

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

# Construction Materials

## Properties and Testing



*Lecture #2*

*Concrete Laboratory*

**Test #2: Water Absorption of Clay Brick**

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*1<sup>st</sup> Year*

*Academic Year (2019-2020)*

# Test No. 2

## Water Absorption of Clay Brick

### Introduction

- Bricks are the oldest types of a masonry structure and an ideal building material because of its good durability, facility to make and require less maintenance compared with the other.
- Clay bricks are commonly used for different purposes like including building, facing and aesthetics, floor making and paving.
- Water absorption is the tendency of the material to absorb the water under specified test condition and commonly expressed as a weight percentage of the test specimen.
- The absorption of the brick is mostly affected by **properties of clay, method of manufacture** and **degree of firing**.
- Bricks with more porosity is therefore **less dense**, absorb more water.

# Test No. 2

## Water Absorption of Clay Brick

### Test Objective

- The objective of the water absorption test of clay brick is to determine the amount of water that is absorbed by the selected sample to know the percentage water absorption by weight.

# Test No. 2

## Water Absorption of Clay Brick

### Requirements

- This test is done according to ASTM C 67, Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile and Iraqi specification.
- The selected Specimens shall be representative of a lot of units and brushed to remove dirt, mud, mortar and any foreign materials.
- According to the ASTM specification, the number of selected specimens is at least 10 individual bricks for lots of 1 000 000 bricks or fraction or .
- The test specimens shall consist of half brick from five selected specimens.

# Test No. 2

## Water Absorption of Clay Brick

### Apparatus

- Electrical Oven



# Test No. 2

## Water Absorption of Clay Brick

### Apparatus

- Balance: the scale or balance used shall have a capacity of not less than 2000 g and shall be sensitive to 0.5 g.



# Test No. 2

## Water Absorption of Clay Brick

### Apparatus

- Thermometer
- Water container.



# Test No. 2

## Water Absorption of Clay Brick

### Procedure

1. Select 5 half-brick from 5 bricks which are selected randomly and mark them.





# Test No. 2

## Water Absorption of Clay Brick

### Procedure

2. Dry the specimen in a drying oven at a temperature of (110 to 115°C) for not less than 24 hrs.



# Test No. 2

## Water Absorption of Clay Brick

### Procedure

3. Remove the bricks from the oven and cool them to room temperature ( $24 \pm 8^\circ\text{C}$ ), with a relative humidity between 30 and 70 % and weigh each one ( $W_d$ ).



# Test No. 2

## Water Absorption of Clay Brick

### Procedure

4. Immerse the five bricks completely in water at (15.5 to 30°C) for the specified time (24 hrs).

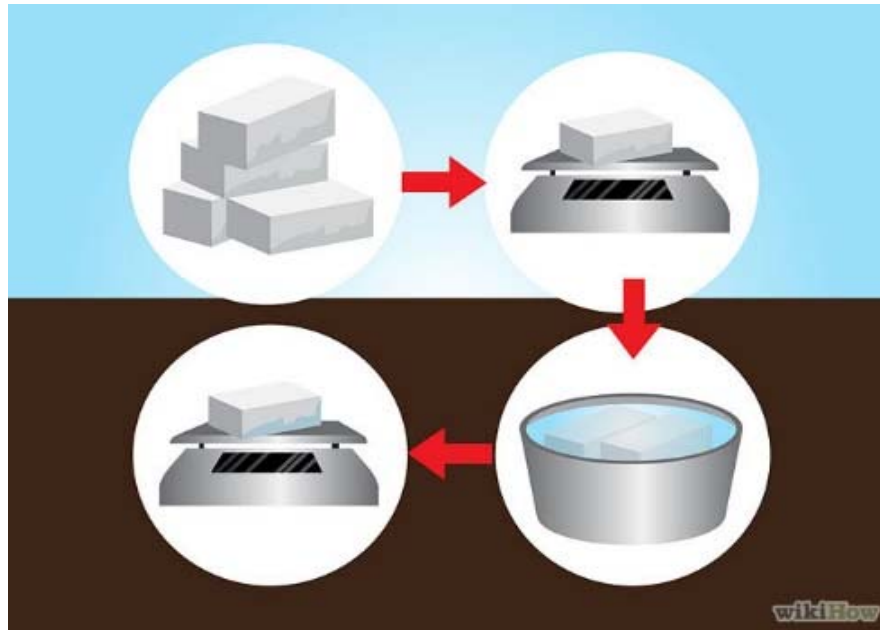


# Test No. 2

## Water Absorption of Clay Brick

### Procedure

5. Remove the specimen, wipe off the surface water with a damp cloth and weigh the specimen. Complete weighing of each specimen within 5 min after removing the specimen from the bath (Ws).



# Test No. 2

## Water Absorption of Clay Brick

### Calculation

- The water absorption can be calculated as follow:

$$\mathbf{Absorption} = \left( \frac{W_s - W_d}{W_d} \right) \times \mathbf{100}$$

Where:

**W<sub>d</sub>**: Dry weight of the specimen.

**W<sub>s</sub>**: Saturate weight of specimen after submersion.

# Test No. 2

## Water Absorption of Clay Brick

### Specification

- According to the both specifications ASTM and Iraqi, the maximum percentage of the clay brick illustrated as follow:

Grade	ASTM Specification		Maximum Cold Water Absorption %	
			Average of 5 brick	Individual
C 902	Pedestrian and Light Traffic Paving Brick	SX: Sever Weathering Extra cont.	8.0	11.0
		MX: Moderate Weathering Extra	14.0	17.0
		NX: Negligible Weathering Extra	No limited	No limited



# Test No. 2

## Water Absorption of Clay Brick

### Specification

- According to the both specifications ASTM and Iraqi, the maximum percentage of the clay brick illustrated as follow:

Grade	ASTM Specification		Maximum Cold Water Absorption %	
			Average of 5 brick	Individual
C 1272	Heavy Vehicular Paving Brick	F: Freezing	6.0	7.0
		R: Thawing	6.0	7.0

# Test No. 2

## Water Absorption of Clay Brick

### Specification

- According to the both specifications ASTM and Iraqi, the maximum percentage of the clay brick illustrated as follow:

Grade	ASTM Specification	Maximum Cold Water Absorption %	
		Average of 5 brick	Individual
C 1405	Single Fired Glazed Brick	EXT.	7.0
		INT.	-----



# Test No. 2

## Water Absorption of Clay Brick

### Specification

- According to the both specifications ASTM and Iraqi, the maximum percentage of the clay brick illustrated as follow:

Iraqi Specification		Maximum Cold Water Absorption %	
		Average of 10 brick	Individual
Class A	Used to structure parts and foundation loaded and exposed to erosion because of climatic effects and for external walls exposed to erosion.	20.0	22.0
Class B	Used for bearing structure parts unexposed to erosion or for internal wall protected from moisture	24.0	26.0
Class C	Used for structure parts unexposed to climatic effects and unloaded as a partitions.	26.0	28.0

# Test No. 2

## Water Absorption of Clay Brick

### Data Sheet

Group No.	Wd (gm)	Ws(gm)	Water Absorption %	Average
1				
2				
3				
4				
5				