1. **SCOPE**

1.1. **Description of Test**

This method provides an indication of the performance of pulverized quicklime in terms of its slaking characteristics.

1.2. **Application of Test**

This test is used to determine temperature rise in three (3) minutes as well as total temperature rise to complete slaking reaction which provides a measure of the available lime content of the sample. This test is also used to determine total slaking period which provides a measure of the over-all degree of reactivity of the material.

1.3. **Additional Testing Required**

Should the test results indicate that the temperature rise at the end of three (3) minutes is less than 40\(^\circ\) C and that the total slaking period is longer than ten (10) minutes, then the sample should be sent to the Saskatchewan Research Council in Saskatoon for chemical analysis. The subsequent chemical analysis test result is used to determine whether or not the material meets the Specification for Manufactured Materials SMM 402-1 Pulverized Quicklime.

2. **APPARATUS AND MATERIALS**

2.1. **Equipment**

Mechanical stirrer capable of 400 ± 50 rpm and fitted with a special stainless steel stirring rod as shown.

Modified Dewar Flask - 665 ml, fitted with special rubber gasket covers.

Thermometers - dial type, 0 to 100\(^\circ\) C range in 1\(^\circ\) increments.

Weight scale.

Sieve - 3.35 mm (No. 6).
3. PROCEDURE

3.1. Sample Preparation

Thoroughly mix the sample to be tested.

Prepare 100 g sample of quicklime to pass the 3.35 mm sieve as rapidly as possible to prevent sample deterioration.

Place the prepared sample in an airtight container and allow to come to room temperature before testing.

3.2. Test Procedure

Adjust the temperature of about 500 ml of distilled water to 25° C.

Add 400 ml of this water to the Dewar Flask.

Set the mechanical stirrer with the stirring rod in the flask revolving at 400 ± 50 rpm.

The temperature of the water in the flask must remain at 25° C ± 0.5° C.

Weigh out 100 g of the prepared sample of quicklime.

Add the quicklime to the water in the flask without delay.

Start timer. This marks the start of the lime slaking period.

Place the rubber gasket covers in place immediately.

Record temperature readings at 30 second intervals.

Continue readings until less than 0.5° C temperature change is noted in each of three consecutive readings.

The time at which the first of three consecutive readings was taken marks the end of the lime slaking period.
4. **RESULTS AND CALCULATIONS**

4.1. **Calculations**

The total slaking period is the difference between the time at which the first of three consecutive readings were taken (ie stopwatch time = x seconds) and the time of the start of the slaking test (ie stopwatch time = 0 seconds).

The final temperature is that which was noted at the time at which the first of three consecutive readings were taken.

The total temperature rise is the final temperature minus the initial temperature (ie presumably $25 \pm 0.5^\circ C$).

The temperature rise in three (3) minutes is the temperature at three (3) minutes minus the initial temperature (ie presumably $25 \pm 0.5^\circ C$).

4.2. **Reporting Results**

Total slaking period is reported in minutes.

Total temperature rise is reported in degrees celsius.

Temperature rise in three (3) minutes is reported in degrees celsius.

5. **ADDITIONAL INFORMATION**

5.1. **Equipment Setup**

The apparatus consists of a covered reaction container fitted with a mechanical stirrer and thermometer. The quicklime change shall be stirred with a mechanical stirrer fitted with a stainless steel rod, the end of which is formed into a loop to follow the contour of the reaction container. The vacuum reaction flask shall be provided with a cover consisting of two circular pieces of gasket rubber sheet, approximately 3 mm thick. The first piece is provided with a single radial slot that slides over the stirring rod and thermometer. The second piece has a similar slot plus a hole to provide for the dial thermometer. When the two cover pieces are in place, the slot on the lower piece is at right angles to the slot on the upper piece with the thermometer stem extending through the lower slot.

5.2. **Reference**

ASTM C-110
FIGURE 209-1-1
LIME SLAKING APPARATUS
## LIME SLAKING RATE TEST

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<th>Temperature</th>
<th>Time / min</th>
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### LIME REACTIVITY

<table>
<thead>
<tr>
<th>LIME REACTIVITY</th>
<th>CRITERIA</th>
<th>ACTION</th>
</tr>
</thead>
</table>
| HIGH            | TEMP INCREASE OF 40°C IN 3 MINUTES  
TOTAL SLAKING PERIOD IS LESS THAN TEN MINUTES  | NONE REQUIRED  
MATERIAL DEEMED ACCEPTABLE |
| MEDIUM          | TEMP INCREASE OF 40°C IN 3 TO 6 MINUTES  
TOTAL SLAKING PERIOD IS BETWEEN 10 - 20 MINUTES | SEND SAMPLE TO SRC FOR CHEMICAL ANALYSIS |
| LOW             | TEMP INCREASE OF 40°C IN 6 MINUTES OR MORE  
TOTAL SLAKING PERIOD IS MORE THAN 20 MINUTES  | SEND SAMPLE TO SRC FOR CHEMICAL ANALYSIS |

### TEMPERATURE RISE IN 3 MINUTES  
TOTAL SLAKING PERIOD  
TOTAL TEMPERATURE

### REMARKS

FIGURE 209 - 1- 2
### APPROVAL SHEET

New __  Revision X  Date of Previous Document  88-04-14

Effective Date: __-__-

Description of Revision (Reason for Revision):

- Format of test procedure updated.

Review/Implementation Process:

- Reviewed by the Materials Section of the Technical Standards and Policies Branch.

Other Manuals/Policies Affected:

- Nil

Follow Up/Training Required:

- Nil

Comments/Concerns/Implications (Budget/Environment/Stakeholders):

Prepared and Recommended by  D. MacLeod ________________ 92-05-20
  Quality Control Engineer  Date

Approval Recommended by  R.A. Widger ________________ 92-07-21
  Senior Materials Engineer  Date

Approval Recommended by  A.R. Gerbrandt ________________ 92-07-23
  Dir., Technical Standards & Policies Br.  Date

Approved by  D.G. Metz ________________ 92-07-25
  Assistant Deputy Minister, Infrastructure  Date
  Electronic File Updated  94-03-10
  Update Mailed  - -