

AMSA REGULATORY CONSULTATION

Electrical safety on vessels

Draft NSCV Subsection C5B-Electrical, Edition 3, 2019 is open for consultation until 28 February 2019

What does this NSCV Subsection apply to?

NSCV Subsection C5B provides standards for the design, construction, installation and repair of electrical installations for vessels. It must be read in conjunction with NSCV Part B—General Requirements

This consultation may be of interest to designers, surveyors, constructors, repairers and operators of vessels with electrical installations, except:

- special vessels as defined in Part F of the NSCV must comply with Part F and are not required to comply with this Subsection unless Part F specifies otherwise
- non-survey vessels as defined in Part G of the NSCV must comply with Part G and are not required to comply with this Subsection unless Part G specifies otherwise.

What are the main changes??

The principal change in the updated standard is the requirement for vessels to comply with:

- Australian Standard AS/NZS 3004.2 as in force from time to time, and
- NSCV Subsection C5B Electrical, and
- The model WHS laws, as implemented, since 2012, in the relevant jurisdictions.

Other updates include:

- The standard no longer duplicates requirements in AS/NZS 3004.2, and instead requires compliance with that standard.
- Confirmation that protective devices (such as RCDs and RCBOs) are required to be fitted and tested regularly on vessels, and lists the documents where those requirements exist.
- Confirmation that there are State and Territory electrical licencing requirements that need to be satisfied for performing electrical work on Low Voltage and higher voltage systems, including on many vessel types.
- Inclusion of information and requirements for use of new and emerging electrical technology in electrical systems.
- Improved readability and clarity of intent of the NSCV Standard, by reformatting and aligning definitions with contemporary legal terms.

For example:

- relocate the required outcomes to a new Schedule 1;
- replace 'shall' and 'should' with 'must' and 'may' for mandatory and recommended courses of action
- provide definitions of extra-low, low, and high voltage systems
- use of plain English where possible.

When?

Submissions can be made anytime up until Thursday 28 February 2019. Please note the consultation period has been extended to take into consideration the festive season.

AMSA will publish the revised standard, as well as the feedback received. We anticipate this will occur in March 2019.

We invite you to make your comments on this draft NSCV Standard by using the AMSA Maritime Regulation Database at <https://www.amsa.gov.au/news-community/consultations/have-your-say-make-submission>.

The table below compares the current NSCV Subsection C5B Ed. 2 (2015) and the consultation draft of NSCV Subsection C5B Ed. 3 (2019).

Existing text of NSCV C5B Electrical - Edition 2 2005 (as amended) clause #	Public consultation draft NSCV C5B Electrical - Edition 3 2018 public clause #	Notes on changes
CHAPTER 1 PRELIMINARY	Chapter 1 Preliminary	
1.1 SCOPE	1.1 Scope This Subsection provides standards for the design, construction, installation and repair of electrical installations for vessels. This Subsection, NSCV C5B, must be read in conjunction with NSCV Part B—General Requirements.	Clarification of the scope.
1.2 APPLICATION	1.2 Application This Subsection applies to vessels that are required to comply with the NSCV by the National Law or its subordinate instruments, except: <ul style="list-style-type: none"> a) special vessels as defined in Part F of the NSCV must comply with Part F and are not required to comply with this Subsection unless Part F specifies otherwise; and b) non-survey vessels as defined in Part G of the NSCV must comply with Part G and are not required to comply with this Subsection unless Part G specifies otherwise. 	Clarification of application of this subsection of the NSCV.
1.2.1 Vessels of measured length 35m or more	Nil	Moved to subsection 2.2 and re-cast to address the required outcomes listed in Schedule 1.
1.2.2 Vessels of measured length less than 35m	Nil	Moved to subsection 2.2 and re-cast to address the required outcomes listed in Schedule 1.
1.2.3 Exceptions This subsection does not apply to Special Vessels provided for in Part F of this standard, unless Part F specifies otherwise.	Nil	Removed and clarification provided at section 1.2
1.3 OBJECTIVE	Nil	Moved to Chapter 2
1.4 REQUIRED OUTCOMES	See Schedule 1	Align with modern NSCV format
1.5 REFERENCED DOCUMENTS	1.3 Reference documents Table not repeated here in the interests of brevity.	Updated content.

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1.6 DEFINITIONS .	1.4 Definitions Table not repeated here in the interests of brevity.	Align with modern NSCV format, includes abbreviations and a list of terms defined by the Dictionary in NSCV Part B.
1.7 ABBREVIATIONS	Nil	Information incorporated into section 1.6
CHAPTER 2 COMMON REQUIREMENTS FOR ALL ELECTRICAL SYSTEMS	Chapter 2 – Requirements for electrical safety and Chapter 3 – Electrical safety Chapter 5 – Common requirements for electrical equipment and installations	
2.1 SCOPE This Chapter sets out the requirements for electrical equipment and electrical installations that are common to all electrical systems used in vessels.	2.1 General requirements The electrical installation of a vessel must be designed, constructed, installed and repaired so that the required outcomes mentioned in Schedule 1 are met.	Align with modern NSCV format.
REQUIRED OUTCOMES 2.2 – 2.9	See Schedule 1 (in the interests of brevity, Sch.1 is not repeated in this document)	Align with modern NSCV format, required outcomes are now listed in Schedule 1. Removed required outcomes that are covered in AS/NZS3004.2.
	2.2 Meeting the required outcomes The two clauses under subsection 2.2 set out how the two kinds of vessel (those of 35m and over, and those below 35m) may comply with the required outcomes listed in Schedule 1.	Primary change to this Subsection: Sub-clause 2.2.2 indicates the new requirement for electrical installations to comply with AS/NZS 3004.2 and State or Territory Electrical Safety Regulator's requirements as applicable.

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DEEMED-TO-SATISFY SOLUTIONS	(Chapters 3 to 8 describe the deemed-to-satisfy-solutions)	Align with modern NSCV format, the deemed-to-satisfy-solutions are now chapters 3 to 8. The requirement to meet them is provided in 2.2.2 (b).
2.10 COMPLIANCE 2.11 ISOLATION	5.1 General requirements The vessel's electrical equipment and installation must comply with the applicable requirements of this chapter, and of AS/NZ 3004.2.	Removal of content covered adequately by AS/NZS3004.2, and referring reader to that document.
2.12 RADIOS	5.2 Radios The electrical power supply for radios must comply with the relevant requirements of NSCV Subsection C7B, clause F2 of Annex F.	Improving the clarity of the standards.
2.13 EARTHING AND BONDING		Removal of content covered adequately by AS/NZS 3004.2
2.14 NAVIGATION LIGHTS AND NAVIGATION EQUIPMENT	5.3 Navigation lights and navigation equipment	
2.14.1 to 2.14.4	5.3.1 General Navigation lights, navigation equipment, and their sources of power must comply with NSCV Subsection C7C and clauses 5.3.2 and 5.3.3 of this Subsection.	Updated referenced. No change to requirements.
2.15 CABLES AND WIRING SYSTEMS		Removal of content covered adequately in AS/NZS 3004.2
2.16 LIGHTNING PROTECTION Vessels with non metallic hulls and/or non metallic structures shall be provided with lightning protection. The minimum level of protection shall be to the requirements for the protection	3.4 Lightning protection The vessel's electrical installation design must consider hazards and risks associated with lightning strikes, and address those risks with appropriate control measures. <i>Note</i> Guidance for lightning protection can be found in AS/NZS 3004:2; AS/NZS 1768 <i>Lightning protection</i> ; and ISO10134 Small craft – Electrical devices – lightning protection systems.	Clarification of the standard. Update references to standards for lightning protection.

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of boats in AS/NZS 1768 Lightning protection.		
	<p>3.5 Electrical work This Subsection imposes no electrical licencing requirements. <i>Note</i> In Australia, relevant State or Territory electrical licensing requirements must be fulfilled by any persons installing, maintaining, and repairing electrical circuits or systems of low voltage and above.</p>	New clause
	<p>3.6 Emerging technology Examples of new and emerging technology are lithium-ion and other novel battery types, electric propulsion systems, and related control systems. Use of such technology on vessels presents new hazards and risks. Knowledge of effective control measures for the elimination or mitigation of any such new risks to a safe level is still maturing. A vessel's electrical installation design must consider hazards and risks associated with emerging technology used in electrical installations. If a vessel's electrical installation includes new and emerging technology components, they must meet the relevant required outcomes and the deemed to satisfy solutions in this Subsection. If the owner of the vessel wishes to meet the required outcomes by another equivalent means, he or she must apply to the National Regulator for approval of the equivalent means of compliance. The owner must be advised of any essential operational safety controls identified at design stage, and those controls must be listed in the vessel's Safety Management System.</p> <p>3.6.1 Electrically powered propulsion equipment</p> <p>3.6.1.1 General Where a vessel's propulsion system is electrically powered, the electrical components must:</p> <ul style="list-style-type: none"> (a) comply with the relevant requirements of Chapters 3 to 8 of this Subsection, or (b) meet the requirements of the rules of a Classification Society or a recognised applicable national or international standard. <p><i>Note</i> Requirements for machinery installations on a vessels <35m are specified in NSCV C5A clause 1.2.2 and states: "if fitted with machinery other than reciprocating</p>	<p>New clause.</p> <p>New content, allowing vessels to install electrical propulsion equipment that complies with chapters 3 to 8 of this subsection which now include requirements that are comparable and consistent with current requirements of NSCV C5A Chapter 2 for internal combustion engines.</p> <p>The previous requirement from C5A 1.2.2 to meet</p>

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	<p>internal combustion machinery—meet the requirements of the rules of a Classification Society or a recognised applicable national or international standard”.</p> <p>Examples of other recognised applicable standards relating to new technology systems can be found in the referenced documents section of this Subsection.</p> <p>3.6.1.2 Essential Monitoring Where a vessel’s propulsion system is electrically powered, the electrical components including any associated battery systems must:</p> <p>(a) be fitted with instrumentation to enable critical parameters, including whether the electric propulsion system is running, to be monitored from each control station. The instrumentation shall be:</p> <ul style="list-style-type: none"> i) suitable for marine use; ii) capable of withstanding vibration and shock; iii) installed to be readily visible; and iv) illuminated if required to be read or operated in darkness. <p>3.6.1.3 Circuit protection and alarms Where a vessel’s propulsion system is electrically powered, the electrical components must be fitted with an overload alarm and short-circuit protection for the motors.</p> <p>The alarm must be both audible and visible at each control station.</p> <p>Short-circuit protection should be for not less than twice full load current of the motor or circuit so protected, and be provided with a manual override function that allows the operator of the vessel to maintain control in critical situations.</p> <p>3.6.1.4 Reliability Where a vessel’s propulsion system is electrically powered, the electrical components must be designed, constructed and arranged to provide a level of reliability appropriate for their intended purpose.</p> <p>3.6.1.5 Risk of fire to be controlled Internal combustion engines on a vessel must be designed, constructed and arranged to control the risk of fire or explosion associated with such installations.</p>	<p>class rules remains an option.</p> <p>Examples of other relevant standards are now provided in the referenced documents section.</p>

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	<p>3.6.1.6 Securing of machinery Each item of machinery must be secured to the vessel's structure to prevent injury to persons, damage to components and excessive vibration.</p> <p>3.6.1.7 Propulsive control Propulsion machinery and controls must be arranged to provide and maintain control over the vessel's motion in both normal and abnormal conditions of operation.</p>	
2.17 UNACCEPTABLE COMPONENTS MATERIALS AND METHODS		Removal of content covered adequately in AS/NZS 3004.2
2.18 ENGINE ROOM AND CARGO SPACE VENTILATION	5.4 Engine room and cargo space ventilation	No change.
2.19 EQUIPMENT AND ACCESSORIES IN EXPOSED LOCATIONS	<p>3.2 Equipment and accessories in exposed locations Electrical equipment must not be installed less than 0.3 metres above the deck unless they have been specifically designed, manufactured and tested in accordance with a recognised national or international standard. An example of a recognised standard is AS/NZS 60529.</p>	Clarified and used consistent terms.
	<p>3.3 Information to be made available Adequate information and guidance in the form of manuals to enable the vessel to be operated and maintained safely must be available on board. Such information must be updated as necessary.</p>	New clause
2.20 OVER CURRENT PROTECTION OF ESSENTIAL SERVICES		Removal of content covered adequately in AS/NZS 3004.2
2.21 COMMISSIONING – INSPECTION AND TESTING	5.5 Commissioning – inspection and testing	
2.21.1 Tests	<p>5.5.1 Tests At the conclusion of construction, modification, or repairs the electrical system, equipment or part must be inspected and tested in accordance with AS/NZS 3000 by a competent person.</p> <p><i>Note</i> Further information on inspection and testing is also available in AS/NZS 3017.</p> <p>Commissioning tests must be conducted in accordance with Part 2 of the Marine Surveyors Accreditation Guidance Manual. Testing must at least include the correct operation in</p>	Updated to include that tests must be conducted in accordance with the Marine Surveyor' Accreditation Guidance Manual Part 2.

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	<p>accordance with manufacturers specifications, and the objectives and requirements of this Subsection of the following equipment where fitted:</p> <ul style="list-style-type: none"> a) generator operation including: <ul style="list-style-type: none"> i) engine governors; ii) parallel operation; iii) load sharing; iv) voltage regulator operation by instantaneous loading and unloading of generator; and v) safety devices, such as over speed trips, reverse power trips, over current trips, load shedding, together with associated controls and alarms; b) load testing of motors; c) overload alarm circuits of essential service motors; d) main engine safety alarms and trips; e) machinery and equipment that incorporates remote controls, remote stops and limit switches; f) emergency stop circuits; g) alarm systems; and h) other systems and equipment installed in the vessel. 	
<p>2.21.2 Test results All test results shall be recorded and the test results shall remain with the vessel's documentation. Test results should be dated, accurate, legible and retained for the life of the vessel.</p>	<p>5.5.2 Test results All test results must be recorded. Test results must be dated, accurate, legible and remain with the vessel's documentation for the life of the vessel.</p>	<p>No change in requirements.</p>
<p>2.22 DESIGN PARAMETERS</p>		<p>Removal of content covered adequately in AS/NZS 3004.2</p>
<p>CHAPTER 3 EXTRA LOW VOLTAGE SYSTEMS AND BATTERIES</p>	<p>Chapter 8 Extra-low voltage (ELV) systems and batteries</p>	<p>The extra low voltage systems have been moved to Chapter 8</p>
<p>3.1 SCOPE</p>		<p>Removed.</p>
<p>3.2 APPLICATION</p>	<p>8.1 General requirements</p>	<p>Include requirements of AS/NZS3004.2 as well as</p>

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This Chapter applies to those parts of a vessel's electricity supply that do not exceed 50 V a.c and 120 V d.c.	The vessel's extra-low voltage electrical equipment and installation must comply with the applicable requirements of this chapter and AS/NZ 3004.2. <i>Note</i> Requirements for the separation of ELV and LV electrical installations in vessels that have both are covered in AS/NZS 3000.	requirements of this chapter.
3.3 – 3.4		The required outcomes are now listed in Schedule 1.
3.5 PROVISION OF AS3000 NOT TO APPLY	8.2 Provisions of AS/NZS 3000 not to apply The provisions in AS/NZS 3000 for ELV that allow switches to 'operate in one less conductor than the number of conductors in the circuit' do not apply to vessels to which this Subsection applies. <i>Note 1</i> The relevant provisions are in clauses 7.7.8.2 (b) and 7.7.9 (b) in the 2000 edition of AS/NZS 3000. <i>Note 2</i> This means that isolated systems switches and circuit protection are required to interrupt all active conductors (See also clause 8.4 below).	Updated to only include relevant content after consideration of AS/NZS3004.2.
3.6 ENGINE STARTING CABLES	8.3 Engine starting cables	No change in content.
3.7 SWITCHES AND CIRCUIT PROTECTION	8.4 Switches and circuit protection In isolated systems, switches and circuit protection must interrupt all active conductors. Double pole isolation of conductors is required in ELV above earth systems. Single pole isolation of the positive active conductor is required in negative earthed ELV systems. An appropriately rated circuit breaker or fuse is to be provided on the active positive conductor for both above earth and negative earthed systems.	Maintained requirements, and included further detail to clarify requirement adequately.
3.8 BATTERIES AND BATTERY INSTALLATIONS 3.8.1 General	8.5 Batteries and battery installations <i>8.5.1 General</i> In addition to AS/NZS 3004.2, batteries and their installations must comply with this Subsection and the relevant requirements of NSCV Subsection C5A (start battery), NSCV Section C4 (fire detection systems), and NSCV Subsection C7B (radio battery). <i>Note</i> New and emerging battery technology presents efficiency gains and the elimination of some hazards associated with lead-acid batteries. However, it also presents new hazards from different types of battery chemistry. AS/NZS 3004.2 clause 2.9.3 contains standards for the use of lithium ion batteries on vessels.	Updated to include reference to AS/NZS 3004.2 and informative notes to include references to guidance materials for new and merging battery types and systems.

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	<p>This clause 8.5 does not apply to batteries integral to particular equipment when those batteries do not feed into a vessel's distribution system.</p> <p><i>Note</i> Batteries integral to equipment may include those used in hand held and portable equipment, internal back up batteries for electronic navigation devices, fire detector back up batteries and batteries for stand-alone emergency lighting units.</p>	
3.8.2 & 3.8.3		Removal of content covered adequately in AS/NZS 3004.2
3.8.4 Location and mounting of batteries	<p><i>8.5.2 Location and mounting of batteries</i></p> <p>8.5.2.1 Location of starting batteries – no change.</p> <p>8.5.2.2 Mechanical protection – no change.</p> <p>8.5.2.3 Battery boxes Battery boxes must be:</p> <ul style="list-style-type: none"> a) made of a chemically resistant material, capable of containing the whole volume of electrolyte; and b) mounted and arranged to prevent movement of the battery due to the motion of the vessel. <p>When located below decks or in a space, battery boxes must:</p> <ul style="list-style-type: none"> c) be provided with a vent system or other means to discharge hydrogen gas to the exterior of the vessel with an outlet from the highest point of the enclosure that rises continuously to open air with bends of not more than 45°; and d) have an air inlet tube or duct that admits air down into to the lower third of the enclosure; and e) have cable entries that are gas tight. <p>8.5.2.4 Battery compartments – no change.</p> <p>8.5.2.5 Housing of batteries Batteries, or sets of batteries, charged by chargers where the sum of all chargers is greater than 2 kW in total must be housed in a compartment dedicated to batteries only. Battery compartments must be well ventilated to the open deck. Cable entries to battery compartments must be gas tight.</p>	<p>8.5.2.3 – clarified requirements for battery boxes located below decks or in spaces in additional points c – e.</p> <p>8.5.2.5 – added clarification that batteries of different chemistry must not be able to be connected together.</p>

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	<p>Lead-acid batteries and alkaline batteries must not be housed in the same compartment or container, or in close vicinity to each other. It shall not be possible to connect batteries of different chemistry together.</p> <p>Batteries must not be housed in enclosed spaces such as a cabin or a wheel house or a void space unless they are in a container sealed from the accommodation space that complies with clause 8.5.2.3.</p> <p><i>Note</i> Alkaline electrolytes and acids react violently when in contact and noxious fumes may be generated.</p>	Added note about potential noxious fumes.
3.8.5 Battery charging		Removal of content covered adequately in AS/NZS 3004.2
3.8.6 Battery protection	8.5.3 <i>Battery protection</i> - No change	
	8.5.4 <i>Earth</i>	The 'earth clause has been moved to 8.5.4 from 4.7.4 (see below)
3.9 VENTILATION OF BATTERIES AND BATTERY COMPARTMENTS		Removal of content covered adequately in AS/NZS 3004.2
CHAPTER 4 LOW VOLTAGE SYSTEMS	Chapter 7 Low voltage (LV) systems	Chapter 4, on low voltage systems has been moved to Chapter 7
4.1 SCOPE		Removed.
<p>4.2 APPLICATION</p> <p>This Chapter applies to vessels having an electricity supply that exceeds 50 V a.c. and 120 V d.c but is less than 1000 V a.c. and 1500 V d.c.</p> <p>NOTE:</p> <p>1. Vessels with an LV system may also have an ELV supply.</p> <p>2. AS/NZS 3000 contains provisions regarding the segregation of circuits of different voltage.</p>	<p>7.1 General requirements</p> <p>A vessel's low voltage electrical equipment and installation must comply with the applicable requirements of this chapter and of AS/NZ 3004.2.</p> <p><i>Note 1</i> Vessels with an LV system may also have ELV supply. AS/NZS 3000 contains provisions regarding the segregation of circuits of different voltage.</p> <p><i>Note 2</i> Relevant State or Territory electrical licensing requirements may apply to persons installing, maintaining, and repairing electrical circuits or systems of low voltage and above.</p>	<p>Updated to reference AS/NZS 3004.2.</p> <p>Included informative note about State and Territory electrical licensing.</p>

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4.3 - 4.4		The required outcomes are now listed in Schedule 1.
4.5 MULTIPLE EARTHED NEUTRAL (MEN) SYSTEM	<p><i>7.2.2 Multiple earthed neutral (MEN/TN) system</i> Where a vessel uses a MEN system the vessel's MEN link must be made at each generator. Where a vessel uses a TN system, it must meet the requirements in AS/NZS3004.2, clause 3.2.2.</p> <p><i>Note</i> This requirement avoids nuisance tripping of shore side RCD. The vessel's MEN point is switched out of the circuit by the shore supply change over switch.</p>	<p>Updated to also include clarification for TN systems.</p> <p>MEN/TN systems are also clarified further in the definitions section.</p>
4.6 RESIDUAL CURRENT DEVICES	<p>3.1 Protection against electrical shock and earth leakage <i>3.1.1 Requirement to fit protective devices in LV Installations</i> Any electrical risks associated with the supply of electricity must comply with ASNZS 3004.2 section 4. <i>3.1.2 Testing of protective devices</i> An RCD or RCBO used on a vessel must be tested regularly by a competent person in accordance with AS/NZS 3760:2010. The vessel owner must keep a record of tests and results.</p> <p><i>Note</i> State and Territory WHS Regulations prescribe requirements for the installation and testing of RCDs in hostile operating environments.</p>	Retained, moved to chapter 3 and updated clarification of requirements in AS/NZS3004.2 and AS/NZS 3760:2010.
4.7 – 4.7.3		Removal of content covered adequately in AS/NZS 3004.2
4.7.4 Earth	<p><i>8.5.4 Earth</i> Earth continuity between the vessel's earth and the shore earth must be maintained through the appropriate pin in a plug/socket shore power connection or by a dedicated earth terminal in a shore supply connection that uses terminals.</p>	Retained and moved to chapter 8.
4.7.5 – 4.7.7		Removal of content covered adequately in AS/NZS 3004.2
4.8 GENERATORS— CONTROL AND INSTRUMENTATION <i>4.8.1.1 Overcurrent</i>	<p>7.2 Generators – control and instrumentation In addition to the requirements of AS/NZS 3004.2, the following provisions apply to generators. Control <i>7.2.1 Over current</i> – no change.</p>	Removal of content covered adequately in AS/NZS 3004.2 and moved to chapter 7

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	<i>7.2.2 Multiple earthed neutral (MEN) system</i>	Mentioned at 4.5 above
<i>4.8.1.2 load shedding</i>	<i>7.2.3 Load shedding – no change.</i>	
4.8.2 Instruments		
<i>4.8.2.1 General and 4.8.2.2 Minimum requirements</i>	Instrumentation <i>7.2.4 General</i> Instrumentation for generators shall meet the requirements in AS/NZS3004.2, clause 2.5.6.	Referred to requirements in AS/NZS3004.2
<i>4.8.2.3 Generators operated in parallel</i>		Removal of content covered adequately in AS/NZS 3004.2
4.8.2.4 Range of instruments		Referred to requirements in AS/NZS3004.2
4.9 INVERTERS	7.3 Inverters	
4.9.1 Inverters – General	<i>7.3.1 General</i> Where applicable, inverters used on board vessels must comply with AS/NZS3004.2.	Updated reference to AS/NZS 3004.2
4.9.2 Inverters with outputs isolated from other electrical systems	<i>7.3.2 Inverters with outputs isolated from other electrical systems</i> Inverters supplying individual or multiple outlets isolated from other supply systems must comply with the provisions of AS/NZS 3000 relating to protection by electrical separation, including the provisions applying to protective earthing.	Removed two last sentences as covered in more detail in 8.4
4.9.3 Inverters used to supply the vessel's power system	<i>7.3.3 Inverters used to supply the vessel's power system</i> Inverters used to supply a vessel's LV system must comply with the requirements for generators. Inverters must have the capability to monitor, give alarm, and disconnect when 'out of specification' values of voltage, frequency and current are detected. Disconnection must occur in all live conductors, and neutral. Supply must comply with AS/NZS 3004.2.	Removal of content covered adequately in AS/NZS 3004.2
CHAPTER 5 EMERGENCY ELECTRICAL INSTALLATIONS	Chapter 4 Emergency electrical installations	
5.1 SCOPE		5.1 removed.
5.2 OBJECTIVE		5.2 removed
5.3 APPLICATION		5.3 removed
REQUIRED OUTCOMES 5.4 GENERAL 5.5 FUNCTION OF ESSENTIAL SERVICES TO BE MAINTAINED 5.6 PERIOD OF OPERATION	4.1 General requirements a) The functionality and reliability of electrical installations and equipment necessary for the safe operation of the vessel and safety of persons on board must be maintained in the event of failure of the main electrical installation. b) The vessel must have an emergency electrical installation designed, constructed, installed, maintained and serviced in accordance with:	Updating the format to the current drafting style for the NSCV

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	<p>i) clauses 4.2 to 4.7; and ii) the requirements of Chapters 5, 7 and 8; and iii) the clauses of the AS/NZS 3000 series of standards that are relevant to emergency electrical installations. <i>Note</i> Where there is any conflict between the requirements in NSCV Subsection C5B and AS/NZS 3000, the requirements in NSCV Subsection C5B apply.</p>	
5.7 EMERGENCY LIGHTING		Removed, to 4.5 and 4.7.
5.4 GENERAL		Removed.
5.8 COMPLIANCE		Removed, requirements covered in 4.1
5.9 GENERAL 5.9.1 - 3	<p>4.2 General 4.2.1 Design and location An emergency source of electrical power must be self-contained. Unless otherwise provided for in clause 4.3.3 the emergency source of electrical power, including any fuel required to supply that source, must comply with the following: a) if located in a space, it must not be located forward of the collision bulkhead; b) it must be located above the freeboard deck, or where there is no freeboard deck then above the water line, and must be accessible from the open deck; c) it must be located and arranged so that a fire or other unplanned occurrence in the propulsion machinery space will not interfere with the supply or distribution of emergency power outside that space; d) The space in which it is located must be: i) protected from exposure to moisture; and ii) provided with ventilation sufficient to enable the emergency power source to operate at full power.</p> <p>4.2.2 Operation The emergency electrical installation must be capable of meeting the requirements of this chapter when the vessel is rolling up to an angle of 22.5° either way and simultaneously pitching 10° by bow or by stern; and including any combination of angles within those limits.</p> <p>4.2.3 Duplication of main source of electrical power Where a vessel is designed with two, non-contiguous machinery spaces having separate electrical installations with separate distribution systems, each installation may be</p>	<p>4.2.1 (a) Included clarification that if the emergency source of electrical power is located in a space, it must not be located forward of the collision bulkhead.</p> <p>Also minor editorial changes to improve readability.</p>

Existing text of NSCV C5B Electrical - Edition 2 2005 (as amended) clause #	Public consultation draft NSCV C5B Electrical - Edition 3 2018 public clause #	Notes on changes
	considered as the emergency source of electrical power for the other and, where this is the case, each installation must met the requirements of this chapter.	
5.10 POWER SOURCE 5.10.1 Type of power source	4.3 Power source 4.3.1 <i>Type of power source</i> – no change.	
5.10.2 Battery	4.3.2 <i>Battery</i> Where a Class 1 or 2 vessel has an emergency source of power from a battery only, the emergency lighting system must automatically come into operation upon failure of the main electrical supply. The emergency source of electrical power for operational area B vessel must not be the normal starting batteries. Operational area C, D and E vessels may use the normal starting batteries provided those batteries are located in accordance with clause 4.4.1.	Minor editorial updates.
5.10.3 Diesel engines 5.10.3.1 – 5.10.3.4	4.3.3 <i>Diesel engines</i> 4.3.3.1 General – no change. 4.3.3.2 Fuel Fuel for an emergency generator engine must have a flashpoint of not less than 60°C 4.3.3.3 Starting arrangements – no change. 4.3.3.4 <i>Location of starting arrangements</i> The starting arrangements specified in clause 4.3.3.3 must not be situated in any of the following locations: a) Below the freeboard deck in the case of a Class 1 vessel or Class 2 vessel. b) Forward of the collision bulkhead. c) In the space containing the main source of electrical power. d) In a space that would be rendered inaccessible or uninhabitable by a fire or other incident in the space containing the main source of electrical power.	4.3.3.2 Note SOLAS II-1 Reg.43/3.1.1 sets fuel flashpoint (closed cup test) temperature at not less than 43C. NSCV currently sets a higher standard. 4.3.3.4 (a) Aligned terms with NSCV Part B.
5.10.4 Temporary source of emergency power	4.3.4 <i>Temporary source of emergency power</i> – no change.	
5.11 EMERGENCY SWITCHBOARD	4.4 Emergency switchboard - No change	

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5.11.1 – 5.11.4		
5.12 EQUIPMENT TO BE SUPPLIED WITH EMERGENCY POWER	4.5 Systems required to be supplied with emergency power – no change.	
5.13 CAPACITY OF EMERGENCY POWER SUPPLY	4.6 Capacity of emergency power supply The emergency power supply must be capable of operating continuously and simultaneously supply all equipment required to be supplied with emergency power for the periods specified in Table 1.	No technical change and for brevity Table 1 has not been repeated here.
5.14 EMERGENCY LIGHTING	4.7 Emergency lighting – no change.	No technical change to 4.7 or to Table 1. Clarified in table 1 the time required for equipment and emergency lighting for class A vessels (12 Hours), previously it referred to Marine Order 12. Also streamlined the content. (Note Table 1 has not been included in this change summary.)
New Chapter	Chapter 6 High voltage (HV) systems 6.1 Requirements for HV systems HV systems must comply with, and be maintained in accordance with the rules of a recognised organisation. <i>Note</i> Relevant State or Territory electrical licensing requirements apply to persons carrying out electrical work on high voltage equipment. Only competent and authorised electrical workers who have received appropriate training in high voltage electrical work are permitted to work on high voltage electrical equipment.	New clause
New chapter	Chapter 7 Low voltage (LV) systems	Chapter 7 is the content of Subsection C5B Edition 2's chapter 4 (see above).
New chapter	Chapter 8 Extra-low voltage (ELV) systems and batteries	The content of Subsection C5B Edition 2's chapter 3

Existing text of NSCV C5B Electrical - Edition 2 2005 (as amended) clause #	Public consultation draft NSCV C5B Electrical - Edition 3 2018 public clause #	Notes on changes
		(see above) is now in Chapter 8.
New Schedule 1	Schedule 1 Required outcomes	Reformat of the standard now lists all the required outcomes in one place.