Introduction to Infrastructural Engineering

Water cement ratio

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Water to cement ratio

: is the ratio of *weight of water* to the *weight of cement* used in a concrete mix and can be expressed as

$$r = w_{h20} / w_c$$

$$= 8.33\, q_{H20} / w_c \quad (1)$$

W/C Formula

where

r = water to cement ratio

w_{h20} *= weight of water (lbs)*

w_c *= weight of cement (lbs)*

q_{H20} *= volume of water (US gallon)*

Example

Example - Water to Cement Ratio

A batch of concrete has 45 gallons of water and 900 lbs of cement. The water to cement ratio can be calculated as

r = 8.33 (45 gallons) / (900 lbs)

= 0.42

Fineness modulus

what, why & how

What is fineness modulus of aggregate?

Fineness modulus is an empirical factor obtained by adding the cumulative percentages of aggregate retained on each of the standard sieves ranging from 80 mm to 150 micron and dividing this sum by 100.

Fineness Modulus

Why to determine fineness modulus?

- Fineness modulus is generally used to get an idea of how coarse or fine the aggregate is. More fineness modulus value indicates that the aggregate is coarser and small value of fineness modulus indicates that the aggregate is finer.
- Fineness modulus of different type of sand is as per given below.

Range of Finesse modulus

Type of Sand	**Fineness Modulus Range**
Fine Sand	2.2 – 2.6
Medium Sand	2.6 – 2.9
Coarse Sand	2.9 – 3.2

Procedure

The **Fineness modulus** (FM) is an empirical figure obtained by adding the total percentage of the sample of an aggregate retained on each of a specified series of sieves, and dividing the sum by 100.

Procure to determine Fineness Modulus

Sieve the aggregate using the appropriate sieves (80 mm, 40 mm, 20 mm, 10 mm, 4.75 mm, 2.36 mm, 1.18 mm, 600 micron, 300 micron & 150 micron)
Note down the weight of aggregate retained on each sieve.

Procedure (Cont)

- Calculate the cumulative weight of aggregate retained on each sieve.
- Find out the cumulative percentage of aggregate retained on each sieve.
- Sum the cumulative weight of aggregate retained and divide the sum by 100.

FM = ∑ Cumulative % retain on each Sieve / 100