

## 2002 - HYDRATED LIME

### SECTION 2002

#### HYDRATED LIME

##### 2002.1 DESCRIPTION

This specification covers hydrated lime suitable for use in mortar, portland cement concrete and the treatment of soil, soil-aggregate and asphalt mixtures.

##### 2002.2 REQUIREMENTS

**a. General.** Ship and store lime in moisture proof containers. Lime that has become partially set or caked will be rejected.

**b. Hydrated Lime for Mortar and Concrete.** Provide Type N, normal finishing hydrated lime that complies with ASTM C 206.

**c. Hydrated Lime for Treating Soil, Soil-Aggregate and Asphalt Mixtures.**

(1) Hydrated lime for this purpose is any hydrated lime product consisting of hydrated lime and insoluble inert material and complying to the following:

- Available Lime Index as Calcium Hydroxide, %, min ..... 90
- Residue retained on a No. 30 sieve, %, max. .... 1
- Residue retained on a No. 200 sieve, %, max. .... 20

(2) Hydrated lime for treating soil, soil-aggregate and cold in-place recycle asphalt pavement may be manufactured at the jobsite by slaking pebble quicklime. Use equipment specifically manufactured for this purpose and approved by the Field Engineer. Provide a certification stating the purity of the load with each load of quicklime.

Using the relationship for Pure Quicklime  $(CaO) \times 1.32 = \text{Hydrated Lime } (Ca(OH)_2)$ , determine the basis of pay for jobsite slaked hydrated lime with the "calculated method" using the certified lime purity for each load. Determine the amount of water needed to make slurry from dry quick lime using the following:

$$W_w = ((A+B)/P_s) - W_{QL}$$

Where:

$$A = (\text{Quicklime Delivered}) * (\% \text{ purity in decimal form}) * 1.32 = W_{QL} * P_{CaO} * 1.32$$

$$B = (\text{Quicklime Delivered}) * (\% \text{ inert material}) * 1.0 = W_{QL} * P_I$$

$$A + B = \text{Total Hydrated Lime Produced (Pay Quantity)}$$

$$W_w = \text{Weight of Water Required for Slurry of Given Percent Solids, tons}$$

$$W_{QL} = \text{Quicklime Weight, tons}$$

$$P_{CaO} = \text{Percent of CaO in the Quicklime, purity (as a decimal)}$$

$$P_I = \text{Percent of Inert Material in the Quicklime (as a decimal)}$$

$$P_s = \text{Percent Solids in the Lime Slurry (as a decimal)}$$

$$\text{Gallons of Water} = W_w * 2000/8.34$$

Verification sampling of the pebble quicklime is required on the basis of 1 sample per 10 loads. Identify the sample as raw material for lime slaking, and accompany the sample with the certification for the load sampled to the MRC for comparison to the laboratory test.

(3) Carbide lime may also be used for treating soil and soil-aggregate. Carbide lime is hydrated lime created as a by-product of acetylene gas manufacturing. It is a relatively pure form of hydrated lime and retains approximately 50% moisture indefinitely after the manufacturing process. Its consistency at delivery is that of a flowable to semi-flowable paste which can be spread evenly over the subgrade. Provide hauling equipment that can be sufficiently sealed to prevent loss of the material during transportation.

During loading of the material, thoroughly mix the upper crust with the lower portions to provide a consistent product. The solids portion of the carbide lime material must comply with all chemical and physical requirements of **subsection 2002.2c** above, except as noted below.

Determine the percent solids of the material by using a rapid method (e.g. microwave), approved by the Engineer. Represent the quantity of material by randomly selecting 1 test per 5 loads for pay, and for determining the rate of application. Provide a copy of each test report to the Engineer along with copies of the weigh tickets

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represented. If the material demonstrates consistent moisture content, a reduced testing frequency may be requested according to Part V. Periodic unannounced check tests for moisture content will be conducted by the Engineer.

Calculate the pay quantity for carbide lime as follows:

(Weight of material delivered) (% solids) = Pay Quantity

The percent moisture will not be credited toward water for pay.

Verification sampling of carbide lime is required on the basis of 1 sample per 10 loads. Place the samples in sealed, airtight containers and forward them to the MRC for analysis.

The source of carbide lime used on a project must be tested and approved prior to use. The Engineer will take a representative sample of the material and forward it to the MRC for analysis. The source may be approved without testing if the material is currently being used on another KDOT project and has already been tested and approved.

If the available lime index falls below 90% during source qualification or verification testing, the first occurrence will be reported as non-comply (NCPL), and the Project Engineer will be notified. The DME may allow continued use of the source, and adjust the application and pay rates based on the test results, or may require the Contractor to use lime in another form or from another source. All subsequent verification samples from the same source that fail the available lime index will be reported as pass, attention advised (PAAA).

(4) Gypsum may be added, no more than 1% by weight, to assist in the pumpability of the lime slurry. If gypsum is used, it shall be incorporated into the process prior to slaking. Any addition of gypsum will be considered subsidiary to the Contract Documents.

### 2002.3 TEST METHODS

Sample and test according to the following methods:

- Chemical Analysis ..... ASTM C 25
- Sampling, other than field ..... ASTM C 50
- Sampling, Field ..... KT-29
- Physical Tests ..... ASTM C 110

### 2002.4 PREQUALIFICATION

None required, except for source qualification of carbide lime as outlined above. No prequalified lists are maintained for any hydrated lime products.

### 2002.5 BASIS OF ACCEPTANCE

#### a. Hydrated Lime.

- (1) Receipt and approval of a Type D certification as specified in **DIVISION 2600**.

#### b. Pebble Quicklime (for slaking).

- (1) Receipt and approval of the certified lime purity for each load of quicklime.
- (2) Visual inspection of the final product in the field.

#### c. Carbide Lime (for use as hydrated lime).

- (1) Approval of the source as outlined in **subsection 2002.2c(3)**.
- (2) Receipt and approval of a Type C certification as specified in **DIVISION 2600**.
- (3) Visual inspection of the material in the field.
- (4) Adjustments for moisture and available lime index as outlined in **subsection 2002.2c(3)**.