

Amendment 1 - May 1988

Order Revision SAA DR 3046 of Feb 1989  
DR 85137

AS 1480

AS 3600 - 1988  
REINSTATED TAS MAY 1988  
See also MP 28 (C&T-304)

AS 1480-1982  
UDC 693.5  
SFB A B 3

Draft Commentary 85307  
OBSOLESCENT TAS MAY 1988

# Australian Standard

1480-1982 New ed. delayed until Jan 88  
WITHDRAWN APRIL TAS 1991

# SAA CONCRETE STRUCTURES CODE



**STANDARDS ASSOCIATION OF AUSTRALIA**

*Incorporated by Royal Charter*



This Australian standard was prepared by Committee BD/2, Concrete Structures. It was approved on behalf of the Council of the Standards Association of Australia on 12 January 1982 and published on 15 June 1982.

---

The following interests were represented on the committee responsible for the preparation of this standard:

Association of Consulting Engineers Australia  
Australian Federation of Construction Contractors  
Bureau of Steel Manufacturers of Australia  
Cement and Concrete Association of Australia  
Department of Housing and Construction  
Department of Public Works NSW and WA  
Division of Building Research CSIRO  
Experimental Building Station  
Hydro-electric Commission Tasmania  
Institution of Engineers, Australia  
Metropolitan Water Sewerage and Drainage Board  
National Association of Australian State Road Authorities  
National Ready Mixed Concrete Association  
Public Buildings Department South Australia  
Steel Reinforcement Promotion Group  
University of Adelaide  
University of New South Wales  
University of Sydney

---

To keep abreast of progress in industry, Australian standards are subject to continuous 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 their standards are up-to-date. Full details of all SAA publications will be found in the Annual List of Australian Standards; these details are supplemented by listings in the SAA monthly journal 'The Australian Standard'. Information on the Annual List and 'The Australian Standard' may be obtained from any sales office of the Association, where details are also available of the current status of individual standards. Suggestions for improvements to published standards, addressed to the head office of the Association, are welcomed.

AS 1480 Amdt 1/1986-05-05

STANDARDS ASSOCIATION OF AUSTRALIA  
Incorporated by Royal Charter

---

AMENDMENT to

to

AS 1480-1982

SAA CONCRETE STRUCTURES CODE

---

REVISED TEXT

*SUMMARY:* This amendment is necessitated by the publication of some new reference standards since the present edition of the standard was published in 1982 and applies to the Preface and Clauses 3.2 and 15.6. Also included is an amendment to Clause 2.1.3 and a typographical correction in Clause 20.2.

Published on 5 May 1986.

15 MAY 1986

AUSTRALIAN STANDARD

# THE USE OF REINFORCED CONCRETE IN STRUCTURES

known as the  
SAA CONCRETE STRUCTURES CODE

AS 1480 — 1982

First published	.. . . .	1974
Second edition	.. . . .	1982

10 JUN 1982

PUBLISHED BY THE STANDARDS ASSOCIATION OF AUSTRALIA  
STANDARDS HOUSE, 80 ARTHUR ST, NORTH SYDNEY, N.S.W.



ISBN 0 7262 2495 2

## PREFACE

This edition of this standard was prepared by the Association's Committee on Concrete Structures to supersede the 1974 edition.

It incorporates Amendment Nos 1 to 4 to the 1974 edition as well as alterations to the following:

Clauses 3.5, 3.6, 4.3.1, 4.5.6, 6.4 (d), 9.11.1.1 (a), 11.10.1.3, 26.2.3

Tables 13.2.2, 16.2, G2, G3, G4.

In addition editorial changes have been made to bring the standard into line with current SAA policy.

Although the committee's main task is currently the preparation of a Unified Concrete Structures Code in limit state format, this edition was necessary to take account of—

- introduction of Grade 410Y reinforcing bar;
- increased concern over durability of concrete structures;
- requests for clarification of shear reinforcement requirements;
- alterations to AS 1302 in relation to strength of welded or mechanically spliced reinforcement; and
- failure criteria for cantilevers under load testing.

The committee has based the provisions relating to the design of structural lightweight concrete on the results of tests made on the types of lightweight structural concrete used in Australia from 1960. Therefore, the standard applies to lightweight structural concrete made with coarse lightweight aggregate and normal-weight fine aggregate (sand) only. It does not apply to cellular concrete, no-fines concrete or concrete made entirely from lightweight aggregate for which there has been little use in Australia. Before lightweight concrete structures incorporating material from any new sources of supply of lightweight aggregate are designed, using the stress criteria of this standard, the lightweight concrete must be tested to prove that it is not inferior to that made from previously established sources of lightweight aggregate. Another point of considerable importance is that the specific provisions in overseas codes, in particular ACI 318, which are intended to ensure safe design within a very wide spectrum of aggregate quality, were not found to be relevant in the light of experience in Australia in recent years, where very different sources of supply have existed. For guidance in the design of lightweight concrete structures made with cellular concrete, no-fines concrete or concrete made entirely with lightweight aggregates (to which this standard does not apply), reference may be made to suitable overseas codes such as ACI 318—77.83

This standard requires reference to the following standards and related documents:

- AS 1012 Methods of Testing Concrete  
Part 1 — Method for Sampling Fresh Concrete  
Part 3 — Determination of Properties Related to the Consistence of Concrete  
Part 4 — Determination of Air Content of Freshly Mixed Concrete

Part 8 — Method for Making and Curing Concrete Compression, Indirect Tensile and Flexure Test Specimens in the Laboratory or in the Field

Part 9 — Determination of Compressive Strength of Concrete Specimens

Part 10 — Determination of Indirect Tensile Strength of Concrete Cylinders ("Brazil" or Splitting Test)

Part 11 — Determination of Flexural Strength of Concrete Flexure Test Specimens

Part 12 — Determination of Weight per Unit Volume of Hardened Concrete

Part 14 — Method for Securing and Testing Cores from Hardened Concrete for Compressive Strength or Indirect Tensile Strength

AS 1129 Fly Ash for Use in Concrete  
AS 1130 Code of Practice for Use of Fly Ash in Concrete

AS 1170 Methods for Sampling and Testing Aggregates

AS 1175 Structural Steel Hollow Sections

AS 1170 SAA Loading Code

Part 1 — Dead and Live Loads

Part 2 — Wind Forces

AS 1302 Steel Reinforcing Bars for Concrete

AS 1303 Hard-drawn Steel Reinforcing Wire for Concrete

AS 1304 Hard-drawn Steel Wire Reinforcing Fabric for Concrete

AS 1315 Portland Cement

AS 1317 Blended Cements

AS 1379 Ready-mixed Concrete

AS 1463 Dense Natural Aggregates for Concrete

AS 1467 Lightweight Aggregates for Structural Concrete

AS 1475 SAA Blockwork Code

AS 1478 Chemical Admixtures for Use in Concrete

AS 1479 Code of Practice for the Use of Chemical Admixtures in Concrete

AS 1481 SAA Prestressed Concrete Code

AS 1509 SAA Formwork Code

AS 1510 Code of Practice for Control of Concrete Surfaces

Part 1 — Formwork

AS 1530 Methods for Fire Tests on Building Materials and Structures

AS 1554 SAA Structural Steel Welding Code Part 3 — Welding of Reinforcing Steel

AS 2121 SAA Earthquake Code

AS 2758 Aggregates and rock for engineering purposes  
Part 1 — 1985, Concrete aggregates

SEE AMENDMENT 1

AS 3000 SAA Wiring Rules  
 BS 1881 Methods of Testing Concrete  
 Part 5 — Method of Testing  
 Hardened Concrete for Other Than  
 Strength

83 ~~SEE AMENDMENT /~~  
 ACI 318-77 Building Code Requirements for  
 Reinforced Concrete

Attention is also drawn to SAA MP28, Commen-  
 tary on AS 1480, SAA Concrete Structures Code.

AMDT **Page 2. PREFACE.**  
 No 1

MAY 1986 At the end of the paragraph preceding the list of  
 reference standards, *substitute* 'ACI 318—83' for  
 'ACI 318—77'.

In the list of references:—

*Delete* 'AS 1465 Dense Natural Aggregates for  
 Concrete'

*Delete* 'AS 1467 Lightweight Aggregates for Structural  
 Concrete'

After 'AS 2121 SAA Earthquake Code' *insert*:-

'AS 2758 Aggregates and Rock for Engineering  
 Purposes  
 Part 1—1985, Concrete Aggre-  
 gates'.

AMDT **Page 3. PREFACE.**  
 No 1

MAY 1986 At the end of the list of references, *substitute*  
 'ACI 318-83' for 'ACI 318-77'.

© Copyright — STANDARDS ASSOCIATION OF AUSTRALIA 1982

Users of standards are reminded that copyright subsists in all SAA publications. No part of  
 this publication may be reproduced, stored in a retrieval system in any form or transmitted  
 by any means without prior permission in writing of the Standards Association of Australia.

## CONTENTS

	<i>Page</i>		<i>Page</i>
<b>PART 1—GENERAL</b>		<b>PART 4—DESIGN: GENERAL</b>	
<b>SECTION 1. SCOPE AND GENERAL</b>		<b>SECTION 9. GENERAL DESIGN REQUIREMENTS</b>	
1.1 Scope .. .. .	6	9.1 Applied Forces .. .. .	30
1.2 New Materials or Methods .. .. .	6	9.2 Bases of Design .. .. .	30
1.3 Supervision .. .. .	6	9.3 Stability of the Structure as a Whole .. .. .	31
<b>SECTION 2. DEFINITIONS AND NOTATION</b>		9.4 Analysis of Structures: General .. .. .	32
2.1 Definitions .. .. .	7	9.5 Linear Elastic Analysis .. .. .	32
2.2 Notation .. .. .	7	9.6 Evaluation of Bending Moments and Shears by Coefficients .. .. .	33
<b>PART 2—MATERIALS</b>		9.7 Properties of Flexural Members .. .. .	33
<b>SECTION 3. MATERIALS</b>		9.8 Slenderness Limits for Beams .. .. .	34
3.1 Cement .. .. .	13	9.9 Deep Beams .. .. .	34
3.2 Aggregate .. .. .	13	9.10 Design Details for Reinforcement in Beams, Slabs and Walls .. .. .	35
3.3 Water .. .. .	13	9.11 Shear Reinforcement .. .. .	35
3.4 Reinforcement .. .. .	13	9.12 Compression Members .. .. .	36
3.5 Chemical Admixtures .. .. .	13	9.13 Transmission of Axial Force through Floor Systems .. .. .	37
3.6 Fly Ash .. .. .	13	9.14 Bearing .. .. .	37
3.7 Storage of Materials .. .. .	13	<b>SECTION 10. SERVICEABILITY</b>	
<b>PART 3—CONSTRUCTION</b>		10.1 Deflection .. .. .	38
<b>SECTION 4. QUALITY OF CONCRETE</b>		10.2 Cracking due to Bending in Flexural Members .. .. .	40
4.1 Specification of Concrete .. .. .	14	<b>SECTION 11. DEVELOPMENT OF STRESS IN REINFORCEMENT</b>	
4.2 Characteristic Strength .. .. .	14	11.1 Development Requirements — General .. .. .	42
4.3 Durability .. .. .	15	11.2 Positive Moment Reinforcement .. .. .	42
4.4 Properties of Fresh Concrete .. .. .	16	11.3 Negative Moment Reinforcement .. .. .	42
4.5 Sampling and Testing .. .. .	16	11.4 Development Length for Tensile Stress .. .. .	42
4.6 Determination of Standard Deviation .. .. .	17	11.5 Development Length for Compressive Stress .. .. .	43
4.7 General Requirements for Compliance .. .. .	18	11.6 Development Length for Bundled Bars .. .. .	43
4.8 Compliance of Concrete Specified by Required Properties .. .. .	18	11.7 Equivalent Tensile Development Length of a Hooked or Cogged Bar .. .. .	44
4.9 Compliance of Concrete Specified by Proportions .. .. .	19	11.8 Development of Stress in Reinforcing Fabric .. .. .	44
4.10 Tests on Concrete Deemed not to Comply .. .. .	19	11.9 Anchorage of Shear Reinforcement .. .. .	44
4.11 Indirect Tensile Strength of Lightweight Concrete .. .. .	19	11.10 Splices in Reinforcement .. .. .	45
<b>SECTION 5. FORMWORK AND ASSOCIATED MATTER</b>		<b>PART 5—PROPORTIONING OF MEMBERS BY THE ULTIMATE STRENGTH METHOD</b>	
5.1 Formwork .. .. .	20	<b>SECTION 12. GENERAL</b>	
5.2 Construction and Like Joints .. .. .	20	12.1 Application of Part .. .. .	47
5.3 Construction Tolerances .. .. .	20	<b>SECTION 13. LOADING AND EFFECTIVE STRENGTH</b>	
5.4 Pipes, Conduits, etc Embedded in Concrete .. .. .	20	13.1 Design Forces and Moments .. .. .	47
<b>SECTION 6. DETAILS OF REINFORCEMENT</b>		13.2 Effective Strength .. .. .	48
6.1 Application of Section .. .. .	22	<b>SECTION 14. GENERAL PRINCIPLES OF BENDING AND BENDING COMBINED WITH AXIAL COMPRESSION</b>	
6.2 Information to be Shown in Drawings .. .. .	22	14.1 Principles .. .. .	49
6.3 Bends, Hooks and Cogs .. .. .	22	14.2 Effective Strength in Pure Bending .. .. .	49
6.4 Bending of Reinforcement .. .. .	22	14.3 Effective Strength in Combined Bending and Compression .. .. .	49
6.5 Surface Condition of Reinforcement .. .. .	23	14.4 Simplified Procedure for Slenderness Effects .. .. .	50
6.6 Fixing Reinforcement .. .. .	23	14.5 Overall Stability of the Structure .. .. .	50
6.7 Spacing of Reinforcement .. .. .	23	14.6 Bearing .. .. .	50
6.8 Bundled Bars .. .. .	23	<b>SECTION 15. SHEAR AND TORSION</b>	
6.9 Welding of Reinforcement .. .. .	25	15.1 Certain Rules Regarding Shear Reinforcement .. .. .	51
6.10 Lap Splicing of Reinforcement .. .. .	25	15.2 Shear without Torsion .. .. .	51
6.11 Lateral Restraint of Compressive Reinforcement .. .. .	25	15.3 Shear with Torsion .. .. .	52
6.12 Concrete Protection for Reinforcement .. .. .	26	15.4 Special Provisions for Slabs and Footings .. .. .	53
<b>SECTION 7. MIXING AND PLACING CONCRETE</b>		15.5 Shear in a Column arising from the Transfer of Bending Moment to the Column .. .. .	55
7.1 Ready-mixed Concrete .. .. .	28	15.6 Special Provisions for Walls .. .. .	55
7.2 Concrete Not Ready Mixed to AS 1379 .. .. .	28		
7.3 Transporting .. .. .	28		
7.4 Placing .. .. .	28		
7.5 Curing .. .. .	28		
7.6 Cold Weather Requirements .. .. .	29		
7.7 Hot Weather Requirements .. .. .	29		
<b>SECTION 8. REJECTION OF HARDENED CONCRETE</b>			
8.1 Rejection of Hardened Concrete .. .. .	29		

## STANDARDS ASSOCIATION OF AUSTRALIA

## Australian Standard

for

## THE USE OF REINFORCED CONCRETE IN STRUCTURES

## PART 1 — GENERAL

## SECTION 1. SCOPE AND GENERAL

## 1.1 SCOPE.

**1.1.1 Application.** This standard sets out requirements for the use of reinforced concrete and plain concrete in any structure, except those excluded by Clause 1.1.2, in which the density of the concrete lies within the range 1250 kg/m<sup>3</sup> to 2600 kg/m<sup>3</sup>.

**NOTE:** It is intended that very light concrete and extremely dense concrete used in special structures should not be covered by this standard.

**1.1.2 Exclusions.** This standard is not intended to apply to the design of—

- (a) special structures such as highway and railway bridges;
- (b) hydraulic structures such as tanks and pipes;
- (c) prestressed concrete structures; and
- (d) ferrocement structures.

## 1.2 NEW MATERIALS OR METHODS.

**1.2.1 General.** This standard shall not be interpreted to prevent the use of materials or of methods of design or construction not specifically referred to in this standard.

**1.2.2 Use of New Materials or Methods.** If it is desired to use materials other than those specified, or methods of design or construction not covered by this standard, details of these materials or methods may be submitted to the SAA Committee on Concrete Structures for an expression of opinion as to compliance with the intention and spirit of this standard.

**NOTE:** The Building Authority must always make the ultimate decision as to whether or not a material or method of design or construction may be used.

## 1.3 SUPERVISION.

**1.3.1 General.** All concrete structures designed in accordance with this standard shall be so supervised as to ensure that all the requirements of the design as contained in the specification and the structural drawings are achieved in the construction.

**NOTE:** The supervisor, where he is not the designer, should, if any doubt arises—

- (a) as to the adequacy of any part of the design; or
  - (b) in the interpretation of the documents;
- refer the matter to the designer for a decision.

**1.3.2 Records.** The person or persons responsible for supervision shall ensure that the contractor keeps a record of—

- (a) the details (including types) of reinforcing steel;
- (b) the quality of concrete materials (with locations in the structure of test samples, test results and copies of manufacturers' certificates);
- (c) the mixing, placing and compaction of concrete; and
- (d) the general progress of the work (with dates of casting of each section);

and this record shall be available for inspection during the progress of the work, and for 2 years after completion of the work.

AMDT. No 1 MAY 1986	Page 7. Clause 2.1.3. In the definitions of 'Reinforcement, main' and 'Reinforcement, secondary', insert the word 'Steel' before 'reinforcement'.
------------------------------	--