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  - Australian Chamber of Commerce and Industry
  - Australian Electrolysis Committee
  - Australian Paint Approval Scheme
  - Australian Pipeline Industry Association
  - AUSTAP
  - AUSTROADS
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  - Bureau of Steel Manufacturers of Australia
  - Corrosion Consultants
  - CSIRO Manufacturing and Materials Technology
  - Galvanizers Association of Australia
  - Materials Australia
  - United Water International
  - Water Services Association of Australia (WSAA)
- 

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Australian Standard®

## Cathodic protection—Installation of galvanic sacrificial anodes in soil

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# STANDARDS AUSTRALIA

## Australian Standard

### Cathodic protection—Installation of galvanic sacrificial anodes in soil

#### 1 SCOPE

This Standard specifies requirements for the installation of galvanic anodes in soils.

The method for installing anodes in soil for each designation code is specified in Appendix A.

##### NOTES:

- 1 This Standard does not specify any purchasing requirements for galvanic anodes. Refer to AS 2239.
- 2 This Standard does not apply to installation of galvanic anodes in liquids.

Galvanic anodes are selected according to the nature of the environment, the ferrous structure to be protected and the output current required. Anodes complying with AS 2239 will meet the requirements of this Standard.

##### NOTES:

- 1 For underground metallic structures, anodes that are typically used, are composed of zinc or magnesium alloys.
- 2 Anodes may be supplied pre-packaged, in a gypsum bentonite backfill, which is contained in a calico bag and usually wrapped in plastic, or in simple unpackaged form.

#### 2 REFERENCED DOCUMENTS

The following documents are referred to in this Standard:

AS	
2239	Galvanic (sacrificial) anodes for cathodic protection
2832	Cathodic protection of metals
2832.2	Part 2: Compact buried structures

#### 3 DEFINITIONS

For the purpose of this Standard the definitions in AS 2832.2 apply.

#### 4 REGISTRATION OF GALVANIC ANODE INSTALLATIONS

In some Australian states or territories registration of galvanic anode cathodic protection systems is mandatory.

NOTE: Further information can be obtained from the relevant State Electrolysis Committee as listed in Appendix B.

#### 5 INFORMATION TO BE PROVIDED TO THE INSTALLER

The following information shall be provided:

- (a) Drawing or description of the location where the anodes are to be installed.
- (b) Number and type of anodes to be installed.
- (c) Mass and dimensions of anodes to be installed, (refer to AS 2239 for anode designations).

- (d) Type of backfill to be used.
- (e) Length and size of cable required.
- (f) Anode installation code. Refer to Appendix A.

NOTE: For guidance on the suitability of backfill for anodes refer to AS 2239.

## 6 PRE-INSTALLATION REQUIREMENTS

The location of any underground structures that may be affected by the installation shall be determined and measures taken to avoid causing any damage to them. Services for underground asset location, such as 'Dial before you dig', shall be contacted to provide advice on the location of underground structures.

Anodes shall not be installed within one metre of other underground structures.

Any necessary permits, registrations and permissions shall be obtained prior to commencement of excavation for anode installation.

NOTES:

- 1 For guidance on permits and/or registration of anodes refer to Appendix B.
- 2 For guidance on the placement of anodes to avoid damage to other structures, refer to Appendix C.

## 7 POSITIONING OF ANODES

Anodes shall be positioned at or below the bottom of the structure unless otherwise specified.

NOTES:

- 1 Typical anode placement is shown in Appendix D.
- 2 Anodes should be placed no closer than 300 mm to the structure.

## 8 ANODE INSTALLATION

Anodes may be installed in a packaged or an unpackaged form. Where packaged anodes are installed in augured holes the hole diameter shall be a minimum of 100 mm greater than the anode packaged diameter.

**CAUTION: PLASTIC PACKAGING SHALL BE REMOVED FROM ANODES PRIOR TO ANODE INSTALLATION AS THE PLASTIC ACTS AS AN INSULATOR WHICH WILL PREVENT GALVANIC SACRIFICIAL ANODES FROM MAKING ELECTRICAL CONTACT WITH THE SOIL.**

Where pre-packaged anodes are not specified and gypsum bentonite backfill is to be separately installed, the anode shall be positioned centrally in the backfill so as to provide a minimum of 50 mm coverage on all surfaces unless otherwise specified.

Care shall be taken when supporting or lowering anodes into position to avoid damage to the cable or cable connection to the anode.

Anode cabling shall be laid in the trench excavation or augured hole so as to avoid tension on the connection to the anode. Care shall be taken to avoid damage to the cable during installation.

Following placement of the anode, backfill shall be placed and compacted to ensure no voids are present between the anode and surrounding soil to a level covering at least the top of the anode. This backfill material shall consist of gypsum bentonite backfill, soil backfill or backfill material as otherwise specified. Where specified, after backfilling and compaction to above the top of the anode, water shall be added prior to filling the remainder of the excavation with backfill or natural soil.

NOTE: The backfill surrounding the anode should not be puddled to form a slurry, as subsequent drying and shrinkage may cause loss of contact with the surrounding soil.

The remainder of the excavation shall be filled with natural soil or other specified backfill.

When specified, a length of non-metallic piping or agricultural piping shall be installed from immediately above the anode to the ground surface to facilitate subsequent watering.

Subsequent to completion of backfilling and compaction the ground surface shall be reinstated to a horizontal condition flush with the surrounding soil unless otherwise specified.

Where specified, the location of the installed anodes shall be marked using a ground box or peg directly above the anode. The excess length of anode cable shall be left within the ground box or coiled on the soil surface at the marking peg.

A sketch or marked-up drawing shall be prepared showing the location of each anode with offset distances to suitable reference points, ISG or GPS coordinates.

## 9 POST INSTALLATION CHECK

Where specified, the installation shall be checked by measuring the open circuit potential of the anode with respect to a copper saturated/copper sulfate reference electrode.

### NOTES:

- 1 Potential readings should be approximately  $-1.05\text{ V}$  to  $-1.2\text{ V}$  for zinc anodes,  $-1.45\text{ V}$  to  $-1.55\text{ V}$  for low potential magnesium anodes and  $-1.55\text{ V}$  to  $-1.65\text{ V}$  for high potential magnesium anodes.
- 2 These are the readings that should be obtained. Recordings outside this range may indicate an incorrect material or installation.

## APPENDIX A

### METHODS OF ANODE INSTALLATION OUTSIDE THE STRUCTURE EXCAVATION

(Normative)

#### A1 GENERAL

This Appendix specifies methods and the designation code for installing anodes to be used for galvanic cathodic protection.

#### A2 DESIGNATION CODE

The following designation code specifies the anode position, packaged or unpackaged and other criteria for installing anodes in the ground.

The designation code is shown as follows:

Anode position .....	1 to 8
Packaged anode or unpackaged .....	P or U
Gypsum bentonite or bare .....	G or B
Distance between anodes in metres .....	L
Ribbon (magnesium or zinc).....	RM or RZ
Other variations .....	OV

See Table A1 for illustrations of the installation method for each designation code.

**TABLE A1**  
**DESIGNATION CODE**

millimetres

Designation code	Installation method
1P	
2P	
3UG	
3UL	<p style="text-align: center;"><b>PLAN VIEW</b></p>

(continued)

TABLE A1 (continued)

millimetres

Designation code	Installation method				
4UG					
5UB					
6UB					
<p>7</p> <p>RM (Mg)</p> <p>RZ (Zn)</p>	<p>LEGEND:</p> <table border="0"> <tr> <td data-bbox="523 1843 576 1895"></td> <td data-bbox="592 1854 815 1883">Gypsum Bentonite</td> <td data-bbox="868 1843 920 1895"></td> <td data-bbox="936 1854 1305 1939">Specified backfill (other than Gypsum Bentonite) e.g. selected soil</td> </tr> </table>		Gypsum Bentonite		Specified backfill (other than Gypsum Bentonite) e.g. selected soil
	Gypsum Bentonite		Specified backfill (other than Gypsum Bentonite) e.g. selected soil		
8OV	Drawing showing the method of installation shall be included with the work instruction				

**APPENDIX B**  
**REGISTRATION OF GALVANIC ANODES—LIST OF ELECTROLYSIS**  
**COMMITTEES**

(Informative)

<b>State</b>	<b>State electrolysis committee</b>
ACT	ACT Electrolysis Committee C/- Actew AGL PO Box 366 CANBERRA CITY ACT 2601
NSW	New South Wales Electrolysis Committee C/- Department of Water and Energy N.S.W. Government GPO Box 3889 SYDNEY NSW 2001
Qld	Electrical Safety Office Department of Natural Resources Locked Mail Bag BRISBANE QLD 4401
SA	South Australian Electrolysis Committee c/o SA Water GPO Box 1751 ADELAIDE SA 5001
Tas.	General Manager of Workplace Standards, Tasmania c/o Tasmanian Electrolysis Committee PO Box 56 ROSNY PARK TAS 7018
Vic.	Victorian Electrolysis Committee Electrolysis Technical Subcommittee (both) Energy Safe Victoria 15A Ceylon Street NUNAWADING VIC 3131
WA	Electrolysis Subcommittee (ACA) Water Corporation Western Australia 629 Newcastle Street LEEDERVILLE WA 6007

NOTE: The above addresses were current at the time of publication.

## APPENDIX C DIAL BEFORE YOU DIG

(Informative)

‘Dial before you dig’ is a national referral service for anyone wanting to know the location of underground networks at a proposed excavation site by helping to prevent damage and disruption to underground pipe and cable networks which carry many essential services, such as electricity, gas, communications and water. ‘Dial before you dig’ may be contacted at [www.dialbeforeyoudig.com.au](http://www.dialbeforeyoudig.com.au).

APPENDIX D  
EXAMPLES OF ANODE PLACEMENT  
(Informative)

Figure D1 illustrates the positioning of the anodes in a typical pipeline application. Anodes are installed in the pipeline trench as part of pipeline construction, or, if installed post construction or on other structures such as tanks, are usually positioned in augured holes located adjacent to the structure.

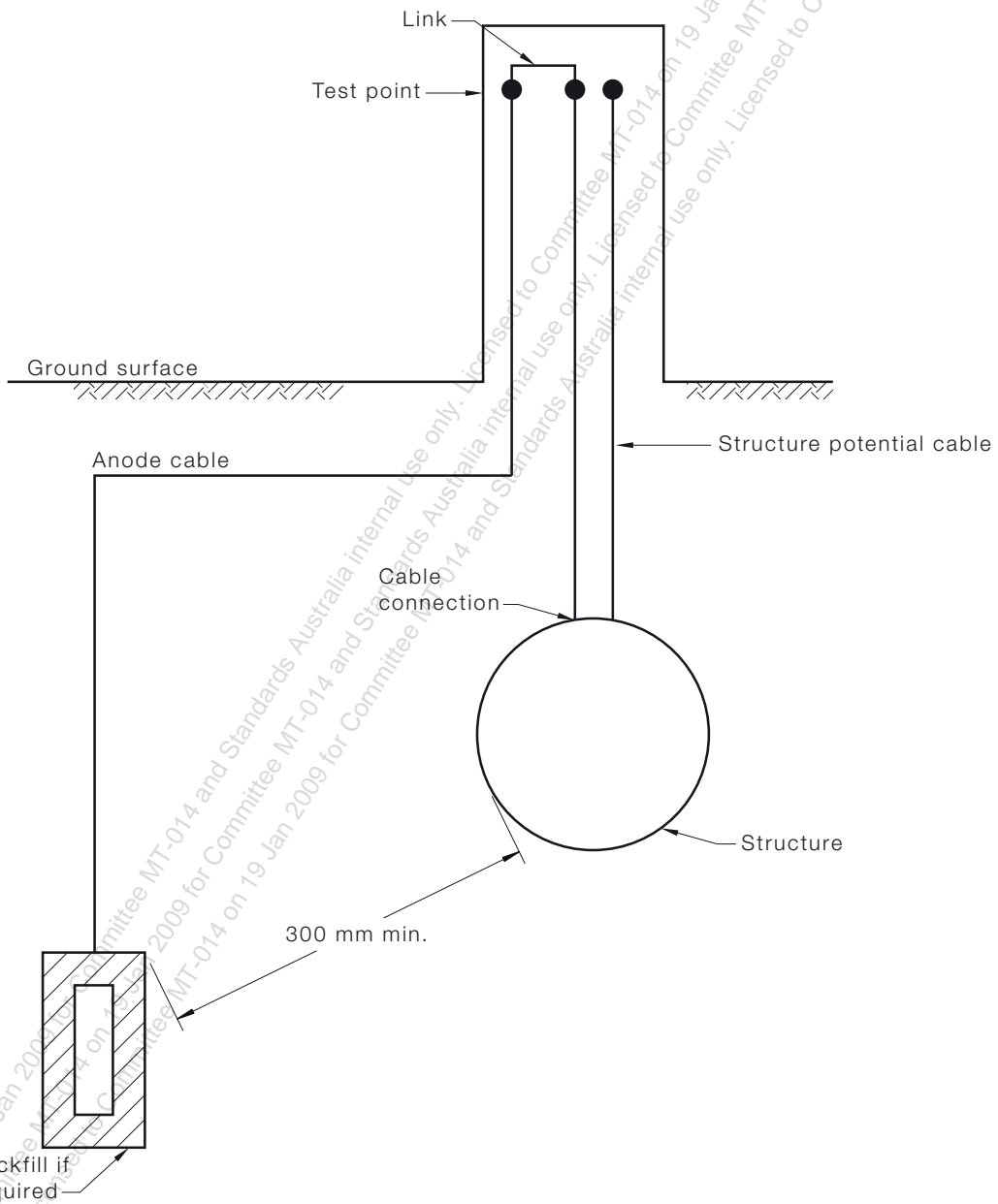


FIGURE D1 EXAMPLE OF ANODE PLACEMENT



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