Guide to Concrete Floor and Slab Construction

Reported by ACI Committee 302

ACI 302.1R-15

American Concrete Institute
Always advancing

American Concrete Institute
Always advancing

First Printing
June 2015
ISBN: 978-1-942727-25-5

Guide to Concrete Floor and Slab Construction

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

ACI 302.1R-15

Guide to Concrete Floor and Slab Construction

Reported by Committee 302

Joseph F. Neuber Jr., Chair
Patrick J. Harrison, Vice Chair

Russell E. Neudeck, Secretary

Dennis C. Ahal
Bryan M. Birdwell
Peter A. Craig
Allen Face
C. Rick Felder
Edward B. Finkel
Barry E. Foreman
Greg K. Fricks
Terry J. Fricks
Jerry A. Holland
Philip S. Kopf
Steve R. Lloyd, Sr.
Kevin A. MacDonald
Arthur W. McKinney
Donald M. McPhee
Scott C. Metzger
Jeffrey S. Miller
Scott L. Niemitalo
Nigel K. Parkes
William S. Phelan
Tim H. Robinson
John W. Rohrer
Paul A. Rouis, III
Domenick Thomas Ruttura
Bruce A. Suprenant
Scott M. Tarr
Consulting Members
Carl Bimel*
Michael A. Clark
William C. Panarese
Brian J. Pashina
Boyd C. Ringo*

*Deceased

The quality of a concrete floor or slab is highly dependent on achieving a hard and durable surface that is flat, relatively free of cracks, and at the proper grade and elevation. Properties of the surface are determined by the mixture proportions and the quality of the concreting and jointing operations. The timing of concreting operations—especially finishing, jointing, and curing—is critical. Failure to address this issue can contribute to undesirable characteristics in the wearing surface such as cracking, low resistance to wear, dusting, scaling, high or low spots, poor drainage, and increasing the potential for curling.

Concrete floor slabs employing portland cement, regardless of slump, will start to experience a reduction in volume as soon as they are placed. This phenomenon will continue as long as any water, heat, or both, is being released to the surroundings. Moreover, because the drying and cooling rates at the top and bottom of the slab are not the same, the shrinkage will vary throughout the depth, causing the as-cast shape to be distorted and reduced in volume.

This guide contains recommendations for controlling random cracking and edge curling caused by the concrete's normal volume change. Application of present technology permits only a reduction in cracking and curling, not elimination. Even with the best floor designs and proper construction, it is unrealistic to expect completely crack- and curl-free floors. Consequently, every owner should be advised by both the designer and contractor that it is completely normal to expect some amount of cracking and curling on every project, and that such an occurrence does not necessarily reflect adversely on either the adequacy of the floor's design or the quality of its construction (Ytterberg 1987).

This guide describes how to produce high-quality concrete slabs-on-ground and suspended floors for various classes of service. It emphasizes such aspects of construction as site preparation, concrete materials, concrete mixture proportions, concrete workmanship, joint construction, load transfer across joints, form stripping procedures, finishing methods, and curing. Flatness/levelness requirements and measurements are outlined. A thorough preconstruction meeting is critical to facilitate communication among key participants and to clearly establish expectations and procedures that will be employed during construction to achieve the floor qualities required by the project specifications. Adequate supervision and inspection are required for job operations, particularly those of finishing.

Keywords: admixture; aggregate; consolidation; contract documents; curing; curling; deflection; durability; form; fracture; joint; mixture proportioning; placing; quality control; slab-on-ground; slabs; slump test.

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 information it contains. ACI disclaims any and all responsibility for the stated principles. The Institute shall not be liable for any loss or damage arising there from.

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

ACI 302.1R-15 supersedes ACI 302.1R-04 and was adopted and published June 2015.