

**Second Edition**

# **KITCHEN & BATH RESIDENTIAL CONSTRUCTION and SYSTEMS**



Jerry Germer

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*Second Edition*

JERRY GERMER

WILEY

**NKBA**<sup>®</sup>  
National Kitchen & Bath Association

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Published by John Wiley & Sons, Inc., Hoboken, New Jersey.

Published simultaneously in Canada.

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#### Library of Congress Cataloging-in-Publication Data

Germer, Jerry, 1938-

[Works. Selections]

Kitchen & bath residential construction and systems / Jerry Germer. – Second Edition.  
pages cm

\*Residential Construction and Systems is a compilation of the material originally published by the NKBA in two prior books, *Residential Construction : Systems, Materials, Codes*, 2006 and *Kitchen & Bath Systems : Mechanical, Electrical, Plumbing*, 2006.\*

Includes index.

ISBN 978-1-118-43910-4 (cloth); 978-1-118-69302-5 (ebk.); 978-1-118-71104-0 (ebk.)

1. House construction—Handbooks, manuals, etc. 2. Building—Details—Handbooks, manuals, etc.  
3. Kitchens—Remodeling. 4. Bathrooms—Remodeling. 5. Buildings—Mechanical equipment.  
I. Germer, Jerry, 1938- Residential construction. II. Germer, Jerry, 1938- Kitchen & bath systems.  
III. National Kitchen and Bath Association (U.S.) IV. Title. V. Title: Kitchen and bath residential construction and systems.

TH4813.G47 2013

690'.42—dc23

2013009462

Printed in the United States of America

10 9 8 7 6 5 4 3 2 1

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The National Kitchen and Bath Association recognizes, with gratitude, the following companies whose generous contributions supported the development of this second edition volume which combines the newly revised Residential Construction and Kitchen & Bath Systems volumes of the NKBA Professional Resource Library.

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# About the National Kitchen & Bath Association

The National Kitchen & Bath Association (NKBA) is the only non-profit trade association dedicated exclusively to the kitchen and bath industry and is the leading source of information and education for professionals in the field. Fifty years after its inception, the NKBA has a membership of more than 55,000 and is the proud owner of the Kitchen & Bath Industry Show (KBIS).

The NKBA's mission is to enhance member success and excellence, promote professionalism and ethical business practices, and provide leadership and direction for the kitchen and bath industry worldwide.

The NKBA has pioneered innovative industry research, developed effective business management tools, and set groundbreaking design standards for safe, functional, and comfortable kitchens and baths.

Recognized as the kitchen and bath industry's leader in learning and professional development, the NKBA offers professionals of all levels of experience essential reference materials, conferences, virtual learning opportunities, marketing assistance, design competitions, consumer referrals, internships, and opportunities to serve in leadership positions.

The NKBA's internationally recognized certification program provides professionals the opportunity to demonstrate knowledge and excellence as Associate Kitchen & Bath Designer (AKBD), Certified Kitchen Designer (CKD), Certified Bath Designer (CBD), Certified Master Kitchen & Bath Designer (CMKBD), and Certified Kitchen & Bath Professional (CKBP).

For students entering the industry, the NKBA offers Accredited and Supported Programs, which provide NKBA-approved curriculum at more than 60 learning institutions throughout the United States and Canada.

For consumers, the NKBA showcases award winning designs and provides information on remodeling, green design, safety, and more at [NKBA.org](http://NKBA.org). The NKBA Pro Search tool helps consumers locate kitchen and bath professionals in their area.

The NKBA offers membership in 11 different industry segments: dealers, designers, manufacturers and suppliers, multi-branch retailers and home centers, decorative plumbing and hardware, manufacturer's representatives, builders and remodelers, installers, fabricators, cabinet shops, and distributors. For more information, visit [NKBA.org](http://NKBA.org).

# Preface

Residential design and construction continues to change and affects two of the most important rooms—the kitchen and bath. Even in lean economic times, such as the one we are just now emerging from, new building materials and products come on the market in a steady stream, and changes continue to be made to tried and true products. Some of these changes are in response to concerns consumers have for the environment and represent positive change. Others are merely updated versions of their predecessors. To be successful, kitchen and bath designers need to keep abreast the changes that affect their areas of expertise. But these rooms don't exist as disparate entities; they are part of a larger entity, the home. That's why K&B designers need a general knowledge of residential design and construction—the focus of this book.

*Residential Construction and Systems* is a compilation of the material originally published by the NKBA in two prior books, *Residential Construction—Systems, Materials, Codes* (2006), and *Kitchen & Bath Systems—Mechanical, Electrical, Plumbing* (2006).

The present volume is an overview of all the elements that go into building a new or modifying an existing home, beginning with a description of who does what in the process and how they interrelate, followed by a description of the codes and permitting process that confront all designers.

Chapters 3, 4, and 5 cover healthy houses, maximizing energy efficiency and using natural energies—topics that have become ever more important to homeowners in an era of dwindling natural resources, increasing energy costs, and concern for the environment. Chapters 6 through 12 describe how homes go together, from the foundation to the finishes. The remaining chapters of the book deal with the mechanical and electrical systems that are necessary to create the desired interior environment and enable the home's appliances and equipment to operate.

While combining the two predecessor books into a single volume the author has updated the content to reflect changes in residential design and construction. One of the improvements in home construction cited is the use of a drainage plain “rain screen” between siding and the substrate which extends the life of the siding and coatings. Throughout the book there is mention of developments in the industry that have come about in response to growing consciousness to create environments that are sustainable and use energy wisely. For example, building codes, ever changing, now include the International Green Construction Code. Concern over indoor air quality has resulted in the availability of paints and panels that contain low or no harmful VOC emissions. Daylighting and new lighting products such as



LED lamps are discussed as ways to conserve household energy, along with trends in insulation that include growing use of spray foam. There is expanded coverage of solar heating, both active and passive. New products mentioned include fiberglass windows, polyethylene gas piping, and dual-flush toilets.

Many contributors made this book possible. Special thanks go to Johanna Baars, publication specialist at the NKBA, Paul Drougas, editor at John Wiley & Sons, and Mike New, editorial assistant. The following peer reviewers provided many useful comments and suggestions: David Alderman, CMKBD, Spencer Hinkle, CKD, Corey Klassen, CKD, and David Newton, CMKBD.



# Acknowledgements

The NKBA gratefully acknowledges the following peer reviewers of this book:

David Alderman, CMKBD  
Spencer Hinkle, CKD  
Corey Klassen, CKD  
David Newton, CMKBD

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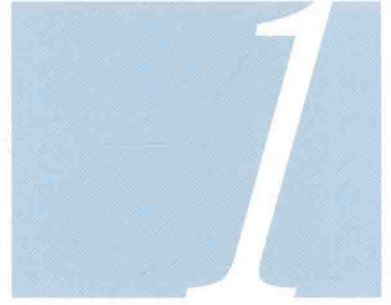
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# The Building Team

As a kitchen and bath designer, you won't be working alone. To begin with, you'll obviously need clients. Beyond that you'll depend on a number of other professionals and installers to realize your design concepts. You should know your own strengths and weaknesses and what specialists to call on for project tasks outside your own expertise. Working smoothly with this team of building specialists will require courtesy, respect, and patience. This chapter gives you an overview of some of the major players on the building team and where they fit in the game.

The teams that design and build commercial or industrial projects have narrower, more clearly defined roles than those involved with residences. Architects and engineers basically design and look in, from time to time, to ensure that the work is being constructed as specified. A general contractor manages the construction, with subcontractors installing various parts.

With residences, many variations are possible. The overall design may not come from an architect or building designer at all but from a magazine or other source, sometimes adapted by a designer for the specific project. The heating system might be designed by the same firm who installs it. The same holds for electrical work. A general contractor, or homebuilder, may coordinate the various subparts, or it may be left to the owner. And the owner often installs some of the work.

How do you fit in? There's no general answer. As a kitchen and bath designer, you play an important part in realizing a residential project. To do this effectively, you need first to know your craft, understand the project, and be able to work smoothly with the other players on the team.

Before you do anything else with a project, you should pin down the organizational model, who does what, and who answers to whom.

***Learning Objective 1: Describe the areas of expertise of those who may interact in the design of a residence.***

***Learning Objective 2: Describe the areas of expertise of those who may install or construct all or portions of a residence.***

***Learning Objective 3: Differentiate the roles of each member of a building team.***



## GENERALIST DESIGNERS

The design process starts with a program statement that lists the client's needs and goals. Your task is to translate the program into a concept that ultimately can be built. Building design is a huge field that contains both generalists and specialists. The overall design may be entrusted to an architect or building designer who coordinates the work of the other specialized design professionals. The list of specialists required to fill out the team varies according to the size and type of project and may include engineers, landscape architects, interior designers, and—here's where you fit in—kitchen and bath designers.

### Architects

The role of architects has changed dramatically from the days when they were “master builders” who orchestrated the entire production of a building, from design through the driving of the last nail. Today architects mostly design, with limited oversight responsibilities during the construction phase. To be called an architect, one must be licensed by the state, which requires a professional degree, a supervised internship, and successfully passing a professional examination. Even though trained as generalists, architects today are increasingly specializing in a niche, such as hospitals, prisons, schools, or residences. Architects who do residential design may include the detailed design of kitchens and baths in the scope of their services or leave it to specialist designers, once the general concept has been established. In this case, the specialist designer may work through the architect or, more likely, answer directly to the client.

### Building Designers

Unlike architects, building designers do not need professional licenses to practice, but they are limited to buildings of a certain type and/or size. Most specialize in residential design. This doesn't mean building designers are untrained, though. Some may have little training in their craft, but others may have substantial formal education and/or practical experience. To qualify as a certified professional building designer by the American Institute of Building Designers (AIBD), one must meet specific educational and professional design experience requirements; submit work samples for extensive peer review; and pass an examination covering such topics as architecture, engineering, building systems and materials, project administration, problem solving, and professional ethics. AIBD also encourages its members to seek qualification from the National Council of Building Designer Certification (NCBDC) and its certification program for professional building. If you are called in to consult on a project for which a building designer has prepared the plans, you may work for either the designer or the client.

### Engineers

Like architects, engineers are licensed by the state and obtain their qualifications via a professional degree and professional exam. Most engineers specialize in a particular area, such as mechanical, electrical, structural, and civil engineering. Multistory housing may require the services of any or all of these specialties. The majority of single-family housing gets built without the services of any engineer, except perhaps for a civil engineer to survey the site. In high-end housing, mechanical engineers may be entrusted with the design of the heating, ventilation, and air-conditioning (HVAC) systems. An electrical engineer might design the power and lighting, communications, and other electrical systems. To work effectively with an engineer, you will need a final layout of your portions of the house in hand, along with the particular equipment that will be installed. If a mechanical engineer is charged with designing the HVAC or plumbing system, be prepared to provide the engineer with any plumbing, ducting, and power requirements for the fixtures and equipment you specify. Get these requirements from catalogs and pass them along as soon as possible in the design process. If an architect is in charge of the overall design, you probably will communicate this information through him or her.

## Interior Designers

The design team of high-end residential projects may include an interior designer, who specializes in organizing the interior and specifying furnishings and color schemes. If an interior designer is involved with the project, you will need to clarify the various design responsibilities early on. Confusion and bruised egos will surely result if all the players don't know how they fit into the team and how project communication will work.

## Other Designers

Various other designers may design particular systems in a residence, including the heating, cooling, lighting, security, automation, solar systems, fire suppression, landscaping, water purification, flooring, and other systems. The professionals who design these systems gain their expertise in various ways, which may include a college major or experience in their field. They may or may not hold professional licenses or certification by a professional association. For example, a lighting designer may be a licensed electrical engineer, an electrician, or a person who has developed skills in that area from working for a company that manufactures or sells lighting.

## BUILDERS AND INSTALLERS

Once the planning work is complete, another team enters the project: builders and installers. A residential project may require the services of a very few or several specialists, according to the complexity of the project.

## General Contractors

All building projects need someone to coordinate the various actors involved in the construction. Whoever takes on this important charge must schedule the construction, recruit the subcontractors (subs), usually pay them, and oversee the construction. The task is daunting, rather like herding cats. Owners who act as their own general contractors often encounter rough waters—work that doesn't happen when it is supposed to, unforeseen costs, and numerous other frustrations. Hiring a general contractor helps avoid these kinds of headaches. Even with a pro managing the show, owners still can reserve portions of the work to do themselves, such as installing drywall or painting.

## Plumbers

If you think of plumbers as the experts on systems that move water in and out of kitchens and baths, it's obvious how crucial these installers are to the project team. Plumbers need to know their way around the myriad of pipes, fittings, and fixtures while keeping up to date with the latest code provisions. It's in your interest to get to know a few competent plumbers in your area so you can pick their brains when you confront plumbing-related questions in your design work. And, naturally, the plumber on your project will need to know the layout and plumbing requirements of the kitchen and bath fixtures.

## Electricians

Electricians are also indispensable to kitchen and bath projects. Their work begins where yours leaves off. If your design shows the proposed locations of power outlets and lighting fixtures, the electrician has to make sure all of these devices work as intended. Like plumbers, electricians must follow the latest provisions of a reference code, most likely the National Electrical Code (NEC). Electricians usually determine the circuiting arrangements in residential work. For this, they'll need to know the voltage requirements of large appliances and which lighting fixtures are low voltage, along with any other electrical requirements.