ACI Mix Design Equations

Step 1. Required material information (already given).
Step 2. Choice of slump. The slump is given, consistent with Table 1.

Step 3. Maximum aggregate size.

Step 4. Estimation of mixing water and air content.

Step 5. Water/cement ratio.

Step 6. Calculation of cement content. Based on steps 4 and 5, the required cement content is:

\[
\text{weight of cement} = \frac{\text{weight of water}}{W/C}
\]
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Therefore, the fine aggregate must occupy a volume of:

$$FA_{volume} = 27 \text{ ft.}^3 - \sum \text{volume}$$

The SSD weight of the fine aggregate is:

$$FA_{SSD} = FA_{volume} \times SG_{FA} \times 62.4 \text{ lb./ft.}^3$$

\[ \text{Specific Gravity of Fine Aggregate} \]
\[ \text{Unit Weight of Water} \]

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**Step 9. Adjustment for moisture in the aggregate.**

- Since the moisture level of the fine aggregate in our storage bins can vary, we will apply a simple rule to adjust the water required.
- Decrease the amount of water required by surface moisture content of the weight of the fine aggregate.
- Increase the amount of aggregate by the amount equal to the surface moisture.

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**Step 9. Adjustment of required water**

The water required is:

$$\text{Require water} = \text{water} - FA_{OD} (\text{SM}) - CA_{OD} (\text{SM})$$

$$\text{SM} = MC - AC$$