

New Zealand Standard

Specification for Concrete Production

Superseding NZS 3104:1991

**NZS
3104:2003**

COMMITTEE REPRESENTATION

Committee P 3104 was responsible for the preparation of this Standard and consisted of the following nominating organizations:

Co-opted Chair

Cement & Concrete Association of New Zealand

Building Research Association of New Zealand (BRANZ)

New Zealand Concrete Society

New Zealand Ready Mixed Concrete Association

© COPYRIGHT

The copyright of this document is the property of the Standards Council. No part of it may be reproduced by photocopying or by any other means without the prior written permission of the Chief Executive of Standards New Zealand unless the circumstances are covered by Part III of the Copyright Act 1994.

Standards New Zealand will vigorously defend the copyright in this Standard. Every person who breaches Standards New Zealand's copyright may be liable to a fine not exceeding \$50,000 or to imprisonment for a term not to exceed three months. If there has been a flagrant breach of copyright, Standards New Zealand may also seek additional damages from the infringing party, in addition to obtaining injunctive relief and an account of profits.

Published by Standards New Zealand, the trading arm of the Standards Council, Private Bag 2439, Wellington 6140.

Telephone: (04) 498 5990, Fax: (04) 498 5994.

Website: www.standards.co.nz

AMENDMENTS

<i>No.</i>	<i>Date of issue</i>	<i>Description</i>	<i>Entered by, and date</i>
1	June 2007	Minor adjustments and corrections, and a new clause (12.13.3.2 (b)) added for on-site concrete production plants.	Incorporated in this edition.
2	February 2010	Recognises that there is now more than one type of mechanism used for weigh systems (knife edge/lever arm and load cell). Clause 2.7.3 has been updated and errors in the Contents, 1.3, 2.9.1, and 3.1.4 have been corrected.	Incorporated in this edition.

CONTENTS **PAGE**

Copyright	IFC
Referenced documents	4
Foreword	5

Section

1	GENERAL	7
1.1	Scope and interpretation	7
1.1.1	Scope	7
1.1.2	Interpretation	7
1.2	Definitions	7
2	PROVISIONS FOR READY-MIXED AND SITE-MIXED CONCRETE	10
2.1	General	10
2.1.1	Concrete	10
2.1.2	Limitations on specified strengths range	10
2.2	Inspection facilities	10
2.3	Supervision and technical control	10
2.3.1	Technical control	10
2.3.2	Supervision	10
2.3.3	Monitoring of test results	11
2.4	Materials	11
2.4.1	General	11
2.4.2	Alkali aggregate reaction	11
2.4.3	Coarse aggregate	12
2.4.4	Sand	12
2.4.5	Other provisions	13
2.5	Batching plant	13
2.5.1	Storage of materials	13
2.5.2	Weighing hoppers	14
2.5.3	Admixtures	14
2.6	Measurement of materials	14
2.6.1	Cement and aggregates	14
2.6.2	Water	14
2.6.3	Admixtures	14
2.6.4	Accuracy	14
2.7	Weighing equipment	15
2.7.1	General	15
2.7.2	Cement and aggregates	15
2.7.3	Testing and accuracy of weighing equipment	16
2.8	Concrete mixing	18
2.8.1	Mixing by stationary mixer	18
2.8.2	Mixing by truck mixer	18
2.9	Transportation	19
2.9.1	Ready-Mixed Concrete	19
2.9.2	Delivery by truck mixer or agitator	19
2.9.3	Addition of water on site	19
2.9.4	Delivery of concrete by non-agitating equipment	19

Amd 2
Feb '10

2.10	Responsibility for mix design.....	20
2.10.1	Normal Concrete (N).....	20
2.10.2	Special Concrete (S).....	20
2.10.3	Compliance	21
2.11	Mixing records.....	21
2.11.1	Ready-Mixed Concrete	21
2.11.2	Site-Mixed Concrete	21
2.11.3	Availability of records.....	21
2.12	Concrete mixes – general requirements	21
2.13	Target mean strengths and variability control.....	21
2.13.1	Normal Concrete.....	21
2.13.2	Special Concrete.....	24
2.13.3	Compliance and evidence of a variability control	25
2.14	Concrete mix design	26
2.14.1	Mix design information	26
2.14.2	Confirmatory tests.....	26
2.15	Control tests and their evaluation.....	26
2.15.1	Slump tests	26
2.15.2	Yield tests.....	27
2.15.3	Air content tests	28
2.15.4	Performance test for mixers and truck mixers.....	28
2.15.5	Strength tests for proof of control.....	29
2.15.6	Evaluation of strength test results.....	30
2.15.7	Plant test records	31
2.15.8	Testing of laboratory equipment.....	32
2.16	Quality audit	33
2.16.1	Certificate of Audit.....	33
2.16.2	Information for Certificate of Audit.....	33
2.16.3	First audit	33
2.16.4	Quarterly monitoring	33
2.16.5	Control	33
3	PROVISIONS FOR PRESCRIBED MIX CONCRETE	34
3.1	General	34
3.1.1	Production.....	34
3.1.2	Compliance	34
3.1.3	Strengths of Prescribed Mix Concrete	34
3.1.4	Definition	34
3.2	Supervision and technical control	34
3.2.1	Batching	34
3.2.2	Certification	34
3.2.3	Disputes	34
3.3	Materials.....	34
3.3.1	General	34
3.3.2	Aggregate	35
3.3.3	Proportion of sand and aggregate	36
3.3.4	Weight batching	36

3.4	Prescribed concrete mixes	36
3.4.1	Proportions of materials	36
3.4.2	Methods of volume batching	36
3.4.3	Accuracy	36
3.5	Concrete mixing	37
3.5.1	Loading	37
3.5.2	Remaining water	37
4	CONCRETE MIXERS	38
4.1	General	38
4.1.1	Performance	38
4.1.2	Operation	38
4.1.3	Application	38
4.2	Performance	38
4.2.1	Mixing	38
4.2.2	Non-complying mixers	38
4.2.3	Mixer maintenance and repair	38
4.2.4	Identification plates	39
4.3	Batch mixers	39
4.3.1	Mixer controls	39
4.3.2	Rated mixing capacity	39
4.3.3	Minimum mixing criteria	39
4.3.4	Determination of minimum mixing time or number of revolutions	39
4.3.5	Identification plates	39
4.4	Continuous mixers	40
4.4.1	Charging rate	40
4.4.2	Identification plates	40

Figure

2.1	Evaluation of coefficient of variation	24
4.1	Identification plate for mixers	40

Table

2.1	Grading recommendations for combined and uncombined coarse aggregates	12
2.2	Accuracy of measurement	15
2.3	Scale division	16
2.4	Accuracy of weighing equipment and frequency of tests ..	17
2.5A	Criteria for plants with a minimum testing regime of 10 tests per month	22
2.5B	Criteria for plants with a minimum testing regime of 6 tests per month	22
2.5C	Plant criteria for interim Certificate of Audit	23
2.6	Maximum tolerances for slump at the plant	27
2.7	Performance test requirements of uniformity of concrete for stationary and truck mixers	29
2.8A	Evaluation of compression test results	32
2.8B	Evaluation of compression test results	32
3.1	Prescribed mixes (P)	35
3.2	Combined grading requirements	36
3.3	Accuracy of measurement	37

REFERENCED DOCUMENTS

Reference is made in this document to the following:

NEW ZEALAND STANDARDS

NZS 3109:1997	Concrete construction
NZS 3111:1986	Methods of test for water and aggregate for concrete
NZS 3112:1986	Methods of test for concrete Part 1: Tests relating to fresh concrete Part 2: Tests relating to the determination of strength of concrete
NZS 3121:1986	Specification for water and aggregate for concrete
NZS 3122:1995	Specification for Portland and blended cements (General and special purpose)
NZS 3123:1974	Specification for Portland pozzolan cement (type PP cement)
NZS 3125:1991	Specification for Portland-limestone filler cement
NZS 3604:1999	Timber framed buildings
NZS 4210:2001	Masonry construction: Materials and workmanship
NZS 4229:1999	Concrete masonry buildings not requiring specific engineering design

AUSTRALIAN STANDARDS

AS 1012.1-1993	Methods of testing concrete – Sampling of fresh concrete
AS 1012.20-1992	Methods of testing concrete – Determination of chloride and sulfate in hardened concrete and concrete aggregates
AS 1478.1-2000	Chemical admixtures for concrete, mortar and grout – Admixtures for concrete

AMERICAN STANDARD

ASTM C1152/C1152M-97 – Standard Test Method for Acid-Soluble Chloride in Mortar and Concrete

OTHER DOCUMENT

TR3 – Alkali Aggregate Reaction – Minimizing the Risk of Damage to Concrete (Guideline notes and Model Specification Clauses).

LATEST REVISIONS

The users of this Standard should ensure that their copies of the above mentioned New Zealand Standards and referenced overseas Standards are the latest revisions or include the latest amendments. Amendments to New Zealand and Joint Australian/New Zealand Standards can be found on www.standards.co.nz.