

Consultation Feedback Report

NSCV C5B Design and Construction – Engineering – Electrical, Edition 3.

Outline

The Australian Maritime Safety Authority (AMSA) has reviewed and revised NSCV subsection C5B - Electrical. The revised NSCV C5B Edition 3, has now been made and is available on the AMSA Website. The planned commencement date of the revised standard is 1 January 2020.

The revised standard addresses the following:

- Alignment of the electrical requirements in the NSCV with the current Australian Standard, and State and Territory WHS requirements.
- Confirmation that protective devices (such as RCDs and RCBOs) are required to be fitted and tested regularly on vessels (in AS/NZS3004.2 and WHS laws).
- Confirmation that there are State and Territory electrical licencing requirements for persons performing electrical work on Low and High Voltage systems, on many vessel types.
- The principal change is the requirement for vessels to comply with:
 - State or Territory Electrical regulator's requirements (demonstrated by the issue of a certificate of compliance), and:
 - If the vessel is less than 35 metres, they will need to comply with:
- The 'required outcomes' NSCV Subsection C5B, and
 - o Australian Standard (AS/NZS 3004.2) or
 - o Class Rules (without being required to obtain a certificate of classification).

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Other updates include:

- NSCV C5B no longer duplicates the requirements in the Australian Standard (AS/NZS 3004.2) and instead requires compliance with that standard. The essential parts of C5B not covered the Australian Standard will remain.
- Information that the model WHS laws, as implemented, since 2012, in the relevant jurisdictions, may apply to many vessels.
- Inclusion of information and requirements for use of new and emerging electrical technology in electrically powered propulsion equipment.

Consultation Feedback

A copy of the draft standard was placed on the AMSA website for public comment for 11 weeks commencing on 12 December 2018 and closing on 28 February 2019. It was also emailed to over 35 stakeholders including ship operating companies, seafarer representative organisations, classification societies, shipping industry peak bodies and interested government departments and agencies.

Comments were received from 12 industry stakeholders addressing the scope or application of the changes being made.

The comments received during the public consultation and AMSA's responses are summarised below.

Comment	Battery boxes vented to open air. This is overkill for engine rooms with fan forced ventilation, suggest clarification here.
AMSA's response	Provide a new definition, "battery boxes". Rework the section on battery boxes, battery compartments and venting wording. Remove from C5B anything covered in AS/NZS3004.2, and refer reader to that standard for requirements: Battery boxes and battery compartment drip trays to be capable of containing the whole volume of the electrolyte, and both to be vented in accordance with AS/NZS3004.2.

Comment	<i>(an emergency source of electrical power must be located above the freeboard deck)</i> Impossible to meet on sailing yachts, all batteries will be low down below WL for VCG, and available space reasons.
AMSA's response	A slight rewording during revision resulted in this possible interpretation. Reworded the section to ensure clarity and no change from C5B Ed 2's requirement.

Comment	Emergency switchboard? I've never seen one installed. Normally the main switchboard is supplied with emergency power when needed.
AMSA's response	Thanks for your feedback, the requirement has not changed Ed 2. No other feedback on this content. No resulting change made to final draft.

Comment	Very rare for all nav lights to be individually controlled. Almost all boats share a switch for the 2 side lights, the 2 NUC lights etc.
AMSA's response	Thanks for your feedback, the requirement has not changed Ed 2. No other feedback on this content. No resulting change made to final draft.

Comment	<p>There are several references to “active” conductors in the NSCV when they should be referencing “live”. It has always been my understanding that “Active” refers to live with regards to earth and “live” refers to live with regards to any other conductor.</p> <p>The statement “In isolated systems, switches and circuit protection must interrupt all active conductors” is contradictory, as there are no active conductors in an isolated system. RCDs only work where there is an active and neutral conductor that can be compared for a difference in current. This fundamental misconception (active vs live) regarding the application RCDs on boats, as good electrical practice on boats is to implement an isolated electrical system, to minimise the effects of electrolysis and as such Residual Current Devices referencing an earth connection are rendered ineffective unless active/neutral conductors are present.</p>
AMSA's response	<p>Thanks for your feedback. C5B Ed 3 uses the definitions for “active” and “live” from AS/NZS3000. No change required for approval draft.</p>

Comment	<p>We have had a few queries raised by local Classed DCV owners and Accredited Marine Surveyors (AMS) in regards to compliance with Australian Standard (AS) 3000 which requires your clarification/confirmation.</p> <p>FOR NEW CONSTRUCTION</p> <p>(a) It is understood from MSAGM, Part 2, Section 3.10, that ROs are only allowed to conduct construction phase surveys other than electrical surveys. We are advising our clients that they will need to approach a third party or Accredited Marine Surveyor(s) who hold/s an unrestricted electrical license. Please advise if this is correct.</p> <p>FOR EXISTING / PERIODIC SURVEYS:</p> <p>a) It is understood from MSAGM, Part 2, Section 5.6, provided the vessel is built and surveyed to RO's Rule and Regulation, the electrical aspect for DCV's surveys is inclusive. Please advise if this is correct.</p> <p>b) Furthermore, as detailed in AMSA Marine Order 503, Division 2, Item 8(1)(a) and Item 8(2)(a), all electrical aspects will be as per RO Rules and Regulations and DCV survey aspects will be inclusive. Please advise if this is correct.</p> <p>c) In light of the above two items a) and b), when a RO surveyor is completing AMSA form 901 (Survey Report and Recommendation), Section C. titled “Electrical Compliance Certificate”, will this “Certificate” be still required to be completed/arranged to be completed by client as per MSAGM Part 2, Sections 7.5.7(1) and 7.5.7(2) or is this only required for Exemption 40 vessels?</p> <p>As per your recent Survey Matters December 2018 issue: If the vessel is a DCV and under or over 35m and Classed with an RO, does the vessel still need to comply with AS 3000. If the vessel complies with Class Rules, it will not meet AS 3000 standards and vice versa. This conflict needs to be address clearly.</p>
AMSA's response	<p>FOR NEW CONSTRUCTION</p> <p>(a) correct, but outside of scope of this review. No change required.</p> <p>FOR EXISTING / PERIODIC SURVEYS</p> <p>(a) The testing will need to be carried out by a suitably qualified electrician. Question refers to a ‘competent person’, the qualifications of the person are determined by each state electrical regulator. ‘<i>Competent person</i>’ is now defined in the C5B Ed 3.</p> <p>(b) as per a.</p> <p>(c) All vessels.</p> <p>The recent Survey Matters December 2018 issue: The issue is if the vessel connects to shore power it needs to comply with state electrical safety regulator's rules (comply with AS 3000-there is no MO covering it for DCV's), refer to your State electrical safety regulator's requirements.</p> <p>Answers to the raised concerns are in the stds. No change required for approval draft.</p>

Comment	<p>What could possibly be wrong with a fuse in a 12 volt system. Smaller boats should be exempt</p>
AMSA's response	<p>Possible hazards in ELV systems include use of undersized conductors, incorrect circuit protection for example which could lead to a fire. Currently wiring diagrams required for initial survey for >32v and complex ELV systems.</p> <p>Answers to the raised concerns are in the stds. No change required for approval draft.</p>

Comment	NSCV does not include the use of isolating transformers For vessels that are connected to shore supply. When using a isolating shore supply transformers and the vessel is using MEN supply on board then the MEN link must be connected in the main switchboard and not in each alternators as stated in NSCV sect 5.
AMSA's response	Refer to AS/NZS 3004.2 (numerous references 3.2.2, 3.5.3.1 & 2, etc). The comment is correct but if the location of the MEN deviates from the standard, it needs to be annotated on the vessel document and well signposted. Answers to the raised concerns are in the stds. No change required for approval draft.

Comment	Vented Battery Boxes parts CD and E, this discussion has been going on for years. Question is how and why do you need to have a vented battery box for a yacht with a starting battery at the base of the engine. Where is the risk or incident data to support this requirement. ISO standards and ABYC do not stipulation? How would you fit it without completely remodelling the engine arrangement on some vessels.
AMSA's response	The requirement for batteries to be mounted in battery boxes or compartments and vented has not changed from C5B Ed 2. No change required for approval draft. Have reworded Ed 3 to clarify that the requirements are now mostly in AS3004.2 and added a definition for 'battery boxes'.

Comment	Part G Non survey vessels should be amended to include electrical works must comply with C5B.
AMSA's response	Out of scope of this review. No change required for approval draft. To go on issues list for NSCV Part G and considered at next revision.

Comment	"including drawings" to be added after the word manuals (in s3.3)
AMSA's response	Adopted.

Comment	The vessel control systems must have some means of manual over ride in the event of a system failure.
AMSA's response	This topic is out of scope of this review, it is covered in NSCV C5A Machinery, s2.7. Has been added to the issues list for C5A. No changes to C5B approval draft required.

Comment	All ELV installations must be approved by surveyor or competent person. ELV drawings must be "approved" so a competent person can carry out initial and periodic survey to compare what is existing to what was initially approved.
AMSA's response	Thanks for your feedback. Not adopted in Ed 3, has been noted and can be consulted on, costed and potentially included as an amendment in the future.

Comment	There was reference to approval only required for "complex systems". Complex systems should be defined somewhere. My suggestion is any system with a battery is a complex system as potential fault currents from any battery are dangerous and the cause of many fires and damaging electrolysis on vessels.
AMSA's response	Thanks for your feedback. The term 'complex' is not used in the document, however the suggestion has been noted and can be consulted on, costed and potentially included as an amendment in the future.

Comment	Item 1.2 b) should be removed or amended.
AMSA's response	S1.2 Application, (b) <i>“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”</i> . 1.2 (b) is included as worded by legal team to be accurate, it reflects current requirements and therefore cannot be removed.

Comment	It's not safe that NS vessels do not have to comply with any electrical standard! It's a loop hole that many people are using to get around surveys and not having to comply with any electrical standard. Too many unsafe vessels out there in this NS category! A separate note c) should be added to specifically mention Part G Non survey vessels MUST NOW comply with C5B.
AMSA's response	Thanks for your feedback. This is outside the scope of this C5B review, however the suggestion has been noted and will be considered at next review of Part G.

Comment	If a vessel is fitted with only one electric propulsion motor, is this equivalent to 1 x petrol or 1 x diesel unit? If a backup generator is provided on board say to recharge batteries, will this comply to having a diesel engine on board for say 2C category (not limited to distance as in the case with 1 x petrol outboard)?
AMSA's response	Taken as a comment only, out of scope of this review. Machinery requirements are in NSCV C5A. No change required to approval draft.

Comment	3.6.1.1 (electric propulsion equip) Must not be only part of an automation or PLC type system. Must be hard wired separately for redundancy.
AMSA's response	This topic is covered in C5A Machinery, s2.7 (must be able to be operated in 'abnormal' conditions) e.g. If the engine controls are via a touch screen and PLC(programmable logic controllers) controls there must be means to remove the touch screen from the equation and be able to operate the system, "manually". No changes to C5B approval draft required.

Comment	Monitoring and control of critical systems such as bilge pump, high level alarms, nav lights, engine control systems etc. Must not be totally dependent of one central system. There must be some independent means or redundancy for control and alarm.
AMSA's response	3.6.1.7 states 'propulsive control' must be able to be maintained in 'abnormal conditions'. 5.3.4 covers nav light alarms but does not require full redundancy for indicators and alarms. AS/NZS3004.2 has requirements for alarms and indicators for essential services / systems but does not require redundancy for those circuits. The recommendation requires a higher safety standard that is becoming more relevant with industry uptake of emerging technology. It would involve implementing a requirement that is above current NSCV and AS/ NZS3004.2 standards for alarm / control systems, and has not been costed as part of this review. This will need to be investigated and determined where in NSCV it sits; i.e. perhaps C5A - Machinery - which covers propulsion machinery control systems. Suggest this not be included in this approval draft but put on issues list for later consideration and research.

Comment	5.5.1 What if not a surveyor, just electrical contractor or another competent person? Will they have to access the SAGM?
AMSA's response	SAGM is available in the internet. No changes to C5B approval draft required.

Comment	5.5.1 Add: - "i) Redundancy of essential control and monitoring systems" or similar words.
AMSA's response	Adopted.

Comment	What about encapsulated batteries e.g. some Lithium Iron Phosphate units? Battery box not required, labeled in battery area "must be replaced by same type"
AMSA's response	Included requirement to label all battery storage areas with battery type.

Comment	Maintained earth connection. What about isolated supplies or electrolysis blockers that isolate the earth?
AMSA's response	Also known as "Galvanic isolators" which are mentioned throughout the standard. Refer to AS/NZS 3004.2, appendix B, B2 – example diagrams of shore side connections with galvanic isolators.

Comment	<p>I am employed as a Chief Engineer and in the past as Fleet Manager with the Smit Marine Australia (Gladstone) now called Smit Lamnalco Towage Australia; Qualifications: STCW Engineer Class 1 Steam and Motor; Graduate Diploma of Maintenance Management with Destinations. Started my seagoing carrier in 1985 with ASP ship management as a trainee engineer and progressed through the ranks to Chief Engineer in 1999; Moved to the towage operation in Gladstone in 1999 with Howard Smith Industries now SVITZER to December 2010 where SVITZER lost the towage contract in Gladstone. While at sea on the blue water fleet all engineers performed electrical repairs. This requirement to perform electrical work was necessary as the electrician was removed from the vessel due to trying to do our part to make Australian shipping efficient.</p> <p>Therefore "all engineers were required to perform and pass the electrical training over the original training of our certificates. In the towage industry due to the connection to the shore power and the vessels where most domestic commercial vessels. The state did not recognise the certificate of competency. In my mind this separation due to a cable was dangerous as when the vessel was at sea we could perform this electrical work even though electricity is the same in both locations. I understand that one major problem is the competency of the engineers employed on the tugs are going to Class 3. Where this certificate does not have a high level of electrical awareness due to the simplicity of obtaining the certificate, note anywhere else in the world this size vessel would require a Class 2 certificate of competency. Due to the fact, the vessel needed to be registered as a Registered Australian Vessel or equivalent due to the proximity of other flag states. Also the modern tugs is a very complex vessel to the same complexity as a general cargo vessel or similar which would normally have a class 2 engineer or class 1. In saying the above, I have enjoyed working with some Class 3 engineers as they have a better grasp of electrical knowledge than myself. As these Class 3 engineers have completed an apprenticeship as an electrician. Compared to some Class 3 engineers that have not completed a trade or trades that have minimal similarities to MARINE ENGINEERING maintenance required on a modern vessel. I have approached the Workplace Health and Safety Electrical Safety Office Workers' Compensation Regulator to obtain a limited electrical licence and was told I had to complete an apprenticeship to do so, as they do not recognise my Class 1 certificate of competency. I find this to be very unsafe as we have two jurisdictions in the same country opposed to recognising safety training. In Summary, I believe the engineer class 3 or anyone performing electrical work on High Voltage equipment is to have the standards as required for Class 1 and 2 engineers as set out by AMSA training regime the electrical work on the vessel. There should be no restriction on where this High Voltage electrical work can be carried out (Onshore power or ships power) for engineers that have the required training. Further, the current engineer class 3 can only be chief engineer on the vessel where their High Voltage power is used for domestic purposes and this engineer does not perform any high voltage works to any equipment. If the engineer has the suitable training they can operate a vessel where High Voltage services are used for critical services, For example, the Fire pump.</p>
AMSA's response	Thanks for your feedback. This is outside the scope of this C5B review.

Comment	<p>2.6, note 2 - Is concerned that the proposed text in the locations in the table set out below do not create certainty about who is and who is not able to perform electrical work on a vessel under the jurisdiction of the Domestic Commercial Vessels National Law (the 'National Law') and thus the NSCV Part 'C'.</p> <p>We consider the proposed text will give rise to misunderstanding and disputation, with possible safety issues onboard vessels and ultimately with legal consequences, because:-</p> <p>the holder of an engineering certificate of competency issued pursuant to the 'National Law' and NSCV Part 'D' has NO DEFINED ROLE, DUTIES or RESPONSIBILITY. As the national maritime authority is silent on what their duties actually are some certificate holders will assume they are permitted such electrical work whilst others will assume to the contrary. But no one will know for certain. In this situation accidents are likely.</p> <p>No Australian/NZ Standard is even aware of the existence of marine engineering certificates of competency of any class. Thus they will never be mentioned or encompassed in such A/NZ Standard. Unless NSCV Part 'D' is amended to specifically DEFINE engineering ROLE, DUTIES and RESPONSIBILITY of each class of certificate holder, including higher duties for those referred to in 1 above, then reference to such Australian/NZ Standard will only cause further confusion/conflict.</p> <p>Oblique references to State requirements for conduct of electrical work will do nothing to resolve the dilemma facing the holders of certificates of competency referred to at 1 above when working on a vessel under the jurisdiction of the 'National Law' and NSCV. As they hold certificates permitting such work, confusion/conflict is inevitable. Reliance on the maxim that Federal legislation trumps a State law to the extent of any inconsistency just means someone will end up in the Federal Court.</p> <p>NSCV Part 'D' should be amended to specifically DEFINE the engineering ROLE, DUTIES and RESPONSIBILITY of each class of certificate holder issued under the 'National Law' and NSCV, including their capacity to perform electrical work.</p> <p>NSCV Part 'D' should be amended to specifically acknowledge and encompass the much higher engineering ROLE, DUTIES and RESPONSIBILITY of each class of certificate holder issued under the STCW and Marine Order 72, including their greater capacity to perform electrical work including High Voltage electrical work.</p>
AMSA's response	<p>Thanks for your feedback. This is outside the scope of this C5B review, however the suggestion has been noted and will be considered in the review of Part D.</p>

Comment	<p>2.6 , note 2: requires further consultation or a meeting to discuss the proposed change to the National Standards, which may be problematic from the perspective of cross-jurisdictional application.</p>
AMSA's response	<p>Contacted enquirer and had further discussions in relation to certification of installations and licencing for persons in QLD. Further meeting to be held after next DIVIAC meeting when electrical licencing will be an agenda item.</p>

Comment	<p>4.4.4 Batteries.</p> <p>Where the main source of electrical power is a battery, the emergency switchboard must not be installed in the same space as the battery.</p> <p>In many cases the Emergency Batteries are installed in Battery Boxes inside the Wheelhouse Console.</p> <p>As such the Emergency Switch board is mounted on the Console</p> <ul style="list-style-type: none"> • This does not meet 4.4.4 Above • This does not meet Design and location 4.2.1.
AMSA's response	<p>4.4.4 reworded to include words "is a battery <i>“installed in a space”</i>" to clarify actual intent.</p>

Comment	<p>4.2.1 (b) Clarification is required, as we would deem this to be installation in the same space and not accessible from the open deck.</p> <p>If the Batteries are correctly vented and enclosed,</p> <ul style="list-style-type: none"> • There would be limited damage from an explosion • Limited contact by corrosive material. • Limited exposure to water and salt. <p>Current Practice has proven this to be a good and workable solution.</p> <p>A solution in this particular situation -: for vessels of < than 25M installation of emergency batteries installed in the console space shall be less than 500Ahrs.</p>
AMSA's response	<p>Thanks for your feedback. Included the condition in 4.2.1 of "if located in a space" to be met before all the listed requirements are to be met.</p>

Comment	<p>4.4.4 -</p> <p>What is the outcome for older surveyed vessels that don't meet these requirements.</p> <ul style="list-style-type: none"> • Fitting RCD's is not terribly problematic or expensive • Replacing cable to meet IEC 60092.350 is a major undertaking and expensive. <p>Even when an extensive upgrade has been undertaken.</p>
AMSA's response	<p>Thanks for your feedback. The changes do not require vessels to be rewired to IEC rules.</p>

Comment	<p>5.5.1 Is a holder of any certificate of competency referred to in 2 above a competent person for the purpose of 5.5.1 Testing?</p> <p>All references to Australian/NZ Standards as to the performance of electrical work should be amended to specifically acknowledge and encompass the permitted duties set out in I and ii above.</p> <p>All references to "...relevant State or Territory electrical licensing requirements..." as to the performance of electrical work should be amended to specifically acknowledge and encompass the permitted duties set out in I and ii above.</p>
AMSA's response	<p>For clarity, the term 'competent person' in 5.5.1 has been changed to state: "<i>must be inspected and tested in accordance with Part 2 of the Marine Surveyors Accreditation Guidance Manual.</i></p> <p><i>Note Part 2 subsection (3) of the Marine Surveyors Accreditation Guidance Manual lists: a person who holds unrestricted electrical licence, or accredited marine surveyor who is accredited to perform electrical surveys.</i>"</p> <p>Electrical licencing requirements of each state and territory exist under separate Acts that operate concurrently to the National Law which C5B is based on. This has been clarified in 3.5 "Electrical work</p> <p><i>This Subsection imposes no electrical licencing requirements.</i></p> <p><i>Note In Australia, State or Territory electrical licensing requirements must be fulfilled by any persons performing electrical work on electrical equipment (see definitions)."</i></p>