

NZS 3116:2002

CONCRETE SEGMENTAL AND FLAGSTONE PAVING

AMENDMENT NO. 1

February 2009

REVISED TEXT

EXPLANATORY NOTE

Amendment No.1 extends the scope of NZS 3116 to include flagstone paving.

APPROVAL

Amendment No. 1 was approved on 17 February 2009 by the Standards Council to be an amendment to NZS 3116:2002.

Title, cover

After 'segmental' **add** 'and flagstone'.

(Amendment No. 1, February 2009)

CONTENTS (page 1)

PART 2 after 'PAVERS' **add** 'AND FLAGSTONES'.

PART 3 delete 'PAVING' and **substitute** 'AND FLAGSTONE PAVING'.

302 after 'paver' **add** 'and flagstone'.

After table 1, **add** new entry:

1A Flagstone selection 12

Figure 1 after 'segmental' **add** 'and flagstone'.

Figure 2 after 'Paver' **add** 'and flagstone'.

(Amendment No. 1, February 2009)

RELATED DOCUMENTS (page 2)

Delete related documents and **substitute**:

REFERENCED DOCUMENTS

Reference is made in this document to the following:

NEW ZEALAND STANDARDS

NZS 3103:1991	Sands for mortars and plasters
NZS 3111:1986	Methods of test for water and aggregate for concrete
NZS 4210:2001	Masonry construction: Materials and workmanship



Single User PDF Terms & Conditions

You have material which is subject to strict conditions of use. Copyright in this material is owned by the New Zealand Standards Executive. Please read these terms and conditions carefully, as in addition to the usual range of civil remedies available to Standards New Zealand on behalf of the New Zealand Standards Executive for infringement of copyright, under New Zealand law every person who infringes copyright may be liable to a fine of up to \$10,000 for every infringing copy or imprisonment of up to 5 years, or a fine of up to \$150,000 or imprisonment not exceeding 5 years.

You have access to a single-user licence to read this non-revisable Adobe Acrobat PDF file and print out and retain ONE printed copy only.

We retain title and ownership of the copyright in this PDF file and the corresponding permitted printed copy at all times.

Under this license use of both the PDF file and the single permitted printed copy of this PDF file you may make are restricted to you. Under no circumstances are you permitted to save, sell, transfer, or copy this PDF file, the one permitted printed copy of this PDF file, or any part of either of them.

You undertake that you will not modify, adapt, translate, reverse engineer, decompile, disassemble or create derivative works based on any of the downloaded PDF file, nor will you merge it with any other software or document, even for internal use within your organization.

Under no circumstances may this PDF file be placed on a network of any sort without our express permission.

You are solely responsible for the selection of this PDF file and any advice or recommendation given by us about any aspect of this PDF file is intended for guidance only and is followed or acted upon entirely at your own risk.

We are not aware of any inherent risk of viruses in this PDF file at the time that it is accessed. We have exercised due diligence to ensure, so far as practicable, that this file does not contain such viruses.

No warranty of any form is given by us or by any party associated with us with regard to this PDF file, and you accept and acknowledge that we will not be liable in any way to you or any to other person in respect of any loss or damage however caused which may be suffered or incurred or which may arise directly or indirectly through any use of this PDF file.

Regardless of where you were when you received this PDF file you accept and acknowledge that to the fullest extent possible you submit to New Zealand law with regard to this licence and to your use of this PDF file.

Copyright Standards New
Zealand

NZS 4402.6:1986	Methods of testing soils for civil engineering purposes – Part 6 Section 1:1986 Determination of the California Bearing Ratio (CBR)
NZS 4407.3:1991	Methods of sampling and testing road aggregates
Part 3.5:1991	Laboratory tests – Test 3.5 The clay index
Part 3.8.2:1991	Laboratory tests – The particle-size distribution – Test 3.8.2 Subsidiary method by dry sieving

JOINT AUSTRALIAN/NEW ZEALAND STANDARDS

AS/NZS 3661.2:1994	Slip resistance of pedestrian surfaces – Guide to the reduction of slip hazards
AS/NZS 4455:1997	Masonry units and segmental pavers
AS/NZS 4456:2003	Masonry units, segmental pavers and flags – Methods of test
Part 3:1997	Determining dimensions
Part 5:1997	Determining breaking load of segmental paving units
Part 9:1997	Determining abrasion resistance
AS/NZS 4586:2004	Slip resistance classification of new pedestrian surface materials

AUSTRALIAN HANDBOOK

SAA HB 197:1999	An introductory guide to the slip resistance of pedestrian surface materials
-----------------	--

BRITISH STANDARDS

BS EN 1339:2003	Concrete paving flags. Requirements and test methods
BS 7533.4:2006	Pavements constructed with clay, natural stone or concrete pavers. Code of practice for the construction of pavements of precast concrete flags or natural stone slabs

OTHER DOCUMENTS

Austrroads	Guide to Pavement Technology Part 4D 2006 Stabilised Materials. AGPT 04D/06
Department of Building and Housing	New Zealand Building Code (NZBC)
Transit New Zealand	
TNZ B/2:1987	Construction of unbound granular pavement layers
TNZ F/1:1986	Earthworks construction
TNZ F/2:1984	Pipe subsoil drainage construction
TNZ F/6:1985	Fabric wrapped aggregate subsoil drain construction
TNZ M/3 Notes:1986	Sub-base aggregate

LATEST REVISIONS

The users of this Standard should ensure that their copies of the above mentioned Standards are the latest revisions. Amendments to referenced New Zealand and joint Australian/New Zealand Standards can be found at <http://www.standards.co.nz>.

REVIEW OF STANDARDS

Suggestions for improvement of this Standard will be welcomed. They should be sent to the Chief Executive, Standards New Zealand, Private Bag 2439, Wellington 6140.

(Amendment No. 1, February 2009)

FOREWORD (page 4)

Delete foreword and **substitute:**

This Standard is a revision of NZS 3116:1991 Interlocking Concrete Block Paving and contains provisions for the non-specific engineering design and construction of pavements using segmental pavers and flagstones. The revision provides for New Zealand variations to paver and flagstone manufacture and tests in relation to the Joint Standards AS/NZS 4455 and AS/NZS 4456.

The many applications for interlocking concrete segmental pavements and flagstone pavements flow directly from the advantages inherent in this form of construction, as opposed to more conventional pavements. These advantages include:

- (a) Access to underground services without significant damage of the concrete pavers and flagstones, and opportunity of reinstatement without leaving unsightly and poorly finished patches;
- (b) Ease of reinstatement of areas of localized settlement without destruction of the pavement or use of road-breaking equipment;
- (c) Simple construction methods suited to unskilled labour but with skilled supervision;
- (d) Low construction plant cost;
- (e) Low maintenance costs and long service life;
- (f) Ability to withstand repeated pavement flexing under traffic loads;
- (g) Suitable for many types of pavements from light duty through to heavy duty with high wheel loads or (with appropriate paver specification) with tracked vehicles;
- (h) Suitability for re-use after lifting for service access, maintenance, or to change layouts;
- (i) Durability and abrasion resistance;
- (j) Design flexibility;
- (k) Suitability for paving both large and small complex areas;
- (l) Aesthetic appeal;
- (m) Wide range of colours;
- (n) Specific areas can be delineated by the use of pavers of contrasting colour.



The range of paver thickness provided by this Standard is 40 mm to 80 mm. While all edge restrained paving to this Standard exhibits some interlocking characteristics, thicknesses of pavers below 50 mm are not regarded as providing any significant interlock. Only 50 mm thickness and over should be used for vehicular traffic. A table of suitable paver applications is included as table 1.

The range of flagstone thickness provided by this Standard is 40 mm to 60 mm. A table of suitable flagstone applications is included as table 1A.

Previous versions of this Standard did not contain performance criteria or provide a suitable test method for evaluating abrasion resistance. This edition contains both performance criteria and a referenced test method.

Modifications to the acceptable grading limits for bedding sands have been introduced.

Appendix A – Method for the determination of abrading stability is normative i.e. an integral part of this Standard.

Amendment No. 1 in 2009 extended the scope of the Standard to include flagstone paving.

(Amendment No. 1, February 2009)

Title, **CONCRETE SEGMENTAL PAVING** (page 7)
After '**SEGMENTAL**', add '**AND FLAGSTONE**'.

(Amendment No. 1, February 2009)

PART 1 GENERAL

101.1 (page 7)

Delete clause and **substitute:**

This Standard is in three parts. General clauses are contained in Part 1. The manufacture, testing, acceptance, and supply of concrete segmental pavers and flagstones are contained in AS/NZS 4455 and AS/NZS 4456, and further requirements are contained in Part 2. The design and construction of the concrete segmental and flagstone paving is covered in Part 3.

(Amendment No. 1, February 2009)

101.2 (page 7)

Delete clause and commentary clause and **substitute:**

Pavement loadings described in this Standard range from highway traffic to pedestrian use. Pavements carrying special purpose traffic loading shall be the subject of specific engineering design. Flagstone pavements carrying road traffic are outside the scope of this Standard, and therefore require specific engineering design.

C101.2

Recommended specifications for the design and construction of segmental concrete and flagstone pavements are given in Part 3, but the overall design of the pavement thickness should be carried out for the specific loading condition.

(Amendment No. 1, February 2009)

101.5 (page 7)**Delete** clause and commentary, and **substitute:****101.5**

Pavers used in this Standard are of a plan size not exceeding 0.08 m², a width to length ratio not exceeding 2 and thicknesses ranging from 40 mm to 80 mm.

Flagstones used in this Standard are of a plan size exceeding 0.08 m², a width to length ratio not exceeding 2 and thicknesses ranging from 40 mm to 60 mm.

(Amendment No. 1, February 2009)

101.6 (page 7)**Insert** new clause**101.6**

This Standard does not cover the design and construction of permeable pavements.

(Amendment No. 1, February 2009)

103 DEFINITIONS (page 8)**CONCRETE SEGMENTAL PAVING**, **Delete** definition and **substitute:**

- (a) **INTERLOCKING PAVING** means a pavement structure comprising a surface course of interlocked concrete pavers of at least 50 mm in thickness and less than 0.08 m² in plan, with sand filling in the joints between pavers, a sand bedding course, a basecourse, a sub-base (depending on subgrade and traffic loading conditions), the subgrade, and edge restraint (see figure 1).
- (b) **OTHER SEGMENTAL PAVING** means a pavement structure comprising pavers under 50 mm in thickness and less than 0.08 m² in plan, with sand filling in the joints between pavers, a sand bedding course, a basecourse (depending on subgrade conditions), the subgrade, and edge restraints.

Insert new definition, **FLAGSTONE**:

FLAGSTONE means a large format solid paver with a gross plan area greater than 0.08 m².

Insert new definition, **FLAGSTONE PAVING**:

FLAGSTONE PAVING means a pavement structure comprising a surface course of flagstones at least 40 mm in thickness with sand filling between the joints, a precompacted sand bed to 309.3.2 or specifically designed alternative, a basecourse, a sub-base (depending on sub-grade), and edge restraint.

INTERLOCK, **Delete** definition and **substitute:**

INTERLOCK means the horizontal and vertical shear resistance developed by the keying action of the sides of pavers or flagstones and the frictional forces developed between pavers or flagstones having a minimum thickness of 50 mm and a bonded laying pattern.

JOINTING SAND, after 'pavers', **add** 'and flagstones'.**PAVER**, **Delete** definition and **substitute:**

PAVER means a rectangular or shaped solid unit of up to 0.08 m² in face area manufactured to close tolerances, with plane or dentated sides, top and bottom faces parallel, preferably with arrises of the top surface chamfered, and of a size that can be hand placed.

SUBGRADE, **Delete** 'segmental paving', and **substitute:** 'pavement'.

SURFACE COURSE, **Delete** definition and **substitute:**

SURFACE COURSE means pavers or flagstones laid together in a specific pattern with joints between them filled by sand which is densified by vibration.

TRAFFIC LOADING CLASSIFICATION, **Delete** last paragraph of NOTE (ii) and **substitute:**

Although pavers and flagstones for different classifications can be selected from tables 1 and 1A, the flexible pavement may need specific engineering design.

(Amendment No. 1, February 2009)

Figure 1 (page 8)

Amend figure title to 'Basic components of segmental and flagstone paving'.

(Amendment No. 1, February 2009)

PART 2 SPECIFICATION FOR CONCRETE SEGMENTAL PAVERS (page 10)

After 'PAVERS', add 'AND FLAGSTONES'.

(Amendment No. 1, February 2009)

201 INTENDED USE (page 10)

Delete clause and **substitute:**

This specification applies to:

- (a) Flagstones designed for pedestrian, and light vehicular traffic as defined in table 1A and constructed in accordance with Part 3 of this Standard; and
- (b) Concrete pavers designed for pedestrian traffic or to carry rubber-tyred vehicles and constructed in accordance with Part 3 of this Standard.

For a manufacturer of pavers or flagstones to demonstrate compliance with AS/NZS 4455 and this Standard, the manufacturer shall make available paver or flagstone work sizes and characteristic breaking loads that satisfy the proposed use of the paver or flagstone as described in tables 1 and 1A of this Standard.

(Amendment No. 1, February 2009)

202 PAVER SPECIFICATION AND PRODUCTION (page 10)

Delete first paragraph and **substitute:**

Manufacture, testing, acceptance, and supply of concrete segmental pavers shall be in accordance with AS/NZS 4455 and AS/NZS 4456 except where modified by the following clauses (a) to (c):

Delete subclause (b) and **substitute:**

- (b) AS/NZS 4456.5 Method 5 Determining breaking load of segmental and flagstone paving units. For all products within the maximum dimensional range of 190 mm to 240 mm the test span 'l' for Clause 6 Procedure (a) shall be fixed at 150 mm.

For all products listed in table 1A, the test span 'l' for Clause 6 Procedure (a) shall be fixed at 250 mm.

Other products outside the dimensional range specified above, shall follow the requirements of Clause 6 Procedure (a) of AS/NZS 4456.5.

NOTE – For products over 80 mm in thickness it is recommended that a product control test programme be based on AS/NZS 4456.18 Method 18 Determining tensile strength of masonry units and segmental pavers.

C202 (page 10)
Delete this commentary clause and **substitute**:

C202

Experience has shown that high volumes of pedestrian traffic cause surface abrasion. An abrasion resistance test is contained in AS/NZS 4456.9 Method 9 and should form part of any specification requirements for public footpaths. Not all pavers and flagstones are produced with the abrasion characteristics as a primary feature and specifiers should check with manufacturers on the availability of such pavers and flagstones before use. Some further guidelines on this issue are shown in tables 1 and 1A of this Standard.

As the breaking load value is not directly used in pavement design, the test spans have been fixed to simplify product testing procedures. The breaking load value is set for overall performance and quality control.

(Amendment No. 1, February 2009)

PART 3 DESIGN AND CONSTRUCTION OF CONCRETE SEGMENTAL PAVING (page 11)

Delete ‘PAVING’ and **substitute**: ‘AND FLAGSTONE PAVING’.

(Amendment No. 1, February 2009)

301 SCOPE (page 11)
Delete clause and **substitute**:

301 SCOPE

Part 3 of this Standard sets out the requirements for the paver and flagstone selection, design and construction of pavements for a range of pavers and flagstones used under New Zealand conditions, using products complying with AS/NZS 4455 and Part 2 of this Standard.

Although pavers and flagstones for different classifications can be selected from tables 1 and 1A, the flexible pavement may need specific engineering design.

(Amendment No. 1, February 2009)

302 PAVER SELECTION (page 11)
Delete clause and **substitute**:

302 PAVER AND FLAGSTONE SELECTION

The paver type shall be selected in accordance with the proposed application in table 1.

The flagstone type shall be selected from table 1A. Flagstones of nominal size or loading greater than specified in table 1A will require specific engineering design. Specific engineering design requirements need to be agreed between the specifier/designer and the producer. Testing regimes may be arranged between the producer and the product user.

Amendment No. 1, February 2009)

Table 1 (page 11)**Delete** table and **substitute**:**Table 1 – Paver selection**

Applications	Characteristic breaking load ⁽¹⁾ (kN) per 100 mm width	Minimum thickness ⁽²⁾ (mm)	Shape ⁽³⁾	Dimensional tolerances ⁽⁴⁾	Edge detail ⁽⁵⁾	Abrasion resistance at 56 days mean ⁽⁶⁾	Minimum slip resistance classification ⁽⁸⁾
Relevant AS/NZS	4456.5	–	–	4455/4456.3	–	4456.9	4586
1 Residential Pedestrian	3.0	40	Any	DPB1	SQ/SC/R/CH	Not required	W
2 Residential driveways Light Traffic	5.0	50	Any	DPB2	CH/R	Not required	W
Medium Traffic	Follow provisions of application 4 Roads: Minor						
3 Public footpaths Low Impact High Impact	5.0 5.0	50 50	Any Any	DPB2 DPB2	SQ/SC/CH SQ/SC	6.0 3.5	W W
4 Roads Minor Local Main	6.0 12.0 12.0	60 80 80	Rr/Dd Rr/Dd Rr/Dd	DPB2 DPB2 DPB2	CH CH CH	Not required Not required Not required	W W W
5 Industrial pavements	Specific engineering design ⁽⁷⁾	80	Rr/Dd	DPB3	CH	See Note (7)	W

NOTES to table 1

- (1) The characteristic breaking load to AS/NZS 4456.5, as amended by clause 202(b), is carried out on a 150 mm actual paver width in mm. The figures quoted are based on a 100 mm width, i.e. actual breaking load x the ratio of 100 mm divided by the actual paver width mm. The modulus of rupture value of any paver shall not be less than 4 MPa. Where pavers may be subject to chemical/environmental exposure e.g., marine, swimming pools, thermal pools etc. it is recommended that they be subjected to the resistance test contained in AS/NZS 4456.10 to demonstrate an acceptable performance at 50 cycles of test.
- (2) In application 3 where pedestrian areas may be subject to service vehicles, a 60 mm SC paver is recommended.
- (3) The principal shapes are:
- (a) Rectangular 2:1 ratio (Rr);
 - (b) Rectangular 2:1 ratio (Dd) but dentated for additional interlock;
 - (c) Approximately square, see 304.1 for laying patterns.
- (4) DPB is fully defined in AS/NZS 4455 and relates to dimensions (D) of paver (P) and specifies a method of measurement (B) with a tolerance (1 or 2). The method of measurement is contained in AS/NZS 4456.3.
- (5) Definitions:
- SQ – square edge
 - SC – shallow chamfer no deeper than 2 mm and no wider than 7 mm.
 - R – rumpled
 - CH – chamfer no deeper than 4 mm in depth and no wider than 7 mm.



- (6) The abrasion index figures quoted are values established as criteria for satisfactory performance of pavers going into service at an age of 56 days in areas subjected to pedestrian impact traffic. Typical abrasion test index values at 28 days rather than 56 days are 7 and 4 respectively. Where abrasion resistance is required, the drawings, specification, and/or purchase order for the pavers should specify the abrasion resistance value to be achieved.
- (7) Industrial pavers may be required to have special strength requirements. Specific engineering design requirements need to be agreed between the specifier/designer and the producer. These may require a specified abrasion index. Alternative testing regimes may be arranged between the producer and the product user.
- (8) Products with minimum slip resistance classification W when tested in accordance with AS/NZS 4586 and used in accordance with SAA HB 197 and AS/NZS 3661.2 provide an Alternative Solution for the Compliance Document for NZBC Clause D1.

(Amendment No. 1, February 2009)

New table, Table 1A (page 12)
Insert new table:

Table 1A – Flagstone selection

Pavement applications	Characteristic breaking load kN per 100 mm width ⁽¹⁾	Nominal size (mm)	Minimum thickness (mm)	Dimensional tolerance ⁽²⁾	Flatness tolerance (mm)	Edge detail ⁽³⁾	Abrasion resistance at 56 days (mean) ⁽⁴⁾	Minimum slip resistance ⁽⁵⁾
Relevant AS/NZS	4456.5	–	–	4455/4456.3	4456.19	–	4456.9	4586
1 Residential pedestrian	2.6	600x600 500x500 450x450 400x400 300x300	40 40 40 40 40	DPB1	2.5 2.2 2.0 1.5 1.0	SQ/SC/CH	Not required	W W W W W
2 Residential driveways Light Traffic	3.8	300x300	60	DPB2	1.0	CH	Not required	W
3 Public footpaths Low Impact High Impact	3.8	450x450 400x400 300x300	60 60 60	DPB2	2.0 1.5 1.0	SQ/SC/CH	Low impact 6.0 or High impact 3.5	W W W

NOTES to table 1A

(1) Breaking loads are characteristic on a 250 mm span by 100 mm nominal width. For large sizes, specimens may be cut, tested, and compared with the results above.

(2) DPB is fully defined in AS/NZS 4455 and relates to dimensions (D) of paver (P) and specifies a method of measurement (B) with a tolerance (1 or 2). The method of measurement is contained in AS/NZS 4456.3.

- (3) Definitions:
- SQ – square edge
 - SC – shallow chamfer no deeper than 2 mm and no wider than 7 mm.
 - CH – chamfer no deeper than 4 mm in depth and no wider than 7 mm.
- (4) The abrasion index figures quoted are values established as criteria for satisfactory performance of flagstones going into service at an age of 56 days in areas subjected to pedestrian impact traffic. Typical abrasion test index values at 28 days rather than 56 days are 7 and 4 respectively. Where abrasion resistance is required, the drawings, specification, and/or purchase order for the pavers should specify the abrasion resistance value to be achieved.
- (5) Products with minimum slip resistance classification W when tested in accordance with AS/NZS 4586:2004 and used in accordance with SAA HB 197 and AS/NZS 3661.2 provide an Alternative Solution for the Compliance Document for NZBC Clause D1.

(Amendment No. 1, February 2009)

304.1 (page 13)

Delete clause and **substitute:**

304.1

The shape of pavers and flagstones and their laying patterns shall be suitable for the loading classification. For applications 4, 5, and medium traffic application 2 as given in table 1 the laying pattern shall be herringbone preferably laid at 45° to the traffic flow. Any of the three basic patterns illustrated in figure 2 may be used for applications 1, 3, and light traffic application 2 unless specified otherwise.

NOTE – Stretcher pattern is the application for square flagstones.

(Amendment No. 1, February 2009)

Figure 2 – Paver laying patterns (page 14)

After 'Paver' add 'and flagstone'.

Delete NOTE and **substitute:**

NOTE – The possible laying patterns are a function of the shape of the paver/flagstone. Most rectangular pavers and flagstones can be laid in any of the three basic patterns – herringbone, stretcher, and basketweave (or parquet). The herringbone pattern is the most satisfactory as it resists movements of the pavers and flagstones in both plan directions. A herringbone pattern laid at 45° to the traffic direction has been found to be most successful in resisting loads, including braking forces in heavy industrial applications. Square flagstones are laid as stretcher pattern.

(Amendment No. 1, February 2009)

306.1 (page 15)

In the first sentence after 'pavers' **add** 'and flagstones'.

(Amendment No. 1, February 2009)

C306.2 (page 16)

After 'pavers' **add** 'and flagstones'.

(Amendment No. 1, February 2009)

C307.1 (page 16)
Delete commentary clause and **substitute:**

C307.1
Compaction of the subgrade is desirable to minimise future settlement under traffic loading and to improve the shear strength of the soil. All subgrades should be given at least a light rolling, with more compaction for the heavier loadings. It is important that the subgrade be uniform in strength otherwise uneven settlement may occur leading to possible ponding or uneven riding. Methods of subgrade preparation, compaction, stabilisation, and testing are outlined in the Austroads Guide to Pavement Technology Part 4D Stabilised Materials.

Geotextiles can also offer worthwhile benefits when placed over weak subgrades.

(Amendment No. 1, February 2009)

309.1.2 Sand properties (page 18)
Delete subclause (a) and **substitute:**

- (a) Sand shall be permeable after compaction with the clay index of the fraction of sand passing the 75µm sieve not greater than 3 when the sand is tested according to NZS 4407.3.5.

(Subclauses (b), (c), and (d) remain unchanged).

(Amendment No. 1, February 2009)

309.3.1 Method 1 Sand surcharge (page 18)
After 'surcharge' **add** '(applicable to segmental pavers only)'.

(Amendment No. 1, February 2009)

309.3.2 Method 2 Sand precompaction (page 19)
After 'precompaction' **add** '(applicable to segmental pavers and flagstones)'.

(Amendment No. 1, February 2009)

Add new commentary clause, C309.3.2 (page 19)

C309.3.2
For flagstones over 500 mm with sloping sides refer to manufacturers' recommendations, which may include cement stabilising the bedding sand.

(Amendment No. 1, February 2009)

310.1.1 (page 19)
After 'Pavers' **add** 'and flagstones'.

(Amendment No. 1, February 2009)

310.1.2 (page 19)
Delete clause and **substitute:**
310.1.2

Joint widths between pavers and flagstones shall be within the range 2 – 4 mm when using jointing sand. Flagstones in pedestrian applications where the joints are to be grouted shall be spaced within the range of 5 – 10 mm.

Where pavers with raised spacer nibs are used, the above joint widths shall apply to the portions of pavers that are not raised.

(Amendment No. 1, February 2009)

Add first paragraph

(Amendment No. 1, February 2009)

After 'pavers', **add** 'or flagstones'.

(Amendment No. 1, February 2009)

Delete commentary and **substitute:**

(Amendment No. 1, February 2009)

After 'pavers' **add** 'or flagstones'.

(Amendment No. 1, February 2009)

Delete title and substitute:

Laying and initial compaction of pavers where bedding sand is laid to method 1, 309.3.1.

(Amendment No. 1, February 2009)

Add new clause 310.5 and commentary clause **C310.5** (page 21)

310.5 Laying of pavers and flagstones where bedding sand is laid to method 2, 309.3.2

The pavers and flagstones shall be bedded into the loose top surface of the bedding sand.

(Amendment No. 1, February 2009)

After 'pavers' **add** 'and flagstones'.

(Amendment No. 1, February 2009)

Delete clause and **substitute**:

311.1.2

Joint sand shall be free of all soluble deleterious salts and other contaminants. The clay index of the fraction of sand passing the 75 μ m sieve shall not be greater than 3 when the sand is tested according to NZS 4407.3.5. The sand shall have not more than 2.5 % by weight of lightweight particles as determined by NZS 3111, section 9. Joint sand shall not have a water soluble chloride content in excess of 0.05 % by its mass where aesthetics of the finished paving are of importance.

(Amendment No. 1, February 2009)

After **'Placing'**, add **'joint'**.

(Amendment No. 1, February 2009)

311.2.1 (page 22)

Add title, 'For pavers only'.

(Amendment No. 1, February 2009)

Delete clauses **311.2.2 to 311.2.4** (page 22) and **substitute:**

311.2.2 *For flagstones only*

As soon as practicable after the initial compaction of the flagstones and infilling of closures, all jointing sand shall be swept across the flagstones and introduced into the joints. Joints shall be completely filled with dense sand.

311.2.3

Surface stabilisers shall not be applied until the sand joint has achieved full mechanical lock-up.

C311.2.3

Traffic use increases mechanical lock-up.

311.2.4

Joints shall be inspected between 1 and 3 days after sanding and after trafficking, and resanded and/or revibrated as necessary. Reinspection and topping up shall continue at intervals between 1 and 2 weeks until two such inspections show no loss or settlement of joint sand.

311.2.5

Excess sand shall be removed from the pavement following the final inspection.

Insert new clause (page 22)

311.3 Mortar

Mortar for grouted joints shall comply with mortar requirements of NZS 4210.

(Amendment No. 1, February 2009)

312.1 (page 22)

In the last line after 'pavers' **add** 'or flagstones'.

(Amendment No. 1, February 2009)

313.1 (page 23)

Delete clause and **substitute:**

313.1 Surface coatings

Surface coatings if applied shall not reduce the slip resistance in wet conditions to a classification lower than W in AS/NZS 4586.

(Amendment No. 1, February 2009)

C313.2 (page 23)

Delete commentary clause and **substitute:**

C313.2

Failure to replace sand can lead to premature pavement failure.

The surface of the paving may need regular cleaning and surface treatment to retain a slip resistance classification of W or better. AS/NZS 3661.2 outlines care and maintenance methods. Manufacturers of pavers and flags should be consulted so that they can advise pavement designers and owners of appropriate maintenance regimes.

Some paving materials polish under foot traffic, reducing their slip resistance. Others abrade, which initially improves slip resistance but may with time attract dirt and biological growth that makes the surface slippery.

(Amendment No. 1, February 2009)

Appendix A**A2.2** (page 24)**Delete** clause and **substitute:****A2.2**

Apparatus for applying the abrading forces to a sand sample shall consist of the following:

- (a) Glass or ceramic jar with screw lid, internal diameter 120 ± 2 mm and length $150 \text{ mm} \pm 2$ mm or nominal 1 litre jar with an internal diameter to length ratio not exceeding 1.66;
- (b) Apparatus for rotating the jar horizontally at 50 ± 2 revolutions per minute, see figure 3; and
- (c) Two 25 mm steel balls each weighing 75 ± 5 grams each.

(Amendment No. 1, February 2009)

**2009 STANDARDS COUNCIL
STANDARDS NEW ZEALAND
PRIVATE BAG 2439
WELLINGTON 6140**