

ACI 305.1-14

An ACI Standard

Specification for Hot Weather Concreting

Reported by ACI Committee 305



American Concrete Institute
Always advancing



Specification for Hot Weather Concreting

Copyright by the American Concrete Institute, Farmington Hills, MI. All rights reserved. This material may not be reproduced or copied, in whole or part, in any printed, mechanical, electronic, film, or other distribution and storage media, without the written consent of ACI.

The technical committees responsible for ACI committee reports and standards strive to avoid ambiguities, omissions, and errors in these documents. In spite of these efforts, the users of ACI documents occasionally find information or requirements that may be subject to more than one interpretation or may be incomplete or incorrect. Users who have suggestions for the improvement of ACI documents are requested to contact ACI via the errata website at <http://concrete.org/Publications/DocumentErrata.aspx>. Proper use of this document includes periodically checking for errata for the most up-to-date revisions.

ACI committee documents are intended for the use of individuals who are competent to evaluate the significance and limitations of its content and recommendations and who will accept responsibility for the application of the material it contains. Individuals who use this publication in any way assume all risk and accept total responsibility for the application and use of this information.

All information in this publication is provided “as is” without warranty of any kind, either express or implied, including but not limited to, the implied warranties of merchantability, fitness for a particular purpose or non-infringement.

ACI and its members disclaim liability for damages of any kind, including any special, indirect, incidental, or consequential damages, including without limitation, lost revenues or lost profits, which may result from the use of this publication.

It is the responsibility of the user of this document to establish health and safety practices appropriate to the specific circumstances involved with its use. ACI does not make any representations with regard to health and safety issues and the use of this document. The user must determine the applicability of all regulatory limitations before applying the document and must comply with all applicable laws and regulations, including but not limited to, United States Occupational Safety and Health Administration (OSHA) health and safety standards.

Participation by governmental representatives in the work of the American Concrete Institute and in the development of Institute standards does not constitute governmental endorsement of ACI or the standards that it develops.

Order information: ACI documents are available in print, by download, on CD-ROM, through electronic subscription, or reprint and may be obtained by contacting ACI.

Most ACI standards and committee reports are gathered together in the annually revised ACI Manual of Concrete Practice (MCP).

American Concrete Institute
38800 Country Club Drive
Farmington Hills, MI 48331
Phone: +1.248.848.3700
Fax: +1.248.848.3701

www.concrete.org

Specification for Hot Weather Concreting

An ACI Standard

Reported by ACI Committee 305

G. Terry Harris Sr., Chair

Oscar R. Antommattei, Secretary

James M. Aldred
Godwin Q. Amekuedi
Philip Brandt
James N. Cornell II
D. Gene Daniel
Kirk K. Deadrick

Darrell F. Elliot
Michael Faubel
Antonio J. Guerra
Kenneth C. Hover
Frank A. Kozeliski
Darmawan Ludirdja

David R. Nau
Jonathan L. Poole
Robert J. Ryan
Bruce G. Smith
Boris Y. Stein
Diep T. Tu

Consulting Members
Richard D. Gaynor
William C. Moore
George V. Teodoru

This reference specification provides requirements for hot weather concreting that the architect/engineer can apply to any construction project involving hot weather concreting by citing it in the project specification. Checklists are provided to assist the architect/engineer in supplementing the provisions of this reference specification as needed by designating or specifying customized project requirements.

This specification includes hot weather requirements for production preparations, delivery, placement, finishing, bleed-water evaporation, curing, and concrete protection. Provisions governing a preplacement conference, concrete mixture proportions, maximum allowable concrete temperature, rate of surface evaporation measurements, evaporation control measures, and acceptance of a concrete mixture from past field experience or preconstruction testing are also included.

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: bleeding; curing; evaporation; finishing; mixture proportioning; plastic shrinkage cracking; protection period; trial batch.

ACI Committee Reports, Guides, and Commentaries are intended for guidance in planning, designing, executing, and inspecting construction. This document is intended for the use of individuals who are competent to evaluate the significance and limitations of its content and recommendations and who will accept responsibility for the application of the material it contains. The American Concrete Institute disclaims any and all responsibility for the stated principles. The Institute shall not be liable for any loss or damage arising therefrom.

Reference to this document shall not be made in contract documents. If items found in this document are desired by the Architect/Engineer to be a part of the contract documents, they shall be restated in mandatory language for incorporation by the Architect/Engineer.

CONTENTS

(mandatory portion follows)

SECTION 1—GENERAL, p. 2

1.1—Scope, p. 2

1.2—Definitions, p. 2

1.3—Reference Standards, p. 2

1.4—Submittals, p. 2

1.5—Quality assurance, quality control, and acceptance of work, p. 3

SECTION 2—PRODUCTS, p. 3

2.1—General, p. 3

SECTION 3—EXECUTION, p. 3

3.1—General, p. 3

3.2—Maximum temperature of fresh concrete at time of discharge, p. 3

3.3—Qualification of concrete mixture, p. 3

3.4—Concrete production and delivery, p. 4

3.5—Concrete placement and finishing, p. 4

3.6—Concrete bleed-water evaporation, p. 4

3.7—Concrete curing, p. 4

3.8—Concrete protection, p. 4

(nonmandatory portion follows)

ACI 305.1-14 supersedes ACI 305.1-06 and was adopted June 16, 2014 and published September 2014.

Copyright © 2014, American Concrete Institute.

All rights reserved including rights of reproduction and use in any form or by any means, including the making of copies by any photo process, or by electronic or mechanical device, printed, written, or oral, or recording for sound or visual reproduction or for use in any knowledge or retrieval system or device, unless permission in writing is obtained from the copyright proprietors.

NOTES TO SPECIFIER, p. 4

General notes, p. 4

Foreword to checklists, p. 5

APPENDIX A—EXAMPLE OF UNO EQUATION USED TO DETERMINE SURFACE EVAPORATION RATE OF FRESH CONCRETE, p. 6**APPENDIX B—EXAMPLE OF NRMCA NOMOGRAPH FOR ESTIMATING SURFACE EVAPORATION RATE ON THE BASIS OF MENZEL FORMULA, p. 6**

Mandatory portion follows

SECTION 1—GENERAL**1.1—Scope**

1.1.1 This specification covers requirements for hot weather concrete construction.

1.1.2 This specification supplements the contract documents and provides requirements for the Contractor.

1.1.3 This specification governs for construction within its scope, but the contract documents govern if there is a conflict.

1.1.4 This specification governs if there is a conflict with its reference standards.

1.1.5 The Contractor is permitted to submit written alternatives to a provision in the specification.

1.1.6 Do not use this specification in conjunction with ACI 301, 350.5, 522.1, or ACI 530.1 unless contract document states that this specification governs for work covered by 1.1.1.

1.1.7 Ignore provisions of the specification that are not applicable to the work.

1.1.8 Values to this specification are stated in inch-pound units. A companion specification in SI units is also available.

1.1.9 The Notes to Specifier are not part of this specification.

1.2—Definitions

ACI provides a comprehensive list of definitions through an online resource, “ACI Concrete Terminology,” <http://concrete.org/Tools/ConcreteTerminology.aspx>. Definitions here compliment that resource.

hot weather—one or a combination of the following conditions that tends to impair the quality of freshly mixed or hardened concrete by accelerating the rate of moisture loss and rate of cement hydration, or otherwise causing detrimental results: high ambient temperature, high concrete temperature, low relative humidity, and high wind speed.

1.3—Reference Standards

Standards of ACI and ASTM cited in this specification are listed by name and designation, including year.

1.3.1 *American Concrete Institute*

ACI 301-10—Specifications for Structural Concrete
ACI 308.1-11—Specification for Curing Concrete
ACI 350.5-12—Specification for Environmental Concrete Structures

ACI 522.1-08—Specification for Pervious Concrete Pavement

ACI 530.1-11—Building Code Requirements and Specification for Masonry Structures

1.3.2 *ASTM International*

ASTM C31/C31M-12—Standard Practice for Making and Curing Concrete Test Specimens in the Field

ASTM C39/C39M-14—Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens

ASTM C78/C78M-10—Standard Test Method for Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading)

ASTM C94/C94M-14—Standard Specification for Ready-Mixed Concrete

ASTM C138/C138M-13—Standard Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete

ASTM C143/C143M-12—Standard Test Method for Slump of Hydraulic-Cement Concrete

ASTM C171-07—Standard Specification for Sheet Materials for Curing Concrete

ASTM C173/C173M-14—Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method

ASTM C192/C192M-13—Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory

ASTM C231/C231M-10—Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method

ASTM C293/C293M-10—Standard Test Method for Flexural Strength of Concrete (Using Simple Beam with Center-Point Loading)

ASTM C1064/C1064M-12—Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete

1.4—Submittals

1.4.1 Submittal of concrete proportions

1.4.1.1 Concrete mixture proportions shall be submitted to the architect/engineer for review.

1.4.1.2 Submittal shall include the constituent materials and proportions of the proposed concrete mixture, in addition to test results obtained from past field experience or preconstruction testing. Test results shall meet all the applicable requirements in the project specification.

1.4.2 Before the preplacement conference, submit procedures for production, placement, finishing, curing, and protection of concrete during hot weather conditions to the architect/engineer for review and comment. Submittals shall indicate which methods will be used for pre- and post-cooling of the concrete, and the order in which they will be initiated when multiple methods are proposed.

1.4.3 *Preplacement conference*

1.4.3.1 At least 15 days prior to beginning concrete construction, hold a preplacement conference to review hot