AS 2832.4—2006

Australian Standard®

Cathodic protection of metals

Part 4: Internal surfaces

This Australian Standard® was prepared by Committee MT-014, Corrosion of Metals. It was approved on behalf of the Council of Standards Australia on 29 September 2006.
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The following are represented on Committee MT-014:

- AUSTAP
- 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
- Australian Pipeline Industry Association
- Blast Cleaning and Coating Association of Australia
- Bureau of Steel Manufacturers of Australia
- Division of Building, Construction and Engineering, CSIRO
- Energy Networks Association
- Galvanizers Association of Australia
- United Water International
- Water Corporation of Western Australia
- Corrosion consultants
- Water Services Association of Australia (WSAA)

This Standard was issued in draft form for comment as DR 06282.

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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Part 4: Internal surfaces

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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 2832.4—1994, *Cathodic protection of metals*, Part 4: *Internal surfaces*.

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 revision is to revise the current cathodic protection requirements for the protection of internal surfaces.

This Standard is Part 4 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
2832.3	Part 3: Fixed immersed structures
2832.4	Part 4: Internal surfaces (this Standard)
2832.5	Part 5: Steel in concrete structures

The Committee decided 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

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. 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 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. Factors which 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) Decide whether the structure should be coated. If the decision is to coat, then decide which 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) Design 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 will be required for the estimation of design parameters.

(iv) Install the 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.

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

STANDARDS AUSTRALIA

Australian Standard
Cathodic protection of metals

Part 4: Internal surfaces

SECTION 1 SCOPE AND GENERAL

1.1 SCOPE

This Standard specifies requirements for the cathodic protection of internal surfaces of pipes and structures including but not limited to heat exchangers, hot water systems, clarifiers, ballast and water storage tanks, cooling conduits and process plants. The internal surfaces of these vessels/structures may contain waters, seawaters, drinking water, brackish waters, sewage and brines. These applications will be termed electrolytes throughout the Standard.

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 internal surfaces.

(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 operation and maintenance of cathodic protection systems.

NOTES:

1 Guidance on the general use and design of cathodic protection systems and factors affecting the corrosion of internal surfaces 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 1852. In order to understand the various electrochemical reactions which occur at electrodes during cathodic protection, it should be recognized that electron flow occurs in the opposite direction to conventional current flow.

3 For guidance on the use of coatings on the internal surfaces of structures which are to be cathodically protected, refer to Appendix E.

4 For guidance on the environmental factors which should be considered when designing a cathodic protection system, refer to Appendix F.

5 For an example of a form that may be used with designing a cathodic protection system of internal surfaces, refer to Appendix G.

6 For guidance on the graphical symbols relating to cathodic protection refer to Appendix H.

7 For guidance on the calibration and maintenance of reference electrodes, refer to Appendix K.