

**Standard for the
Supply of Hydrated
Lime for Use in
Water Treatment**

Second Edition

January 1997



STANDARD FOR THE SUPPLY OF HYDRATED LIME FOR USE IN WATER TREATMENT

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January 1997

The first edition of this standard was prepared for the Water Supply Managers' Group of the New Zealand Water & Wastes Association and the Ministry of Health by Works by Consultancy Services Ltd in 1994.

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1 GENERAL

1.1 Scope

This Standard covers hydrated lime for use in water treatment.

1.2 Purpose

The main purpose of this Standard is to provide purchasers, manufacturers and suppliers with the minimum requirements for hydrated lime, including physical, chemical and testing requirements.

1.3 Application

This Standard can be referenced in specifications for purchasing and receiving hydrated lime and can be used as a guide for testing the physical and chemical properties of hydrated lime samples. The stipulations of this Standard apply when this document has been referenced and only to hydrated lime used in water treatment.

1.4 Uses in Water Treatment

Hydrated lime is frequently used in water treatment in three areas: either prior to coagulation to increase the pH and alkalinity of the water to bring them to optimum levels for coagulation, or to absorb aggressive carbon dioxide from some groundwaters, or as a final pH, alkalinity and calcium ion level adjustment before water is delivered to the consumer to reduce corrosivity (or aggressiveness – refer to Drinking-Water Standards for New Zealand 1995 and Guidelines for Drinking-Water Quality Management for New Zealand 1996) for a description of the Langelier Index.

1.5 Manufacture of Hydrated Lime

When crushed limestone is calcined, or burnt, the heating process drives off carbon dioxide to leave calcium oxide, or quicklime or burnt lime. A specific amount of water is added to the quicklime to form calcium hydroxide or hydrated lime; this is sometimes called the slaking process.

1.6 Description of Chemicals

Hydrated lime is available as a fine white powder consisting essentially of calcium hydroxide.

1.7 Methods of Dosing

Lime is generally dosed as a slurry because it has very low solubility, (about 0.12% w/v at ambient temperatures and 0.18% at 0°C) so therefore not all of the lime is dissolved into the solution before dosing into the water to be treated. Lime is usually either delivered as a slurry and pump dosed or delivered as a dry powder and dosed via a dry feeder:

- into a concentrated dosing slurry flowing in an open channel; or

- directly into a wetted cone which carries the lime via a pipe or directly feeds into the water to be -treated; or
- is made up as a 5-10% w/v slurry and pump fed, often with the use of additional water as a dispersing agent to avoid precipitation in the dosing lines.

1.8 Definitions

The following definitions shall apply in this Standard:

- | | | |
|-------|-------------------------|--|
| 1.8.1 | <i>Hydrated Lime:</i> | A very finely divided powder resulting from the hydration of quicklime, consisting essentially of calcium hydroxide, Ca(OH) ₂ . Hydrated lime used to be slaked lime too. |
| 1.8.2 | <i>Quicklime</i> | Calcium oxide, CaO, the result of burning limestone. |
| 1.8.3 | <i>Limestone:</i> | Calcium carbonate, CaCO ₃ , sometimes called agricultural lime. |
| 1.8.4 | <i>Manufacturer:</i> | The party and manufacturers, fabricates, or produces materials or products. |
| 1.8.5 | <i>Purchaser:</i> | The person, company or organisation that purchases any materials or work to be performed. |
| 1.8.6 | <i>Reception Point:</i> | The point of physical transfer of materials from the supplier to the purchaser. |
| 1.8.7 | <i>Supplier:</i> | The party who supplies material or services. A supplier may or may not be the manufacturer. |
| 1.8.8 | w/v | weight per volume. |

2 MATERIALS

2.1 Physical Properties

Table 1 gives some physical characteristics for lime.

Property	Hydrated Lime
pH of a Saturated Solution	12.5 @ 25°C
Specific Gravity	2.1 – 2.4
Bulk Density	400 – 750 kg/m ³
Solubility (% w/v)	about 0.12% (at ambient temperatures)
Particle Distribution	should be uniform
Particle size	Product shall be free from lumps or foreign material that might interfere with the operation of dry feed, pneumatic or hydraulic equipment.

Table 1: Some Physical Properties of Hydrated Lime

2.2 Chemical Requirements

2.2.1 Hydrated Lime shall be of a purity of not less than 90% available calcium hydroxide, (Ca(OH)₂). Hydrated lime is typically 92-95% Ca(OH)₂.

2.2.2 The water insoluble matter shall not exceed 2%.

2.3 Impurities

2.3.1 Specific Impurity Limits

2.3.1.1 The limits of specific impurities in hydrated lime shall be set by the purchaser. In setting impurity limits the purchaser shall take into consideration the expected maximum dosage (MD) of calcium hydroxide, the maximum acceptable value (MAV) of a determinand taken from the Drinking-Water Standards for New Zealand 1995, and a safety factor which reflects the maximum percentage of a MAV that may be contributed by a specific impurity. The specific impurity limits may be calculated using the following equation:

$$SIL = \frac{MAV (mg / litre) \times 10^6 (mg / kg)}{MD (mg / litre) \times SF}$$

Where

SIL	=	Specific Impurity Limit
MAV	=	Maximum Acceptable Value
MD	=	Maximum Dosage
SF	=	Safety Factor

2.3.1.2 Appendix A sets out some example calculations for the determinand of specific impurity limits, along with a table of impurity limits based on a maximum dosage of 200 mg of calcium hydroxide/litre of water and a safety factor of 10. A table of MAVs taken from the Drinking-Water Standards for New Zealand 1995 is also presented in Appendix A.

2.3.1.3 Alternative MAVs to those in the Drinking-Water Standards for New Zealand 1995 may be chosen by the purchaser to reflect their individual requirements (eg, fluoride). The purchaser may also vary the SF to suit their circumstances.

2.3.1.4 Specific impurity limits shall be given as weight of impurity by weight of calcium hydroxide (as $\text{Ca}(\text{OH})_2$).

2.3.2 **General Impurities**

In addition to the above specific impurities, hydrated lime shall not contain any other impurities that may be deleterious to health or aesthetically objectionable as determined in the Drinking-Water Standards for New Zealand 1995. General impurity limits shall be based on a maximum dosage of 200 mg/L, the MAV of determinands and a minimum safety factor of 10.

3 DELIVERY

3.1 Packaging and Shipping

- 3.1.1 Hydrated lime may be shipped in bulk, polypropylene bulk bags or in 25 kg multi-wall paper bags.
- 3.1.2 Bulk tankers shall be in a road worthy condition for transporting hydrated lime as required under the Transport Act 1992 and shall not contain any substances that might affect the quality of the hydrated lime in treating water supplies.

3.2 Labelling

Each shipment of material must be clearly identifiable and be marked and/or accompanied by clear means of giving the following information:

Contents: Hydrated Lime
Name of Manufacturer:

3.3 Unloading and Storage

- 3.3.1 Bulk hydrated lime shall be unloaded at the purchaser's premises using pneumatic conveying equipment into an appropriate receiving vessel. The supplier shall provide an appropriate "camlock" or other type of coupling as agreed with the purchaser for connection to the silo reception, if required. This arrangement should prevent chemicals being transferred to the incorrect receiving vessel.
- 3.3.2 Bulk bags shall incorporate lifting straps and bagged lime shall be transported on pallets for unloading with a forklift or by hand. Bags shall be stored in a dry, covered, designated storage area, because hydrated lime can absorb moisture from the air, even through multiwall paper bags. Damp hydrated lime cakes and can cause blockages in some dosage systems.
- 3.3.3 Bags damaged prior to delivery will be the responsibility of the supplier, and bags damaged during unloading at the purchaser's premises will be the responsibility of the agent undertaking the unloading.
- 3.3.4 Bags should be warehoused on the "first-in-first-out" principle, because hydrated lime absorbs carbon dioxide from the air forming insoluble calcium carbonate which does not raise the pH of water.

4 SAFETY

4.1 Health and Safety

- 4.1.1 Suppliers of hydrated lime must comply with the requirements of the Health and Safety in Employment Act 1992 and take all practicable steps to protect the purchaser and others from hazards rising from the transportation, delivery and supply of hydrated lime.
- 4.1.2 Within two weeks of award of a contract to supply product, and prior to delivery, the supplier shall provide to the purchaser the following information:
- (a) An updated copy of the Material Safety Data Sheet, which as a minimum shall include the following information, as detailed in *Guidance Note for Completion of a Material Safety Data Sheet*, [NOHSC:3001 (1991)]:
- Introductory and Company Details
 - Page numbers and total
 - Date of issue
 - Company, address and phone numbers
 - Identification
 - Product names, codes and numbers
 - Physical description/properties
 - Chemical properties
 - Other properties
 - Uses
 - Health Hazard Information
 - Health effects
 - First aid
 - Precautions for Use
 - Safe Handling Information
 - Other Information and Emergency Contacts
- (b) Evidence that drivers have been adequately trained and have adequate knowledge and experience in the handling and delivery of hydrated lime.
- 4.1.3 A copy of the purchaser's Health and Safety Management Plan shall be made available to the supplier of hydrated lime. Any practices by the supplier which do not comply with the Health and Safety Management Plan may be grounds for the termination of a supply contract. Health and Safety Management Plans are discussed in the National Guidelines for Health and Safety in the New Zealand Water Industry (1997).

4.2 Protective Equipment

The purchaser and the supplier will be responsible for providing their respective personnel or agents with any necessary safety and protective equipment identified in their Health and Safety Management Plans and ensuring it is used as required.

4.3 Spills

The supplier, their agent or the authorised purchaser's representative responsible for unloading the hydrated lime shall attend to and report immediately any spills within the grounds of the property in which the hydrated lime reception point is located. Clean-up and reporting procedures should be specified in Health and Safety Management Plans; they may also be specified in the water treatment plant Consent issued by the Regional Council.

5 TESTING METHODS

5.1 General

- 5.1.1 The manufacturer or supplier shall test the materials at their own cost in order to provide a Certificate of Compliance as required in Section 7.1.
- 5.1.2 The purchaser may randomly take samples of the material and have these samples analysed for conformance with this Standard, at the cost of the purchaser. These samples shall be taken at the place of manufacture and/or at the delivery point, as may be agreed upon by the manufacturer or supplier and the purchaser.
- 5.1.3 When inspection and sampling are to be conducted at the point of manufacture, the manufacturer shall afford the inspector representing the purchaser all reasonable facilities for inspection and sampling of finished material, which shall be so conducted as not to interfere unnecessarily with the operation of the plant.
- 5.1.4 Analytical testing methods shall be as specified in this Standard in Section 5.4.2.
- 5.1.5 If the analysis of a sample taken at the place of manufacture shows the material does not comply with the requirements of this Standard, the purchaser may require that the manufacturer provide a certified analysis from a suitably Telarc registered organisation (or equivalent) for successive deliveries.
- 5.1.6 If the analysis of a sample taken at the point of delivery shows the material does not comply with the requirements of this Standard, a notice of non-conformance must be provided by the purchaser to the supplier in accordance with Section 7.4.

5.2 Sampling

- 5.2.1 The sampling procedure shall be agreed by the purchaser and supplier prior to the award of a contract to supply product.
- 5.2.2 The sample size shall be determined in order to provide a representative sample of the material and shall be agreed by the purchaser and the supplier.
- 5.2.3 A suitable sampling procedure is set out in Appendix B of this Standard.

5.3 Sample Preparation

- 5.3.1 Prior to the award of the contract to supply product the preparation of the sample for analysis shall be agreed by the purchaser and supplier giving consideration to the analytical testing to be undertaken, given that samples prepared by different methods may give different results when tested.
- 5.3.2 A suitable sample preparation procedure for the analytical tests is set out in Appendix B of this Standard.

5.4 Standard Tests

5.4.1 For standard tests for hydrated lime, refer to ANSI/AWWA Standards B202-93, Section 5, pp5-6 and 10-11. Tests include:

- the purity of the product, or $CA(OH)_2$ content;
- insoluble matter.

5.4.2 Test methods for specific impurities can be found in *Standard Methods for the Examination of Water and Wastewater*, 19th Edition, 1995. Samples require appropriate preparation. Methods for some parameters are given under the following codes:

Arsenic	3500-As, pp 3-49 to 3-51
Boron	4500-B, pp 4-8 to 4-10
Cadmium	3500-Cd, pp 3-55 to 3-56
Chromium	3500-Cr, pp 3-58 to 3-62
Fluoride	4500-F ⁻ , pp 4-59 to 4-64
Iron	3500-Fe, pp 3-67 to 3-70
Lead	3500-Pb, pp 3-71 to 3-72
Manganese	3500-Mn, pp 3-71 to 3-78
Mercury	3500-Hg, pp 3-78 to 3-80
Selenium	3500-Se, pp 3-85 to 3-93
Sulphide	4500-S ²⁻ , pp 4-122 to 4-131

6 SUPPLY CONTRACT

6.1 Contract

The purchaser may enter into a contract with a supplier for the supply of hydrated lime in accordance with this Standard.

6.2 Acceptable Conditions

Acceptable conditions of supply are outlined in Appendix C of this Standard, or as agreed between the supplier and the purchaser.

7 QUALITY ASSURANCE

7.1 Certificate of Compliance

- 7.1.1 The manufacturer or supplier shall provide the purchaser with a certificate of compliance that states that the material furnished in accordance with the purchaser's order complies with all applicable requirements of this Standard.
- 7.1.2 The purchaser may require that the supplier provide a certified analysis of the material, from a mutually agreed upon laboratory at the commencement of the contract and thereafter at three monthly intervals or as agreed between purchaser and supplier. The purchaser may also require that the supplier provide a certified analysis for insoluble matter or particular impurities, from a mutually agreed upon laboratory, for each delivery.

7.2 Method of Manufacture

- 7.2.1 The quality of a water treatment chemical is greatly influenced by the method of manufacture and quality of raw material used. If other than recognised methods of manufacture, or if unusual raw materials are used, the potential may exist for impurities to be present, or poor quality chemical to be produced, that may be inconsistent with good water supply practice.
- 7.2.2 If the method of manufacture, source and/or quality of raw material used is changed during the period of the contract, then additional samples shall be analysed at the manufacturer's or supplier's cost, to demonstrate that the changes have not affected compliance with this Standard.

7.3 Weight Certificate

Delivered bulk product shall be weighed over certified weighbridges and the docket produced on delivery.

7.4 Rejection

7.4.1 Notice of Non-conformance

If the hydrated lime delivered does not meet the requirements of this Standard, a notice of non-conformance must be provided by the purchaser to the supplier within 10 working days after receipt of the shipment at the point of destination. The results of the purchaser's tests shall prevail unless the supplier notifies the purchaser within five working days after receipt of the notice of complaint that a retest or inspection is desired. On receipt of the request for a retest, the purchaser shall forward to the supplier one of the sealed samples taken in accordance with Section 5. In the event that the results obtained by the supplier upon retesting do not agree with the results obtained by the purchaser, the other sealed sample shall be forwarded, unopened, for analysis to a referee laboratory agreed upon by both parties. The results of the referee analysis or inspection shall be accepted as final.

The cost of the referee analysis shall be paid by the supplier if the material does not meet the requirements of this Standard, and shall be paid by the purchaser if the material does meet the requirements of this Standard.

7.4.2 **Material Removal**

- 7.4.2.1 If the material does not meet the impurity limit requirements or other specifications of this Standard, the supplier shall remove the material from the premises of the purchaser when requested by the purchaser. Removal of material shall be at no cost to the purchaser.
- 7.4.2.2 If the material meets the impurity limits but not the calcium hydroxide or water insoluble matter content requirements of this Standard, a price adjustment may be agreed between the supplier and the purchaser. In the event that a price adjustment cannot be agreed, the supplier shall remove the material from the premises of the purchaser if required by and at no cost to the purchaser.
- 7.4.2.3 The material that shall be removed shall include the rejected material and any other material the rejected material may have contaminated, for example contents of a silo into which a bulk delivery has been unloaded, if required by the purchaser.
- 7.4.2.4 All material removed shall be concurrently replaced with material conforming to this Standard with an appropriate compliance certificate at no cost to the purchaser.

Appendix A: Specific Impurity Limits

A1 Example Calculations

Specific Impurity Limits (SIL) have been calculated based on a maximum dosage (MD) of calcium hydroxide/litre of water and the maximum acceptable value (MAV) of a parameter taken from the Drinking-Water Standards for New Zealand 1995. The safety factor (SF) used in the calculation of the SIL is 10, which reflects the view that no more than 10 percent of a MAV should be contributed by a given impurity in a water treatment chemical.

The SIL, values were determined using the following equation:

$$SIL = \frac{MAV (mg/L) \times 10^6 mg/kg}{MD (mg/L) \times SF}$$

An example calculation is as follows:

Arsenic:	MAV	=	0.01 mg/litre
	MD	=	200 mg/litre
	SF	=	10

$$SIL (As) = \frac{0.01 \times 10^6}{200 \times 10}$$

$$= 5 mg/kg$$

Boron:	MAV	=	0.03 mg/litre
	MD	=	200 mg/litre
	SF	=	10

$$SIL (B) = \frac{0.3 \times 10^6}{200 \times 10}$$

$$= 150 mg/kg$$

A2 Specific impurity Limits based on maximum dosage of 200 mg of calcium hydroxide per litre of water, and a safety factor of 10

Antimony	1.5	mg Sb/kg Ca(OH) ₂
Arsenic	5	mg As/kg Ca(OH) ₂
Barium	350	mg Ba/kg Ca(OH) ₂
Boron	150	mg B/kg Ca(OH) ₂
Cadmium	1.5	mg Cd/kg Ca(OH) ₂
Chromium	25	mg Cr/kg Ca(OH) ₂
Copper	500	mg Cu/kg Ca(OH) ₂
Fluoride	750	mg F ⁻ /kg Ca(OH) ₂
Iron	100	mg Fe/kg Ca(OH) ₂
Lead	5	mg Pb/kg Ca(OH) ₂
Manganese	25	mg Mn/kg Ca(OH) ₂
Mercury	1	mg Hg/kg Ca(OH) ₂
Molybdenum	35	mg Mo/kg Ca(OH) ₂
Nickel	10	mg Ni/kg Ca(OH) ₂
Selenium	5	mg Se/kg Ca(OH) ₂
Sulphide	20	mg S ²⁻ /kg Ca(OH) ₂
Zinc	1500	mg Zn/kg Ca(OH) ₂

The above table of specific impurity limits has been calculated based on the maximum acceptable value (MAV) of a determinand taken from the Drinking-Water Standards for New Zealand 1995, as follows:

Antimony	0.003	mg/L
Arsenic	0.01	mg/L
Barium	0.7	mg/L
Boron	0.3	mg/L
Cadmium	0.003	mg/L
Chromium	0.05	mg/L
Copper *	1	mg/L
Fluoride	1.5	mg/L
Iron *	0.2	mg/L
Lead	0.01	mg/L
Manganese *	0.5	mg/L
Mercury	0.002	mg/L
Molybdenum	0.07	mg/L
Nickel	0.02	mg/L
Selenium	0.01	mg/L
Sulphide *	0.05	mg/L
Zinc *	3	mg/L

* For aesthetic parameters, guideline values are given. In the case of copper and manganese, the health based MAV is higher than the aesthetic parameter guideline value.

Appendix B: Sampling Procedure

B1 Sampling Method

B1.1 General

B1.1.1 Sampling and preparation shall be conducted as expeditiously as possible in order to avoid undue exposure of the material to the air.

B1.1.2 The sampling method must give a gross sample that is representative of the material, and which may be divided to provide representative samples for analysis. Samples for analysis shall be provided in triplicate. Samples shall be sealed in airtight moisture proof containers. Each of the triplicate samples shall weight not less than 1.0 kg.

B 1.1.3 One sample is for the immediate use of the purchaser for testing of the shipment. The other two samples shall be retained until it is known from the results of the laboratory examination that the shipment meets the requirements of this Standard. The second sample shall be delivered to the supplier if requested within five days of notification of the examination results of the first sample. The third sample is for the use of a referee laboratory if there is a controversy over the analyses.

B 1.1.4 Each sample shall be labelled to identify it by such information as the material, the name of the purchaser, package number, and date received. Each label shall be signed by the sampler.

B1.2 Sample Size

B1.2.1 The sample size must provide a gross sample that is representative of the material.

B1.2.2 The size of the gross sample and the samples for analysis shall be agreed by the purchaser and the supplier, giving consideration to obtaining representative samples and the requirements of the laboratory to undertake analyses.

B1.2.3 Suggested gross samples sizes are as follows:

B1.2.3.1 A minimum gross sample of 23 kg shall be taken for each 22 tonnes of material or as agreed.

B1.2.3.2 If the delivery is less than 223 tonnes, a sufficient gross sample of 16 kg shall be obtained from each shipment to provide representative samples in triplicate for analysis, or as agreed.

B1.3 Sampling Method

B1.3.1 With packaged materials, at least 2% of packaged materials, but no fewer than five packages, shall be sampled. Individual packages shall be taken from various locations on the unit being sampled. No sample shall be taken from a broken package.

B 1.3.2 On packaged powdered material, a sampling tube which takes a core not less than 13 mm in diameter shall be used. The tube shall be inserted sideways into the package so that it will take a core of the material from the entire width of the package. Three samples shall be taken from each package, evenly spaced over the length of the package.

B1.3.3 Finely divided bulk material shall be sampled by the use of a sampling tube that takes a core at least 25 mm in diameter. Cores shall be taken from at least eight separate parts of the mass to secure a representative sample.

B 1.3.4 In situations where the material is delivered by bulk transport and access for uniform sampling is not available, the sampler must use their best judgement in collecting a representative sample. Documentation of sampling location and method is essential.

B 1.4 **Handling of Samples**

B1.4.1 The gross sample shall be mixed thoroughly, and at least 16 kg of the material representative of the gross sample, shall be quartered to ensure that it is homogeneous. One 4 kg sample shall be mixed well and quartered. Store three of the four 1 kg samples in sealed containers as required in Section B1.1.2. To quarter the sample, tip it on to a clean surface so that it forms a conical or hemispherical pile. With a clean knife, cut into the pile vertically, dividing the pile into four equal parts. Make up a new pile with these four parts, and repeat the quartering process. Use three of the quarters as described in Section B1.1.3.

B2 Sample Preparation

B2.1 The preparation of subsamples for testing may affect the results obtained from identical samples so appropriate and consistent preparation procedures are most important.

B2.2 An appropriate preparation technique must be agreed by the purchaser and the supplier following discussions with all parties, including the laboratory undertaking the analyses, with regard to the objectives of the analyses and the desired results.

B2.3 A suggested sample preparation method to determine the "total" determinand present, as compared to a method appropriate for the determination of "water soluble" determinands, is as follows:

B2.3.1 A vigorous acid digestion of the sample would be required, that would provide a prepared sample suitable for an approved analysis.

B2.3.2 *AWWA Standard Methods for the Examination of Water and Wastewater* suggests that as a general rule Nitric Acid digestion alone is adequate for samples containing easily oxidised materials.

B2.3.3 Nitric Acid - Sulphuric Acid digestion or Nitric - Hydrochloric Acid (Aqua Regia) digestion is adequate for samples with readily oxidisable organic matter.

B2.3.4 Nitric - Perchloric Acid digestion or Nitric - Perchloric - Hydrofluoric Acid digestion is necessary for samples containing difficult to oxidise organic matter or minerals.

B2.4 The mutually agreed sample preparation method will depend on the determinands to be measured and the equipment available for preparation and testing by the laboratory.

B2.5 As an alternative, some non-destructive techniques are available, such as X-ray spectrophotometry, for total elemental analysis of solid samples, which do not require an acid digestion preparation.

Appendix C: Supply Contract

C1 Contract

The following provides an outline of acceptable conditions of supply of product, to be included in a contract between a purchaser and a supplier for the supply of hydrated lime in accordance with this Standard, or as agreed by the purchaser and the supplier.

C2 Contract Period

A nominated contract period shall be set as part of a supply contract and shall commence from the date of entering into contract.

C3 Annual Requirements

An approximate annual requirement of product shall be provided for the information of the supplier. However, no guarantee can be given to these amounts as they will vary with water treatment plant throughput, water quality and customer consumption.

C4 Delivery

- C4.1 The reception point for the supply of hydrated lime shall be designated and agreed between the supplier and the purchaser.
- C4.2 Delivery of an order to the purchaser's specified reception point shall be made within seven days of receipt of the order or at any other mutually agreed time.
- C4.3 Delivery of hydrated lime shall be in full tanker or compartment loads. Bulk bags shall be delivered in full truck or truck and trailer loads unless a prior agreement between the supplier and the purchaser has been reached as to the load size.
- C4.4 Delivery shall be made between the hours of 7.30 am and 4.00 pm Monday to Friday, excluding public holidays, unless a prior arrangement is made between the supplier and the purchaser, and discharged only with the authorisation of the purchaser's representative or operating personnel.
- C4.5 Delivery dockets shall be provided giving the weight of the product and the proportion of calcium hydroxide. Bulk deliveries shall be weighed over certified weighbridges.
- C4.6 The purchaser may check the proportion of available calcium hydroxide in the hydrated lime after delivery.

C5 Payment

- C5.1 Payment will be made in full by the purchaser by the 20th of the month following that in which deliveries are made and correctly invoiced by the supplier, unless otherwise agreed.
- C5.2 Invoices shall state the order number, docket number, weight of product supplied and the proportion of available calcium hydroxide.
- C5.3 Payment will be made on measured quantities unless otherwise agreed.

C6 Contract Sums

- C6.1 Suppliers shall submit quotes in NZ\$/tonne for the product offered. The quoted price shall allow for delivery including off-loading to the nominated reception points.
- C6.2 The quote shall hold firm for the duration of the contract period.
- C6.3 The quote shall be exclusive of GST, but inclusive of any applicable duties or charges.

C7 Insurance

The supplier shall make their own arrangements for insurance of the order while in transit to the reception point. Responsibility will pass to the purchaser once the delivery has been made to the purchaser's storage facility.

C8 Subletting

The supplier shall not assign or sublet the contract or any part of the contract without the written consent of the purchaser.

C9 Cancellation

The purchaser shall reserve the right to cancel the contract for non-compliance with the Standard or failure to deliver within the allotted time.

REFERENCES

ANSI/AWWA Standard for Quicklime and Hydrated Lime. ANSI/AWWA B202-93, AWWA, 1993.

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