

## Determination of Compressive Strength

Lab Test Reference            306  
British Standard Reference  
BS 1881 : Part 120 : 1983

### Principal Apparatus

Compression Testing - Lab Inventory No. xxx (BS1881 Pt 115)

Masonry Saw - Lab Inventory No. xxx

Cube Tank - Lab Inventory No. xxx

Steel Callipers - Lab Inventory No. xxx (BS3123)

Measuring Rule - Lab Inventory No. xxx (BS4035/4372)

External Callipers - Lab Inventory No. xxx

1. Preliminaries
  - 1.1 The test is carried out in the concrete laboratory where a flat clear area of bench shall be prepared.
  - 1.2 Check that the compression testing machine, callipers and measuring rule certificates are valid.
  - 1.3 Check the jubilee clips, steel collars and metal bases are clean, serviceable and lightly oiled.
  - 1.4 Check that the test sample number and test schedule correspond and obtain a test worksheet from the Cabinet.
2. Standard Test Method
  - 2.1 An inspection of the core shall first be carried out by measuring the diameter at four points along its length with the callipers and recording the mean value on the test sheet. The nominal size should be 100mm or 150mm. Any other size shall be rejected.
  - 2.2 The maximum aggregate size shall be measured and the ratio of the diameter to the maximum size shall be calculated. If this value is less than 3, the core shall be rejected, unless the client wishes the test to proceed in which case the core shall be noted as non standard
  - 2.3 The maximum and minimum length of the core as received is recorded on the worksheet.
  - 2.4 The length to diameter ratio is now calculated and should be between 1 and 2. If it is too long, then the core needs to be trimmed to size with the masonry saw after the visual inspection. If it is too short, the core is rejected.
  - 2.5 A visual inspection is now carried out to determine the degree of voids, honeycombing or cracks. In order to avoid extremes of subjective bias, two observers shall compare the surface voids.
  - 2.6 Using the card viewer which is cut to give 125mm x 80mm aperture, the voids are observed through the card which is placed on the surface of the core and compared with the specimen photographs given in figure 1 of BS1881, Part 120.

- 2.7 At least four positions are observed and the average excess voidage recorded on the worksheet.
- 2.8 Cores which are too long are now cut to size using the masonry saw.
- 2.9 The cores are soaked in water at  $20 \pm 2^{\circ}\text{C}$  and dried to a saturated surface dry condition. Before capping roughen the ends by wire brushing to provide a key for the mortar
- 2.10 The core is capped on both ends by firstly placing it on one end in the vertical position and attaching the steel collar and jubilee clip to the other to allow for a thickness of approximately 10mm of mortar.
- 2.11 A mixture of dry sand mainly passing the 300 micron sieve and rapid hardening cement in the ratio 1:3 by mass is prepared and sufficient water added so that when mixed with a spatula, a creamy consistency is obtained. A 100mm cube is also made of the mortar.
- 2.12 The mortar is applied to the space at the top of the core within the collar and trimmed slightly flush with the rim. The oiled based of a glass plate is placed on the mortar and gently rotated, pressing down until the rim of the collar makes contact.
- 2.13 The whole core is now covered with damp sacking or polythene for at least 24 hours ensuring room temperature is between  $15$  and  $20^{\circ}\text{C}$ , after which the glass is removed along with the collar and jubilee clip.
- 2.14 The other end of the core is similarly treated. The Tolerances of the core are now checked with a spirit level, T square, and feeler gauge. The core is rejected if the tolerances are not met.
- Flatness Tolerance- 0.06 mm wide
- Squareness Tolerance- 2 mm wide
- Parallelism Tolerance - 2 mm wide
- Cylindricity - 3% of core diameter
- (ref: BS 308, Part 3)
- 2.15 After capping, the core is placed in the cube tank to cure for at least 48 hours. When the core is due to be crushed, the mortar cube shall be tested for compressive strength. If this exceeds the anticipated strength the core shall be crushed.
- 2.16 The core is removed from the tank and the capping inspected for shrinkage, cracks and voids. If any such defects are found, the cores shall be re-capped.
- 2.17 Before testing, the length of capped core shall be measured and its density calculated in accordance with BS1881, Part 114.
- 2.18 Observations shall be made on the size and position of reinforcing bars, and the mortar cube crushed to assess its strength.

- 2.19 The core is now transferred to the compression testing machine after ensuring any loose particles are cleaned off, and placed between the platens.
- 2.20 The machine is set such that the pace rate lies between 0.2 and 0.4 MN/m<sup>2</sup>/sec. and switched on in automatic mode.
- 2.21 The maximum load sustained by the core is recorded at the point of failure.
- 2.22 The compressive strength is calculated by dividing the maximum load by the cross-sectional area, calculated from the average diameter.
- 2.23 If the compressive strength of the core exceeds that of the capping material as measured in the mortar cube, then this shall be noted on the worksheet.
- 2.24 Corrections for the presence of reinforcement, voidage and length th diameter ratio are now made using the formula on the reverse of the worksheet. The corrected compressive strength is repeated to the nearest 0.5NM/m<sup>2</sup>
- 2.25 Unless instructed otherwise the correction for voidage as detailed in Concrete Society Technical Report II shall be applied.
- 2.26 Ensure any supplementary information on the method of drilling or details supplied with the cores is appended to the worksheet.