Properties of brick and block materials - lab report example

Science, Physics

Properties of Brick and Block Materials

The paper " Properties of Brick and Block Materials" is a good example of a lab report on formal science and physical science. To measure the water absorbed by capillary action for brick and block samples. The pores in masonry materials exhibit capillary action or suction when exposed to moisture. This process can lead to problems such as rising damp in buildings, penetrating rain or other water-borne degradation problems such as sulfate attack, frost damage, efflorescence, etc. This process can be predicted since it is related to the number and size of the pores in the material. Basically, the smaller the pore the greater the suctional pressure, but also the larger the number of pores then greater the overall amount of water is absorbed. The first test will seek to measure the capillary action/ suction of the dry masonry material. Weighing the mass of water absorbed by the sample when one surface of the sample is immersed in water does this.

Procedure

- Select three specimens for analysis, we suggest a thermalite block, and engineering brick and facing brick.
- Weigh the specimen and record its dry mass.
- Using a ruler measure the height, width, and depth of the sample. Place two supports on the bottom of the flat dish and pour sufficient water into the dish to cover the supports to a depth of approximately 5 mm.
- Place one sample onto the supports and start the timer. Leave in position for 1 minute.

- Remove the specimen; wipe off the surplus water with a damp cloth. Weigh the sample and record its new mass. DO NOT STOP THE TIMER.
- Replace the specimen on the supports exposing the same face to the water and continue this process weighing the sample every minute for 10 minutes, adjusting the water level as necessary.

DO NOT STOP THE CLOCK DURING THE 10 MINUTES OF THE

TEST ResultsTable 1: Sample MeasurementsMeasurements

- Thermalite

BlockEngineering BrickFacingBrickLength (cm)19. 521. 521. 3Height6. 96. 26. 5Width (cm)9. 71010. 2Area (cm2)189. 15215. 00217. 26

- Results
- Table 2: Water Absorption by Capillarity

Specimen: Thermalite BlockMass dry (g): Area (cm2): Time (minutes)Mass when weighed after every minute(g)Cumulative Mass of water absorbed (g)Mass of water absorbed per minute (g)⟳Time (min0. 5)1655. 6113. 2113. 2112660. 2517. 854. 641. 423653. 721. 33. 451. 734666. 2623. 862. 5625668. 5326. 132. 272. 246670. 8128. 412. 282. 457671. 9229. 521. 112. 658673. 3930. 991. 472. 839675. 1932. 791. 8310676. 5334. 131. 343. 16Specimen: Engineering BrickMass dry (g): Area (cm2): Time (minutes)Mass when weighed (g)Cumulative Mass of water absorbed(g)Mass of water absorbed per minute(g)⟳Time (min0. 5)13229. 270. 550. 55123229. 420. 70. 151. 4133229. 670. 950. 251. 7343229. 610. 890. 06253229. 741. 020. 132. 2463229. 941. 210. 22. 4573230. 031. 310. 092. 6583229. 881. 160.

152. 8393229. 731. 010. 153103229. 991. 270. 263. 16Specimen: Facing BrickMass dry (g): Area (cm2): Time (minutes)Mass when weighed (g)Cumulative Mass of water absorbed(g)Mass of water absorbed per minute (g)⟳Time (min0. 5)11990. 66. 996. 99121993. 8910. 283. 291. 4131996. 713. 33. 021. 7341999. 3515. 742. 44252001. 5517. 7422. 2462003. 7320. 122. 382. 4572005. 7322. 1222. 6582007. 7924. 182. 062. 8392009. 9126. 32. 123102011. 9728. 362. 063. 16

- Table 3: Calculated Data

SpecimenInitial Rate of Absorption(g cm-2 min-1)Gradient of Graph(g min-0. 5)Water Absorption Coefficient(g cm-2 min-0. 5)Thermalite Block3. 466655. 613. 466Engineering Brick15. 0193229. 2715. 019Facing Brick9. 1621990. 69. 162The initial rate of absorption (suction rate) (g cm-2 min-1): Water absorption coefficient (g cm-2 min-0. 5) rearrange the equation to find A. Where, M = mass of water absorbed (g)a = area (cm2)t = time (min)A is a constant characteristic of the material known as the water absorption coefficient (g cm-2 min-0. 5)B) Comparative Water Absorption Of Brick And Block Materials Objective The water absorption test allows you to determine the total volume of the pores present in the masonry sample (the porosity). This value is useful in that factors such as durability and frost resistance may be related to this figure. This test is used in this experiment to try to explain why samples used in part 1 of the experiment either absorb or do not absorb water. So the question is does a high porosity value increase or decrease the water absorption coefficient? Procedure

- Use the same three samples from part A.

- Use the recorded weights from part A.
- Saturate the sample using the vacuum saturation apparatus under the supervision of the laboratory supervisor or technician. The specimens are placed in a vacuum chamber, which is evacuated for 10 minutes. The chamber is then flooded with water, which saturates the specimens. After soaking for a further ten minutes, the specimens are removed.
- Wipe off the surplus water, weigh the specimens and record their saturated masses.
- Determine the volume of each specimen. (Use measurements from part A to determine the volume)
- Volume (cm3) = height (cm) x length (cm) x width (cm) (Note: If the bricks have “ frogs” or depression present, you will need to calculate the area of the holes and remove this from the value you have obtained for the volume of the brick. This can be performed one of two ways – either by direct measurement with a ruler or by use of the displacement can).

2. Calculate the water absorption porosity (by volume) for each specimen (the volume of water absorbed by the specimen represents the void volume of the pore structure in the specimen):

- 3. Calculate the percentage of water absorption (by mass) for each specimen: ResultsTable 4: Water Absorption of Brick and BlockSpecimenThermalite BlockEngineering BrickFacing Brick Bulk volume (cm3) 1305. 1413331412. 19Mass dry (g) 642. 43228. 721983.

61Mass saturated (g) 676. 533229. 992011. 97Mass of water absorbed (g) 34. 131. 2728. 36The volume of water absorbed (cm3) 34. 131. 2728. 36Water absorption porosity(by volume %) 2. 615%0. 095%2. 008%Percentage of water absorption(by mass %) 5. 312%0. 393%1. 429