AS 4036—2006

Australian Standard®

Corrosion of metals—Dissimilar metals in contact in seawater

This Australian Standard® was prepared by Committee MT-014, Corrosion of Metals. It was approved on behalf of the Council of Standards Australia on 19 September 2006.
This Standard was published on 17 October 2006.

The following are represented on Committee MT-014:

- Australian Corrosion Association
- Australasian Institute of Metal Finishing
- Australian Chamber of Commerce and Industry
- Australian Electrolysis Committee
- Australian Paint Manufacturer's Federation
- Australian Paint Approval Scheme
- Austroads
- Bureau of Steel Manufacturers of Australia
- Department of Defence
- Division of Building, Construction and Engineering, CSIRO
- Galvanizers Association of Australia
- Telstra
- United Water International
- Water Corporation of Western Australia
- Corrosion consultants
- Water Services Association of Australia (WSAA)
- Water Authority of Western Australia

This Standard was issued in draft form for comment as DR 06130.

Standards Australia wishes to acknowledge the participation of the expert individuals that contributed to the development of this Standard through their representation on the Committee and through public comment period.

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Originated as AS 4036—1992.
Second edition 2006.

Published by Standards Australia, GPO Box 476, Sydney, NSW 2001, Australia

ISBN 0 7337 7772 4

PREFACE

This Standard has been prepared by the Australian members of the Joint Standards Australia/Standards New Zealand Committee MT-014, Corrosion of Metals, to supersede AS 4036—1992, *Corrosion of metals—Dissimilar metals in contact in seawater.*

After consultation with stakeholders in both countries, Standards Australia and Standards New Zealand decided to develop this Standard as an Australian Standard rather than an Australian/New Zealand Standard.

The objective of this Standard is to provide a test method to determine the corrosion rate of dissimilar metals when immersed in stagnant artificial seawater.

The objective of this revision is to update the reference documents, to apply current editorial style and to revise the test methods for determining the corrosion of dissimilar metals in stagnant artificial seawater.

This Standard provides a test method to derive the ratings of galvanic corrosion activity of metallic couples immersed in artificial seawater, based on their current/time relationships.

It also lists the galvanic series comprising a number of individual metals and alloys after immersion for one hour and also for a 28 day period, in artificial seawater.

The Committee determined that there were no International Standards (ISO) which were suitable to be used as an Australian 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 only for information and guidance.

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FOREWORD

The corrosion of dissimilar metals in contact is sometimes known as bimetallic, galvanic or contact corrosion, and occurs when two such metals are in electrical contact and bridged by an electrolyte to form an electrochemical cell.

A variety of factors can influence the functioning of a dissimilar-metal corrosion cell. Although theoretical considerations can offer some guidance, they cannot provide precise information on what will happen for a range of dissimilar metals in contact under all conditions of exposure. At present, the most reliable guidance is found in published tables of the galvanic series of metals or alloys in contact in seawater, based on potential measurements or sound practical experience. The test procedure given in this Standard requires the measurement of galvanic current to give information on dissimilar metal behaviour for the determination of corrosion ratings.

It is intended that this procedure should be used by persons or organizations wishing to evaluate other dissimilar-metal couples.

STANDARDS AUSTRALIA

Australian Standard
Corrosion of metals—Dissimilar metals in contact in seawater

SECTION 1 SCOPE AND GENERAL

1.1 SCOPE

This Standard specifies a test method to determine the degree of additional corrosion of the more anodic of two metals in direct electrical contact, when immersed under standard conditions in stagnant artificial seawater.

NOTES:

1 The factors controlling galvanic corrosion given in Section 3 should be taken into account when evaluating the test results in terms of expected performance in actual seawater conditions and may reduce the viability of some galvanic couple ratings given in Table B1.

2 The basic theory of the galvanic corrosion of dissimilar metals is given in Appendix C

The test method given in Appendix A requires the measurement of the galvanic current over a period of 28 days, and rates the amount of additional corrosion of the metal under consideration into four categories.

The Standard provides ratings for a variety of commercially-significant dissimilar metal couples (including alloys and carbon).

NOTE: Table B1 may be used to give a qualitative assessment of the performance of dissimilar metal couples when they are immersed in actual seawater.

The Standard also provides information on factors influencing galvanic corrosion and in addition, provides guidelines on controlling this corrosion.

1.2 REFERENCED DOCUMENTS

The following documents are referred to in this Standard:

AS	
1789	Electroplated zinc (electrogalvanized) coatings on ferrous articles (batch process)
2832	Cathodic protection of metals
2832.3	Part 3: Fixed immersed structures
4108	Metal finishing—Glossary of terms in electroplating and related processes

1.3 DEFINITIONS

For the purpose of this Standard the definitions given in AS 4108 apply.