Vertical Cold-Insertion Joint

Overview

An experimental and numerical study on the effects of cold joint. Effect of cold joint orientation (vertical, horizontal or angled) was examined. Experim.

Key Takeaways

Vertical cold joints create a plane of weakness in concrete, significantly reducing compressive and flexural strength if not properly managed.

Definition and Formation

A cold joint occurs when fresh concrete is poured onto a previously cast layer that has begun to set, preventing full chemical and physical bonding between layers. In vertical elements like columns or walls, this happens when the concrete pour is interrupted, or the lift rate is insufficient to maintain plasticity across the cross-section. The interface often contains a film of surface laitance or bleed water, which further weakens the bond.

Structural Implications

Vertical cold joints are particularly critical because they interrupt the monolithic continuity of the concrete, transforming the element into stacked, weakly connected blocks. Research shows that vertical or diagonal cold joints can reduce concrete strength by over 30%, whereas horizontal joints have less impact on compressive strength. The orientation of the joint relative to the main stress direction is therefore crucial for structural performance.

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Effects on StrengthExperimental studies indicate that vertical cold joints reduce both compressive and flexural strength, with the severity depending on concrete type, additives, and curing conditions. For example: Normal concrete with vertical cold joints shows a noticeable decrease in strength. High early-strength concrete with superplasticizers also experiences reduced performance.

Concrete with polypropylene fibers can mitigate some strength loss, improving flexural performance compared to standard mixes.

Best Practices for Vertical Cold Joints

Placement Timing: Pour continuously or in lifts that maintain plasticity to avoid the formation of a weak interface. Location Strategy: If unavoidable, place joints in areas of minimal shear or bending stress, such as midspan in beams or over columns. Surface Preparation: Roughen the hardened surface and remove laitance before placing new concrete to enhance mechanical interlock and bonding.

Use of Admixtures: Incorporate bonding agents, superplasticizers, or fibers to improve adhesion and reduce strength loss. Curing: Ensure proper curing of both layers to maintain hydration and reduce shrinkage cracks at the joint.

Conclusion

Vertical cold joints are a significant structural concern in concrete construction. Proper planning, surface preparation, and the use of appropriate materials can mitigate their negative effects. Understanding the orientation, timing, and treatment of these joints is essential to maintain the integrity and durability of vertical concrete elements.

Article Content

An experimental and numerical study on the effects of cold joint ...

Effect of cold joint orientation (vertical, horizontal or angled) was examined. Experimental results were compared with numerical analysis. The microstructure of the cold joint region was

An experimental and numerical study on the effects of cold joint ...

The influence of cold joint orientation (vertical, horizontal, or angled) on crack formation, failure mechanisms and mechanical behavior was examined. Microstructural analysis was employed

The Critical Threat of Cold Joints in Concrete Columns: Ensuring ...

A construction joint that is not properly prepared (i.e., fails to undergo surface laitance removal and the application of a concrete bonding agents) will perform like a cold joint, but the

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cold joints Topic

ACI Suite of Codes ACI offers a suite of concrete knowledge with a wide range of individual codes ... nt at joints between the precast concrete members.

Effect of Cold Joint and Its Direction on The

Tests carried out in the form of compressive strength and flexural strength of the vertical and horizontal directions of cold joints.

Influence of Horizontal and Vertical Cold Joints on the Concrete ...

These joints can negatively affect the mechanical performance and durability of concrete structures. This study investigated the mechanical properties of both normal concrete with grade of

Optimal Location and Time Interval of Concrete Placement on Vertical ...

This paper investigates changes in chloride diffusion coefficient in cold joint concrete considering time effect and various loading conditions.

Vertical Cold Joint in Concrete Beams

Get the nomenclature right. This is not a control joint, just a construction joint. I have never understood the "middle third" bit. Midspan is the best place, unless minimum shear occurs

What is a Cold Joint in Concrete? (And How to Fix them!)

A cold joint in concrete is an area or surface with a structural discontinuity caused by the delayed concrete pouring between two layers of concrete.

Cold Joints | Concrete Society

Generally, cold joints are not a problem structurally if the joint is in compression. However, the location of the joint within the structure, the structural function of

Shear strength in reinforced concrete beams with cold joint

Abstract Cold joints in reinforced concrete (RC) beams can significantly impact shear behavior, influencing stress distribution and failure patterns. This study examines how delay times,

Impact of Construction Joints on the Structural Performance of ...

Keywords: Construction Joint Cold Joint Horizontal Construction Joint Vertical Construction Joint This review examined the effects of construction joints, particularly cold joints, on reinforced concrete

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(PDF) Mechanical behavior of concrete cold joints

A loss of resistance over 30% for cold concrete cylinders with diagonal joints was found, while concrete cylinders with horizontal cold joints had no loss of resistance.

CRP insertion in Cold Box for 2021 tests: procedure and technical

On-going insertion studies must include margins on other values in the CAD model (insertion kinematics could be trickiest in reality ! F. Resnati 2021/02/04 Vertical Drift –Cold Box CRP insertion procedure 6

Impact of Construction Joints on the Structural Performance of ...

This review examined the effects of construction joints, particularly cold joints, on reinforced concrete beams'' structural performance and integrity. Cold joints, which form when

XYPEX CRYSTALLINE COATING SYSTEM

This method statement details the products and procedures for the treatment of construction joints/cold joints in new concrete structures. This method statement is not applicable for the movement joints,

VARIOUS TYPES OF JOINTS IN CONCRETE

Horizontal construction joints occur at levels between two successive lift of concrete, whereas vertical construction joints occur where the structure of such length that

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