Effect of Elevated Temperatures on Dolomite Concrete

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Abstract **- This examination presents the aftereffects of examination of the impacts of raised temperatures on the compressive strength of Grade 30 cement. An aggregate of fifty shape examples were projected, relieved in water at surrounding temperature in the research facility and exposed to different temperature systems prior to testing. A substantial blend of 1:1:3 (concrete: fine totals: coarse totals) with water content proportion of 0.44, fine totals lying in zone III of sifter tests just as rock of greatest size 12.5mm was intended for these examinations. Examples relieved for 7 and 28 Days were exposed to uniaxial compressive stacking tests at room and raised temperature of 200 degree Celsius to 400 degrees Celsius at four to eight-hour span. The outcomes decline in compressive strength at the prior cited temperatures separately. At a raised temperature of 400 degrees Celsius a pinnacle decrease of in compressive strength was noticed.**

Index Terms **- compressive strength, Dolomite Powder, M-30 Grade, Elevated Temperatures, Split-tensile Strength.**

1.INTRODUCTION

For the most part, the surrounding temperature of substantial designs is relied upon to be at room esteems during development and during their administration life. Current plan and development codes deal with wellbeing of these constructions comparable to room temperature esteems. On occasion the natural temperature might increment amazingly or vacillate intermittently and frequently the plan strength of the design is essentially influenced. It has become basic for specialists to be keen on the lingering plan strength of cement exposed to high temperatures to frame information base for execution at these raised temperatures for down to earth research applications. Albeit experimental methodologies of applying least substantial cover to deal with imperviousness to fire has been the standard, a more same methodology emerging from measurable proof isn't awkward. The first stage is to expose the sizable 3D square blends to a range of temperature variations above room temperature and observe the changes in compressive strength at various significant ages. The findings of concrete cube tests on residual compressive strength while exposed to temperature ranges of 200 to 400℃ at intervals of 50℃ for M40 grade of concrete and tested at 7 and 28 days are presented in this study. On the fine aggregate, moisture loss of the sample cubes was evaluated, as well as other minor characterization tests such as sieve analysis and specific gravity.

2. MATERIALS

Cement:
Cement is a binder, which means it sets and hardens on its own and may hold other materials together. The Portland Cement 53 grade is employed in this project.

Fine aggregates:
For specimen preparation, locally accessible river sand that meets IS: 383 – 1970 grading zone II is used. The sand is screened atsite to remove deleterious materials.

Coarse aggregates:
Stones which are obtained from crushing of gravel are used as coarse aggregate. The maximum size of coarse aggregate is limited to 20mm. The aggregates are added strength to the composition. The coarse aggregates are crushed from natural rocks, so the all properties like hardness, stability are derived from parent rock. The 20 mm aggregates are used.

Water:
Water is most important material in construction for mixing of cement mortar & curing etc. The water gives the binding matrix in between cement and aggregates. The pH range of surface water must in between 6.5 to 8.5 and ground water is 6to 8.5. The potable water used, Maintained as per design.

Dolomite:
Dolomite is a calcium magnesium carbonate (CaMg (CO3)2) carbonate mineral. The sedimentary carbonate rock dolostone is also referred to as dolostone. Dolostone (dolomite rock) is mostly made up of the mineral dolomite, with a stoichiometric ratio of 50 percent or more magnesium replacing calcium, which occurs frequently as a result of digenesis. Dolomite is a rock-forming mineral with exceptional wet ability and dispersibility, as well as a moderate capacity to absorb oil and plasticizers. Dolomite is a weather-resistant stone.

Super Plasticizers:
Super plasticizers are a new type of plasticizer that is better than regular plasticizers. They're not the same as regular plasticizers in terms of chemistry. In comparison to the probable decrease of up to 15% in the case of plasticizers, the use of super plasticizers allows for a reduction of up to 30% in water without impairing workability.

3. RESULTS AND DISCUSSIONS

In this paper according to referenced journals compressive strength, split-tensile strength and ultrasonic pulse velocity tests are conducted.

3.1 Compressive Strength

On 150mm×150mm×150mm cubes, compression tests were performed. The concrete specimens were cleaned after being taken from the curing tank. The cube is placed in the testing machine with the cast faces at right angles to the compressive faces, then a constant load of 140 kg/cm^2/minute is applied up to failure, and the ultimate load is recorded. The load is gradually increased until the specimen breaks down, at which point the maximum load is recorded. At 7 and 28 days, compression tests were performed.

Table:1 Compressive strength at 7 & 28 days

S.No.	Type of mix	POR	Compressive strength, N/mm^2	
			7 days	28 days
1	DOM-I	0	28.86	41.33
2	DOM-II	3	29.76	42.59
3	DOM-III	6	31.59	45.28
4	DOM-IV	9	33.21	47.52
5	DOM-V	12	31.37	44.95

POR – Percentage of replacement

3.2 Spilt tensile Strength Test:

The cylinder specimen has a diameter of 150 mm and a length of 300 mm. The test is performed by inserting a cylindrical specimen horizontally between the loading surfaces of a compression testing machine and applying a load along the cylinder's longitudinal direction until the cylinder fails. At 7 and 28 days, the cylinder specimens are tested.

Table:2 Split tensile strength of cylinder at 7 & 28 Days

S.No	Type of mix	POR	Split tensile strength, N/mm^2	
			7 days	28 days
1	DOM-I	0	2.81	4.05
2	DOM-II	3	2.94	4.21
3	DOM-III	6	3.11	4.58
4	DOM-IV	9	3.33	4.70
5	DOM-V	12	2.78	4.04

Temperature effects of ordinary a dolomite concrete optimum (9%):

Dolomit	Temperature	0	4	8
0%	28	41.33	-	-
	200	-	34.43	32.24
	400	-	33.51	31.41
9%	28	47.52	-	-
	200	-	37.96	35.42
	400	-	36.51	33.78

4. CONCLUSSION

The conclusions drawn based on visual examination and experimental investigation carried out on concrete subjected to sustained elevated temperature with different duration of exposure are listed below.

Colour changes, surface cracking are important parameters to assess the level of temperature to which concrete is subjected by visual inspection.

1. The compressive strength at 0, 3, 6, 9 and 12% are 28.86, 29.76, 31.56, 33.21 and 31.37 at 7 days.
2. The compressive strength at 0, 3, 6, 9 and 12% are 41.33, 42.59, 45.28, 47.52 and 44.95 at 28 days.
3. The split tensile strength at 0, 3, 6, 9 and 12% are 2.81, 2.94, 3.11, 3.33 and 2.78 at 7 days.
4. The split tensile strength at 0, 3, 6, 9 and 12% are 4.05, 4.21, 4.58, 4.70 and 4.04 at 28 days.
5. At 9% replacement of dolomite the percentage of increment observed is 15.07 and 14.98% at 7 and 28 days.
6. Temperature effects of ordinary and dolomite concrete optimum is found at 9% only.

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