Test Method

Density Decay Correction Factor For Granular Materials Stabilised With Cementitious Binder

RC 330.03

1. Scope

This Method covers the laboratory procedure for the determination of the job specific density decay correction factor for granular pavement materials stabilised with cementitous binder.

2. Definitions

(a) Cementitious Binder

A cementing agent which binds the particles of a granular pavement material together to increase its strength. Cementitious binders include Portland cement Type GP or blended cement Type GB, hydrated lime, quicklime, or a blend of ground granulated blast furnace slag (GGBFS), hydrated lime, fly ash, alkali activated slag or other pozzolanic material.

(b) Density Decay Correction Factor

A factor derived to calculate the field density ratio from a laboratory determined reference density where compaction of the test sample has occurred after the maximum allowable working time has expired.

(c) Maximum Allowable Working Time

The time available, to the nearest hour, for a crushed rock base material stabilised with a cementitious binder to reach a value of 90% of the Unconfined Compressive Strength (UCS) determined for the stabilised material after storage for one hour at the specified temperature.

The specified temperature is:

May to September	10° to 15°C
October to April	20° to 25°C

3. Apparatus

(d) For unconfined compressive strength-as detailed in AS 1141.51.

(e) For maximum dry density and optimum moisture content as detailed in AS 1289.5.2.1

4. Procedure

4.1. General

If decay factors are required for construction being carried out from October to April inclusive, maintain the material at a temperature between 20° to 25°C.

If decay factors are required for construction being carried out from May to September inclusive, maintain the material at a temperature between 10° to 15°C.

4.2. Density Decay Correction Factor

(a) Obtain a representative portion of the material to be stabilised (including any additives) of sufficient quantity after removal of oversize to:

(i) produce 7 pairs of moulded UCS samples; and

(ii) determine maximum dry density and optimum moisture content.

(b) Prepare the combined sample in accordance with clause 5.1 of AS 1289.1.1. Ensure that all asphalt and surfacing seal material is broken up. Take care not to crush individual particles.

(c) Condition the material for 24 hours in a sealed container if an additive has been added which requires such conditioning (e.g. lime).

(d) Screen out any oversize material retained on the 19 mm sieve. Mix the sample with added water to achieve laboratory moisture ratio of 95% to 105%. Cure the mixed material for a minimum of 8 hours.

(e) Add the required quantity of the cementitious binder and add water to obtain a laboratory moisture ratio of 95% to 105% and thoroughly mix the stabilised sample.

(f) Allow the material to stand for the maximum allowable working time for the binder.

(g) Breakup any lumps over a 10 mm screen and recombine material passing and retained on the screen.

(h) Split out a representative sub sample of the material and compact a specimen in accordance with AS 1289.5.2.1. Complete the compaction within 30 minutes of the standing time beyond the maximum allowable working time. Determine the dry density *(D_0)* of the moulded sample in accordance with AS 1289.5.2.1.

(i) Repeat step 4.2 (h) and calculate the mean value of the dry density results obtained (D).

(j) Repeat steps 4.2(f) to (i) after storage of mixed material for 2, 4, 8, 12 and 24 hours beyond the maximum allowable working time under the conditions as detailed in Clause 4.1.

(k) Calculate the density decay factor *(DDCF)* for each standing time t from the following equation:

$$DDCF = \frac{D_t}{D_o}$$

where:
D_0 = the mean dry density determined at the maximum allowable working time; and

D_t = the mean dry density determined at time t after maximum allowable working time.

(l) Plot a graph of density decay correction factor versus standing time in excess of the maximum allowable working time. Draw a curve of best fit to fit the points (see Figure 1 as an example).

(m) Determine the density decay correction factors at 3, 5, 7, 10, 15 and 21 hours standing time after the maximum allowable working time from the curve.

5. Report

Report the following:

(a) the details of the material and any additives included;

(b) details of the cementitious binder,

(c) the percentage of cementitious binder added to the nearest 0.1%;

(d) the temperature at which the samples were conditioned;

(e) the density decay correction factor for each range of hours 2 to 4, 4 to 6, 6 to 8, 8 to 12,12 to 18 and 18 to 24 of standing time after mixing, using the density correction factors determined in 4.2 (m) for the mid points of the ranges.

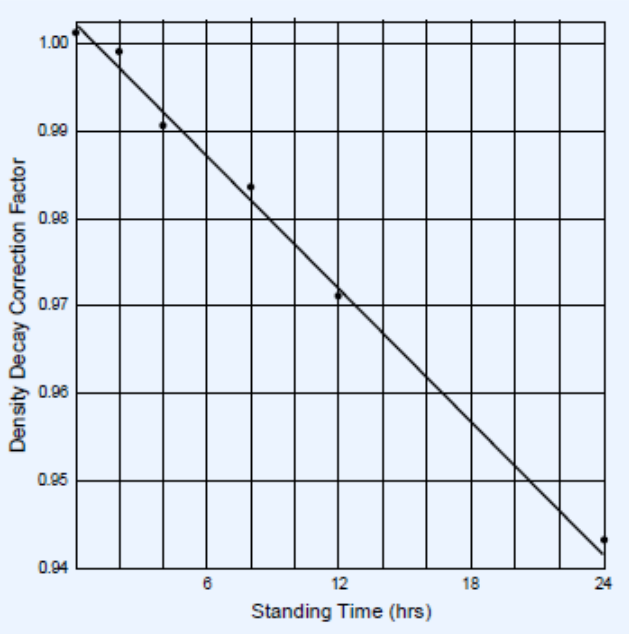

Figure 1 – Density decay correction factor vs standing time after maximum allowable working time

Test Method - Revision Summary

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