

An ACI Standard

Construction with Glass Fiber-Reinforced Polymer Reinforcing Bars— Specification

Reported by ACI Committee 440

ACI SPEC-440.5-22



American Concrete Institute
Always advancing



Construction with Glass Fiber-Reinforced Polymer Reinforcing Bars—Specification

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.

ACI codes, specifications, and practices are made available in the ACI Collection of Concrete Codes, Specifications, and Practices. The online subscription to the ACI Collection is always updated, and includes current and historical versions of ACI’s codes and specifications (in both inch-pound and SI units) plus new titles as they are published. The ACI Collection is also available as an eight-volume set of books and a USB drive.

American Concrete Institute
30300 Country Club Drive
Farmington Hills, MI 48331
Phone: +1.248.848.3700
Fax: +1.248.848.3701

Construction with Glass Fiber-Reinforced Polymer Reinforcing Bars—Specification

An ACI Standard

Reported by ACI Committee 440

William J. Gold, Chair

Maria Lopez de Murphy, Secretary

Tarek Alkhrdaji
Charles E. Bakis
Lawrence C. Bank
Abdeldjelil Belarbi
Brahim Benmokrane
Luke A. Bisby
Gregg J. Blaszak
Hakim Bouadi
Timothy E. Bradberry
Vicki L. Brown
John P. Busel
Raafat El-Hacha
Garth J. Fallis

Amir Z. Fam
Russell Gentry
Nabil F. Grace
Mark F. Green
Doug D. Gremel
Shawn P. Gross
Trey Hamilton
Issam E. Harik
Kent A. Harries
Mark P. Henderson
Tom Hershberger
Didier Hutchison
Ravindra Kanitkar

Yail Jimmy Kim
Michael W. Lee
Amir Mirmiran
John J. Myers
Antonio Nanni
Ayman M. Othman
Carlos E. Ospina
Renato Parretti
Marcelo P. Pimenta
Alex L. Porter
Andreas Prota
Hayder A. Rasheed
Lami H. Rizkalla

Rajan Sen
Rudolph Seracino
Venkatesh Seshappa
Carol K. Shield
Pedro F. Silva
Samuel A. Steere III
Jennifer E. Tanner
Jay Thomas
Houssam A. Toutanji
J. Gustavo Tumialan
Milan Vatovec
David White
Sarah E. Witt

Consulting Members

P. N. Balaguru
Craig A. Ballinger
Harald G. F. Buddelmann
C. J. Burgoyne
Rami M. Elhassan
David M. Gale

Srinivasa L. Iyer
Koichi Kishida
Howard S. Krenner
Ibrahim M. Mahfouz
Kyuichi Maruyama
Antonio E. Naaman

Hajime Okamura
Mark A. Postma
Ferdinand S. Rostasy
Surendra P. Shah
Mohsen Shahawy
Yasuhisa Sonobe

Minoru Sugita
Luc R. Taerwe
Taketo Uomoto
Paul Zia

This Specification covers construction of concrete members internally reinforced with glass fiber-reinforced polymer reinforcing bars.

Keywords: concrete construction; fiber-reinforced polymer reinforcement; placing; tolerance.

CONTENTS

PART 1—GENERAL, p. 2

- 1.1—Scope, p. 2
- 1.2—Interpretation, p. 2
- 1.3—Definitions, p. 2
- 1.4—Reference standards, p. 3
- 1.5—Submittals, p. 3
- 1.6—Delivery, storage, and handling, p. 3
- 1.7—Quality assurance and acceptance of work, p. 3

ACI SPEC-440.5-22 supersedes ACI 440.5-08 and was adopted and published in August 2022.

Copyright © 2022, 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.

PART 2—PRODUCTS, p. 3

- 2.1—Materials, p. 3
- 2.2—Accessories, p. 4
- 2.3—Offsite fabrication, p. 4

PART 3—EXECUTION, p. 4

- 3.1—Preparation, p. 4
- 3.2—Installation, p. 4
- 3.3—Repair of glass fiber-reinforced polymer bars, p. 5

NOTES TO SPECIFIER, p. 5

- General notes, p. 5

FOREWORD TO CHECKLISTS, p. 5**MANDATORY REQUIREMENTS CHECKLIST, p. 6****PART 1—GENERAL****1.1—Scope**

1.1.1 This Specification covers cast-in-place structural concrete reinforced with glass fiber-reinforced polymer (GFRP) bars that conform to the requirements of **ASTM D7957**.

1.1.2 This Specification is incorporated by Contract Documents and provides requirements for the Contractor.

1.1.3 This Specification governs for construction within its scope, except other Contract Documents govern if there is a conflict.

1.1.4 This Specification governs if there is a conflict with referenced material and testing standards for the GFRP bars.

1.1.5 Contractor is permitted to submit written alternatives to any provision in this Specification for consideration.

1.1.6 This Specification is to be used in conjunction with **ACI 301**; if there is a conflict with **ACI 301**, this Specification governs.

1.1.7 Do not use this Specification in conjunction with **ACI 350.5** or **ACI 530/530.1** unless Contract Documents state that this Specification governs for Work covered by 1.1.1.

1.1.8 Ignore provisions of this Specification that are not applicable to the Work.

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

1.1.10 The Notes to Specifiers are not part of this Specification.

1.2—Interpretation

1.2.1 Unless otherwise explicitly stated, this Specification shall be interpreted using the following principles.

1.2.1.1 Interpret this Specification consistent with the plain meaning of the words and terms.

1.2.1.2 Definitions provided in this Specification govern over the definitions of the same or similar words or terms found elsewhere.

1.2.1.3 Wherever possible, interpret this Specification so that its provisions are in harmony and do not conflict.

1.2.1.4 Headings are part of this Specification and are intended to identify the scope of the provisions or sections that follow. If there is a difference in meaning or implication between the text of a provision and a heading, the meaning of the text governs.

1.2.1.5 Where a provision of this Specification involves two or more items, conditions, requirements, or events connected by the conjunctions “and” or “or” interpret the conjunction as follows:

“and” indicates that all of the connected items, conditions, requirements, or events apply.

“or” indicates that the connected items, conditions, requirements, or events apply singularly.

1.2.1.6 The use of the verbs “may” or “will” indicates that the specification provision is for information to Contractor.

1.2.1.7 The phrase “as indicated in Contract Documents” means the specifier included the provision requirements in Contract Documents.

1.2.1.8 The phrase “unless otherwise specified” means the specifier may have included an alternative to the default requirement in Contract Documents.

1.2.1.9 The phrase “if specified” means the specifier may have included a requirement in Contract Documents for which there is no default requirement in this Specification.

1.3—Definitions

The following definitions shall govern in this Specification.

acceptance—acknowledgment by the Architect/Engineer that a submittal or completed Work conforms to Contract Documents.

accepted—determined by the Architect/Engineer to be in compliance with Contract Documents.

Architect/Engineer—the architect, engineer, architectural firm, or engineering firm developing Contract Documents or administering the Work under Contract Documents, or both.

Contract Documents—set of documents that provide the basis for a construction project; these documents may include Owner-Contractor Contract, Project Specifications, Project Drawings, and Addenda.

Contractor—the person, firm, or entity under contract for construction of the Work.

dielectric—a substance, such as porcelain, glass, and most plastics, that is a poor conductor of electricity.

grating—planar fiber-reinforced polymer form; gratings may be manufactured using molding methods or by mechanically assembling pultruded fiber-reinforced polymer elements (bars, I-shapes, or rods) together in two orthogonal directions to produce sheets.

grid—two-dimensional (planar) or three-dimensional (spatial) rigid array of interconnected fiber-reinforced polymer bars that forms a contiguous lattice that can be used to reinforce concrete.

mechanical splice—complete assembly of a coupling sleeve device and any additional components configured to accomplish positive splicing of overlapping or butt-ended reinforcing bars.