Title	**Explain cathodic protection for marine vessels**		
Level	**5**	**Credits**	**6**

Purpose	People credited with this unit standard are able to explain: the process of metal corrosion on vessels; types of cathodic protection of vessels; electrolysis, electrolytic and stray current corrosion; and the potential effects and prevention of over protection on aluminium alloy vessels.

Classification	Boating Industries > Boatbuilding

Available grade	Achieved

Guidance Information

1 This unit standard applies to vessels greater than 20m but less than 120m in length.

2 Definition
Corrosion refers to electrochemical action produced by dissimilar metals in contact with each other and an electrolyte that produces a flow of electrons and an associated current flow.

3 Relevant reference standards include:
American Boat & Yacht Council. *ABYC E-2 Cathodic Protection*.
This standard is a guide for the design, installation, and use of cathodic protection systems on boats. This standard applies to the use of galvanic anodes and impressed current systems if installed on a boat.
American Boat & Yacht Council. *ABYC E-11 – AC and DC Electrical Systems on Boats*.
These standards are guides for the design, construction, and installation of alternating current (AC) and direct current (DC) electrical systems on boats, available at http://www.abycinc.org.

Outcomes and performance criteria

Outcome 1

Explain the process of metal corrosion on vessels.

Performance criteria

1.1 Electrochemical corrosion is explained in terms of process.

1.2 Flow of electrons and current are explained in terms of directions.

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1.3 Current flow between different metals is explained in terms of potential voltage difference.

1.4 Anodic and cathodic sites are explained in terms of concept on single metals corroding without contact with other metals.

1.5 The concept of energy required to manufacture and corrode metals is explained in relation to the metal's position on galvanic series.

1.6 The effects of the properties of electrolyte are explained in terms of resistance to current flow.

Range includes – salinity, oxygenation.

1.7 Unique attributes of aluminium alloys are explained in relation to their natural corrosion protection.

Outcome 2

Explain types of cathodic protection of vessels.

Range galvanic protection (sacrificial anodes), impressed current cathodic protection.

Performance criteria

2.1 Cathodic protection system is explained in terms of protected components, type and placement of anodes, and electron and current flow.

2.2 Cathodic protection is explained in terms of advantages and disadvantages.

2.3 Cathodic protection is explained in terms of bonding requirements.

Range includes – shaft bonding.

2.4 Installation requirements are explained in terms of the anode attachment system and its resistance.

Outcome 3

Explain electrolysis, electrolytic and stray current corrosion.

Performance criteria

3.1 Corrosion is explained in terms of its difference from common electrochemical corrosion processes.

Range corrosion – electrolysis, electrolytic.

3.2 Stray current corrosion is explained in terms of electrical fault paths and prevention.

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Outcome 4

Explain the potential effects and prevention of over protection on aluminium alloy vessels.

Performance criteria

4.1 The implications of over protection on aluminium alloy vessels are explained in terms of ions and the reduction of the properties of the alloy.

4.2 The prevention of over protection on aluminium alloy vessels is explained in terms of techniques and measurement.

Planned review date	31 December 2025

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	21 May 2010	31 December 2022
Rollover and Revision	2	30 August 2018	31 December 2022
Review	3	27 August 2020	N/A

Consent and Moderation Requirements (CMR) reference	0136

This CMR can be accessed at http://www.nzqa.govt.nz/framework/search/index.do.

Comments on this unit standard

Please contact the NZ Marine and Composites Industry Training Organisation training@nzmarine.com if you wish to suggest changes to the content of this unit standard.

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