

The volume of a concrete cylinder mold, $V_{cylinder}$ (in³), is computed as

$$V_{cylinder} = \frac{\pi D^2 h}{4} \quad (1)$$

where D is the diameter of the cylinder (in.), and h is the height of the cylinder (in.).

The total volume of concrete $V_{concrete}$ (in³) required for m cylinders is given as

$$V_{concrete} = mV_{cylinder} \times MSYHE \quad (2)$$

where $MSYHE$ is the “make sure you have enough” factor (typically 2). The total weight of concrete required, $W_{concrete}$ (lb.), is given by

$$W_{concrete} = \frac{V_{concrete}}{1,728 \frac{\text{in}^3}{\text{ft}^3}} \times \gamma_{concrete} \quad (3)$$

where $\gamma_{concrete}$ is the unit weight of concrete (typically 150 lb./ft³).

The weight of each component in a concrete mix is the fraction of each component in the mix ratio to the sum of the components. For example, an x:y:z mix implies x parts cement to y parts fine aggregate to z parts coarse aggregate. The weight of cement, W_{cement} (lb.), in a concrete mix can be determined from the mix ratio by

$$W_{cement} = \frac{x}{x + y + z} \times W_{concrete} \quad (4)$$

The weight of fine aggregate, $W_{fine\ aggregate}$ (lb.), in a concrete mix is

$$W_{fine\ aggregate} = \frac{y}{x + y + z} \times W_{concrete} \quad (5)$$

The weight of coarse aggregate, $W_{coarse\ aggregate}$ (lb.), in a concrete mix is

$$W_{coarse\ aggregate} = \frac{z}{x + y + z} \times W_{concrete} \quad (6)$$

The required weight of water, W_{water} (lb.), for a given mix is given by

$$W_{water} = w/c(W_{cement}) \quad (7)$$

where w/c is the water-to-cement ratio.