

Mix Design M-40 Grade

The mix design M-40 grade for Pier (Using Admixture – Fosroc) provided here is for reference purpose only. Actual site conditions vary and thus this should be adjusted as per the location and other factors.

Parameters for mix design M40

Grade Designation = M-40

Type of cement = O.P.C-43 grade

Brand of cement = Vikram (Grasim)

Admixture = Fosroc (Conplast SP 430 G8M)

Fine Aggregate = Zone-II

Sp. Gravity Cement = 3.15

Fine Aggregate = 2.61

Coarse Aggregate (20mm) = 2.65

Coarse Aggregate (10mm) = 2.66

Minimum Cement (As per contract) = 400 kg / m³

Maximum water cement ratio (As per contract) = 0.45

Mix Calculation: -

1. Target Mean Strength = $40 + (5 \times 1.65) = 48.25$ Mpa

2. *Selection of water cement ratio:-*

Assume water cement ratio = 0.4

3. *Calculation of cement content: -*

Assume cement content 400 kg / m³

(As per contract Minimum cement content 400 kg / m³)

4. *Calculation of water: -*

$400 \times 0.4 = 160$ kg Which is less than 186 kg (As per Table No. 4, IS: 10262)

Hence o.k.

5. Calculation for C.A. & F.A.: – As per IS : 10262 , Cl. No. 3.5.1

$$V = [W + (C/S_c) + (1/p) \cdot (f_a/S_{fa})] \times (1/1000)$$

$$V = [W + (C/S_c) + \{1/(1-p)\} \cdot (ca/S_{ca})] \times (1/1000)$$

Where

V = absolute volume of fresh concrete, which is equal to gross volume (m^3) minus the volume of entrapped air ,

W = mass of water (kg) per m^3 of concrete ,

C = mass of cement (kg) per m^3 of concrete ,

S_c = specific gravity of cement,

(p) = Ratio of fine aggregate to total aggregate by absolute volume ,

(fa) , (ca) = total mass of fine aggregate and coarse aggregate (kg) per m^3 of Concrete respectively, and

S_{fa} , S_{ca} = specific gravities of saturated surface dry fine aggregate and Coarse aggregate respectively.

As per Table No. 3 , IS-10262, for 20mm maximum size entrapped air is 2% .

Assume F.A. by % of volume of total aggregate = 36.5 %

$$0.98 = [160 + (400 / 3.15) + (1 / 0.365) (Fa / 2.61)] (1 / 1000)$$

$$\Rightarrow Fa = 660.2 \text{ kg}$$

Say $Fa = 660 \text{ kg}$.

$$0.98 = [160 + (400 / 3.15) + (1 / 0.635) (Ca / 2.655)] (1 / 1000)$$

$$\Rightarrow Ca = 1168.37 \text{ kg}.$$

Say $Ca = 1168 \text{ kg}$.

Considering 20 mm : 10mm = 0.6 : 0.4

20mm = 701 kg .

10mm = 467 kg .

Hence Mix details per m^3

Cement = 400 kg

Water = 160 kg

Fine aggregate = 660 kg

Coarse aggregate 20 mm = 701 kg

Coarse aggregate 10 mm = 467 kg

Admixture = 0.6 % by weight of cement = 2.4 kg.

Recron 3S = 900 gm

Water: cement: F.A.: C.A. = 0.4: 1: 1.65: 2.92

Observation: -

A. Mix was cohesive and homogeneous.

B. Slump = 110mm

C. No. of cube casted = 12 Nos.

7 days average compressive strength = 51.26 MPa.

28 days average compressive strength = 62.96 MPa which is greater than 48.25MPa

Hence the mix is accepted.

We are thankful to Er Gurjeet Singh for this valuable information.

Source: <http://www.engineeringcivil.com/mix-design-m-40-grade.html>