

Study of Reduction in Corrosion of Rebars in the Integral Waterproofed Concrete

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Abstract: Durability of concrete is dependent on many aspect but from them one of the aspect is impermeability of concrete. Reduction of water ingress in concrete provide protection to rebars. In this paper, work on study of corrosion in rebars which is affected by ingress of water in concrete and decrease the strength and life of structure. This study includes various silane concentration for M20, M25 & M30 grade of concrete with rebars. The properties which will be studied is workability, compressive strength, tensile strength, corrosion effect in rebars, water ingress properties for concrete. Organosilanes compounds having hydrophobic properties which is not fully documented in construction industry particularly in concrete manufacturing industry. Concrete can be made hydrophobic by integrally adding Organosilanes compounds by mixing it with water.

Index Terms - Organosilanes compounds, corrosion, rebars.

I. INTRODUCTION

In India, terrace waterproofing has always been done with traditional materials. Typical conventional systems like brickbat coba (BBC) or lime terracing are still very prevalent. These are supposed to provide waterproofing with some insulation against heat. BBC is used particularly for waterproofing flat roofs, primarily RCC with some thermal insulation in the coastal region.

Various problems with this type of water proofing methods are:

- Imposes unnecessary load: The thickness of the coba is maintained at about 125 mm to 150 mm, which adds unnecessary dead load on the slab.
- It is impossible to trace the inlet point of water leakage to repair it.
- BBC is rigid and cannot accommodate movements owing to thermal stresses. This leads to cracks.

II. ORGANOSILANE COMPOUNDS

Organosilane compounds having hydrophobic properties which is not fully recognized in construction industry particularly in concrete manufacturing industry. Concrete can be made hydrophobic by integrally adding Organosilane compounds by mixing it with water. Working procedure of Organosilane compound is it reacts with silane groups of cement sand and aggregate surface which makes surface of the particles hydrophobic. This compound forms Si-O-Si (Silicate) bonds which is strongest in nature hence strength of concrete shouldn't be affected.

III. PROPERTIES OF ORGANOSILANE COMPOUND

Table 1.1: Properties of Organosilane chemical

Organosilane Properties	
Appearance(Form)	Clear Liquid
Appearance(Color)	Pale Reddish Liquid
Specific Gravity	1.05
Solubility	Easily Soluble
Solid Content (Organosilane)	70%
Viscosity	100-200 CPS
Flash Point	>90°C (194 F)

IV. LITERATURE REVIEWS

Rajeshwara C.S., Sauvik Banerjee, Ye Lu, It is observed that these two damages have complementary effects on wave characteristics. It is demonstrated that co-occurrence of more than one damage may lead to a zero effect state and, hence, a possibility of concealed damage(Less Damage). It is also observed that there can be more than one zero effect state in the corrosion process, which necessitates the development of techniques to study various kind of damages simultaneously.

Md. Aminul Islam, 2015. In this study there are various routes for production micro alloying, thermo mechanical treatment, cold working, etc. For steel bars of thermo mechanical treatment (TMT) route, some designers believe these steel bars to be more sensitive to corrosive environment.

S.Shanmugapriya, P.Prabhakar, S.Rajendran, 2017. In this paper corrosion resistance property of mild steel immersed in simulated concrete pore solution (SCPS) prepared in well water has been evaluated by weight loss method, in the absence and

presence of an aqueous extract of Turmeric (*Curcuma longa* L), The main constituent of the plant extract is curcumin. It is observed that in the presence of an aqueous extract of turmeric corrosion inhibition efficiency increases.

V. DATA COLLATION

Course Aggregates:

Impact Value of Aggregate: 9.61 and 7.41

Fineness Modulus Test: 8.136

Specific Gravity & Water Absorption: Average of Specific Gravity- 2.85 and Average of Water Absorption- 1.06 %

Fine Aggregates:

Fineness Modulus Test: As result of sieve analysis cumulative percentage passing for fine aggregate are in under range of Zone III Grade.

Specific Gravity & Water Absorption: Average of Specific Gravity- 2.55 and Average of Water Absorption- 1.52 %

Cement: All the physical and chemical properties are guided by company of cement.

Mix Design of Concrete: for M20, M25 and M30

M20 Material Proportion Chart, M20-Normal, 0.3%, 0.4% and 0.5% OS



Fig. 1.1: Mix Design of Concrete: for M20, M25 and M30

VI. RESULT ANALYSIS

Table 1.2: M20 Workability Data Analysis:

Test	Controlled Sample		0.3 % OS Sample		0.4 % OS Sample		0.5 % OS Sample	
	Batch 1	Batch 2	Batch 1	Batch 2	Batch 1	Batch 2	Batch 1	Batch 2
Slump Value	70	72	63	74	90	100	75	90

Table 1.3: M20 Water Absorption Analysis

Cubes	Water Absorption % Controlled	Water Absorption % 0.3%	Water Absorption % 0.4%	Water Absorption % 0.5%
A	0.80	0.23	0.40	0.17
B	0.80	0.27	0.42	0.16
C	0.86	0.24	0.43	0.14
D	0.74	0.50	0.50	0.09
E	0.73	0.25	0.43	0.16
F	0.79	0.21	0.35	0.12
Average	0.79	0.28	0.42	0.14

Table 1.4: M20 Compressive Strength Analysis

7-Days COMPRESSIVE STRENGTH FOR M20					
Sr No.	Cube	Controlled Sample	0.3%OS Sample	0.4% OS Sample	0.5% OS Sample
1	A	19.56	21.33	20.00	20.00
2	B	19.56	20.00	20.09	22.22
3	C	19.11	23.11	20.36	20.00

Workability Data Analysis, Water Absorption Analysis and Compressive Strength Analysis repeated for M25 and M30 mix design and result was obtained.



Fig. 1.2: Analysis repeated for M25 and M30 mix design

VII. CONCLUSION

- It is observed that Slump value of every mix is above 70mm in all the grades except M20-0.3% B1.
- Compressive Strength of all mix does not get effected by mixing Organosilane
- No chemical reaction of Organosilane physically found with BASF Super Plasticizer
- Water Absorption in M20 Concrete is 0.79%,0.28%,0.42% & 0.12% of Normal, 0.3% OS, 0.4% OS & 0.5% OS respectively give that concrete behave effectively hydrophobic in 0.5% of Organosilane Dose.
- Water Absorption in M25 Concrete is 1.95%,0.66%,0.53% & 0.41% of Normal, 0.3% OS, 0.4% OS & 0.5% OS respectively give that concrete behave effectively hydrophobic in 0.5% of Organosilane Dose.
- Water Absorption in M30 Concrete is 1.12%,0.32%,0.28% & 0.62% of Normal, 0.3% OS, 0.4% OS & 0.5% OS respectively give that concrete behave effectively hydrophobic in 0.4% of Organosilane Dose.

VIII. REFERENCES

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