

## Test Method

# Preparation of Lime Stabilized Materials to Establish the Dry Density-Moisture Content Relationship

# RC 301.03

## 1. Scope

This method describes the processes used for preparing materials stabilized in the field and sampled prior to compaction or materials stabilized in the laboratory to establish a dry density - moisture content relationship.

## 2. Apparatus

As for AS 1289.5.1.1 and .5.2.1.

## 3. Sample Preparation

As for AS 1289.1, .5.1.1 and .5.2.1.

## 4. Procedure

As for AS 1289.5.1.1 and .5.2.1 with the addition of the following:

### 4.1. For materials sampled in the field after compaction.

Laboratory compaction must be completed between 48 and 72 hours of field mixing unless otherwise directed by the Superintendent (see Note 1).

### 4.2. For materials stabilized in the Laboratory

As for AS 1289.5.1.1 or .5.2.1 with the addition of the following:

- (a) Obtain a sample of fresh lime (see Note 2)
- (b) Determine the equivalent calcium oxide content of the lime in accordance with AS 4489.6.1 (see Note 3).
- (c) When Quicklime is to be used, determine the Residue of Quicklime after Slaking in accordance with RC 131.00 (see Note 3).
- (d) If required, the optimum percentage of lime to be used for a specific soil type, lime type, supplier and batch can be determined by RC 131.01 - *Lime Saturation Point of Soils (pH method)*.
- (e) Calculate the required amount of lime additive on a percentage by dry mass basis for each portion.
- (f) Spread the material to be stabilized evenly over the base of the container (see Note 4).
- (g) Spread the lime to be added over the surface of the soil
  - (i) Hydrated Lime
 

To aid mixing, a quantity of water equal to about half the mass of hydrated lime should be added. An allowance for this should be made in the target moisture level. Add the water as a spray and mix the material thoroughly.
  - (ii) Quicklime
 

Add a quantity of water equal to about one and one-half times the mass of quicklime. This must be done about 30 minutes after the quicklime is spread on the top of the soil (see Note 4).

An allowance for the water added shall be made in the target moisture level taking into account that about one-third of the mass of water added will be removed by chemical combination and steam generated during hydration.
- (h) After about 4 hours mix the lime thoroughly into the soil until, with fine-grained soil, at least 60% of the treated material passes the 9.50 mm sieve (see Note 4).
- (i) Compact specimens about 1 hour after mixing, using AS 1289.5.1.1 or .5.2.1, as appropriate. Remove each compacted specimen from the mould, place it in a sealable container and seal the container.
- (j) Between 48 and 72 hours (see Note 5) after mixing has taken place, take each specimen and break up aggregations until all such material will pass a 10 mm screen. Compact specimens in accordance with AS 1289.5.1.1 or .5.2.1, as appropriate, to obtain the moisture content–dry density curve.

## 5. Calculations

Calculate according to AS 1289.5.1.1 or .5.2.1, as appropriate.

## 7. Notes

1. Lime, by its reaction with soil, causes a progressive drop in the dry density for a given energy input in disturbed and compacted specimens. This effect varies with different soil types but the maximum effect generally occurs in 12-24 hours.
2. Samples of hydrated lime and quicklime must be kept in airtight containers and may need to be discarded 14 days and 7 days respectively after the date of manufacture. Calcium hydroxide and calcium oxide may be converted to calcium carbonate after these times, reducing the amount of calcium available for stabilization
3. Unless otherwise approved by the Superintendent, lime which does not comply with the minimum specified Available Lime and, in the case of quicklime, the specified residue after slaking level must not be used for laboratory stabilization.

## 6. Reporting

Report as stated in AS 1289.5.1.1 or .5.2.1, as appropriate.

For materials stabilized in the laboratory:

- (a) The source of the lime used and date sampled
- (b) The available lime
- (c) If quicklime is used, the Residue of Quicklime after Slaking
- (d) If determined, the Optimum Percentage of Lime determined in accordance with RC 131.01.

4. The depth of material, the spreading of lime and the times for slaking and mixing are meant to model field processes and are derived from the relevant job specification.

If conditioning or two stage stabilization is to be carried out, the same time intervals between mixing and compaction as intended in the field should be used in the laboratory.

5. Material prepared in this manner will then have had similar treatment to material stabilized in the field and sampled to establish the dry density-moisture content relationship.

## Test Method - Revision Summary

### RC 301.03 Preparation of Lime Stabilized Materials to Establish the Dry Density-Moisture Content Relationship

Date	Clause Number	Description of Revision	Authorised by
November 2012	Full document	Re-styled with minor corrections made	Principal Advisor – Pavements & Materials