Chembase International

PAVEMENT STABILISATION WITH CHEMBASE®

GUIDELINE ON FIELD SAMPLING

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Guide on field sampling and laboratory testing of marginal quality pavement materials for stabilisation with Chembase compound

1 Executive Summary

This document outlines a structured approach to evaluating the performance of Chembase® compound in stabilising marginal quality soils for road construction. It details the sampling methodology, control tests, and treatment procedures using Chembase's two-part system, namely an organic polymer stabiliser and an ionic salt activator, alongside hydrated lime. Laboratory tests are conducted on both untreated and treated soil samples to assess improvements in strength, shrink and swell behaviour, and water resistance. Treated trial samples were cured and tested at 7 and 28 days, with expected strength gains of up to 25 percent, demonstrating Chembase's sustainable benefits in enhancing soil properties for long-term pavement performance.

2 Introduction

The following steps and quantities of Chembase stabiliser, activator and hydrated lime may vary according to the results of the soil tests of different soils.

The Chembase pavement stabiliser is developed to be used in road construction and rehabilitation for sustainable and environment friendly outcomes.

Chembase treats in-situ soil to produce an unbound road base layer which is water resistant, has an increased Californian Bearing Ratio (CBR) and reduces Swell and Shrink characteristics.

3 CHEMBASE®: A two-part stabiliser and compaction system

Part 1: The Stabiliser is an organic plant-based Polymer which is non-toxic and environmentally friendly
Part 2: The Activator is an ionic salt compound

Several representative samples shall be collected from the materials of pavement layers where treatment is required. The frequency of sampling shall be such that it is representative of the overall material behaviour for the project road length)

For sub-grade sampling, a minimum of three samples is recommended for a road of 1000 Metres in length, first one at 250 mts from beginning of road, 2nd and 3rd at 500 and 750 mts respectively. The lateral positions of these samples should be taken from the wheel paths, two at inner tracks and one at outer track.

In case of unconfined compression tests on undisturbed samples, where applicable, the diameter of treated samples taken for such tests must be true representations of the soil to be treated including small stones, gravel etc, without removing the gravel and small stones when sampling as they contribute to the overall test results.

The surface before sampling shall be free from all organic matters (twigs, leaves, roots etc.).
Samples of 100 kg (5 bags each of approx. 20 kg) should be taken from each sample site for assessment of soil type and for evaluating Chembase effectiveness. Appropriate sampling procedures to obtain representative material are detailed in many national standards and road authority documentation. For example, AS1289.1.2.1 describes how to obtain samples from a test pit, AS 1289.1.3.1:2015 for undisturbed sampling, and AS1289.1.1 details the amounts of material required for various standard tests.
Note that standard sampling protocols require the removal of all topsoil and vegetation before obtaining samples.

4 Test Requirements

Control tests shall be carried out on untreated samples (one test for each) as follows:

Test Required	Australian Standard No.
Moisture content of sampled material	AS 1289.2.1.1
Particle Size Distribution (PSD)	AS 1289.3.6.1, AS 1289.3.6.3
Atterberg limits and linear shrinkage	AS 1289.3.1.1, AS 1289.3.2.1, AS 1289.3.4.1
Standard Compaction tests	AS 1289.5.1.1
California Bearing Ratio (CBR)	AS 1289.6.1.1
Unconfined Compressive Strength (UCS)	AS 5101.4
Water permeability / Capillary Rise	AS 5101.5
Lime Demand	ASTM D6276 or Q133 (DMR Queensland)

These results are required in order to calculate the quantities of Chembase compound, lime and water required to treat the layers of pavement. They are also the control sample results against which treated samples are compared to demonstrate improvements in soil properties.

Tests to be carried out in conformity with Australian Standards.

These tests will determine Plasticity (clay content), CBR (California Bearing Rating), OMC (Optimum Moisture Content), Shrink/Swell, UCS (Unconfined Compressive Strength) and Water Resistance (Capillary Rise) etc.

5 Trial Mix Design for Soil Stabilization

The tests listed below are required to demonstrate the improvements and sustainable benefits that Chembase compound will enhance to the marginal quality soil to be used for the construction of the road.

The recommended trial concentrations of Chembase compound and Hydrated Lime are as follows, however they may vary depending on the soil being treated:

Part	Component	Mixing Ratio
Part 1	Stabiliser/Polymer	Mixed at 0.32% of the dry weight of the soil sample
Part 2	Activator	Mixed at 0.16% of the dry weight of the soil sample
Part 3	Hydrated Lime	Mixed at Lime Demand amount from control tests + **1–2%** extra (based on soil plasticity) in percentage of dry weight of 1 m^3 of soil

The above trial concentrations are based on the average dry density (dry weight) of soils tested from various sites in NSW is 1.75 t/m^3 (gm/cc) or (17.5 kN/m_3).

6 Trial Batches for Soil Stabilization Testing

Produce two test batches of the above mixtures of Chembase, Lime and the initial control soil samples:

The following tests are required for each treated sample.

Test Name	Standard Reference
Atterberg Limits & Linear Shrinkage	AS 1289.3.1.1, AS 1289.3.2.1, AS 1289.3.4.1
Standard Compaction Tests	AS 1289.5.1.1

Test Name	Standard Reference
California Bearing Ratio (CBR)	AS 1289.6.1.1
Unconfined Compressive Strength (UCS)	AS 5101.4
Swelling / Capillary Rise	AS 5101.5
Lime Demand (for performance audit)	ASTM D6276 or Q133 (DMR Queensland)

Each treated sample for the test should be set aside to cure at approximately 23 degrees C.

First test on day 7 and then at day 28. The day 7 sample will provide an indication of the increase in strength and water resistance of the treated soil. The day 28 test shall show an increase of approx. 20-25% as Chembase compound continues its aid to gain strength and water resistance over future weeks and months.

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