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

Guide for Structural Lightweight-Aggregate Concrete

Reported by ACI Committee 213

ACI PRC-213-14(23)

American Concrete Institute
Always advancing

American Concrete Institute
Always advancing

Second Printing
November 2023
ERRATA as of February 8, 2017
ISBN: 978-0-87031-897-9

Guide for Structural Lightweight-Aggregate Concrete

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. Despite 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 regarding 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.

ACI documents are written via a consensus-based process. The characteristics of ACI technical committee operations include:
(a) Open committee membership
(b) Balance/lack of dominance
(c) Coordination and harmonization of information
(d) Transparency of committee activities to public
(e) Consideration of views and objections
(f) Resolution through consensus process

The technical committee documents of the American Concrete Institute represent the consensus of the committee and ACI. Technical committee members are individuals who volunteer their services to ACI and specific technical committees.

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 PRC-213-14(23)

Guide for Structural Lightweight-Aggregate Concrete

Reported by ACI Committee 213

Jiri G. Grygar*, Chair

Mauricio Lopez*, Secretary

David J. Akers
Theodore W. Bremner
Michael A. Caldarone
David A. Crocker
Per Fidjestol
Dean M. Golden
Ralph D. Gruber
Thomas A. Holm*
Bruce W. Jones
Edward S. Kluckowski
Mervyn J. Kowalsky
Ronald L. Kozikowski
Michael L. Leming
Keith A. McCabe
Fred Meyer*
Avi A. Mor
Dipak T. Parekh
Bruce W. Ramme
John. P. Ries*
G. Michael Robinson*
Jeffrey F. Speck
Jody R. Wall
William H. Wolfe
Shelley Wright
Min-Hong Zhang

Consulting Members

Tor Arne Hammer
W. Calvin McCall
William X. Sypher†
Alexander M. Vaysburd

*Members of the Task group who prepared the update of this guide.
†Deceased.

Special thanks to the following associate members for their contribution to the revision of this document: Reid W. Castrodale, and W. Jason Weiss. The committee would also like to thank the late William X. Sypher for his contribution to revision of the guide.

The guide summarizes the present state of technology, presents and interprets the data on lightweight-aggregate concrete from many laboratory studies and the accumulated experience resulting from its successful use, and reviews performance of structural lightweight aggregate concrete in service.

This guide includes a definition of lightweight-aggregate concrete for structural purposes and discusses, in a condensed fashion, the production methods for and inherent properties of structural lightweight aggregates. Current practices for proportioning, mixing, transporting, and placing; properties of hardened concrete; and the design of structural concrete with reference to ACI 318 are all discussed.

Keywords: abrasion resistance; aggregate; bond; contact zone; durability; fire resistance; internal curing; lightweight aggregate; lightweight concrete; mixture proportion; shear; shrinkage; specified density concrete; strength; thermal conductivity.

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 AND SCOPE, p. 2
1.1—Introduction, p. 2
1.2—Scope, p. 2

CHAPTER 2—NOTATION AND DEFINITIONS, p. 4
2.1—Notation, p. 4
2.2—Definitions, p. 4

CHAPTER 3—STRUCTURAL LIGHTWEIGHT AGGREGATES, p. 4
3.1—Internal structure of lightweight aggregates, p. 4
3.2—Production of lightweight aggregates, p. 4
3.3—Aggregate properties, p. 5

CHAPTER 4—SPECIFYING, PROPORTIONING, MIXING, AND HANDLING, p. 7
4.1—Scope, p. 7
4.2—Specifying lightweight concrete, p. 7
4.3—Materials, p. 7
4.4—Mixture proportioning criteria, p. 8
4.5—Proportioning and adjusting mixtures, p. 9

ACI 213R-14 supersedes ACI 213R-03 and was adopted and published in June 2014.

Copyright © 2023, 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.