

DRAFT

New Zealand Standard

**Draft Number: DZ
3123/V1**

Public comment Draft

**Specification for
pozzolan for use with
Portland and blended
cement**

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Committee: P3123

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Standards New Zealand

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New Zealand Standard

**Specification for pozzolan
for use with Portland and
blended cement**

Superseding NZS 3123:1974

Committee representation

This Standard was prepared under the supervision of the P 3123 Committee, the Standards Council established under the Standards Act 1988.

The committee consisted of representatives of the following:

Nominating Organisation

Cement and Concrete Association of New Zealand
IPENZ – Institution of Professional Engineers New Zealand
New Zealand Concrete Society
New Zealand Portland Cement Association
New Zealand Ready Mixed Concrete Association

Acknowledgement

Standards New Zealand gratefully acknowledges the contribution of time and expertise from all those involved in developing this Standard. The committee acknowledges the contribution made by the scientists responsible for this work.

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REFERENCED DOCUMENTS

Reference is made in this document to the following:

NEW ZEALAND STANDARDS

NZS 3122:2009 Specification for Portland and blended cements (General and special purpose)
NZS 4402:1986 Methods of testing soils for civil engineering purposes – Preliminary and general

JOINT AUSTRALIAN/NEW ZEALAND STANDARDS

AS/NZS 2350.0:1999 Methods of testing Portland and blended cements – General introduction and list of methods
AS/NZS 2350.1:2006 Methods of testing portland and blended cements – Method 1: Sampling
AS/NZS 3582.3:2002 Supplementary cementitious materials for use with Portland and blended cement. Part 3: Amorphous silica
AS/NZS ISO 9001:2008 Quality management systems – Requirements
AS/NZS ISO 9004:2000 Quality management systems – Guidelines for performance improvements

AMERICAN STANDARDS

ASTM C311:2007 Standard test methods for sampling and testing fly ash or natural pozzolans for use in Portland-cement concrete
ASTM C618:2008 Standard specification for coal fly ash and raw or calcined natural pozzolan for use in concrete

AUSTRALIAN STANDARDS/OR OF OTHER NATIONAL STANDARDS BODIES

AS 1199.1:2003 Sampling procedures for inspection by attributes – Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection
AS 1199.0:2003 Sampling procedures for inspection by attributes – Introduction to the ISO 2859 attribute sampling system
AS 2350.2:2006 Methods of testing Portland, blended and masonry cements. Method 2: chemical composition
AS 2350.9:2006 Methods of testing Portland, blended and masonry cements – Determination of residue on the 45 micrometre sieve
AS 2879.4:2003 Alumina. Part 4: Determination of specific surface area by nitrogen adsorption.
AS 3582.1:1998 Supplementary cementitious materials for use with Portland and blended cement. Part 1: Fly ash
AS 3582.2:2001 Supplementary cementitious materials for use with Portland and blended cement. Part 2: Slag – ground granulated iron blast-furnace
AS 3972:1997 Portland and blended cements
AS 3583.1:1998 Methods of test for supplementary cementitious materials for use with portland and blended cement – Determination of fineness by the 45 micrometre sieve
AS 3583.2:1991 Methods of test for supplementary cementitious materials for use with portland cement – Determination of moisture content
AS 3583.3:1991 Methods of test for supplementary cementitious materials for use with portland cement – Determination of loss on ignition
AS 3583.4:1991 Methods of test for supplementary cementitious materials for use with portland cement – Determination of autoclave expansion
AS 3583.5:1991 Methods of test for supplementary cementitious materials for use with portland cement – Determination of relative density
AS 3583.6:1995 Methods of test for supplementary cementitious materials for use with portland cement Determination of relative water requirement and relative strength
AS 3583.7:1991 Methods of test for supplementary cementitious materials for use with portland cement – Determination of sulfide sulfur content
AS 3583.8:1991 Methods of test for supplementary cementitious materials for use with portland cement – Determination of sulfuric anhydride content
AS 3583.9:1991 Methods of test for supplementary cementitious materials for use with portland cement – Determination of magnesia content
AS 3583.10:1991 Methods of test for supplementary cementitious materials for use with portland cement – Determination of alumina and total iron content
AS 3583.11:1991 Methods of test for supplementary cementitious materials for use with portland cement – Determination of manganese content

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| AS 3583.12:1991 | Methods of test for supplementary cementitious materials for use with portland cement – Determination of available alkali |
| AS 3583.13:1991 | Methods of test for supplementary cementitious materials for use with portland cement – Determination of chloride ion content |
| AS 3583.14:1991 | Methods of test for supplementary cementitious materials for use with portland cement – Determination of insoluble residue content |

BRITISH STANDARD

BS EN 196-5:2005 Methods of testing cement – Part 5: pozzolanicity test for pozzolanic cement

WEBSITES

<http://www.legislation.govt.nz>

LATEST REVISIONS

The users of this Standard should ensure that their copies of the above-mentioned New Zealand Standards are the latest revisions. Amendments to referenced New Zealand and Joint Australian/New Zealand Standards can be found on <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.

OUTCOME STATEMENT

The previous edition of the Standard, NZS 3123:1974, specified the requirements for blended hydraulic cement comprising Portland cement and a pozzolan of appropriate type and quantity. NZS 3122:2009 now includes provisions for blended hydraulic cement containing natural pozzolan, superseding the NZS 3123:1974 provisions for Type PP cement. NZS 3123:2009 now only includes requirements for pozzolans that may be added directly to concrete or used to manufacture Type GB cement. Together, NZS 3122:2009 and NZS 3123:2009 reflect current technology and current industry methods and practices.

Foreword

Pozzolan may be used with advantage in Portland cement concrete to achieve one or more of the following benefits:

- (a) Reduced heat of hydration (such as in mass concrete);
- (b) Reduced expansion related to alkali-silica reaction;
- (c) Reduced permeability to water;
- (d) Reduced bleeding and segregation in fresh concrete;
- (e) Increased ultimate compressive strength;
- (f) Improved chemical resistance (such as resistance to sulfate attack);
- (g) Improved rheology and stability of self-compacting concrete;
- (h) Ability to meet Green Star New Zealand criteria for recycled binder content.

Pozzolan may be blended or interground with Portland cement to produce Type GB cement complying with NZS 3122:2009. Pozzolan may also be added separately to the concrete as an admixture.

The previous edition of this Standard, NZS 3123:1974, specified requirements for Portland pozzolan cement (Type PP cement), including requirements for the pozzolan component of the cement. In response to the more recent practice of adding pozzolan directly to the concrete, and to align with the AS 3582 series of standard specifications for supplementary cementitious materials, the 2009 revision specifies requirements for pozzolans only. Type PP cement as defined by NZS 3123:1974 is now covered by the requirements of NZS 3122:2009 Type GB.

The requirements of this Standard are based on those of NZS 3123:1974, which was developed from research into pumicites, diatomites, diatomaceous pumicites, and fly ash being considered and/or used by the Ministry of Works in New Zealand in the 1950s and 1960s. This research, carried out by the Department of Scientific and Industrial Research, forms the basis of our current understanding of New Zealand pozzolanic materials.

1 GENERAL

1.1 Scope

This Standard sets out requirements for natural pozzolan (raw or calcined) as a supplementary cementitious material in concrete, mortar, and grout where pozzolanic action is desired and/or where concrete properties may be modified by the addition of pozzolans. Such properties may include rheology, heat of hydration, alkali-aggregate reactivity, chemical resistance, marine durability, and control of set.

This Standard replaces the requirements for pozzolans for use in Portland pozzolan cement specified in NZS 3123:1974. Portland pozzolan cement, formerly covered by NZS 3123:1974, is now classed as Type GB cement as specified by NZS 3122:2009.

Fly ash, ground granulated blast furnace slag ('slag') and amorphous silica have pozzolanic and/or hydraulic properties. Fly ash and slag are not included in this Standard. Instead, fly ash is specified by AS 3582.1, and slag is specified by AS 3582.2. Amorphous silica is specified by AS/NZS 3582.3. Naturally occurring amorphous silica may be covered by AS/NZS 3582.3 or NZS 3123 as appropriate.

1.2 Interpretation

For the purposes of this Standard, the word 'shall' refers to requirements that are essential for compliance with the Standard, while the word 'should' refers to practices that are advised or recommended.

Clauses prefixed 'C' and printed in italic type are intended as comments on the corresponding clauses. They are not to be taken as the only or complete interpretation. The Standard can be complied with if the comment is ignored.

The term 'Informative' has been used in this Standard to define the application of the Appendix to which applies. An 'Informative Appendix gives additional information, and only for guidance. It does not contain requirements.

2 DEFINITIONS

For the purpose of this Standard the definitions below apply:

| | |
|---|--|
| Portland cement | Cement complying with the requirements of 4.2. of NZS 3122 |
| Pozzolan | <p>Pozzolan is a siliceous or siliceous and aluminous material or a combination thereof. It has little or no intrinsic cementitious value, but when finely ground and in the presence of water, it reacts with dissolved calcium hydroxide at normal ambient temperatures to form calcium silicate and calcium aluminate compounds similar to those produced by the hydration of Portland cement</p> <p>The principal components of a pozzolan are silicon dioxide (SiO_2) and aluminium oxide (Al_2O_3). Minor components include oxides of iron, magnesium, manganese, and other elements. Chloride and sulfur compounds may also be present</p> <p>Pozzolans may be processed to produce a material of suitable performance and consistency</p> <p>Fly ash, ground granulated iron blast furnace slag ('slag') and amorphous silica have pozzolanic and/or hydraulic properties. Fly ash is specified by AS 3582.1, slag is specified by AS 3582.2 and amorphous silica is specified by AS/NZS 3582.3 Naturally occurring amorphous silica may also be specified by NZS 3123</p> |
| Natural calcined pozzolan (Class C) | Natural materials that have been activated by thermal treatment (calcined). This class includes calcined materials of origins included in Class N, and also some shales or clays of the montmorillonite and kaolinite type |
| Natural pozzolan (Class N) | Natural materials, usually of volcanic or sedimentary origin, such as certain diatomaceous earths; opaline cherts and shales; tuffs, pumicites, and volcanic ashes |
| Naturally occurring amorphous silica | A refined pozzolanic material composed mostly of amorphous silica derived either from hydrothermal alteration of ignimbrite and pumice breccia or from the extraction of precipitated silica from geothermal waters |
| Processing additions | Processing additions are constituents that are added in minor quantities, nominally less than 1% by mass, during the manufacturing process to aid the manufacture or improve the handling properties of pozzolan |

3 ADDITIONS

Additions of materials other than processing additions and water shall be clearly stated by the supplier.

4 MARKING

The following information shall appear on the container in which the pozzolan is supplied, or shall accompany bulk supplies of the pozzolan:

- (a) Source;
- (b) Name and brand of the producer;
- (c) Type of pozzolan, as defined by section 2;
- (d) Type and quantity of processing additions, as provided in section 2 and section 3, or other material incorporated into the pozzolan (if appropriate);
- (e) Net weight;
- (f) Whether the container is degradable in concrete under normal mixing conditions;
- (g) Compliance with this Standard.

5 PROPERTIES

5.1 Specified properties

Pozzolans shall comply with the specified properties given in table 1. See also Appendix A.

Pozzolan for use in the manufacture of Type GB cement shall conform to the relative strength requirements of table 1.

Pozzolan that is to be blended with finished Portland cement to produce Type GB cement shall also conform to the fineness residue requirement of table 1.

Pozzolan that is to be interground with Portland cement clinker in the production of Type GB cement and that does not meet the fineness requirement of table 1 shall be ground in the laboratory so as to meet this requirement before measuring relative strength.

5.2 Reportable properties

The supplier shall, at the request of a purchaser, provide a certificate or statement showing the most recent test results for the reportable properties listed in table 1 obtained on a sample of the pozzolan representing the type being supplied.

Table 1 – Properties of pozzolans

| Property | S/R (See Note) | Specification limit | Reference method | Comment |
|--|-----------------------|-----------------------------------|---------------------|---|
| Silicon dioxide (SiO ₂) plus aluminium oxide (Al ₂ O ₃) plus iron oxide (Fe ₂ O ₃) | S | ≥ 70% | AS 2350.2 | See 7.1. Does not apply to amorphous silica. |
| Total silicon dioxide | S | > 85% | AS 2350.2 | For amorphous silica only. See 7.1 |
| Sulfuric anhydride (SO ₃) | S | See 7.2. | AS 3583.8 | See 7.2. |
| Sulfide sulfur | R | See 7.2 | AS 3583.7 | See 7.2. |
| Total sulfur | R | See 7.2 | – | See 7.2 |
| Other sulfur compounds | R | See 7.2 | See 7.2 | See 7.2 |
| Moisture content | S | ≤ 3.0% | See 7.3 | See 7.3. If the pozzolan is supplied as slurry then solids content is reported and the maximum limit of 3% does not apply. |
| Loss on ignition | S | ≤ 6.0% | AS 3583.3 | See 7.4. |
| Fineness residue | S | residue less than or equal to 12% | AS 2350.9. | See 5.1 and 7.5. Does not apply to amorphous silica. |

| Property | S/R (See Note) | Specification limit | Reference method | Comment |
|---|-----------------------|-------------------------------------|---------------------|--|
| Fineness – uniformity | R | – | AS 3583.1 | See 7.5. |
| Fineness – amorphous silica | R | – | AS 2879.4 | See 7.5. For amorphous silica only. |
| Relative strength | S | ≥ 75% of control at 7 or 28 days | AS 3583.6 | See 5.1 and 7.6. |
| Relative water requirement | R | – | AS 3583.6 | See 7.6. |
| Soundness | R | – | AS 3583.4 | See 7.7. |
| Relative density | R | – | AS 3583.5 | See 7.8. |
| Relative density – uniformity | R | – | AS 3583.5 | See 7.8. |
| Bulk density | R | – | 7.9 | See 7.9. |
| Available alkali content | R | – | AS 3583.12 | See 7.10. |
| Total alkali content | R | – | AS 2350.2 | See 7.10. |
| Chloride ion content | R | – | AS 3583.13 | See 7.11. |
| Magnesium oxide (MgO) | R | – | AS 3583.9 | See 7.12. |
| Total Fe | R | – | AS 3583.10 | See 7.12. |
| Aluminium oxide (Al ₂ O ₃) | R | – | AS 3583.10 | See 7.12. |
| Manganese (MnO) | R | – | AS 3583.11 | See 7.12. |
| Insoluble residue | R | – | AS 3583.14 | See 7.13. |

NOTE – 'S' indicates specified properties; 'R' indicates reportable properties.

6 SAMPLING

Sampling shall be carried out in accordance with AS/NZS 2350.1.

For testing for compliance with the general requirements of this Standard, a sample of pozzolan weighing at least 10 kg shall be taken monthly or from each 500 tonnes (whichever is more frequent). Appendix B presents a suggested sampling procedure.

For testing compliance with only selected properties a 5 kg sample shall be taken from each 250 tonnes of the supply.

Samples should be taken, packed, and stored in accordance with AS/NZS 2350.1.

7 TEST METHODS

7.1 Silicon dioxide, aluminium oxide, and iron oxide

Silicon dioxide, aluminium oxide, and iron oxide shall be determined in accordance with AS 2350.2.

For amorphous silica from a single source, a silicon dioxide (silica) content less than 85% may be deemed to comply, providing the supplier of that amorphous silica demonstrates that the amorphous silica has a satisfactory relative strength.

7.2 Total sulfur, sulfuric anhydride (sulfur trioxide) and sulfide sulfur

Sulfuric anhydride (SO₃) shall be determined in accordance with AS 3583.8.

The sulfuric anhydride content shall be such that when combined with cement the total sulfuric anhydride content shall be no greater than the limits specified in NZS 3122.

C7.2

Sulfur may be present in pozzolan as sulfate, elemental sulfur, metal sulfide or various organic compounds.

Sulfuric anhydride represents sulfur present as sulfate and should not be confused with total sulfur or other sulfur compounds. Therefore techniques that report total sulfur as sulfuric anhydride, such as x-ray fluorescence of samples tested as pressed powders, may not be suitable. X-ray fluorescence of samples tested as fused discs determine sulfur present as sulfate but not compounds such as sulfides that are lost on igniting or fusing the sample.

Total sulfur may be determined by Leco combustion.

Sulfide sulfur, if required, shall be determined in accordance with AS 3583.7.

Sulfur present as elemental sulfur and/or organic compounds may be determined by subtracting sulfuric anhydride plus sulfide sulfur from total sulfur.

7.3 Moisture content

The moisture content of pozzolan shall be determined in accordance with AS 3583.2 but using a ventilated oven and minimum sample mass of 100 g. The sample is to be dried at 105°C for either 60±5min or to constant mass, whichever period is the longer.

The moisture content of slurry shall also be determined by this method but the results shall be reported as solids content.

7.4 Loss on ignition

Loss on ignition shall be determined in accordance with AS 3583.3 at 750°C.

For pozzolan from a single source a limit greater than 6% may be deemed to comply, providing the pozzolan supplier demonstrates that the relative strength of the pozzolan is satisfactory.

7.5 Fineness

Fineness and residue of pozzolans other than amorphous silica shall be determined in accordance with AS 2350.9. Both the fineness and the residue retained on the 45 micron sieve shall be reported.

The fineness of amorphous silica shall be determined by the BET method in accordance with AS 2879.4. For amorphous silica from a single source, other test methods to indicate fineness may be acceptable provided there is a history of satisfactory performance.

The uniformity of the fineness is determined by the difference between an individual result from the average of the ten preceding tests, or by all preceding tests if fewer than 10 tests are performed..

7.6 Relative water requirement and relative strength

Relative water requirement and strength shall be determined in accordance with AS 3583.6.

The amount of cement replaced by pozzolan in the test mortar shall be 20% by mass of cement.

Relative water requirement and strength shall be determined and reported to the purchaser on the test certificate in accordance with section 9. Results of these tests are influenced by the cement and the source of the pozzolan. The type of cement used in the test shall be reported on the test certificate. Where possible, perform the test with the cement proposed for use with the pozzolan.

C7.6

Batching the pozzolan by mass means that the pozzolan volume and the total binder volume in the test mortar will vary with pozzolan density. Concrete is generally batched on a mass basis, so batching by mass indicates the likely performance of the pozzolan in the production of concrete.

This test does not measure pozzolanic behaviour as defined in section 2. Instead it indicates how the pozzolan will behave with a specific cement. Thus it will not necessarily differentiate between pozzolans and fine materials that exhibit little or no pozzolanic behaviour.

7.7 Soundness

Soundness shall be determined by autoclave expansion in accordance with AS 3583.4.

The proportion of pozzolan to cement in the test specimens shall be 1:4 by mass unless the pozzolan will constitute more than 20% by mass of the cementitious material in the proposed concrete. If the pozzolan will constitute more than 20% by mass of the cementitious material in the proposed concrete then the test specimens shall contain that percentage.

C7.7

Excessive autoclave expansion is highly significant in cases where water to cementitious ratios are low.

7.8 Relative density

The relative density of pozzolan shall be determined in accordance with AS 3583.5.

The uniformity of the relative density is determined by difference between an individual result from the average of the ten preceding tests, or by all preceding tests if the number is less than ten.

7.9 Bulk density

To determine the bulk density of pozzolan with sufficient accuracy for the purpose of this Standard, the pozzolan shall be poured into a container of not less than 1 L and the surface struck off with a straightedge. The mass of pozzolan in the container in kilograms, divided by the volume of the container in cubic metres is taken as the bulk density.

7.10 Alkali content

When the pozzolan is to be used in concrete containing potentially alkali reactive aggregates, the purchaser may require the available alkali content or the total alkali content to be reported on the test certificate.

The available alkali shall be determined in accordance with AS 3583.12.

Total alkali shall be determined in accordance with AS 2350.2.

7.11 Chloride ion content

Chloride ion content shall be determined in accordance with AS 3583.13.

7.12 Other elements

The presence of other elements not covered in 7.1 to 7.11 and referred to in table 1 shall be determined by appropriate relevant methods which are AS 3583.9 for magnesium oxide, AS 3583.10 for aluminium oxide and total iron, and AS 3583.11 for manganese

7.13 Insoluble residue

Insoluble residue shall be determined in accordance with AS 3583.14.

7.14 Alternative test methods

Where practical, alternative methods of test for the properties given in table 1 are permitted provided that such methods have been checked against the reference method. Before the results of such alternative procedures are reported it shall be established that they do not differ from those of the reference methods in this Standard by more than the percentage of the parameter concerned, as shown in table 2.

In any case of dispute, determinations shall be conducted by the reference method.

Table 2 – Permissible variation from reference method

| Property | Permissible variation |
|--|--|
| Moisture content | 0.1% moisture content |
| Loss on ignition | 0.2% mass loss |
| Sulfur trioxide (sulfuric anhydride) | 0.2% SO ₃ content (see section 7.2) |
| Sulfide sulfur (S) | 0.2% sulfide sulfur |
| Silica | 0.3% |
| Available alkali content | 0.05% |
| Chloride ion content | 0.01% chloride ion content |
| Fineness | 1% |
| Relative density | 0.03 |
| Insoluble residue | 0.2% insoluble residue content |
| Magnesium oxide (MgO), aluminium oxide (Al ₂ O ₃) | 0.2% of content or 5% of value, whichever is greater |
| Total iron (FeO) content | 0.2% relevant oxide content |
| Manganese (MnO) content | 0.2% manganese content |

8 RETEST

If, when tested in accordance with this Standard, a consignment of pozzolan or part thereof fails to comply with any of the limits specified in tables 1 and 2, the relevant test or tests shall be repeated on each of two further portions of the sample.

If the retest shows both these further portions to comply with the relevant specification, the quantity represented by the sample shall be deemed to comply with this Standard.

If one or both of these further portions fails to comply upon retest, the consignment shall be deemed not to comply with this Standard.

9 TEST CERTIFICATE

When requested by the purchaser, the supplier shall issue a test certificate, which shall include the following information:

- (a) Source;
- (b) Type of pozzolan;
- (c) Date of sampling;
- (d) Place of sampling;
- (e) Specified and reportable properties reported in accordance with the relevant test method;
- (f) Identification of cement used for relative water requirement and relative strength testing;
- (g) Name of the testing laboratory;
- (h) Test date.

A test certificate of the form illustrated in Appendix C is suitable.

APPENDIX A – METHODS FOR DEMONSTRATING COMPLIANCE WITH THIS STANDARD (INFORMATIVE)

A1 SCOPE

This Appendix sets out the following different means by which compliance with this Standard can be demonstrated by the manufacturer or supplier:

- (a) Evaluation by means of statistical sampling;
- (b) The use of a product certification scheme;
- (c) Assurance using the acceptability of supplier's quality system;
- (d) Other such means proposed by the manufacture or supplier and acceptable to the customer.

A2 STATISTICAL SAMPLING

Statistical sampling is a procedure which enables decisions to be made about the quality of batches of items after inspecting or testing only a portion of those items. This procedure will only be valid if the sampling plan has been determined on a statistical basis and the following requirements are met:

- (a) The sample needs to be drawn randomly from a population of product of known history. The history needs to enable verification that the product was made from known materials at essentially the same time, by essentially the same processes and under essentially the same system of control;
- (b) For each different situation, a suitable sampling plan needs to be defined. A sampling plan for one manufacturer of given capability and product throughout may not be relevant to another manufacturer producing the same items;
- (c) In order for statistical sampling to be meaningful to the customer, the manufacturer or supplier needs to demonstrate how the above conditions have been satisfied. Sampling and the establishment of a sampling plan should be carried out in accordance with AS 1199.1:2003 guidance to which is given in AS 1199.0:2003.

A3 PRODUCT CERTIFICATION

The purpose of product certification is to provide independent assurance of the claim by the manufacturer that products comply with the stated Standard.

The certification scheme should meet the criteria described in SNZ HB 18.28 in that, as well as full type testing from independently sampled production and subsequent verification of conformance; it requires the manufacturer to maintain effective quality planning to control production.

The certification scheme serves to indicate that the products consistently conform to the requirements of the Standard.

A4 SUPPLIER'S QUALITY MANAGEMENT SYSTEM

Where the manufacturer or supplier can demonstrate an audited and registered quality management system complying with the requirements of the appropriate or stipulated New Zealand or international Standard for a supplier's quality management system or systems, this may provide the necessary confidence that the specified requirements will be met. The quality assurance requirements need to be agreed between the customer and supplier and should include a quality or inspection and test plan to ensure product conformity.

Information on establishing a quality management system is set out in AS/NZS ISO 9001 and AS/NZS ISO 9004.

A5 OTHER MEANS OF ASSESMENT

If the above methods are considered inappropriate, determination of compliance with the requirements of this Standard may be assessed from the results of testing coupled with the manufacturer's guarantee of product conformance.

Irrespective of acceptable quality levels (AQLs) or test frequencies, the responsibility remains with the manufacturer or supplier to supply products that conform to the full requirements of the Standard.

APPENDIX B – SAMPLING AND PREPARATION OF TEST SAMPLES

(INFORMATIVE)

B1 SCOPE

This Appendix sets out a suggested procedure to be used for obtaining samples of pozzolan and the method of packing them, and states the necessary labelling requirements. It is applicable to a continuous stream or to a discrete lot of pozzolan.

B2 DEFINITIONS

For the purpose of this Appendix, the definitions below apply.

B2.1 Composite sample

A sample compounded from not less than three individual samples in proportion to the relative amounts that they represent.

B2.2 Continuous sample

A sample taken in accordance with one of the following conditions:

- (a) From a continuous stream when a representative portion is diverted for the sampling period;
- (b) From a container when a representative portion is removed using a sampling tube or other device;
- (c) From bagged lots when a full bag is taken at random and a representative sample extracted.

B3 SAMPLING

B3.1 General

Samples for testing pozzolan for compliance with the general requirements of this Standard should be not less than 10 kg and should be made up from either a continuous sample or a composite sample. However, for testing compliance with only selected specification criteria, an appropriate lesser sample mass may be taken.

Where the size of the sample is too large, the whole sample should be reduced in mass by using a non-biasing mixing and splitting procedure.

B3.2 Preparation of testing samples

Test samples should be prepared for test using the following procedure:

- (a) Individual test samples should be prepared by thoroughly mixing the whole laboratory sample, and reducing it by quartering and subdividing as described in NZS 4402:1986 Part 1.6 until the required amount of material is obtained. Test proportions should then be drawn from the test sample;
- (b) Composite test samples should be prepared by arranging the daily laboratory samples in a group, covering the test period or delivery for which the composite test sample is intended and taking equal test samples from each of the laboratory samples in the group, sufficient to form a composite test sample of suitable size. Mix the composite sample thoroughly before use, and draw the required number of test portions from the composite test sample. Composite test samples should be identified by source and time period;
- (c) Individual test samples should be kept in clean, impermeable, airtight containers, and retained as long as required.

B3.3 Report

The identify of each sample should be recorded at the time the sample is taken or compounded, and sample packages should be identified both by enclosing and by attaching a suitable tag to each package.

B3.4 Containers

Immediately after being taken or prepared, the test sample should be transferred to a container.

Containers for holding samples should be clean, airtight when sealed, and constructed of materials which will not react with or contaminate the sample.

NOTE – After filling and sealing, it is necessary to ensure there is a minimum of air in the container, as follows:

- (a) A rigid container should be completely filled with the sample and sealed;
- (b) A flexible container should be filled with the sample and any unfilled portion of the container folded and adjusted so that the final volume of the container corresponds to that of the sample.

B3.5 Labelling

Each sample container should have enclosed in it a card giving the following information:

- (a) Place of sampling;
- (b) Date of sampling;
- (c) Name of manufacturer;
- (d) Brand and type of amorphous silica;
- (e) Name and proportion of processing addition, if known;
- (f) Place of manufacture;
- (g) Store, silo number or mill identity;
- (h) How sample was taken;
- (i) Name, in block letters, and signature of person taking the sample.

B4 FREQUENCY

Frequency of sampling and testing should be monthly or 500 tonnes (whichever is more frequent).

Test certificates for the amorphous silica powder used to make slurry or cake may be used as evidence that the slurry complies with the Standard. Where slurry or cake is made directly from the powder, the testing frequency should be taken as the weight of the solid content of the slurry.

