Australian Standard™

Cathodic protection of metals

Part 2: Compact buried structures

Standards Australia

This Australian Standard was prepared by Committee MT-014, Corrosion of Metals. It was approved on behalf of the Council of Standards Australia on 6 May 2003 and published on 27 June 2003.

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New Zealand Abrasive Blasting Association
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Additional interests participating in the preparation of this Standard:

Building Research Association of New Zealand
Corrosion engineers and consultants
Galvanic anode manufacturers
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PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee MT-014, Corrosion of Metals, at the request of industry to supersede AS 2832.2—1991, *Guide to the cathodic protection of metals*, Part 2: *Compact buried structures*. After consultation with stakeholders in both countries, Standards Australia and Standards New Zealand decided to develop this Standard as an Australian, rather than an Australian/New Zealand Standard.

The objective of this Standard is to specify the technical requirements for the cathodic protection of compact buried structures.

This Standard is Part 2 of the AS and AS/NZS 2832 series of Standards, titled *Cathodic protection of metals*, currently comprising four parts. The other three parts are as follows:

AS or AS/NZS		
2832	Cathodic protection of metals	
2832.1	Part 1:	Pipes and cables
2832.3	Part 3:	Fixed immersed structures
2832.4	Part 4:	Internal surfaces

To enable this Standard to be referred to in regulations, it now contains requirements for cathodic protection and differs from the other Standards in the AS 2832 series which give guidelines for cathodic protection.

There are no International Standards (ISO) on the cathodic protection of metals.

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

Corrosion of a metal is an electrochemical reaction between it 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 on a buried or submerged structure. This is achieved by applying an appropriate direct current flowing in opposition to the original corrosion current, thus preventing the natural tendency of the metal to react with its environment. In practice, the electrical potential of the metal at risk is used to judge whether adequate protection is being achieved.

To employ cathodic protection, a circuit is established by connecting a suitable source of direct current to the structure to be protected.

Two types of cathodic protection systems are available, as follows:

(a) Galvanic anode systems, which employ metallic anodes that are consumed to provide the source of direct current for protection of the structure. The driving voltage for the protective current comes from the natural potential difference that exists between the structure and a second metal (the galvanic anode).

(b) Impressed current systems, in which the driving voltage for the protective current between the structure and the anode is supplied by an external direct current power source.

Corrosion control for a structure should be considered at the conceptual design stage. Factors that affect the corrosion of metallic structures are listed in Paragraph A3 of Appendix A. 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) Designing the structure to be compatible with cathodic protection and including cathodic protection facilities during construction. For existing structures, determine the measures to be taken to apply cathodic protection effectively, and the facilities necessary for cathodic protection monitoring.

(ii) For new structures, deciding whether to coat, and if so, deciding which particular coating system should be employed. The nature and condition of any coating on existing structures needs to be considered when determining the requirements for the cathodic protection system.

(iii) Designing the cathodic protection system. If the structure is already installed, the design parameters may be measured and an optimum design provided. If the structure is not installed, a number of assumptions, especially in regard to interference, will be required for the estimation of design parameters.

(iv) Installing the cathodic protection system.

(v) Commissioning the cathodic protection system and achieving a balance of cathodic protection current to enable the entire structure to be protected with minimum current, and with as uniform a potential distribution as is practicable.

(vi) Monitoring cathodic protection at regular intervals, adjusting the system as necessary, and maintaining complete records of its operation.

STANDARDS AUSTRALIA

Australian Standard
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Part 2: Compact buried structures

SECTION 1 SCOPE AND GENERAL

1.1 SCOPE

This Standard specifies requirements for the cathodic protection of external surfaces of compact buried structures, including tank farms, service station tanks, tower footings, steel pilings (in soil), short well casings, compressor and pump stations and associated pipe work.

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

(a) Pertinent aspects of the design of structures requiring cathodic protection.

(b) Coatings for use on buried structures.

(c) Criteria for the cathodic protection of a structure.

(d) Measuring techniques and equipment.

(e) The design of cathodic protection systems.

(f) The installation of cathodic protection systems.

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

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

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

(j) Electrical hazards.

NOTES:

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

2 This Standard employs conventional (positive) current flow, for consistency with accepted practice, and uses the potential sign conventions specified in AS/NZS 1852 (all parts). 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.

3 Voltage and current referred to in this Standard is direct voltage and direct current, unless otherwise stated.

1.2 REFERENCED DOCUMENTS

The following documents are referred to in this Standard:

AS
1100 Technical drawing
1100.401 Part 401: Engineering survey and engineering survey design drawing