Transport Roads & Maritime Services

NSW GOVERNMENT

Test method T229

Unconfined compressive strength of rock core to 50 MPa strength

OCTOBER 2012

Revision Summary

Ed/Rev Number	Clause Number	Description of Revision	Authorisation	Date
		Reformatted and Revision Summary Added	D.Dash	May 1999
		Date on Test Method Revised to Agree with Date on Revision Summary	D.Dash	Feb 2001
Ed 2/ Rev 0	All	Reformatted RMS template	J Friedrich	October 2012

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

The most recent revision to Test method T229 (other than minor editorial changes) are indicated by a vertical line in the margin as shown here.

Test method T229

Unconfined compressive strength of rock core to 50 MPa strength

1. Scope

This Test Method sets out the procedure for the determination of the unconfined compressive strength of intact cylindrical rock specimens of strength up to 50 MPa.
The test is based on the A.S.T.M. and I.S.R.M. methods, however the stringent requirements for end finish is relaxed for rocks of strength up to 50 MPa for reasons detailed in referenced document.
For samples which achieve strengths of greater than 50MPa, the strength is regarded as a minimum since a more stringent end finish may have produced a higher strength result.

2. Referenced Document

Pells, P.J.N., & Ferry, M.J. Needless Stringency in Sample Preparation Standards for Laboratory Testing of Weak Rocks. International Congress on Rock Mechanics, Melbourne 1983; Sect. A, p.A203.

3. Apparatus

(a) Loading Devices to apply and measure axial load on the specimen, of sufficient capacity to apply load at a rate conforming to the requirements set out in "Procedure". The machines shall conform to the Grade A requirements of A.S.2193 for forces, to cover the range 1KN to 200KN

(b) Bearing Surfaces: The testing machine shall have two steel blocks having a Rockwell hardness of not less than HRC58. One of the bearing blocks shall be spherically seated and the other a plain rigid block. The thickness of the platens shall be at least 15mm and their flatness should be better than 0.005mm

(c) Devices for accurately measuring height, diameter and specimen tolerances to 0.05mm

4. Test Specimens

Test specimens should be right circular cylinders whose sides shall be free of irregularities and straight to 0.15mm over the length of the specimen.

The ends of the specimen shall be cut parallel to each other and ground flat to 0.1mm across the face with no surface irregularities.

The ends shall not depart from perpendicularity by more than 1o, so that five equally distributed measurements of height will not vary by more than 0.85 mm.

The specimen shall have a length to diameter ratio of 2.0 to 2.5 and a diameter of not less than 45 mm.

The use of capping materials is not permitted.

5. Procedure

(a) Weigh the sample after cutting.

(b) The sample may be tested as received or soaked for a minimum of 24 hours as directed by the Engineer or Geologist.

(c) If the sample is to be soaked, weigh the sample again in the saturated surface dry condition after soaking but prior to testing.

(d) Place the sample in the centre of the loading machine and apply load at constant rate so that failure will occur within five to fifteen minutes loading.

(e) A protective shield should be placed around the sample to prevent injury from flying rock fragments.

(f) After sample has failed, release load and remove specimen from machine.

(g) Use all remaining specimen to perform moisture content in accordance with T120.

6. Calculations

Calculate the Unconfined Compressive Strength by dividing the maximum load recorded by the cross sectional area of the specimen.
Note If only specimens with a length to diameter ratio of less than 2 are available for testing, their corrected strength must be computed using the following formula:

$$C = \frac{C_m}{[0.88 + 0.24(\frac{d}{l})]}$$

Where C = Corrected Compressive Strength.
Cm = Measured Compressive Strength.
d = Diameter of specimen.
l = Length of specimen.

Calculate the original and/or after test moisture and the dry density.

7. Reporting

Report the following:

Description of Rock
Test Condition (Soaked/Unsoaked)
Diameter of Sample
Length of Sample
Length to Diameter ratio
Unconfined Compressive Strength in MPa
Original Moisture Content
Moisture Content after test
Dry Density
Description of Failure (as per attached guide.)
Report if the sample has been corrected when length to diameter ratio is less than 2.

Note: If specimen attains more than 50MPa, add + to the value to indicate sample may have attained higher strength if ends were finished to more stringent specifications.

8. Unconfined Compressive Strength

8.1 Description of Failure

When describing the type of failure the terms defined below should be used either singly or in combination where appropriate. However, other descriptions may be more applicable in particular cases. Record should be made of joint planes inclusions direction of pronounced strata or any other factors that might affect the strength of the specimen.

Axial Single (AS) **Single Shear (SS)** **Double Shear (DS)**

Axial Multiple (AM)

When shearing failure is partly or wholly along either a bedding plane or a joint plane, the letters "B" or "J' are to be added to failure symbol as applicable. Cores can also be described as by "Crumbling failure" or "Shattering failure".