

Redundancy of Single Electric Propulsion Motors

Object of Amendment

Rules for the Survey and Construction of Steel Ships Part H
Guidance for the Survey and Construction of Steel Ships Parts D and H
Guidance for High Speed Craft
Rules / Guidance for the Survey and Construction of Inland Waterway Ships

Reason for Amendment

Chapter II-1 of SOLAS stipulates that special consideration is to be given to the reliability of single essential propulsion components and that ships be capable of maintaining sufficient navigable speed in the case of failure of such components.

IACS recognised there were concerns that damage to the winding of the propulsion motor of a single propulsion machinery could lead to the total loss of the motor. Moreover, even if double windings were used for such propulsion motors, damage to the windings could still result in the total loss of the motor because interference between the windings could not be avoided. In light of this, the IACS examined the requirements for reliability of single propulsion motor and submitted a draft unified interpretation applicable to all ship types to the IMO for review.

Although the IMO agreed the draft UI, provided that the draft UI applies only to passenger ships. The IMO approved this draft UI as MSC.1/Circ.1685 at the 109th session of its Maritime Safety Committee (MSC109) in December 2024.

IACS, however, still was of the opinion that the draft UI should apply to not only just passenger ships but also to cargo ships. So, it adopted a UI SC305 that applied to all ship types and then notified the IMO of this at MSC110 in June 2025.

Accordingly, relevant requirements are amended based on MSC.1/Circ.1685 and UI SC305.

Outline of the Amendment

The main details of this amendment are as follows:

- (1) Adds requirement related to ensuring the reliability of single electric propulsion motors.
- (2) Deletes requirement related to reliability with respect to the installation of only one propulsion motor with two stator winding systems that can be disconnected from their respective propulsion converter.

Effective Date and application

This amendment applies to ships for which the date of contract for construction is on or after 1 January 2026.

For passenger ships, this amendment applies to electric machines for propulsion for which the date of contract for delivery is on or after 1 January 2026.

ID:DD22-26

An asterisk (*) after the title of a requirement indicates that there is also relevant information in the corresponding Guidance.

Amended-Original Requirements Comparison Table (Redundancy of Single Electric Propulsion Motors)

Amended	Original	Remarks
<p align="center">RULES FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS</p> <p align="center">Part HELECTRICAL INSTALLATIONS</p> <p align="center">Chapter 5 ADDITIONAL REQUIREMENTS FOR ELECTRIC PROPULSION PLANTS</p> <p>5.2 Propulsion Electrical Equipment and Cables</p> <p>5.2.2 General Requirements for Propulsion Motors* 1 Propulsion motors are to perform as specified in the following (1) to (5):</p> <ol style="list-style-type: none"> (1) The amount of available torque is to be sufficient enough for stopping or reversing such ships in a reasonable amount of time when such ships are running at maximum service speeds. (2) Adequate torque margins are to be provided in <i>a.c.</i> propulsion systems to guard against any motors being pulled out of sync during rough weather and at times of turning operations in multiple-screw ships. (3) Motors are not to produce any harmful torsional vibrations within normal ranges of rotational speeds. (4) Propulsion motors are to be capable of withstanding a sudden short circuit at their terminals under all conditions without suffering damage. (5) Permanent excited motors and their current carrying components are to be capable of withstanding any steady state short circuit currents. 	<p align="center">RULES FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS</p> <p align="center">Part HELECTRICAL INSTALLATIONS</p> <p align="center">Chapter 5 ADDITIONAL REQUIREMENTS FOR ELECTRIC PROPULSION PLANTS</p> <p>5.2 Propulsion Electrical Equipment and Cables</p> <p>5.2.2 General Requirements for Propulsion Motors* 1 Propulsion motors are to perform as specified in the following (1) to (5):</p> <ol style="list-style-type: none"> (1) The amount of available torque is to be sufficient enough for stopping or reversing such ships in a reasonable amount of time when such ships are running at maximum service speeds. (2) Adequate torque margins are to be provided in <i>a.c.</i> propulsion systems to guard against any motors being pulled out of sync during rough weather and at times of turning operations in multiple-screw ships. (3) Motors are not to produce any harmful torsional vibrations within normal ranges of rotational speeds. (4) Propulsion motors are to be capable of withstanding a sudden short circuit at their terminals under all conditions without suffering damage. (5) Permanent excited motors and their current carrying components are to be capable of withstanding any steady state short circuit currents. 	

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Amended	Original	Remarks
<p>2 In the case of <i>d.c.</i> motors liable to go over those speeds specified in 2.4.7 because of propeller missing or propeller racing, overspeed protection devices are to be provided. In such cases, rotors are to be suitably constructed to prevent any damage due to excessive overspeeding.</p> <p>3 In cases where arrangements permit propulsion motors to be connected to generating plants having a continuous rating greater than the motor ratings, means are to be provided to prevent any continuous operation at the overload or overtorque conditions not permitted for such motors and shafting.</p> <p>4 Propulsion motor shafts are to conform to those requirements given in 2.4.11. In such cases, diameters of rotor shafts in the lengths from those sections where rotors are fixed to the shaft ends of propeller sides are to conform to those requirements given in 2.4.11-4(1). The value of F_1 is to comply with those values specified either in (1) or (2) below:</p> <p>(1) In cases where motors have bearings at both ends: 110</p> <p>(2) In cases where motor have no bearings at their propeller sides: 120</p> <p>5 In cases where the coolers of propulsion motors fail, but restricted service is to be possible. (Moved)</p> <p>6 In cases where the temperature rise for the windings of propulsion motors mentioned above in 5.2.3-3. exceed design allowance values, means of decreasing nominal propulsion power are to be provided.</p>	<p>2 In the case of <i>d.c.</i> motors liable to go over those speeds specified in 2.4.7 because of propeller missing or propeller racing, overspeed protection devices are to be provided. In such cases, rotors are to be suitably constructed to prevent any damage due to excessive overspeeding.</p> <p>3 In cases where arrangements permit propulsion motors to be connected to generating plants having a continuous rating greater than the motor ratings, means are to be provided to prevent any continuous operation at the overload or overtorque conditions not permitted for such motors and shaftings.</p> <p>4 Propulsion motor shafts are to conform to those requirements given in 2.4.11. In such cases, diameters of rotor shafts in the lengths from those sections where rotors are fixed to the shaft ends of propeller sides are to conform to those requirements given in 2.4.11-4(1). The value of F_1 is to comply with those values specified either in (1) or (2) below:</p> <p>(1) In cases where motors have bearings at both ends: 110</p> <p>(2) In cases where motor have no bearings at their propeller sides: 120</p> <p>5 In cases where the coolers of propulsion motors fail, but restricted service is to be possible.</p> <p>6 <u>Breaking or blocking systems or decoupling systems which can fix the shafts of propulsion motors are to be provided in preparation for those cases where such propulsion motors failure. In this case, the power output of the remaining shafts may be limited as long as manoeuvrability is maintained under all weather conditions.</u></p> <p>7 In cases where the temperature rise for the windings of propulsion motors mentioned above in 5.2.3-3. exceed design allowance values, means of decreasing nominal propulsion power are to be provided.</p>	<p>Moved to 5.3.1-3, Part H of the Rules.</p>

Amended-Original Requirements Comparison Table (Redundancy of Single Electric Propulsion Motors)

Amended	Original	Remarks
<p>5.3 Composition of Electrical Equipment for Propulsion and Electrical Power Supply Circuits</p> <p>5.3.1 Composition of Electrical Equipment for Propulsion and Auxiliary Machinery for Propulsion*</p> <p>1 Means are to be provided to ensure that the installations or equipment mentioned in the following (1) to (5) are to be capable of starting propulsion motors and obtaining navigable speeds for ships even though one of those mentioned below becomes inoperative.</p> <p>(1) Sources of electrical power for propulsion</p> <p>(2) Transformers for propulsion</p> <p>(3) Semiconductor convertors (or propulsion motor control devices)</p> <p>(4) Propulsion motors (including cooling systems and lubricating systems)</p> <p>(5) Other installations and equipment which the Society deems necessary</p> <p>2 In cases where sources of electrical power for propulsion correspond to (1) and (2) below, they may be used as those main sources of electrical power specified in 3.2.1.</p> <p>(1) In cases where one set of the sources of electrical power for propulsion is out of operation, those capacities specified in 3.2.1-2 are to be secured by the remaining sources of electrical power for propulsion, which at the same time has a capacity sufficient enough to obtain navigable speeds for ships.</p> <p>(2) At times of load fluctuations and braking of the propeller, variations of voltage and frequency are to comply with the requirements given in 2.1.2-3.</p> <p>3 Any one of the following is to be taken, allowing the</p>	<p>5.3 Composition of Electrical Equipment for Propulsion and Electrical Power Supply Circuits</p> <p>5.3.1 Composition of Electrical Equipment for Propulsion and Auxiliary Machinery for Propulsion*</p> <p>1 Means are to be provided to ensure that the installations or equipment mentioned in the following (1) to (5) are to be capable of starting propulsion motors and obtaining navigable speeds for ships even though one of those mentioned below becomes inoperative.</p> <p>(1) Sources of electrical power for propulsion</p> <p>(2) Transformers for propulsion</p> <p>(3) Semiconductor convertors (or propulsion motor control devices)</p> <p>(4) Propulsion motors (including cooling systems and lubricating systems)</p> <p>(5) Other installations and equipment which the Society deems necessary</p> <p>2 In cases where sources of electrical power for propulsion correspond to (1) and (2) below, they may be used as those main sources of electrical power specified in 3.2.1.</p> <p>(1) In cases where one set of the sources of electrical power for propulsion is out of operation, those capacities specified in 3.2.1-2 are to be secured by the remaining sources of electrical power for propulsion, which at the same time has a capacity sufficient enough to obtain navigable speeds for ships.</p> <p>(2) At times of load fluctuations and braking of the propeller, variations of voltage and frequency are to comply with the requirements given in 2.1.2-3.</p> <p>(Moved)</p>	<p>Moved from 5.2.2-6, Part</p>

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<p><u>operation of the remaining propeller shafts, in preparation for those cases where such propulsion motors fail.</u></p> <p><u>(1) Decoupling systems or blocking systems to prevent shaft rotation of failed propulsion motors are provided. The drives for the remaining shafts may be limited as long as manoeuvring capability is maintained under all weather conditions if blocking systems to prevent shaft rotation are provided.</u></p> <p><u>(2) Propulsion motors having rotors that can be de-excited are provided</u></p> <p><u>(3) Means for disconnecting each phase of the stator windings of propulsion motors from electrical circuits are provided.</u></p>		<p>H of the Rules.</p> <p>In addition, the second sentence of the new 5.3.1-3. (1), Part H of the Rules, in accordance with 4.1.3 of IEC60092-501:2013, clarifies that it is applicable only when the shaft is fixed.</p> <p>Furthermore, since 5.2.2-3, Part H of the Rules (5.3.1-3(1), Part H of the Rules) was a requirement for the prevention of electric shock. 5.3.1-3(1) may be replaced by 5.3.1-3(2) to prevent the generation of induced electromotive force by making the rotor non-exciting and by a measure that generates electromotive force but does not allow the current to flow outside the motor.</p>

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<p>RULES FOR THE SURVEY AND CONSTRUCTION OF INLAND WATERWAY SHIPS</p> <p>Part 8 ELECTRICAL INSTALLATIONS</p> <p>Chapter 4 ADDITIONAL REQUIREMENTS FOR ELECTRIC PROPULSION PLANTS</p> <p>4.2 Propulsion Electrical Equipment</p> <p>4.2.2 General Requirements for Propulsion Motors*</p> <p>1 Propulsion motors are to perform as specified in the following (1) to (5):</p> <p>(1) The amount of available torque is to be sufficient enough for stopping or reversing such ships in a reasonable amount of time when such ships are running at maximum service speeds.</p> <p>(2) Adequate torque margins are to be provided in <i>a.c.</i> propulsion systems to guard against any motors being pulled out of sync during rough weather and at times of turning operations in multiple-screw ships.</p> <p>(3) Motors are not to produce any harmful torsional vibrations within normal ranges of rotational speeds.</p> <p>(4) Propulsion motors are to be capable of withstanding a sudden short circuit at their terminals under all conditions without suffering damage.</p> <p>(5) Permanent excited motors and their current carrying components are to be capable of withstanding any</p>	<p>RULES FOR THE SURVEY AND CONSTRUCTION OF INLAND WATERWAY SHIPS</p> <p>Part 8 ELECTRICAL INSTALLATIONS</p> <p>Chapter 4 ADDITIONAL REQUIREMENTS FOR ELECTRIC PROPULSION PLANTS</p> <p>4.2 Propulsion Electrical Equipment</p> <p>4.2.2 General Requirements for Propulsion Motors*</p> <p>1 Propulsion motors are to perform as specified in the following (1) to (5):</p> <p>(1) The amount of available torque is to be sufficient enough for stopping or reversing such ships in a reasonable amount of time when such ships are running at maximum service speeds.</p> <p>(2) Adequate torque margins are to be provided in <i>a.c.</i> propulsion systems to guard against any motors being pulled out of sync during rough weather and at times of turning operations in multiple-screw ships.</p> <p>(3) Motors are not to produce any harmful torsional vibrations within normal ranges of rotational speeds.</p> <p>(4) Propulsion motors are to be capable of withstanding a sudden short circuit at their terminals under all conditions without suffering damage.</p> <p>(5) Permanent excited motors and their current carrying components are to be capable of withstanding any</p>	

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<p>steady state short circuit currents.</p> <p>2 In the case of <i>d.c.</i> motors liable to go over those speeds specified in 2.4.7 because of propeller missing or propeller racing, overspeed protection devices are to be provided. In such cases, rotors are to be suitably constructed to prevent any damage due to excessive overspeeding.</p> <p>3 In cases where arrangements permit propulsion motors to be connected to generating plants having a continuous rating greater than the motor ratings, means are to be provided to prevent any continuous operation at the overload or overtorque conditions not permitted for such motors and shafting.</p> <p>4 Propulsion motor shafts are to conform to those requirements given in 2.4.11. In such cases, diameters of rotor shafts in the lengths from those sections where rotors are fixed to the shaft ends of propeller sides are to conform to those requirements given in 2.4.11-3(1). The value of F_1 is to comply with those values specified either in (1) or (2) below:</p> <p>(1) In cases where motors have bearings at both ends: 110</p> <p>(2) In cases where motor have no bearings at their propeller sides: 120</p> <p>5 In cases where the coolers of propulsion motors fail, but restricted service is to be possible. (Moved)</p> <p>6 In cases where the temperature rise for the windings of propulsion motors mentioned above in 4.2.3-3 exceed design allowance values, means of decreasing nominal</p>	<p>steady state short circuit currents.</p> <p>2 In the case of <i>d.c.</i> motors liable to go over those speeds specified in 2.4.7 because of propeller missing or propeller racing, overspeed protection devices are to be provided. In such cases, rotors are to be suitably constructed to prevent any damage due to excessive overspeeding.</p> <p>3 In cases where arrangements permit propulsion motors to be connected to generating plants having a continuous rating greater than the motor ratings, means are to be provided to prevent any continuous operation at the overload or overtorque conditions not permitted for such motors and shaftings.</p> <p>4 Propulsion motor shafts are to conform to those requirements given in 2.4.11. In such cases, diameters of rotor shafts in the lengths from those sections where rotors are fixed to the shaft ends of propeller sides are to conform to those requirements given in 2.4.11-3(1). The value of F_1 is to comply with those values specified either in (1) or (2) below:</p> <p>(1) In cases where motors have bearings at both ends: 110</p> <p>(2) In cases where motor have no bearings at their propeller sides: 120</p> <p>5 In cases where the coolers of propulsion motors fail, but restricted service is to be possible.</p> <p>6 <u>Breaking or blocking systems or decoupling systems which can fix the shafts of propulsion motors are to be provided in preparation for those cases where such propulsion motors failure. In this case, the power output of the remaining shafts may be limited as long as manoeuvrability is maintained under all weather conditions.</u></p> <p>7 In cases where the temperature rise for the windings of propulsion motors mentioned above in 4.2.3-3 exceed design allowance values, means of decreasing nominal</p>	<p>Same as amendment of 5.2.2-6, Part H of the Rules.</p>

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<p>propulsion power are to be provided.</p> <p>4.3 Composition of Electrical Equipment for Propulsion and Electrical Power Supply Circuits</p> <p>4.3.1 Composition of Electrical Equipment for Propulsion and Auxiliary Machinery for Propulsion*</p> <p>1 Means are to be provided to ensure that the installations or equipment are to be capable of starting propulsion motors and obtaining navigable speeds for ships even though one of those mentioned below becomes inoperative.</p> <p>(1) Sources of electrical power for propulsion</p> <p>(2) Transformers for propulsion</p> <p>(3) Semiconductor convertors (or propulsion motor control devices)</p> <p>(4) Propulsion motors (including cooling systems and lubricating systems)</p> <p>(5) Other installations and equipment which the Society deems necessary</p> <p>2 In cases where sources of electrical power for propulsion correspond to (1) and (2) below, they may be used as those main sources of electrical power specified in 3.2.1.</p> <p>(1) In cases where one set of the sources of electrical power for propulsion is out of operation, those capacities specified in 3.2.1-2 are to be secured by the remaining sources of electrical power for propulsion, which at the same time has a capacity sufficient enough to obtain navigable speeds for ships.</p> <p>(2) At times of load fluctuations and braking of the</p>	<p>propulsion power are to be provided.</p> <p>4.3 Composition of Electrical Equipment for Propulsion and Electrical Power Supply Circuits</p> <p>4.3.1 Composition of Electrical Equipment for Propulsion and Auxiliary Machinery for Propulsion*</p> <p>1 Means are to be provided to ensure that the installations or equipment are to be capable of starting propulsion motors and obtaining navigable speeds for ships even though one of those mentioned below becomes inoperative.</p> <p>(1) Sources of electrical power for propulsion</p> <p>(2) Transformers for propulsion</p> <p>(3) Semiconductor convertors (or propulsion motor control devices)</p> <p>(4) Propulsion motors (including cooling systems and lubricating systems)</p> <p>(5) Other installations and equipment which the Society deems necessary</p> <p>2 In cases where sources of electrical power for propulsion correspond to (1) and (2) below, they may be used as those main sources of electrical power specified in 3.2.1.</p> <p>(1) In cases where one set of the sources of electrical power for propulsion is out of operation, those capacities specified in 3.2.1-2 are to be secured by the remaining sources of electrical power for propulsion, which at the same time has a capacity sufficient enough to obtain navigable speeds for ships.</p> <p>(2) At times of load fluctuations and braking of the</p>	

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<p>propeller, variations of voltage and frequency are to comply with the requirements given in 2.1.2-3.</p> <p>3 <u>Any one of the following is to be taken, allowing the operation of the remaining propeller shafts, in preparation for those cases where such propulsion motors failure.</u></p> <p>(1) <u>Decoupling systems or blocking systems to prevent shaft rotation of failed propulsion motors are provided. The drives for the remaining shafts may be limited as long as manoeuvring capability is maintained under all weather conditions.</u></p> <p>(2) <u>Propulsion motors having rotors that can be de-excited are provided</u></p> <p>(3) <u>Means for disconnecting each phase of the stator windings of propulsion motors from electrical circuits are provided.</u></p>	<p>propeller, variations of voltage and frequency are to comply with the requirements given in 2.1.2-3.</p> <p>(Moved)</p>	<p>Same as amendment of 5.3.1-3, Part H of the Rules.</p>

Amended-Original Requirements Comparison Table (Redundancy of Single Electric Propulsion Motors)

Amended	Original	Remarks
<p align="center">GUIDANCE FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS</p> <p align="center">Part D MACHINERY INSTALLATIONS</p> <p align="center">D1 GENERAL</p> <p>D1.3 General Requirements for Machinery Installations</p> <p>D1.3.1 General 1 The “navigable speed” referred to in 1.3.1-2, Part D of the Rules means a speed at which the ship is capable of being steered and kept navigable for an extended period of time (period required to get to the nearest port for repairs). Normally, <i>7 knots</i> or a speed corresponding to 1/2 of the speed specified in 2.1.8, Part A of the Rules at the ship’s full loaded draught may be regarded as a navigable speed. 2 The unconventional machinery referred to in 1.3.1-2, Part D of the Rules is the machinery with novel design features (e.g. gas only engines) specified in 1.1.3, Part D of the Rules. 3 Examples of starting arrangements for restoring propulsion from a dead ship condition are shown in Fig. D1.3.1-1 to Fig. D1.3.1-3. 4 Dead ship condition means that all machinery installations, including their power supplies, are out of operation and that all auxiliary services, such as compressed air, starting current from batteries, etc., needed to bring these</p>	<p align="center">GUIDANCE FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS</p> <p align="center">Part D MACHINERY INSTALLATIONS</p> <p align="center">D1 GENERAL</p> <p>D1.3 General Requirements for Machinery Installations</p> <p>D1.3.1 General 1 The “navigable speed” referred to in 1.3.1-2, Part D of the Rules means a speed at which the ship is capable of being steered and kept navigable for an extended period of time (period required to get to the nearest port for repairs). Normally, <i>7 knots</i> or a speed corresponding to 1/2 of the speed specified in 2.1.8, Part A of the Rules at the ship’s full loaded draught may be regarded as a navigable speed. 2 The unconventional machinery referred to in 1.3.1-2, Part D of the Rules is the machinery with novel design features (e.g. gas only engines) specified in 1.1.3, Part D of the Rules. 3 Examples of starting arrangements for restoring propulsion from a dead ship condition are shown in Fig. D1.3.1-1 to Fig. D1.3.1-3. 4 Dead ship condition means that all machinery installations, including their power supplies, are out of operation and that all auxiliary services, such as compressed air, starting current from batteries, etc., needed to bring these</p>	

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Amended	Original	Remarks
<p>machinery installations back into operation are not available. However, the energy source for starting the emergency generator can be regarded as being available at the dead ship condition.</p> <p>5 When designing and constructing machinery installations that are adequate for the service for which they are intended in accordance with 1.3.1-1, Part D of the Rules, the properties (e.g. viscosity, cold flow property) of the fuel oils intended to be used by the machinery installations are to be taken into account, and fuel oil heaters and fuel oil coolers are to be provided when deemed necessary.</p> <p>6 For the machinery installations specified in 1.3.1-2(4), Part D of the Rules, the following measures are to be taken.</p> <p><u>(1) The possibility of failures in electric machines should be considered, and sufficient propulsion capacity should be maintained or restored within due time for the following failure modes of electric machines, as a minimum. The expression “sufficient propulsion capacity” in this case means a propulsion capacity that can provide the speed specified in -1 above.</u></p> <p><u>(a) winding insulation failures</u> <u>(b) excitation failures</u></p> <p><u>(2) Single electric propulsion motors (both single and dual winding with a single rotor) for main propulsion are not to be considered as satisfying 1.3.1-2, Part D of the Rules. A separate propulsion unit sufficient to give the ship the navigable speed specified in -1 above should be required for such arrangements.</u></p> <p><u>(3) Propulsion arrangements with two independent rotors on a single shaft should be considered as</u></p>	<p>machinery installations back into operation are not available. However, the energy source for starting the emergency generator can be regarded as being available at the dead ship condition.</p> <p>5 When designing and constructing machinery installations that are adequate for the service for which they are intended in accordance with 1.3.1-1, Part D of the Rules, the properties (e.g. viscosity, cold flow property) of the fuel oils intended to be used by the machinery installations are to be taken into account, and fuel oil heaters and fuel oil coolers are to be provided when deemed necessary.</p> <p>(Newly added)</p> <p>(Newly added)</p> <p>(Newly added)</p> <p>(Newly added)</p>	<p>interpretation 1 of IACS UI SC305</p> <p>interpretation 2 of IACS UI SC305</p> <p>interpretation 3 of IACS UI SC305</p>

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Amended	Original	Remarks
<u>satisfying 1.3.1-2, Part D of the Rules, provided it is possible to de-excite or de-flux each of the rotors individually and to supply independently the stators.</u>		

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Amended-Original Requirements Comparison Table (Redundancy of Single Electric Propulsion Motors)

Amended	Original	Remarks
<p align="center">GUIDANCE FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS</p> <p align="center">Part H ELECTRICAL INSTALLATIONS</p> <p align="center">H5 ADDITIONAL REQUIREMENTS FOR ELECTRIC PROPULSION PLANTS</p> <p align="center">H5.3 Composition of Electrical Equipment for Propulsion and Electrical Power Supply Circuits</p> <p align="center">H5.3.1 Composition of Electrical Equipment for Propulsion and Auxiliary Machinery for Propulsion</p> <p>1 The wording “obtaining a navigable speed for the ship” specified in the main sentence of 5.3.1-1, Part H of the Rules means the speed given in D1.3.1-1, Part D.</p> <p>2 The wording “lubricating systems” specified in 5.3.1-1(4), Part H of the Rules means lubricating oil pumps.</p> <p>3 In cases where specified in 5.3.1-1(4), Part H of the Rules, <u>D1.3.1-6, Part D</u> are to be also satisfied.</p> <p>(Deleted)</p>	<p align="center">GUIDANCE FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS</p> <p align="center">Part H ELECTRICAL INSTALLATIONS</p> <p align="center">H5 ADDITIONAL REQUIREMENTS FOR ELECTRIC PROPULSION PLANTS</p> <p align="center">H5.3 Composition of Electrical Equipment for Propulsion and Electrical Power Supply Circuits</p> <p align="center">H5.3.1 Composition of Electrical Equipment for Propulsion and Auxiliary Machinery for Propulsion</p> <p>1 The wording “obtaining a navigable speed for the ship” specified in the main sentence of 5.3.1-1, Part H of the Rules means the speed given in <u>D1.3.1-1, Part D of the Guidance for the Survey and Construction of Steel Ships.</u></p> <p>2 The wording “lubricating systems” specified in 5.3.1-1(4), Part H of the Rules means lubricating oil pumps.</p> <p>3 In cases where specified in 5.3.1-1(4), Part H of the Rules, the <u>installation of only one propulsion motor onboard ship may be acceptable on the condition that the following requirements are satisfied:</u></p> <p>(1) <u>Synchronous motors and induction motors are to be provided with two stator winding systems which can be disconnected from their respective propulsion convertor. Furthermore, such convertors are to be designed for at least 50 % nominal power of the</u></p>	<p>Para. 2 of UI SC305 is considered. It is no longer considered that only 1 motor with double winding has ensured reliability as a propulsion engine.</p>

Amended-Original Requirements Comparison Table (Redundancy of Single Electric Propulsion Motors)

Amended	Original	Remarks
(Deleted)	<p><u>propulsion drive system</u></p> <p>(2) <u>Permanent-magnet excited motors are to be provided with two stator winding systems which can be disconnected from their respective propulsion convertor.</u></p>	
(Deleted)	<p>(3) <u>Propulsion motors are to be provided with means for substitution (emergency opening air flap etc.) in addition to those temperature monitoring systems required in 5.2.3-3 and -4, Part H of the Rules. However, in cases where two cooling systems are installed, this requirement does not apply.</u></p>	

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Amended-Original Requirements Comparison Table (Redundancy of Single Electric Propulsion Motors)

Amended	Original	Remarks
<p style="text-align: center;">GUIDANCE FOR HIGH SPEED CRAFT</p> <p style="text-align: center;">Part 9 MACHINERY INSTALLATIONS</p> <p style="text-align: center;">Chapter 1 GENERAL</p> <p>1.2 General Requirements for Machinery Installations</p> <p>1.2.1 General 1 The wordings “navigable speed” in 1.2.1-3, Part 9 of the Rules means a speed at which the ship is capable of steering and being kept navigability for an extended period of time (the period required to get the nearest port for repairs). Normally, 7 knots or a speed corresponding to 1/2 of the speed specified in 2.1.8, Part 1 of the Rules at the ship’s full loaded draught, whichever is smaller, may be regarded as a navigable speed. 2 When designing and constructing machinery installations that are adequate for the service for which they are intended in accordance with 1.2.1-2, Part 9 of the Rules, the properties (e.g. viscosity, cold flow property) of the fuel oils intended to be used by the machinery installations are to be taken into account, and fuel oil heaters and fuel oil coolers are to be provided when deemed necessary. 3 For the machinery installations specified in <u>1.2.1-3(3), Part 9 of the Rules, the following measures are to be taken.</u> (1) The possibility of failures in electric machines</p>	<p style="text-align: center;">GUIDANCE FOR HIGH SPEED CRAFT</p> <p style="text-align: center;">Part 9 MACHINERY INSTALLATIONS</p> <p style="text-align: center;">Chapter 1 GENERAL</p> <p>1.2 General Requirements for Machinery Installations</p> <p>1.2.1 General 1 The wordings “navigable speed” in 1.2.1-3, Part 9 of the Rules means a speed at which the ship is capable of steering and being kept navigability for an extended period of time (the period required to get the nearest port for repairs). Normally, 7 knots or a speed corresponding to 1/2 of the speed specified in 2.1.8, Part 1 of the Rules at the ship’s full loaded draught, whichever is smaller, may be regarded as a navigable speed. 2 When designing and constructing machinery installations that are adequate for the service for which they are intended in accordance with 1.2.1-2, Part 9 of the Rules, the properties (e.g. viscosity, cold flow property) of the fuel oils intended to be used by the machinery installations are to be taken into account, and fuel oil heaters and fuel oil coolers are to be provided when deemed necessary. (Newly added) (Newly added)</p>	<p>Same as amendment of D1.3.1-6, Part D of the Guidance.</p>

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Amended	Original	Remarks
<p><u>should be considered, and sufficient propulsion capacity should be maintained or restored within due time for the following failure modes of electric machines, as a minimum. The expression “sufficient propulsion capacity” in this case means a propulsion capacity that can provide the speed specified in -1 above.</u></p> <p><u>(a) winding insulation failures</u> <u>(b) excitation failures</u></p> <p>(2) <u>Single electric propulsion motors (both single and dual winding with a single rotor) for main propulsion are not to be considered as satisfying 1.2.1-3, Part 9 of the Rules. A separate propulsion unit sufficient to give the ship the navigable speed specified in -1 above should be required for such arrangements.</u></p> <p>(3) <u>Propulsion arrangements with two independent rotors on a single shaft should be considered as satisfying 1.2.1-3, Part 9 of the Rules, provided it is possible to de-excite or de-flux each of the rotors individually and to supply independently the stators.</u></p>	<p>(Newly added)</p> <p>(Newly added)</p>	

Amended-Original Requirements Comparison Table (Redundancy of Single Electric Propulsion Motors)

Amended	Original	Remarks
<p style="text-align: center;">GUIDANCE FOR THE SURVEY AND CONSTRUCTION OF INLAND WATERWAY SHIPS</p> <p style="text-align: center;">Part 7 MACHINERY INSTALLATIONS</p> <p style="text-align: center;">Chapter 1 GENERAL</p> <p>1.3 General Requirements for Machinery Installations of Tugs and Pushers</p> <p>1.3.1 General</p> <p>1 The “navigable speed” referred to in 1.3.1-2, Part 7 of the Rules means a speed at which the ship is capable of being steered and kept navigable for an extended period of time (period required to get to the nearest port for repairs). Normally, 7 <i>knots</i> or a speed corresponding to 1/2 of the speed specified in 2.1.9, Part 1 of the Rules at the ship’s full loaded draught may be regarded as a navigable speed.</p> <p>2 Unconventional machinery referred to in 1.3.1-2, Part 7 of the Rules is any machinery with novel design features specified in 1.1.3, Part 7 of the Rules.</p> <p>3 When designing and constructing machinery installations that are adequate for the service for which they are intended in accordance with 1.3.1-1, Part 7 of the Rules, the properties (e.g. viscosity, cold flow property) of the fuel oils intended to be used by the machinery installations are to be taken into account, and fuel oil heaters and fuel oil coolers are to be provided when deemed necessary.</p>	<p style="text-align: center;">GUIDANCE FOR THE SURVEY AND CONSTRUCTION OF INLAND WATERWAY SHIPS</p> <p style="text-align: center;">Part 7 MACHINERY INSTALLATIONS</p> <p style="text-align: center;">Chapter 1 GENERAL</p> <p>1.3 General Requirements for Machinery Installations of Tugs and Pushers</p> <p>1.3.1 General</p> <p>1 The “navigable speed” referred to in 1.3.1-2, Part 7 of the Rules means a speed at which the ship is capable of being steered and kept navigable for an extended period of time (period required to get to the nearest port for repairs). Normally, 7 <i>knots</i> or a speed corresponding to 1/2 of the speed specified in 2.1.9, Part 1 of the Rules at the ship’s full loaded draught may be regarded as a navigable speed.</p> <p>2 Unconventional machinery referred to in 1.3.1-2, Part 7 of the Rules is any machinery with novel design features specified in 1.1.3, Part 7 of the Rules.</p> <p>3 When designing and constructing machinery installations that are adequate for the service for which they are intended in accordance with 1.3.1-1, Part 7 of the Rules, the properties (e.g. viscosity, cold flow property) of the fuel oils intended to be used by the machinery installations are to be taken into account, and fuel oil heaters and fuel oil coolers are to be provided when deemed necessary.</p>	

Amended-Original Requirements Comparison Table (Redundancy of Single Electric Propulsion Motors)

Amended	Original	Remarks
<p><u>4 For the machinery installations specified in 1.3.1-2(2), Part 7 of the Rules, the following measures are to be taken.</u></p> <p><u>(1) The possibility of failures in electric machines should be considered, and sufficient propulsion capacity should be maintained or restored within due time for the following failure modes of electric machines, as a minimum. The expression “sufficient propulsion capacity” in this case means a propulsion capacity that can provide the speed specified in -1 above.</u></p> <p><u>(a) winding insulation failures</u></p> <p><u>(b) excitation failures</u></p> <p><u>(2) Single electric propulsion motors (both single and dual winding with a single rotor) for main propulsion are not to be considered as satisfying 1.3.1-2, Part 7 of the Rules. A separate propulsion unit sufficient to give the ship the navigable speed specified in -1 above should be required for such arrangements.</u></p> <p><u>(3) Propulsion arrangements with two independent rotors on a single shaft should be considered as satisfying 1.3.1-2, Part 7 of the Rules, provided it is possible to de-excite or de-flux each of the rotors individually and to supply independently the stators.</u></p>	<p>(Newly added)</p> <p>(Newly added)</p> <p>(Newly added)</p> <p>(Newly added)</p>	<p>Same as amendment of D1.3.1-6, Part D of the Guidance.</p>

Amended-Original Requirements Comparison Table (Redundancy of Single Electric Propulsion Motors)

Amended	Original	Remarks
<p align="center">Part 8 ELECTRICAL INSTALLATIONS</p> <p align="center">Chapter 4 ADDITIONAL REQUIREMENTS FOR ELECTRIC PROPULSION PLANTS</p> <p>4.3 Composition of Electrical Equipment for Propulsion and Electrical Power Supply Circuits</p> <p>4.3.1 Composition of Electrical Equipment for Propulsion and Auxiliary Machinery for Propulsion</p> <p>1 The wording “obtaining a navigable speed for the ship” specified in the main sentence of 4.3.1-1, Part 8 of the Rules means the speed given in 1.3.1-1, Part 7.</p> <p>2 The wording “lubricating systems” specified in 4.3.1-1(4), Part 8 of the Rules means lubricating oil pumps.</p> <p>3 In cases where specified in 4.3.1-1(4), Part 8 of the Rules, <u>1.3.1-4, Part 7</u> are to be also satisfied.</p> <p>(Deleted)</p> <p>(Deleted)</p>	<p align="center">Part 8 ELECTRICAL INSTALLATIONS</p> <p align="center">Chapter 4 ADDITIONAL REQUIREMENTS FOR ELECTRIC PROPULSION PLANTS</p> <p>4.3 Composition of Electrical Equipment for Propulsion and Electrical Power Supply Circuits</p> <p>4.3.1 Composition of Electrical Equipment for Propulsion and Auxiliary Machinery for Propulsion</p> <p>1 The wording “obtaining a navigable speed for the ship” specified in the main sentence of 4.3.1-1, Part 8 of the Rules means the speed given in 1.3.1-1, Part 7.</p> <p>2 The wording “lubricating systems” specified in 4.3.1-1(4), Part 8 of the Rules means lubricating oil pumps.</p> <p>3 In cases where specified in 4.3.1-1(4), Part 8 of the Rules, <u>the installation of only one propulsion motor onboard ship may be acceptable on the condition that the following requirements are satisfied:</u></p> <p>(1) <u>Synchronous motors and induction motors are to be provided with two stator winding systems which can be disconnected from their respective propulsion convertor. Furthermore, such convertors are to be designed for at least 50% nominal power of the propulsion drive system</u></p> <p>(2) <u>Permanent-magnet excited motors are to be provided with two stator winding systems which can be disconnected from their respective propulsion convertor.</u></p>	<p>Same as amendment of H5.3.1-3, Part H of the Guidance.</p>

Amended-Original Requirements Comparison Table (Redundancy of Single Electric Propulsion Motors)

Amended	Original	Remarks
(Deleted)	<p>(3) <u>Propulsion motors are to be provided with means for substitution (emergency opening air flap etc.) in addition to those temperature monitoring systems required in 4.2.3-3 and -4, Part 8 of the Rules. However, in cases where two cooling systems are installed, this requirement does not apply.</u></p>	
EFFECTIVE DATE AND APPLICATION		
<p>1. The effective date of the amendments is 1 January 2026.</p> <p>2. Notwithstanding the amendments, the current requirements apply to ships for which the date of contract for construction* is before the effective date, however this amendment applies to electric machines for propulsion for which a contractual delivery date (in the absence of a contractual delivery date, the actual delivery date) on passenger ship is on or after 1 January 2026.</p> <p>* “contract for construction” is defined in the latest version of IACS Procedural Requirement (PR) No.29.</p> <p style="text-align: center;">IACS PR No.29 (Rev.0, July 2009)</p> <p>1. The date of “contract for construction” of a vessel is the date on which the contract to build the vessel is signed between the prospective owner and the shipbuilder. This date and the construction numbers (i.e. hull numbers) of all the vessels included in the contract are to be declared to the classification society by the party applying for the assignment of class to a newbuilding.</p> <p>2. The date of “contract for construction” of a series of vessels, including specified optional vessels for which the option is ultimately exercised, is the date on which the contract to build the series is signed between the prospective owner and the shipbuilder. For the purpose of this Procedural Requirement, vessels built under a single contract for construction are considered a “series of vessels” if they are built to the same approved plans for classification purposes. However, vessels within a series may have design alterations from the original design provided:</p> <p>(1) such alterations do not affect matters related to classification, or</p> <p>(2) If the alterations are subject to classification requirements, these alterations are to comply with the classification requirements in effect on the date on which the alterations are contracted between the prospective owner and the shipbuilder or, in the absence of the alteration contract, comply with the classification requirements in effect on the date on which the alterations are submitted to the Society for approval.</p> <p>The optional vessels will be considered part of the same series of vessels if the option is exercised not later than 1 year after the contract to build the series was signed.</p> <p>3. If a contract for construction is later amended to include additional vessels or additional options, the date of “contract for construction” for such vessels is the date on which the amendment to the contract, is signed between the prospective owner and the shipbuilder. The amendment to the contract is to be considered as a “new contract” to which 1. and 2. above apply.</p> <p>4. If a contract for construction is amended to change the ship type, the date of “contract for construction” of this modified vessel, or vessels, is the date on which revised contract or new contract is signed between the Owner, or Owners, and the shipbuilder.</p> <p>Note: This Procedural Requirement applies from 1 July 2009.</p>		<p>IACS UI SC305 MSC.1/Circ.1685</p>