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

Design and Construction of Fixed Offshore Concrete Structures—Guide

Reported by ACI Committee 357

ACI PRC-357-24

American Concrete Institute
Always advancing

American Concrete Institute
Always advancing

First Printing
December 2024
ISBN: 978-1-64195-282-8

Design and Construction of Fixed Offshore Concrete Structures—Guide

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-357-24

Design and Construction of Fixed Offshore Concrete Structures—Guide

Reported by ACI Committee 357

Jeremiah D. Fasl, Chair

Jonathan Hurff, Secretary

Erik Åldstedt
Domenic D'Argenzio
Raymond R. Foltz
Kjell Tore Fosså
Michael J. Garlich
Anton Magne Gjorven
Kare Hjorteset
Mohammad S. Khan
Jonah C. Kurth
Abbas Mokhtar-zadeh
Robert Moser
Jose Pacheco
Barry J. Pecho
Jorge L. Quiros, Jr.
Felipe Saavedra
Watsamon Sahasakkul
Joar Tistel
Widianto*
Samuel X. Yao

*Chair of the Task Group.

This document is a guide for the design and construction of fixed reinforced and prestressed concrete structures for service in a marine environment. Only fixed structures that are founded on the seabed are covered.

Contents include materials and durability; dead, deformation, live, environmental, and accidental loads; design and analysis; foundations; construction and installation; and inspection and repair. The two appendixes discuss environmental loads such as wave, wind, and ice loads in detail, and the design of offshore concrete structures for earthquake resistance.

Keywords: concrete construction; cracking; dynamic loads; earthquakes; earthquake-resistant structures; floating; foundations; gravity-based structure(s); grouting; harbor structures; ice; inspection; marine; offshore structures; platform; post-tensioning; prestressed concrete; slipforming; underwater construction; waves.

CONTENTS

ACI PRC-357-24 supersedes ACI 357R-84(97) and was published in December 2024. This document was first published in 1984 and reapproved in 1997.

CHAPTER 1—GENERAL

1.1—Introduction

Concrete structures have been constructed and used all over the world, including for fixed offshore structures. As concrete and construction technology continues to advance, fixed concrete structures are increasingly being used in areas with relatively shallow water depths and/or regions subjected to extreme waves and ice/iceberg impact loads. This guide summarizes considerations for the design and construction of fixed offshore concrete structures. Widianto et al. (2016, 2019) described distinctive characteristics of offshore concrete gravity-based structures (GBSs) compared to typical buildings and bridges.

Where adequate data are available, specific recommendations are made, whereas in less developed areas, particular points are indicated for consideration by the designer. The design of offshore structures requires much creativity from the designer, and it is intended that this guide encourage creativity and continuing research advancements in the development of structures that are safe, serviceable, and economical. Widianto et al. (2018) presents innovative design and effective execution method in one of the recent offshore structures supported by concrete GBS.

1.2—Scope

This guide is intended to be used for the design of fixed concrete structures for service in a marine environment.