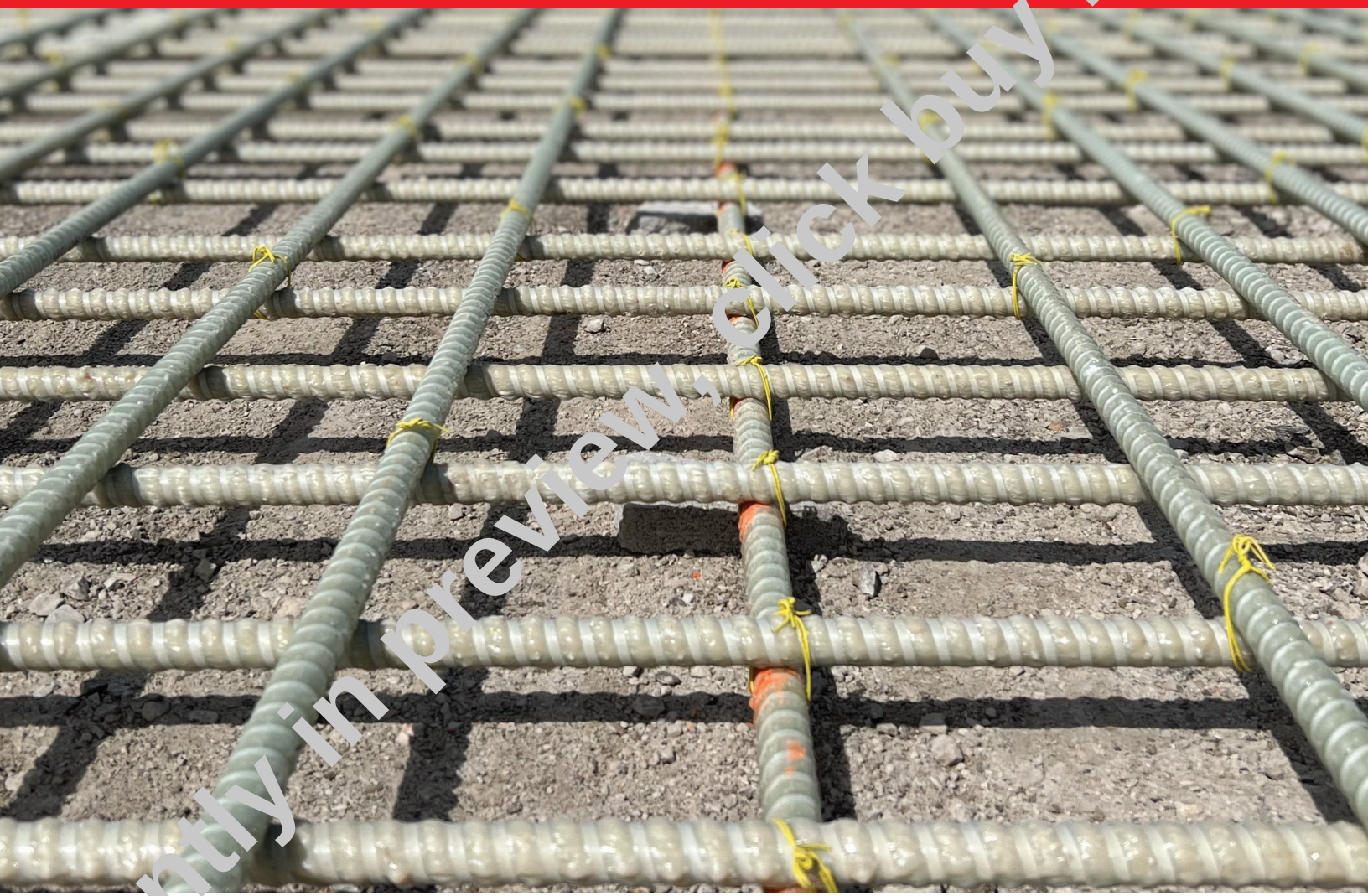
An ACI / NEx Manual

GFRP-Reinforced Concrete Design Handbook

A Companion to ACI CODE-440.11-22



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GFRP-Reinforced Concrete Design Handbook

This manual for designing GFRP reinforced concrete structures has been made possible in part by the sponsorship of NEx. NEx is a subsidiary of the American Concrete Institute that partners with leading organizations focused on accelerating the use and technology of nonmetallic materials and products in construction.

The authors would like to thank and recognize NEx and its member companies* for providing insight, guidance, and resources for the development of this manual.

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Back cover photo: GFRP Bars (photo courtesy Galen-Panamerica/Binevir)

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GFRP-Reinforced Concrete Design Handbook
ISBN 978-1-64195-230-9

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PREFACE

The *GFRP Reinforced Concrete Design Handbook* is a vital reference for professionals interested in the use of non-metallic GFRP reinforcement for concrete structures. It is meant to provide valuable insight to structural engineers on understanding and utilizing the provisions of "Building Code Requirements for Structural Concrete Reinforced with Glass Fiber Reinforced Polymer (GFRP) Bars" (ACI CODE 440.11).

The *GFRP Reinforced Concrete Design Handbook* provides several engineering design examples for various concrete members reinforced with GFRP bars including beams, one-way slabs, two-way slabs, and slender columns. The examples help illustrate the provisions of ACI CODE 440.11 as they pertain to serviceability, flexural strength, shear strength, torsional strength, axial strength, stability, and structural analysis. Many of the examples are based on a fictious four-story GFRP reinforced concrete building to illustrate how the design provisions work together in a full building design. These examples are also closely related to the example problems presented in the *ACI Reinforced Concrete Design Handbook* (ACI MNL-17) to allow for comparison to the steel reinforced concrete members presented in MNL-17. Each example starts with a brief problem statement and then presents a full set of design calculations that reference the appropriate provisions in ACI CODE 440.11 (red highlighted text next to equations) to arrive at a solution. Detailed explanations of the design calculations are provided throughout.
In addition to the example problems, this handbook provides general information and guidance about the appropriate use of GFRP reinforcement, its material and durability characteristics, typical applications, and considerations for fire resistance. It also highlights key differences between designing GFRP reinforced concrete versus traditional steel reinforced concrete.

The appendix to this handbook provides additional detailed information from FRP bar manufactures on commercially available products and solutions.

The following individuals are acknowledged and thanked for their contributions and review of this manual. Without their efforts, this manual would not be possible.

Gusai Al Aithan
Gregg Blaszak
Vicki Brown
John Busel
Francisco de Caso
Aparna Deshmukh
Ehab El-Salakaway
Alvaro Ruiz Emparanza
Doug Gremel
Zahid Hussain
Isaac Higgins
Maria Lopez de Murphy
Antonio Nanni
Jay Pease
Carol Shield
Doug Tomlinson
Jerzy Zemajtis

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Managing Editor