IN-LB	Inch-Pound Units
SI	International System of Units

Curing of Concrete—Guide

Reported by ACI Committee 308

ACI PRC-308-26

American Concrete Institute
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This guide reviews and describes practices, procedures, materials, and monitoring methods for the external curing of concrete and provides guidance for specifying curing procedures. Current curing techniques are presented, and commonly accepted methods, procedures, and materials are described. Methods are given for curing structures and buildings, pavements and other slabs-on-ground, and for mass concrete. Curing methods for several specific categories of cement-based products are discussed in this document.

The materials, processes, quality control measures, and inspections described in this document should be tested, monitored, or performed as applicable only by individuals holding the appropriate ACI certifications or equivalent.

Keywords: cold weather construction; curing compound; hot weather construction; mass concrete; reinforced concrete; sealer; shotcrete; slabs-on-ground.

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CHAPTER 1—INTRODUCTION

1.1—Scope

The fundamental principles of external curing remain the same; however, new research and methods of curing are presented herein. Topics such as internal curing, curing at elevated temperatures, sustainability, curing of moisture-sensitive flooring, sensors for mass concrete curing, and new curing monitoring techniques have been added or enhanced in this document.

The principles and practices of external curing are applicable to most types of concrete construction. This document does not fully address curing for specialty concrete and special construction techniques (refer to Section 4.5), nor does it fully address internally cured concrete. For additional information on internally cured concrete using preconditioned absorptive lightweight aggregates, refer to ACI PRC-(308-213). Curing measures, in general, are specified in ACI SPEC-308.1. Curing measures directed toward the maintenance of satisfactory concrete temperature under specific environmental conditions are addressed in greater detail in ACI PRC-305, ACI PRC-306, ACI SPEC-301, and ACI CODE-318.

1.2—Curing

Curing is an action taken to maintain moisture and temperature conditions in a freshly placed cementitious mixture to allow hydraulic cement hydration and, if pozzolans are used, pozzolanic reactions to occur so that the potential properties of the mixture may develop. A mixture is properly proportioned and adequately cured when the properties of the in-place concrete equal or exceed the design properties of the concrete. The curing period begins at placing and continues until the desired concrete properties have developed. The objectives of curing are to prevent the loss of moisture from concrete and maintain a favorable concrete temperature for a sufficient period. Proper curing allows the cementitious material within the concrete to properly hydrate. Hydration is the chemical reaction that leads to changes that take place when portland cement reacts with water. Both at depth and near the surface, curing has a significant influence on the properties of hardened concrete, such as strength, permeability, abrasion resistance, volume stability, propensity for early-age cracking, and resistance to freezing and thawing as well as deicing chemicals.

The term “curing” has also been used in a more general sense to describe the process by which hydraulic cementitious concrete matures and develops hardened properties over time because of the continued hydration of the cementitious materials in the presence of sufficient water and heat. While all concrete hydrates to varying levels of maturity with time, the rate and extent to which this development takes place depends on the natural environment surrounding the concrete and, on the measures, taken to modify this environment by limiting the loss of water, heat, or both, from the concrete; externally providing moisture and heat; or incorporating special materials in the mixture design.

Low-carbon cements, such as Type IL cements, are in current use and additional versions are being developed. Curing methods and needs for these types of cements are being studied. Early indications are that initial and intermediate curing are critical to the concrete performance.

CHAPTER 2—DEFINITIONS

Please refer to the latest version of ACI Concrete Terminology for a comprehensive list of definitions. Definitions provided herein complement that resource.

curing-affected zone—portion of the concrete most influenced by external surface curing measures.

evaporativity—maximum rate at which the atmosphere can vaporize water from a free water surface.

external curing—process by which the hydration of cementitious materials continues because of deliberate actions taken at the concrete surface to maintain moisture and temperature within the concrete during early-age development.

final curing—deliberate action taken between final finishing and termination of curing to reduce the loss of water from the surface of the concrete and control the temperature of the concrete.

initial curing—deliberate action taken between placement and final finishing of concrete to reduce the loss of water from the surface of the concrete.

intermediate curing—deliberate continuation of initial curing that is sometimes necessary when finishing is complete, but before final curing methods have been implemented.

internal curing—supplemental curing process by which the hydration of cement continues because of the availability of internal water that is not part of the mixing water.

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