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# **PLUMBER'S HANDBOOK**

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**REVISED**  
**6th EDITION**

**Howard C. Massey**

Revised and Updated  
by

**David M. Gans, CBO, MCP**



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# Book Foreword

Hello, My name is Tom Bigely.

At the time of the publication of *The Plumber's Handbook*, sixth edition, I serve as chairman of the World Plumbing Council (WPC) and the Plumbing Director for the United Association of Plumbing and Pipefitters. As Chair the WPC, I have given my commitment to work with the highest level of plumbing professionals to achieve a mutual goal of creating the best possible plumbing for the world through the growth and development of the world's plumbing industries. One of the most important industries in the plumbing profession is education. The education of plumbers is very dear to my heart and my career in plumbing includes working as a plumber, an instructor and later, the National Training Director of a training program that annually educates thousands of some of the best plumbers in the USA, Canada and beyond.

I first met co-author, David Gans when we were both serving on the National Board of Directors for the International Association of Plumbing and Mechanical Officials (IAPMO). Since then David has moved up the ranks and is currently serving as President of IAPMO. IAPMO is a premier plumbing code and standards development organization that publishes the *Uniform Plumbing Code* and has over 5000 members which include installers, code officials, engineers, and manufactures of plumbing products.

Since we met, David and I have become close friends and have traveled extensively to plumbing events around the world. On each trip together, David has been a pleasure to collaborate with and clearly values building positive relationships with other plumbing industry professionals and organizations. He believes firmly that our plumbing industry consists of quality people, great ideas, great plumbing codes and quality plumbing products. David has always impressed me with his passion for plumbing, his integrity and his sound decision making. David's passion for and knowledge of plumbing is evident in his endeavor to update this book with the latest code language, materials and methods.

*The Plumber's Handbook* is unique in that it uses common language to explain the code requirements used by both the *Uniform Plumbing Code* and the *International Plumbing Code*. Together, these two codes are used in all states other than New Jersey which uses the *National Standard Plumbing Code*. Many States use both the *UPC* and *IPC* codes and people in those States will greatly benefit by reading this book. This book is impressive since it covers topics A-Z of plumbing including every part of a typical plumbing system. With test questions at the end of each chapter, *The Plumber's Handbook* would make an excellent addition to any plumbing school training curriculum or person interested in self-study.

Thank you for your interest in *The Plumber's Handbook* and your efforts to be an educated plumber!

You are on your way to improving the plumbing of your community, country and the world!

*Tom Bigely*

World Plumbing Council Chairman 2023



David and Tom at a plumbing trade show, Germany 2022

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# Plumbing and the Plumber

If you've chosen plumbing as your profession, you should find it one of the most challenging and satisfying of all construction trades. The many variations in design, layout, and installation methods present a challenge to any competent professional plumber, plumbing inspector or plumbing plans examiner. But notice that word *competent*. If you don't have a good knowledge of practical plumbing methods and of the minimum requirements of modern plumbing codes, you're going to be discouraged, frustrated, and confused.

Learning plumbing from a code book is a very difficult task. That's the reason for this manual. It's intended to help you grasp the important design and installation principles recognized as essential to doing professional-quality plumbing work. What you learn here should be applicable nearly anywhere in the U.S., regardless of the model code adopted by your jurisdiction. And if you're just learning the fundamentals of plumbing, you'll find this book much easier than reading and understanding the code.

Remember, however, that this book is not the plumbing code. The two most widespread model code organizations, The International Association of Plumbing and Mechanical Officials (IAPMO) and the International Code Council (ICC) have graciously allowed this book to utilize some of their tables for understanding the basic use of their codes. With that said, all plumbers will have to refer to their local code on a regular basis. I'll emphasize the minor variations in model plumbing codes throughout this book, so you

should easily recognize them as you read and compare sections of this book with your local *code*. *But the basic principles of sanitation and safety remain the same, regardless of the geographical location.*

## The History of Plumbing

The art and science of plumbing came into being as mankind struggled against disease. The history of civilization is the history of plumbing. At the dawn of civilization, when two or three families gathered together to make a tribe, people drank from springs and streams. They made no provisions for the disposal of sewage and garbage. We can assume that when their site became fouled with kitchen refuse and human waste, they just moved on. If disease killed members of the tribe because they neglected the laws of sanitation, they didn't understand the cause and effect. They didn't know that lack of cleanliness breeds disease.

Archeologists, while digging in various parts of the world, have confirmed that even ancient civilizations developed plumbing systems for protecting health. At Nippur, in Babylon, archeologists uncovered an aqueduct made of glazed clay brick that dates back to 4,500 B.C. This aqueduct contained three lines of glazed clay pipe. Each section was 8 inches in diameter and 2 feet long, with a flanged mouth. Other excavations have revealed glazed clay pipe in jar patterns, concave and cone shapes and a sewage system complete with manholes.

On the island of Crete, some of the palaces of ancient kings were equipped with extensive water supply and drainage systems. The glazed clay pipe was found to be in perfect condition after 3,500 years. Archeologists even discovered evidence of plumbing fixtures constructed of hard clay.

In ancient Greece, further advances were made in cleanliness. Greek aqueducts took pure water from mountain streams into cities. Sewers, which exist to this day, carried away waste to the surrounding rivers. They understood that bathing was a desirable habit. Greeks portrayed Hygeia, the goddess of health (from whose name we get the word "hygiene"), as supplying pure water to a serpent, the symbol of wisdom.

The ancient Egyptians also realized the value of sanitation. Moses was acquainted with the sanitary science of the Egyptians and used it in framing the code of laws found in the book of Leviticus.

The Romans in the time of Julius Caesar developed the principles of sanitation to a high art. Unlike the ancient Greeks and Egyptians, they were familiar with lead, which they imported from the British Isles. They called it *plumbum*. The word *plumbing* is derived from the Latin word for a worker in lead. The Romans used lead in many of the same ways we use it today.

Two thousand years ago the city of Rome had an adequate water supply and sewage disposal system. Water was piped from hills and mountains 50 miles distant from the city. To bring this water into Rome, great overhead aqueducts and underground tunnels were built of masonry. Branch lines carried water into the homes of the upper class for private bathrooms long before the development of the great public baths. Some baths in Pompeii had floors and walls of marble, with brass, bronze and silver fixtures.

From as far back as 600 B.C. Rome had an elaborate drainage system called the *Cloaca Maxima*. This main was 13 feet in diameter and was joined by many laterals. It was constructed from three concentric rows of enormous stones piled one on the top of another

without cement or mortar. It still exists and is used today in the drainage system of *modern* Rome.

When Rome set out to conquer the world, they took their bathing habits with them. In what is now Great Britain, in the city of Bath, archeologists uncovered a Roman bath 110 feet long and 68 feet wide.

In the 12th century, trade guilds were first organized in England. The first apprenticeship laws were passed in 1562 during the reign of Queen Elizabeth. These laws required an apprenticeship of seven years and made apprenticeship in all crafts compulsory. It was not until 1814 that the compulsory clause was removed and apprenticeship was made voluntary. The first known master plumbers' association was organized in England and incorporated in the College of Heralds of London.

With the discovery of the New World, man, like his ancient ancestors, sought to escape the dark and dirty cities of Europe for a fresh campground.

Although America has become a symbol of high standards in plumbing and sanitation, progress in the early development of sanitation and plumbing was very slow. As the population of the early settlements increased, conditions deteriorated. Garbage and sewage dumped onto the ground and seepage from earth-pit privies polluted nearby wells.

Health conditions became so intolerable that eventually public sewers had to be installed underground and extended to each building. Although New York in 1782 installed the first sewer under the streets, Chicago is credited with having the first real city sewage system, constructed in 1855.

Plumbing as we know it today traces its roots back many centuries, but was not really perfected until the twentieth century. Many older Americans, reared without indoor plumbing, still remember the open well, the pitcher pump, the outhouse, and the Saturday night romp in the old wooden tub. The modern bathroom, city water, and the sewers of today are taken for granted. But don't forget that plumbers protect the health of our nation and the world.

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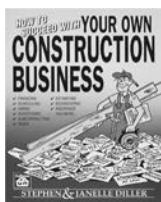


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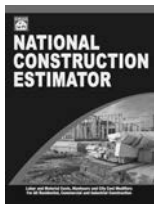


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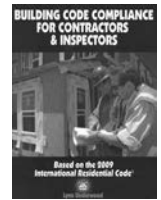
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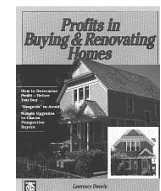
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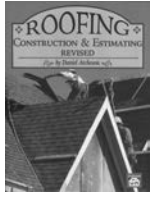
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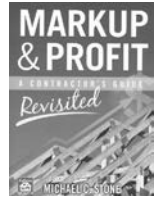
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