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Different Grades of Concrete, Their Strength and Selection for Construction

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What is Grade of Concrete?

Grade of concrete is defined as the minimum strength the concrete must possess after 28 days of construction with proper quality control. Grade of concrete is denoted by prefixing M to the desired strength in MPa. For example, for a grade of concrete with 20 MPa strength, it will be denoted by M20 where M stands for Mix. These grade of concrete is converted into various mix proportions. For example, for M20 concrete, mix proportion will be 1:1.5:3 for cement:sand:coarse aggregate.



How to select suitable concrete grade for construction?



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Grade of concrete construction is selected based on structural design requirements. There are two types of concrete mixes, nominal mix and design mix. Nominal mix concrete are those which are generally used for small scale construction and small residential buildings where concrete consumption is high. Nominal mix takes care of factor of safety against various quality control problems generally occurring during concrete construction. Design mix concrete are those for which mix proportions are obtained from various lab tests. Use of design mix concrete requires good quality control during material selection, mixing, transportation and placement of concrete. This concrete offers mix proportions based on locally available material and offers economy in construction if large scale concrete construction is carried out. Thus, large concrete construction projects use design mix concrete. So, suitable grade of concrete can be selected based on structural requirements. Nominal mixes for grades of concrete such as M15, M20, M25 are generally used for small scale construction. Large structures have high strength requirements, thus they go for higher grades of concrete such as M30 and above. The mix proportions of these concretes are based on mix design.

Regular Grades of Concrete and their Uses



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Regular grades of concrete are M15, M20, M25 etc. For plain cement concrete works, generally M15 is used. For reinforced concrete construction minimum M20 grade of concrete are used.

Concrete Grade	Mix Ratio	Compressive Strength	
		MPa (N/mm²)	psi
Normal Grade of Concrete			
M5	1 : 5 : 10	5 MPa	725 psi
M7.5	1 : 4 : 8	7.5 MPa	1087 psi
M10	1 : 3 : 6	10 MPa	1450 psi
M15	1 : 2 : 4	15 MPa	2175 psi
M20	1 : 1.5 : 3	20 MPa	2900 psi
Standard Grade of Concrete			
M25	1 : 1 : 2	25 MPa	3625 psi
M30	Design Mix	30 MPa	4350 psi
M35	Design Mix	35 MPa	5075 psi
M40	Design Mix	40 MPa	5800 psi
M45	Design Mix	45 MPa	6525 psi
High Strength Concrete Grades			
M50	Design Mix	50 MPa	7250 psi
M55	Design Mix	55 MPa	7975 psi
M60	Design Mix	60 MPa	8700 psi
M65	Design Mix	65 MPa	9425 psi
M70	Design Mix	70 MPa	10150 psi

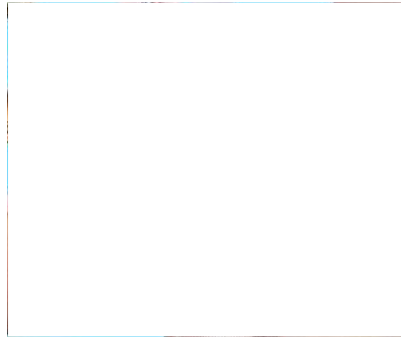
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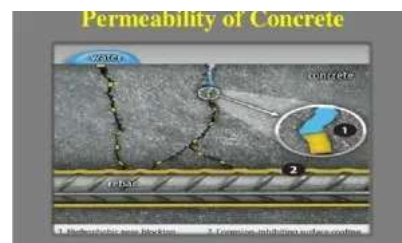
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