

ACI 304.3R-20

IN-LB

Inch-Pound Units

SI

International System of Units

Heavyweight Concrete: Measuring, Mixing, Transporting, and Placing

Reported by ACI Committee 304



American Concrete Institute
Always advancing

This is a preview. [Click here to purchase the full publication.](#)



Heavyweight Concrete: Measuring, Mixing, Transporting, and Placing

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, 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 the ACI Collection of Concrete Codes, Specifications, and Practices.

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

www.concrete.org

Heavyweight Concrete: Measuring, Mixing, Transporting, and Placing

Reported by ACI Committee 304

Tarek S. Khan, Chair

Hakim S. Abdelgader
David J. Akers
Casimir J. Bognacki
David A. Burg
Manjit S. Chopra*
Carl L. Cunningham
Bernard J. Eckholdt III

J. Mitchell Englestead
Michael R. Gardner
Brian H. Green
T. J. Harris
Thomas Kjellberg
Larry W. Matejcek
Avi A. Mor

Mike Murray
Dipak T. Parekh
James S. Pierce
Jorge L. Quiros
James M. Shilstone
William W. Squyres
Boris Y. Stein

William L. Thrasher
Kevin D. Wolf
Samuel X. Yao
Richard Yelton

Consulting Members

Jacques A. Bertrand

Thomas R. Clapp

Neil R. Guptill

*Task Group leader.

This document presents recommended methods and procedures for measuring, mixing, transporting, and placing heavyweight concretes that are used principally for radiation shielding in nuclear construction. Also covered are recommendations on cement, heavyweight aggregates, water, and admixtures. Mixture proportioning of heavyweight concrete is discussed. Mixing equipment, form construction, placing procedures, and methods of consolidation are described. Quality control, inspection, and testing are emphasized, and a list of references is included. Preplaced heavyweight concrete is not discussed in this version of 304.3R. It is covered in the 2004 version of the document.

Keywords: admixtures; aggregates; barite; concrete construction; consolidation; construction equipment; conveying; density (mass/volume); formwork (construction); grout; heavyweight aggregates; heavyweight concretes; hematite; ilmenite; limonite; magnetite; mass concrete; materials handling; mixture proportioning; mixing; placing; quality control; radiation shielding; segregation; ultra-heavyweight concrete.

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

CHAPTER 1—INTRODUCTION, p. 2

- 1.1—Introduction, p. 2
- 1.2—Scope, p. 2

CHAPTER 2—MATERIALS, p. 2

- 2.1—Cement, p. 2
- 2.2—Aggregates, p. 2
- 2.3—Mixing water, p. 3
- 2.4—Admixtures, p. 3
- 2.5—Heavyweight mortar and grouts, p. 4

CHAPTER 3—CONCRETE CHARACTERISTICS, p. 4

- 3.1—Physical properties, p. 4
- 3.2—Mixture proportioning, p. 4

CHAPTER 4—EQUIPMENT, p. 4

CHAPTER 5—FORMWORK, p. 5

CHAPTER 6—PLACEMENT, p. 6

CHAPTER 7—QUALITY CONTROL, p. 6

- 7.1—Samples and tests, p. 6

ACI 304.3R-20 supercedes ACI 304.3R-96(04), was adopted July 30, 2020, and published November 2020.

Copyright © 2020, 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 granted by the American Concrete Institute.