

Australian/New Zealand Standard™

**Electrical installations—Marinas and
boats**

Part 2: Boat installations



AS/NZS 3004.2:2014

This Joint Australian/New Zealand Standard was prepared by Joint Technical Committee EL-057, Boating and Boating Marinas Installations. It was approved on behalf of the Council of Standards Australia on 7 May 2014 and on behalf of the Council of Standards New Zealand on 6 June 2014.
This Standard was published on 27 June 2014.

The following are represented on Committee EL-057:

Australian Corrosion Association
Australian Industry Group
Boating Industries Alliance of Australia
Electrical Contractors Association of New Zealand
Electrical Regulatory Authorities Council
Electrical Safety Organisation, New Zealand
Energy Networks Association
Marina Industries Association of Australia
Marine Queensland
New Zealand Marina Operators
New Zealand Motor Caravan Association

Keeping Standards up-to-date

Standards are living documents which reflect progress in science, technology and systems. To maintain their currency, all Standards are periodically reviewed, and new editions are published. Between editions, amendments may be issued. Standards may also be withdrawn. It is important that readers assure themselves they are using a current Standard, which should include any amendments which may have been published since the Standard was purchased.

Detailed information about joint Australian/New Zealand Standards can be found by visiting the Standards Web Shop at www.saiglobal.com.au or Standards New Zealand web site at www.standards.co.nz and looking up the relevant Standard in the on-line catalogue.

For more frequent listings or notification of revisions, amendments and withdrawals, Standards Australia and Standards New Zealand offer a number of update options. For information about these services, users should contact their respective national Standards organization.

We also welcome suggestions for improvement in our Standards, and especially encourage readers to notify us immediately of any apparent inaccuracies or ambiguities. Please address your comments to the Chief Executive of either Standards Australia or Standards New Zealand at the address shown on the back cover.

This Standard was issued in draft form for comment as DR AS/NZS 3004.2.

Australian/New Zealand Standard™

Electrical installations—Marinas and boats

Part 2: Boat installations

Originated in Australia as part of AS 3004—1979.
Originated in New Zealand as part of AS/NZS 3004:2002.
Previous edition AS/NZS 3004.2:2008.
Second edition 2014.
Reissued incorporating Amendment No. 1 (July 2015).

COPYRIGHT

© Standards Australia Limited/Standards New Zealand

All rights are reserved. No part of this work may be reproduced or copied in any form or by any means, electronic or mechanical, including photocopying, without the written permission of the publisher, unless otherwise permitted under the Copyright Act 1968 (Australia) or the Copyright Act 1994 (New Zealand).

Jointly published by SAI Global Limited under licence from Standards Australia Limited, GPO Box 476, Sydney, NSW 2001 and by Standards New Zealand, Private Bag 2439, Wellington 6140.

PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee EL-057, Boating and Boating Marinas Installations, to supersede AS/NZS 3004.2:2008, *Electrical installations—Marinas and recreational boats, Part 2: Recreational boats installations*.

This Standard incorporates Amendment No. 1 (July 2015). The changes required by the Amendment are indicated in the text by a marginal bar and amendment number against the clause, note, table, figure or part thereof affected.

The objective of this Standard is to provide designers, manufacturers, boat builders and regulators with safety requirements for small boats.

This Standard is part of a series, which includes the following:

AS/NZS

3004 Electrical installations—Marinas and boats

3004.1 Part 1: Marinas

3004.2 Part 2: Boat installations (this Standard)

In the preparation of this Standard reference was made to the following:

- (a) IEC 60092-507: Ed.1.0 (2000), *Electrical installations in ships, Part 507: Pleasure craft*.
- (b) ISO 10133, *Small craft—Electrical systems—Extra-low-voltage d.c. installations*.
- (c) ISO 13297, *Small craft—Electrical systems—Alternating current installations*.
- (d) American Boat and Yacht Council (ABYC) Standards and Technical Information Reports for Small Craft:
 - (i) A-28, *Galvanic isolators*.
 - (ii) A-32, *AC power conversion equipment and systems*.
 - (iii) E-11, *AC and DC electrical systems on boats*.
 - (iv) S-31, *Environmental considerations for systems and components installed onboard boats*.

and acknowledgement is made of the assistance received therefrom.

Compliance with this Standard may be required by legislation, from a date to be set by the relevant regulating authority.

If work on an installation was commenced before publication of this edition, permission can be granted by the relevant regulatory authority or electricity distributor for the installation to be completed under AS/NZS 3004:2008.

It is not the intention of this Standard to limit the introduction and use of emerging technologies. However, designers are reminded that it is essential that the basic tenets of electrical and marine safety be addressed before any other equipment and installation design elements are considered.

Any requirements that may be applicable in Australia only or New Zealand only are indicated in the text and by a symbol in the right margin as follows:

‘In Australia.....’

‘In New Zealand.....’



Statements expressed in mandatory terms in footnotes to Tables are deemed to be requirements of this Standard.

The terms ‘normative’ and ‘informative’ have been used in this Standard to define the application of the appendix to which they apply. A ‘normative’ appendix is an integral part of a Standard, whereas an ‘informative’ appendix is for information and guidance only.

CONTENTS

	Page
SECTION 1 SCOPE AND GENERAL	
1.1 SCOPE.....	6
1.2 APPLICATION	7
1.3 REFERENCED AND RELATED DOCUMENTS.....	7
1.4 DEFINITIONS.....	10
SECTION 2 GENERAL REQUIREMENTS	
2.1 RATINGS	15
2.2 AMBIENT AIR AND COOLING WATER TEMPERATURE.....	15
2.3 INCLINATION OF BOAT	16
2.4 VOLTAGE AND FREQUENCY VARIATIONS	16
2.5 ELECTRICAL POWER SOURCES	17
2.6 EQUIPMENT	20
2.7 EQUIPMENT CONSTRUCTION	22
2.8 PLUGS AND SOCKET-OUTLETS	24
2.9 BATTERY INSTALLATION.....	25
2.10 BATTERY CHARGERS	26
2.11 INTERNAL COMMUNICATION CIRCUITS	27
2.12 ELECTRICAL APPARATUS FOR EXPLOSIVE GAS ATMOSPHERES	27
2.13 ELECTRICAL FITTINGS AND CABLES ATTACHED TO STRUCTURES OF ANOTHER METAL	27
2.14 NAVIGATION LIGHTS SUPPLY	27
2.15 LUMINAIRES.....	28
2.16 ELECTRICAL HEATING AND COOKING APPLIANCES	28
2.17 MAGNETIC COMPASSES.....	28
2.18 DIGITAL NETWORKED POWER DISTRIBUTION, CONTROL AND MONITORING SYSTEMS	28
SECTION 3 DISTRIBUTION SYSTEMS	
3.1 d.c. DISTRIBUTION SYSTEMS	29
3.2 STANDARD a.c. DISTRIBUTION SYSTEMS.....	29
3.3 EQUIPOTENTIAL BONDING CONDUCTORS	30
3.4 BALANCE OF LOADS IN THREE-PHASE a.c. SYSTEMS.....	31
3.5 SHORE CONNECTION ARRANGEMENTS	31
3.6 SWITCHBOARD	34
SECTION 4 PROTECTION AGAINST ELECTRIC SHOCK AND EARTH LEAKAGE IN a.c. SYSTEMS WITH VOLTAGE EXCEEDING 50 V	
4.1 PROTECTION AGAINST DIRECT CONTACT	36
4.2 AUTOMATIC DISCONNECTION OF SUPPLY TO FINAL SUBCIRCUITS OR EQUIPMENT	36
4.3 EARTHED NEUTRAL SYSTEMS	36
4.4 NON-NEUTRAL EARTHED SYSTEM (IT TYPE SYSTEM)	37
4.5 USE OF CLASS II EQUIPMENT	37
4.6 UNACCEPTABLE MEASURES AGAINST ELECTRIC SHOCK.....	37

	Page
SECTION 5 PROTECTION AGAINST OVERCURRENT	
5.1 GENERAL.....	38
5.2 CHARACTERISTICS OF PROTECTIVE DEVICES	38
5.3 d.c. SYSTEM.....	38
5.4 a.c. SYSTEM.....	39
5.5 GENERATORS	39
5.6 TRANSFORMERS	39
5.7 MOTOR PROTECTION.....	40
SECTION 6 CABLES	
6.1 SELECTION OF CABLES FOR MARINE ENVIRONMENT.....	41
6.2 CABLE SELECTION AND INSTALLATION	41
6.3 PROTECTIVE COVERINGS	41
6.4 DETERMINATION OF THE CROSS-SECTIONAL AREAS OF CONDUCTORS ..	41
SECTION 7 CABLE AND WIRING INSTALLATION AND TERMINATION	
7.1 EQUIPOTENTIAL BONDS	46
7.2 CABLE TERMINATIONS	46
7.3 CABLE AND CONDUCTOR INSTALLATION	47
7.4 d.c. AND a.c. CABLING AND WIRING SEGREGATION	48
7.5 CONDUCTOR IDENTIFICATION.....	48
7.6 LIGHTNING PROTECTION	49
SECTION 8 VERIFICATION	
8.1 GENERAL.....	50
8.2 EARTHING.....	50
8.3 INSULATION RESISTANCE.....	50
8.4 SWITCHGEAR AND CONTROLGEAR	51
8.5 VOLTAGE DROP	51
8.6 INTERNAL COMMUNICATION CIRCUITS.....	51
8.7 LIGHTING, HEATING AND GALLEY EQUIPMENT.....	51
APPENDICES	
A BOATS OVER 24 METRES AND LARGER VESSELS OPERATIONAL IN OFFSHORE WATERS	52
B SHORE SIDE ARRANGEMENTS.....	55
C PERIODIC TESTING.....	59
D BOATS WARRANT OF ELECTRICAL FITNESS CERTIFICATION FORM— NEW ZEALAND ONLY	66

STANDARDS AUSTRALIA/STANDARDS NEW ZEALAND

Australian/New Zealand Standard
Electrical installations—Marinas and boats

Part 2: Boat installations

SECTION 1 SCOPE AND GENERAL

1.1 SCOPE

This Standard specifies requirements for the design, construction and installation of electrical systems in boats that have a length of up to 50 m, and are designed for use on inland waters or at sea.

NOTES:

- 1 This Standard is not intended to apply to small boats equipped with a battery supplying circuits for engine starting and navigation lighting only that is recharged from an inboard or outboard engine driven alternator.
- 2 Attention is drawn to the *International Regulations for Preventing Collisions at Sea*, 1972 (COLREGs) as amended, which govern specific requirements for navigation lights for boats.
- 3 Attention is drawn to regulations in Australia and New Zealand that govern specific requirements for the safety of electronic and electrical equipment; electromagnetic compatibility requirements; marine safety requirements; energy and water usage; telecommunications and radio communication requirements.

For high speed boats, attention is drawn to the *Australian National Standard for Commercial Vessels (NSCV)*, Part F: *Special Vessels, Section 1—Fast craft and the Maritime New Zealand Rules*.

- 4 Attention is drawn to the regulatory requirements for the issue of an electrical warrant of fitness for New Zealand boats connected to shore power.

This Standard applies to the following types of d.c. and a.c. electrical systems, individually or in combination:

- (a) Direct current systems that operate at a nominal voltage not exceeding 1500 V.
NOTE: For example, for many small boats this will be the main electrical system. Alternatively a boat equipped with an a.c. system as its principal electrical system may also be equipped with a d.c. system for navigation and communications equipment supplied from batteries.
- (b) Single-phase alternating current systems that operate at a nominal voltage not exceeding 1000 V.
NOTE: Such a system may be the principal electrical power system of a boat, or a system which may only be energized when connected to a shore supply, a.c. extra-low voltage, safety extra-low voltage etc. circuits may also comprise part of a single-phase a.c. system. A boat may also be equipped with d.c. system(s) as in (a) above.
- (c) Three-phase alternating current systems that operate at a nominal voltage not exceeding 1000 V.
NOTE: Three-phase systems are likely to be the principal electrical power system of a boat's electrical installation. Such a boat may also be equipped with single-phase a.c. subsystem(s) and d.c. subsystem(s).