

ROCK MECHANICS LAB

DETERMINATION OF UNIAXIAL COMPRESSIVE STRENGTH OF CYLINDRICAL ROCK SPECIMENS BY DIRECT METHOD

1. Scope

This test measures the uniaxial compressive strength of cylindrical rock specimens for strength classification and characterization of intact rock.

2. Sample Preparation

Specimens need special preparations. Please refer to Lab 1 for UCS sample preparation

3. Apparatus

A Compression machine, with two hardened steel platens, able to apply and measure an axial load to the specimen. The compression machine should have sufficient capacity and capable to apply a load at a constant rate.

4. Procedure

- i. Input all parameter into the digital compression machine (Diameter, Height & Mass).
- ii. Place the cylindrical core specimen between the platens vertically
- iii. Load the specimen continuously at a constant rate until failure occurs.
- iv. Record the failure load. (P)
- v. Repeat (i) – (iv) for the remaining specimens.

5. Calculations

- i. The uniaxial compressive strength is computed as follows;

$$\sigma_c = P/A$$

Where; P is failure load expressed as a force in kN; D is the specimen diameter in mm.

- ii. The Estimated Uniaxial Compressive Strength, therefore is computed as follows;

- a. Correction for specimen Diameter:

$$\frac{UCS}{UCS_{D50}} = \left(\frac{50}{D}\right)^{0.18}$$

b. Correction for Length:

$$\sigma_c = \frac{\sigma_{ucs}}{\left(0.88 + 0.24 \times \left(\frac{D}{L}\right)\right)}$$

