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Guide to Residential Concrete Construction

Reported by ACI Committee 332



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Guide to Residential Concrete Construction

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This guide provides practical information about the construction of residential concrete that meets or exceeds code requirements. It covers concrete work for one- and two-family dwellings with a maximum height of three stories above grade and a basement that is either cast-in-place or placed as precast members. Information on materials, proportions, production, delivery, and testing is provided. Separate chapters on footings, walls, and slabs provide information on subgrade, forms, reinforcement, placement, consolidation, finishing, and curing. Special considerations regarding above-grade concrete systems (Chapter 6) and project considerations (Chapter 8) are included. Common problems and their repair are also addressed. Although the discussion of specific design provisions and all drawings provided by this guide are intended to offer illustrations of typical practice, they should be verified as to whether they meet the requirements of specific codes or project specifications. Applicable codes and construction documents take precedence over the information contained in this document.

Keywords: finish; footing; foundation; form; residential; slab; slab-on-ground; subgrade; tolerance; wall.

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CHAPTER 1—INTRODUCTION

Concrete is the most widely used construction material throughout the world. Concrete is used in commercial structures, transportation, water and waste management, public works, farm construction, and utility and residential structures. Based on the amount of concrete produced for each of these categories, residential construction accounts for the second largest application of concrete (PCA MI451D).

1.1—Scope

This guide provides practical information about the construction of residential concrete that meets or exceeds code requirements, covering all concrete work within the scope defined in the “International Residential Code for One- and Two-Family Dwellings” (International Code Council 2018) and that of ACI 332. Provisions of these codes apply to detached one- and two-family dwellings and multiple single-family dwellings (townhomes) not more than three stories in

height. These structures are no more than three stories above grade and may include a basement that is either cast-in-place or placed as precast members. Information on materials, proportions, production, delivery, and testing is provided. Separate chapters on footings, walls, and slabs provide information on subgrade, forms, reinforcement, placement, consolidation, finishing, and curing. Special considerations regarding above-grade concrete systems in Chapter 6 and project considerations in Chapter 8 are included. Common problems and their repair are also addressed. The discussion of specific design provisions and all drawings provided by this guide are intended to offer illustrations of typical practice and should not be interpreted as meeting the requirements of specific codes or project specifications. Applicable codes and construction documents take precedence over the information contained in this document.

Information excluded from this guide includes deep foundation systems (such as piles, drilled piers, or caissons), free-standing retaining walls (greater than 4 ft [1.2 m]), and post-tensioned slabs-on-ground. Limited information on the use of lightweight concrete is presented. This guide does not cover loading and design for seismic forces, with the exception of guidance on types of connections between the sill plate and foundation wall commonly used in higher seismic design categories. Additional information on seismic loading and design can be found in the “International Residential Code for One- and Two-Family Dwellings” (International Code Council 2018).

CHAPTER 2—DEFINITIONS

Please refer to the latest version of ACI Concrete Terminology for a comprehensive list of definitions. Definitions provided herein complement that resource.

anchor strap—metal connector with corrosion resistance designed to transfer uplift, lateral forces, or both, from wood framing members to concrete foundations.

bar diameter—proper designation of the sizes for reinforcement bars used in concrete construction, expressed as d_b .

fiber reinforcement—slender and elongated filaments in the form of bundles, networks, or strands of any natural or manufactured material that can be distributed throughout freshly mixed concrete.

fill—material placed to bring grade or subgrade to the desired elevation.

flowable fill—self-consolidating cementitious material used primarily as a backfill in place of compacted fill.

foundation walls—structural members of a foundation that transmit loads to the footing or directly to the subgrade.

hydrostatic pressure—pressure on a foundation wall due to water.

insulated concrete form—stay-in-place wall form made of foam plastic or other insulation materials that is filled with reinforced concrete; form remains in place to create fully insulated, reinforced concrete walls used for foundations, basements, and above-grade load-bearing walls.

moderately reinforced walls—structural concrete walls reinforced with an amount of steel reinforcement including reinforcing bar and welded wire reinforcement less than that