Mix Design M-50 Grade

The mix design M-50 grade (Using Admixture –Sikament) 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 M50
Grade Designation = M-50
Type of cement = O.P.C-43 grade
Brand of cement = Vikram (Grasim)
Admixture = Sika [Sikament 170 (H)]
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 = 50 + (5 X 1.65) = 58.25 Mpa

2. Selection of water cement ratio:-
Assume water cement ratio = 0.35

3. Calculation of water: -
Approximate water content for 20mm max. Size of aggregate = 180 kg /m³ (As per Table No. 5, IS : 10262 ). As plasticizer is proposed we can reduce water content by 20%.
Now water content = 180 X 0.8 = 144 kg /m³

4. Calculation of cement content:-
Water cement ratio = 0.35
Water content per cum of concrete = 144 kg
Cement content = 144/0.35 = 411.4 kg / m³
Say cement content = 412 kg / m³ (As per contract Minimum cement content 400 kg / m³ )
Hence O.K.

5. Calculation for C.A. & F.A.: [Formula's can be seen in earlier posts]-
Volume of concrete $= 1 \text{ m}^3$
Volume of cement $= \frac{412}{(3.15 \times 1000)} = 0.1308 \text{ m}^3$
Volume of water $= \frac{144}{(1 \times 1000)} = 0.1440 \text{ m}^3$
Volume of Admixture $= \frac{4.994}{(1.145 \times 1000)} = 0.0043 \text{ m}^3$
Total weight of other materials except coarse aggregate $= 0.1308 + 0.1440 +0.0043 = 0.2791 \text{ m}^3$
Volume of coarse and fine aggregate $= 1 - 0.2791 = 0.7209 \text{ m}^3$
Volume of F.A. $= 0.7209 \times 0.33 = 0.2379 \text{ m}^3$ (Assuming 33% by volume of total aggregate)

Volume of C.A. $= 0.7209 - 0.2379 = 0.4830 \text{ m}^3$
Therefore weight of F.A. $= 0.2379 \times 2.61 \times 1000 = 620.919 \text{ kg/ m}^3$
Say weight of F.A. $= 621 \text{ kg/ m}^3$
Therefore weight of C.A. $= 0.4830 \times 2.655 \times 1000 = 1282.365 \text{ kg/ m}^3$
Say weight of C.A. $= 1284 \text{ kg/ m}^3$

Considering 20 mm: 10mm = 0.55: 0.45
20mm = 706 kg
10mm = 578 kg
Hence Mix details per m$^3$
Increasing cement, water, admixture by 2.5% for this trial
Cement $= 412 \times 1.025 = 422 \text{ kg}$
Water $= 144 \times 1.025 = 147.6 \text{ kg}$
Fine aggregate $= 621 \text{ kg}$
Coarse aggregate 20 mm $= 706 \text{ kg}$
Coarse aggregate 10 mm $= 578 \text{ kg}$
Admixture $= 1.2 \% \text{ by weight of cement} = 5.064 \text{ kg}$.

**Water: cement: F.A.: C.A. = 0.35: 1: 1.472: 3.043**

**Observation: -**
A. Mix was cohesive and homogeneous.
B. Slump $= 120 \text{ mm}$
C. No. of cube casted $= 9 \text{ Nos.}$
7 days average compressive strength $= 52.07 \text{ MPa}$.
28 days average compressive strength $= 62.52 \text{ MPa}$ which is greater than 58.25MPa
Hence the mix accepted.

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