AS 2832.3—2005

Australian Standard™

Cathodic protection of metals

Part 3: Fixed immersed structures

This Australian Standard was prepared by Committee MT-014, Corrosion of Metals. It was approved on behalf of the Council of Standards Australia on 27 October 2005.
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The following are represented on Committee MT-014:

Australasian 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
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Division of Building, Construction and Engineering, CSIRO
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Corrosion Consultants

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Cathodic protection of metals

Part 3: Fixed immersed structures

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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 2832.3—1992, *Cathodic protection of metals,* Part 3: *Fixed immersed structures.*

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 Regulatory Authorities and the Australian corrosion mitigation industry with requirements for the cathodic protection of fixed immersed structures, such as wharves and piling, in order to minimize corrosion rates.

The objective of this revision is to specify the new design requirements for designing cathodic protection systems for fixed immersed structures.

This Standard is Part 3 of the AS 2832 series of Standards. The other parts are as follows:

AS	
2832	Cathodic protection of metals
2832.1	Part 1: Pipes and cables
2832.2	Part 2: Compact buried structures
2832.4	Part 4: Internal surfaces
2832.5	Part 5: Steel in concrete structures

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, where an ‘informative’ appendix is only for information and guidance.

CONTENTS

Page

FOREWORD

Corrosion of a metal is an electrochemical reaction between the metal and its environment which results in wastage of the metal. Thus corrosion is a combination of chemical effects with an associated flow of electrical energy (corrosion current).

In many practical situations where it is impossible to change the nature of the environment, corrosion may be prevented by employing cathodic protection. The natural tendency of the metal to react with its environment is prevented by the application of an appropriate direct current to the structure surface.

Two types of cathodic protection system are available:

(a) Galvanic anode systems, which employ buried or immersed metallic anodes which sacrifice themselves to provide the source of direct current for protection of the structure.

(b) Impressed current systems, which employ an external electrical power source of direct current for the protection of the structure.

Corrosion control for a structure should be considered at the conceptual design stage. The practices recommended in this Standard relate to steps that need to be taken following a decision to apply cathodic protection to a structure. These steps are as follows:

(i) Decide whether the structure should be coated. If the decision is to coat, then decide what particular coating system should be employed. If the structure is already installed, a determination should then be made of whether the nature and quality of the coating are compatible with cathodic protection.

(ii) Design the structure to be compatible with cathodic protection and to include cathodic protection facilities during construction. If the structure is already installed, determine the measures to be taken to apply cathodic protection effectively, and the facilities necessary for cathodic protection monitoring.

(iii) If necessary, design the cathodic protection system to include provisions for the mitigation of stray current effects. If the structure is already installed, the design parameters may be measured and an optimum design provided for the mitigation of stray current effects. If the structure is not installed, a number of assumptions will be required for the estimation of design parameters, and an adequate design for the mitigation of stray current effects may not be possible to achieve.

During the cathodic protection design stage, consideration should be given to the possibility that interference with foreign structures in the area may occur. In some circumstances this interference may only be resolved by field testing subsequent to installation.

(iv) Install the cathodic protection system.

NOTE: Legislation in some States requires that a permit be obtained prior to the installation of a cathodic protection system.

(v) Commission the cathodic protection system after achieving a balance of cathodic protection current, to enable the entire structure to be protected with minimum current, and with as uniform a potential over its surface as is practicable. Equipment installed for the mitigation of stray current effects should be balanced for optimum performance.

Carry out interference testing and satisfy all parties involved that any interference problems have been resolved, giving attention to regulatory requirements (if any) of the State in which the system is installed.

(vi) Monitor cathodic protection at regular intervals, adjusting the conditions of operation as necessary, and maintain complete records of its operation.

NOTE: Further literature, guidance and details of training courses on corrosion and its control can be obtained from the Australasian Corrosion Association web address www.corrosion.com.au.

STANDARDS AUSTRALIA

Australian Standard
Cathodic protection of metals

Part 3: Fixed immersed structures

SECTION 1 SCOPE AND GENERAL

1.1 SCOPE

This Standard specifies requirements for the cathodic protection of external surfaces of fixed immersed structures, including offshore platforms, wharves, jetties, pontoons, sewage treatment plants, water treatment plants, lock gates, dam gates, pump station piles in rivers, weirs, mooring buoys, piling, foundations and water inlet/outlet structures.

Whilst fixed immersed structures are rarely affected by stray direct traction currents, there are some significant examples where this does occur and where mitigation is required. Examples of affected fixed immersed structures are underwater tunnels and electrically continuous sheet piling along water-ways and harbours.

This Standard does not apply to steel in concrete structures, see AS 2832.5.

The Standard specifically covers the following subjects which relate to cathodic protection:

(a) The design of structures requiring cathodic protection.

(b) Coatings for use on immersed metal structures.

(c) Criteria for the choice of cathodic protection potential.

(d) The design of cathodic protection systems.

(e) The installation of cathodic protection systems.

(f) The control of interference currents on foreign structures.

(g) The cathodic protection of structures subject to stray direct current.

(h) The operation and maintenance of cathodic protection systems.

This Standard employs conventional (positive) current flow, for consistency with accepted practice, and uses the potential sign conventions specified in AS 1852. In order to understand the various electrochemical reactions that occur at electrodes during cathodic protection, it should be recognized that electron flow occurs in the opposite direction to conventional current flow.

NOTES:

1 Guidance on the general use and design of cathodic protection systems and factors affecting the corrosion of immersed metallic structures are given in Appendix A.

2 This Standard employs positive current flow. The international convention is that the potential of an electrode is measured with respect to the potential of an electrode situated in the electrolyte. In the absence of cathodic protection, positive current in a corroding system flows through the electrolyte from the more negative to the more positive portion of the circuit. The aim of cathodic protection is to move the potential of the structure in the negative direction so that positive current flows on to it.