Transport Roads & Maritime Services

NSW GOVERNMENT

Test method T1029

Determination of chloride content in powdered concrete

NOVEMBER 2012

Revision Summary

Ed/Rev Number	Clause Number	Description of Revision	Authorisation	Date
		Reformatted and Revision Summary Added	D. Dash	Jun 2001
Ed 2/ Rev 0	All	Reformatted RMS template	J Friedrich	November 2012

Note that Roads and Maritime Services is hereafter referred to as 'RMS'.

The most recent revision to Test method T1029 (other than minor editorial changes) are indicated by a vertical line in the margin as shown here.

Test method T1029

Determination of chloride content in powdered concrete

1. Scope

This test method sets out the procedure for determination of chlorides in powdered concrete samples. The test method has been modified from the method set out in the British Standard BS 1881.

2. General

Term	Definition
chloride content of concrete	(a) Is the amount of chlorine in salt form found in concrete, expressed either as weight percent or as milligrams of chloride per gram of concrete. **Note** If the content of cement in concrete is known, the chloride content can be recalculated relative to it. In some instances it desirable to express it as content of sodium chloride or calcium chloride.

3. Apparatus

(a) 1-2 L dark glass bottle

1-2 L bottle

100 ml drop bottle

25-50 ml burette

25 ml pipette

10 ml pipette (5 ml, see text)

Per sample: 250 ml Erlenmeyer bottle

100 ml volumetric flask

250 ml beaker

Watch glass

(b) Solutions:

Nitric acid, ($HN0_3$) concentrated (d1.42)

0.01 M Silver nitrate solution ($AgNO_3$) 1-2 L

0.01 M Ammonium thiocyonide (NH_4SCN) 1-2 L

100 ml ferric indicator (see text)

(c) Water bath

(d) Balance 200 ± 0.01 g

4. Preparation of Test Specimens

In general, the concrete powder obtained by 5 - 8 mm dia drills is sufficiently fine for immediate processing. If, however, some coarser particles are visible, the whole sample should be ground in a suitable mortar.

5. Procedure

(a) Weigh 1.00 ± 0.01 g of sample into a 250mL Erlenmeyer bottle. Add 10 ml of water, disperse, add 5 ml nitric acid (d = 1.42) and 25 ml hot water and cover with a watch glass immediately. Place on a boiling water bath and keep it on for 10 minutes after the drops start to condense beneath the watch glass. Cool to room temperature.

(b) Transfer the whole content into volumetric flask and make up to 100 ml. Pipette 25 ml into a 250 ml glass beaker. Pipette into it 10 ml of standard 0.01 M $AgNO_3$ solution. Add 0.5 ml or 10 drops ferric indicator solution (100 ml saturated ammonium ferric sulphate plus 10 ml nitric acid, d = 1.42). Titrate with standard 0.01 N NH_4SCN solution to the first permanent pale-brownish colour.

Note: Approximately 0.5 - 1 ml before equivalence, the precipitated silver chloride starts to agglomerate and the titrated solution to clear.

(c) In case of turbidity, 1 ml of nitrobenzene may be added and titration performed in a fume cupboard. Rare occurrence of very high turbidity may require filtering of the digested slurry.

Caution: Nitrobenzene is moderately toxic. It is essential to use the fume cabinet and to wash the hands after use.

(d) Determine daily the chloride content of the deionized water by titrating 25 ml of it (in duplicate). Use 5 ml of $AgNO_3$ solution. If the volume difference (5-V) is 0.1 ml or more, add this difference to the volume of NH_4SCN consumed by each sample.

6. Calculations

Calculate:

Chloride percent ($C1^-$ %) in concrete =(10 - V) x 0.140

Where V = volume of 0.01 N NH_4SCN

If the results are requested as percent sodium chloride (NaCL %) in concrete, use the formula:

% NaCl = (10 - V) x 0.232

To obtain milligrams per gram of concrete, if requested, multiply the percents by 10.

If the cement in concrete is known, the results may be recalculated using the formula:

$$\% \text{ of chloride in cement} = \frac{\% \ of \ chloride \ in \ concrete \ \times \ 100}{\% \ of \ cement \ in \ concrete}$$

Note: In case of low levels of chlorides, only 5 ml of 0.01 $AgNO_3$ solution may be added in the step (c). Formulae in the step (d) are then:

% of Chlorides = (5 - V) x 0.140

% of NaCl = (5 - V) x 0.232

7. Report

Report calculated chloride content as a percent by mass of concrete, unless otherwise requested.

RMS 13.065