

Under Revision See DR 95074

SUPERSEDED BY AS 3798-1996

AS 3798—1990

Australian Standard®

---

**Guidelines on earthworks for  
commercial and residential  
developments**

---

This Australian Standard was prepared by Committee CE/27, Earthworks. It was approved on behalf of the Council of Standards Australia on 6 August 1990 and published on 12 November 1990.

---

The following interests are represented on Committee CE/27:

Australian Federation of Construction Contractors  
Australian Geomechanics Society  
Australian Local Government Engineers Association  
Australian Road Research Board  
Institution of Engineers, Australia  
Ministry of Housing and Construction, Victoria  
National Association of Australian State Road Authorities  
National Association of Testing Authorities, Australia  
Railways of Australia Committee  
The Association of Consulting Engineers Australia  
The University of New South Wales

---

**Review of Australian Standards.** To keep abreast of progress in industry, Australian Standards are subject to periodic review and are kept up-to-date by the issue of amendments or new editions as necessary. It is important therefore that Standards users ensure that they are in possession of the latest edition, and any amendments thereto.

Full details of all Australian Standards and related publications will be found in the Standards Australia Catalogue of Publications; this information is supplemented each month by the magazine 'The Australian Standard', which subscribing members receive, and which gives details of new publications, new editions and amendments, and of withdrawn Standards.

Suggestions for improvements to Australian Standards, addressed to the head office of Standards Australia, are welcomed. Notification of any inaccuracy or ambiguity found in an Australian Standard should be made without delay in order that the matter may be investigated and appropriate action taken.

---

This Standard was issued in draft form for comment as DR 89204. ✓

Australian Standard®

---

**Guidelines on earthworks for  
commercial and residential  
developments**

---

First published as AS 3798—1990.

## PREFACE

This Standard was prepared by the Standards Australia Committee on Earthworks in response to a widely distributed questionnaire that identified the need for guidance in the interpretation and application of AS 1289, *Methods of testing soil for engineering purposes*, to routine control testing and other relevant matters related to earthworks within commercial and residential developments.

The guidance contained in this Standard on specifying, execution, and control testing of earthworks and application of AS 1289 should reduce contractual disputes and, in many cases, subsequent arbitration or litigation.

In preparation of this Standard reference has been made to Guidelines for the specification and testing of earthworks prepared by the Sydney Group of the Australian Geomechanics Society and the assistance gained from this source is acknowledged.

## © Copyright — STANDARDS AUSTRALIA

Users of Standards are reminded that copyright subsists in all Standards Australia publications and software. Except where the Copyright Act allows and except where provided for below no publications or software produced by Standards Australia may be reproduced, stored in a retrieval system in any form or transmitted by any means without prior permission in writing from Standards Australia. Permission may be conditional on an appropriate royalty payment. Requests for permission and information on commercial software royalties should be directed to the Head Office of Standards Australia.

Standards Australia will permit up to 10 percent of the technical content pages of a Standard to be copied for use exclusively in-house by purchasers of the Standard without payment of a royalty or advice to Standards Australia.

Standards Australia will also permit the inclusion of its copyright material in computer software programs for no royalty payment provided such programs are used exclusively in-house by the creators of the programs.

Care should be taken to ensure that material used is from the current edition of the Standard and that it is updated whenever the Standard is amended or revised. The number and date of the Standard should therefore be clearly identified.

The use of material in print form or in computer software programs to be used commercially, with or without payment, or in commercial contracts is subject to the payment of a royalty. This policy may be varied by Standards Australia at any time.

## CONTENTS

	<i>Page</i>
<b>SECTION 1 SCOPE AND GENERAL</b>	
1.1 SCOPE .....	4
1.2 REFERENCED DOCUMENTS .....	4
1.3 DEFINITIONS .....	4
1.4 DESIGNATION OF PERSONNEL .....	4
1.5 SAND-SILT BOUNDARY .....	5
<b>SECTION 2 INVESTIGATION, PLANNING AND DESIGN</b>	
2.1 GENERAL .....	6
<b>SECTION 3 DOCUMENTATION</b>	
3.1 GENERAL .....	3
3.2 INVESTIGATION AND PLANNING .....	8
3.3 DESIGN AND SPECIFICATION .....	8
3.4 CONSTRUCTION .....	8
<b>SECTION 4 MATERIALS</b>	
4.1 GENERAL .....	10
4.2 UNSUITABLE MATERIALS .....	10
4.3 SUITABLE MATERIALS .....	10
<b>SECTION 5 COMPACTION CRITERIA</b>	
5.1 GENERAL .....	11
5.2 COMPACTION OF SOILS .....	12
5.3 COARSE MATERIAL .....	12
5.4 TEST ROLLING .....	12
5.5 OTHER MATERIALS .....	12
5.6 TRENCHES .....	13
<b>SECTION 6 CONSTRUCTION</b>	
6.1 SITE PREPARATION .....	14
6.2 FILL CONSTRUCTION .....	15
<b>SECTION 7 METHODS OF TESTING</b>	
7.1 GENERAL .....	17
7.2 FIELD DENSITY .....	17
7.3 ESTABLISHMENT OF A REFERENCE DENSITY FOR CALCULATION OF RELATIVE COMPACTION .....	17
7.4 SAMPLE SELECTION FOR REFERENCE DENSITY .....	17
7.5 USE OF DIFFERENT TEST PROCEDURES .....	18
7.6 PERMISSIBLE OVERSIZE .....	18
7.7 ONE POINT COMPACTIONS .....	19
7.8 PREPARATION OF LABORATORY REFERENCE DENSITY SAMPLES .....	20
7.9 NUMBER OF COMPACTION POINTS .....	20
<b>SECTION 8 SUPERVISION, INSPECTION AND TESTING</b>	
8.1 GENERAL .....	21
8.2 TESTING .....	21
<b>APPENDICES</b>	
A LIST OF REFERENCED DOCUMENTS .....	22
B COORDINATION OF GEOTECHNICAL TESTING .....	23
C TYPICAL SITE RECORD SHEETS .....	24
D SUITABILITY OF COMPACTION EQUIPMENT FOR VARIOUS TYPES OF FILL MATERIALS .....	30
E STATISTICAL METHODS IN EARTHWORKS .....	31

## STANDARDS AUSTRALIA

### Australian Standard

## Guidelines on earthworks for commercial and residential developments

### SECTION 1 SCOPE AND GENERAL

**1.1 SCOPE** This Standard gives guidance on the specifying, execution, and control testing of earthworks and associated site preparation works within commercial and residential developments. The Standard also gives guidance on the interpretation and application of the relevant test methods specified in AS 1289.

The Standard does not apply to—

- (a) railway, highway and major road constructions;
- (b) selection, placement, and compaction of pavement materials;
- (c) water retaining structures; and
- (d) container terminals, airports or other heavy industrial applications.

NOTE: This Standard has been prepared primarily for use by those responsible for or involved with the design, specification, supervision and control testing of earthworks for commercial and residential developments.

**1.2 REFERENCED DOCUMENTS** The documents referred to in this Standard are listed in Appendix A.

**1.3 DEFINITIONS** For the purpose of this Standard, the definitions below apply:

**1.3.1 Cohesionless soils**—poorly graded sand and gravel mixture, generally with less than 5 percent fines (i.e. finer than 75 micron) which are non-plastic and which do not exhibit a well defined moisture-density relationship when tested in accordance with AS 1289.E1.1 or AS 1289.E1.2 and AS 1289.E2.1 or AS 1289.E2.2 and AS 1289.E7.1.

**1.3.2 Cohesive soils**—those materials which have a defined moisture-density relationship when tested in accordance with AS 1289.E1.1 or AS 1289.E1.2 and AS 1289.E2.1 or AS 1289.E2.2 and AS 1289.E7.1.

**1.3.3 Collapsing soils**—a soil that may suffer a significant decrease in volume under load or when it becomes nearly saturated. Such soils may have existed in this meta-stable state for long periods.

**1.3.4 Dispersive soil**—a soil whose clay component loses its structure on contact with water, forming particles of colloidal or near-colloidal size.

**1.3.5 Foundation**—that earth material immediately underlying and supporting any engineering structure; thus the foundation for a wall or building is the stripped surface and a fill itself can be a foundation for a building.

**1.3.6 Reactive soils**—clay soils, for which a change in moisture content may result in a sufficient change in volume to affect the engineering performance of any structure in contact with this soil.

**1.3.7 Relative compaction** For cohesionless soils, the density index determined in accordance with AS 1289.E6.1 and for cohesive soils, the dry density ratio determined in accordance with AS 1289.E4.1, or the Hilf density ratio determined in accordance with AS 1289.E7.1.

**1.3.8 Rock fill**—fill composed almost exclusively of fragments of broken rock. It generally consists of a large portion of gravel and larger sized fragments. Such fill may contain large open voids.

**1.3.9 Structural filling**—any filling, which will, or may, be required to support structures or pavements, or for which it is intended time dependent settlement will be restricted.

**1.3.10 Topsoil**—a surficial soil containing some organic matter, usually darker than the underlying soil.

**1.4 DESIGNATION OF PERSONNEL** For the purpose of this Standard the following terms are relevant:

- (a) The Owner, sometimes called the Proprietor or the Principal.
- (b) The Designer.
- (c) The Superintendent, sometimes called the Engineer or the Architect.
- (d) The Constructor, sometimes called the Contractor or the Builder.
- (e) The Geotechnical Testing Authority.

NOTE: Suitable arrangements for the coordination of geotechnical testing are given in Appendix B.