AQUACRETE®- NANO COMPOSITE CONCRETE ADDITIVE – ANALYTICAL SYNOPSIS

Carbon nanotubes are introduced in AQUACRETE® to fabricate a uniform Nanocomposite that can be used in cementitious composite. But mostly while introducing Nanotubes in cementitious composite, homogeneous distribution is hindered. It is the key factor to obtain the desired results. The desired results are durability, less ingression of water with soluble salts to wet the surface only, excellent mechanical performance, advantageous microstructural changes. Heat of hydration developed during production of calcium silicate hydrate is one of the main causes of micro crack development in cementitious materials. Moreover, it is observed that formation of nanoscale pores and cracks development is the vital drawback in cementitious products. But, well designed AQUACRETE® provides excellent mechanical performance that prepare a crack free cementitious product. The analysis is based on laboratory evaluation and field application of the composite since last more than 15 years. The important parameters for a durable cement mortar as observed in analytical study, a) In 7 days 4 Percent of increase of Compressive strength with respect to blank sample b) Higher flexural strength (7 days), Percentage of increase of Flexural strength with respect to blank sample is 50 c) In 7 days Percentage of decrease of Tensile strength with respect to blank sample is 41 d) Good resistant to water and salt ingression. The above characteristics of AQUACRETE® modified cement mortar microstructure" play an essential role that have an effective result to make a mortar durable supporting all the relevant parameters durability requires. The cement composite can act as a nucleation agent and promote the sedimentation and growth of hydration products. Preferably, calcium silicate hydrate (C-S-H) gel should be observed around the CNTs within the cement composites. The above analytical findings proves that Carbon Nanotubes in AQUACRETE® acts as a nucleation component that promotes the sedimentation and growth of hydration products. Preferably, calcium silicate hydrate (C-S-H) gel should be observed around the CNTs within the cement composites.

भारत सरकार **Government of India**
राष्ट्रीय परीक्षण शाला (पू.क्षे.)
National Test House (ER)
राष्ट्रीय परीक्षण शाला (पू.क्षे.),ब्लॉक-सी.पी., सेक्टर-V, सॉल्ट लेक, कोलकाता, पश्चिम बंगाल - 700091
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PART B. SUPPLEMENTARY INFORMATION

1.	नमूना लेने की प्रक्रिया का संदर्भ, जहां लागू हो! Reference to sampling procedure, wherever applicable.	Not Applicable
2.	परीक्षण रिपोर्ट से संबंधित मापन एवं परिमाण प्रप्ति हेतु सहायक प्रलेख जैसे ग्राफ, तालिका, चित्र और / अथवा फोटोग्राफ , यदि कोई हो। Supporting documents for the measurements taken and results derived like graphs, table sketches and or photographs as appropriate to test certificate, if any.	Not Applicable
3.	सम्बध्द मानक / कार्य निर्देशो में निर्धारित परीक्षण पद्धति से विचलन , यदि कोई हो। Deviation from the test methods as prescribed in relevant ISS/Work instruction, if any.	Not Applicable
4.	परीक्षण सामग्री की पहचान/identification of Test item	One Sample of "AQUACRETE" Stated as Nano Composite Concrete Additive received in a plastic bottle.
5.	व्यावद्रत की प्राणाली की पहचान/Method(s) used for Test	ASTM C 109-99, ASTM C 307-99, ASTM C 348-97 & ASTM C 1585-13
6.	नमूना प्रक्रिया जहां प्रासंगिक हो/Sampling Procedure where relevant	not Applicable
7.	पर्यावरण की स्थिति/Environmental Conditions	As per Specification
8.	उपयोग किए जाने वाले प्रमुख मानक/उपकरण/Major Standards/Equipments used	As per Specification
9.	कैलिब्रेशन स्थल/Site of Calibration	--
10.	मापन का पता लगाने की क्षमता/Traceability of Measurement	--

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PART C. TEST RESULT

S.No.	Clause No Table No. Sl. No	Parameter - Method of test	Test Description	Min Limit	Max Limit	Unit	Result/ Observation
1	ASTM C 1585-04	Rate of Absorption of Water (single duration on the lines of ASTM C 1585:2004)	Rate of Absorption of Water (single duration on the lines of ASTM C 1585:2004)	-	-	-	Rate of absorption of water after 2 hrs, in mm (For blank sample) = 0.0000002 and Rate of absorption of water after 2 hrs, in mm (For sample prepared with Aquacrete) = 0.0000001 and Percentage of decrease of Rate of absorption of water after 2 hrs with respect to blank sample is 50
2	ASTM C 348	Test for Flexural Strength (7 Day Flexural Strength), N/ mm^2 [ASTM C 348]	Test for Flexural Strength (7 Day Flexural Strength), N/ mm^2 [ASTM C 348]	-	-	-	Flexural Strength, in N/sq mm (For blank sample) = 2.2 and Flexural Strength, in N/sq mm (For sample prepared with Aquacrete) = 3.3 and Percentage of increase of Flexural strength with respect to blank sample is 50
3	ASTM C 307	Test for Tensile Strength (7 Day Tensile Strength), N/ mm^2 [ASTM C 307]	Test for Tensile Strength (7 Day Tensile Strength), N/ mm^2 [ASTM C 307]	-	-	-	Tensile Strength, in N/sq mm (For blank sample) = 2.2 and Tensile Strength, in N/sq mm (For sample prepared with Aquacrete) = 1.3 and Percentage of decrease of Tensile strength with respect to blank sample is 41
4	ASTM C 109	Test for Compressive Strength (7 Day Compressive Strength), N/mm^2 [ASTM C 109]	Test for Compressive Strength (7 Day Compressive Strength), N/mm^2	-	-	-	Compressive Strength, in N/sq mm (For blank sample) = 19.6 and Compressive Strength, in N/sq mm (For sample prepared with Aquacrete) = 20.4 and Percentage of increase of Compressive strength with respect to blank sample is 4

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Part D.

REMARKS

In respect of the tests carried out the Sample Shows Satisfactory result.

Notes

A) Concrete Additive "AQUACRETE" will show the following Advantages in Concrete i) Water proof Concrete, ii) Crack resistant surface.
B) Recommended dose is one Liter in 50 kg of Cement

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End of Report