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COIMBATORE

DEPARTMENT OF CIVIL ENGINEERING

19CEB201 – CONSTRUCTION MATERIALS

II YEAR / III SEMESTER

Unit 3 : Concrete

Topic 2 : Mix Specifications

Concrete Mix Ratio

- Concrete mix ratios are the proportions of concrete components such as cement, sand, aggregates and water.
- These mix ratios are decided based on type of construction and mix designs.
- However, building codes provides nominal and standard concrete mix ratios for various construction works based on experience and testing.

Types of Concrete Mix Ratio – Mix Designs

1. Nominal Concrete Mix Ratios
2. Standard Mixes or Ratio
3. Designed Mix Ratio of Concrete

Nominal Concrete Mix Ratios

- In the past the specifications for concrete prescribed the proportions of cement, fine and coarse aggregates.
- These mixes of fixed cement-aggregate ratio which ensures adequate strength are termed nominal mixes.
- Nominal mixes offer simplicity and under normal circumstances, have a margin of strength above that specified.
- However, due to the variability of mix ingredients the nominal concrete for a given workability varies widely in strength.
- Nominal mix ratios for concrete are 1:2:4 for M15, 1:1.5:3 for M20 etc.

Standard Mixes or Ratio

- The nominal mixes of fixed cement-aggregate ratio (by volume) vary widely in strength and may result in under or over-rich mixes.
- For this reason, the minimum compressive strength has been included in many specifications.
- These mixes are termed standard mixes. IS 456-2000 has designated the concrete mixes into a number of grades as M10, M15, M20, M25, M30, M35 and M40.
- In this designation the letter M refers to the mix and the number to the specified 28 day cube strength of mix in N/mm^2.
- The mixes of grades M10, M15, M20 and M25 correspond approximately to the mix proportions (1:3:6), (1:2:4), (1:1.5:3) and (1:1:2) respectively.

Designed Mix Ratio of Concrete

- In these mixes the performance of the concrete is specified by the designer but the mix proportions are determined by the producer of concrete, except that the minimum cement content can be laid down.
- This is most rational approach to the selection of mix proportions with specific materials in mind possessing more or less unique characteristics.
- For the concrete with undemanding performance nominal or standard mixes (prescribed in the codes by quantities of dry ingredients per cubic meter and by slump) may be used only for very small jobs, when the 28-day strength of concrete does not exceed 30 N/mm^2.
- No control testing is necessary reliance being placed on the masses of the ingredients.

Normal Grade of Concrete

Concrete Grade	Mix Ratio	Compressive Strength	
		MPa(N/mm2)	psi
M5	1:5:10	5	725
M7.5	1:4:8	7.5	1087
M10	1:3:6	10	1450
M15	1:2:4	15	2175
M20	1:1.5:3	20	2900

Standard Grade of Concrete

Concrete Grade	Mix Ratio	Compressive Strength	
		MPa(N/mm2)	psi
M25	1:1:2	25	3625
M30	Design Mix	30	4350
M35	Design Mix	35	5075
M40	Design Mix	40	5800
M45	Design Mix	45	6525

High Strength Concrete Grades

Concrete Grade	Mix Ratio	Compressive Strength	
		MPa(N/mm2)	psi
M50	Design Mix	50	7250
M55	Design Mix	55	7975
M50	Design Mix	60	8700
M65	Design Mix	65	9425
M70	Design Mix	70	10150

Thank You!!