INVESTIGATION OF EFFECTS OF BONDING AGENT ON PERFORMANCE OF COLD JOINT IN CONCRETE MEMBER

by

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Declaration

“I declare that this is my own work and this thesis does not incorporate without acknowledgement any material previously submitted for a Degree or Diploma in any other University or institute of higher learning and to the best of my knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text.

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Abstract

One of the most common difficulties in the execution of concrete structures is cold joint because of delay in concrete casting due to several circumstances as well as improper casting sequence. The discontinuity in concrete element leads to structural weakness, increasing the permeability, corrosion of the reinforcement, reducing the durability and bad appearance of concrete. In this research, the aim to eliminate the cold joint by applying the bonding agent.

In order to evaluate the effect of the bonding agent on cold joint, 76 number of cubes were cast using grade 30 concrete. Out of them, 36 specimens contain cold joint with 20° degree of inclination to the horizontal plane for compressive strength with and without applying bonding agent other 36 specimens had cold joint in the horizontal plane for splitting tensile strength with and without applying bonding agent and considered delay time of one hour interval up to 5 hours.

After 28 days of curing, all specimens were tested as per standard method. The experimental result of compressive strength shows that cold joint with applying bonding agent give 6% improvement as compare to without applying bonding agent. But, the experimental result of splitting tensile strength shows that no considerable influence on cold joint as applying bonding agent compare to without applying bonding agent. However, there is considerable reduction in the compressive strength (30.50%) and tensile strength (33.14%) compare with initial specimens with applying bonding agent.

Further, observation based on failure surface of tested specimens clearly indicated that, there are no aggregate inter logged in between two layers when delay time past the initial setting time of the first layer. So, the reduction in strength due to the cold joint purely depends on aggregate interlocking.

The better options are to avoid the cold joint by using admixtures (retarders) to increase the initial setting time, adopt proper casting sequences and vibrate the layers together even within the initial setting time.

Key words: aggregate interlocking, bonding agent, cold joint, initial setting time, strength,

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LIST OF ABBREVIATIONS

Abbreviation	Description
AIV	Aggregate Impact Value
ASTM	American Society for Testing and Material
BS	British Standard
CERP	Carbon Fiber Reinforced Polymer
Comp	Composite
CP	Cement Paste
DS	Dry Substrate
EC	Euro Code Standard
EP	Epoxy
IS	Indian Standard
LAC	Left as Cast
OPC	Ordinary Portland Cement
RC	Repairing Concrete
SBR	Styrene Butadiene Rubber
SC	Substrate Concrete
SHB	Sand Blasting
SLS	Sri Lankan Standard
SS	Saturated Substrate
T	Time
UPV	Ultrasonic Pulse Velocity
w/c	Water to Cement Ratio
WB	Wire Brushed