

Clay Bricks - Determination of Compressive Strength

Lab Test Reference 334
British Standard Reference
BS 3921 : 1985

Principal Apparatus

Compression Testing Machine - Lab Inventory No. xxx (BS1881 Part 115)
Cube Tank - Lab Inventory No. xxx
Vernier Callipers - Lab Inventory No. xxx
4mm Plywood Packing Material at least 5mm larger than the blocks

1. Preliminaries
 - 1.1 The test is carried out in the concrete laboratory using the compression testing machine.
 - 1.2 Check the equipment is clean, serviceable and that the calibration certificates are valid.
 - 1.3 Check the sample number and test schedule correspond.
 - 1.4 Obtain a test worksheet from the Cabinet.
2. Standard Test Procedure
 - 2.1 Ten bricks are used to perform this test and these are first measured individually at the mid-points of the brick to determine their width and length. The measurements are recorded to the nearest millimetre and the plan area calculated for the smaller of the two faces by multiplying the length and width dimension.
 - 2.2 The bricks are examined to determine what type they conform to ie cellular, frogged or perforated. Before testing can proceed they must first be prepared as follows:-
 - 2.3 Solid bricks, bricks with frog intended to be laid downwards, perforated bricks, cellular bricks:- All the ten bricks shall be saturated by placing them in the cube tanks for 24 hours.
 - 2.4 Bricks with a single frog intended to be laid frog upwards:- The bricks are immersed in the cube tank for not less than 24 hours to achieve saturation. They are then removed from the tank and allowed to drain for not less than 5 minutes and dried off to achieve a saturated surface dried condition.
 - 2.5 A mortar is prepared by mixing dry clean concreting sand complying with BS882 with Instacrete or some other rapid hardening cement in the proportion 1:3 (cement : sand) adding sufficient water to produce a creamy workable consistency.
 - 2.6 The mortar is applied to the frogs in the bricks with a spatula ensuring all the void is filled and the final surface is flush with the rim of the brick.
 - 2.7 All the bricks are similarly treated after which they are laid on the floor of the laboratory for 24 hours under a cover a damp sacking or polythene.

- 2.8 The bricks are then transferred to the cube tanks where they are immersed in water for a further 3 days at least.
- 2.9 Bricks with double frogs:- These bricks are treated in the same way as for single frogged bricks except that between 4 to 8 hrs shall elapse between the applications of mortar to the frogs on the opposite faces of the bricks.
- 2.10 After the immersion period all the bricks shall be removed from the cube tanks, allowed to drain and the frog mortar checked for shrinkage, cracks and cavities. Any bricks showing such defects shall be rejected and further bricks prepared.
- 2.11 Pieces of 4mm plywood shall be prepared by sawing sheeting to a size which exceeds the work dimensions by 5 to 15mm.
- 2.12 Two pieces of plywood shall be placed symmetrically above and below each brick specimen and the assembly positioned between the metal platens of the compression testing machines, checking that the appropriate platens and sub-platens have been installed.
- 2.13 The load is applied to the specimens by using the compression tester in the manual mode at a pace rate not exceeding $35\text{N/mm}^2/\text{min}$ up to half the anticipated maximum load. Thereafter the rate is smoothly changed to $15\text{N/mm}^2/\text{min}$ and this maintained until failure is indicated by a drop in applied load and stress cracks appear in the brick.
- 2.14 The maximum load is recorded (in N).
- 2.15 The test is repeated for each brick specimen using fresh plywood sheets each time.
- 2.16 The compressive strength of each brick is calculated by dividing the maximum recorded load by the plan area and expressed to the nearest 0.1N/mm^2 .
- 2.17 The mean compressive strength of all 10 bricks is also calculated to the nearest 0.1N/mm^2 .
- 2.18 Compliance is assessed by consulting Table 4 of BS 3921.

NOTES

1. A higher rate of loading up to half of the maximum load reduces the time for testing the specimen and maybe used because the rate of loading during this stage does not influence the ultimate strength.
2. It is necessary to adjust the controls of the machine continuously and smoothly to maintain a constant rate of loading.