Fire Code Essentials:
Based on the 2024 *International Fire Code*®

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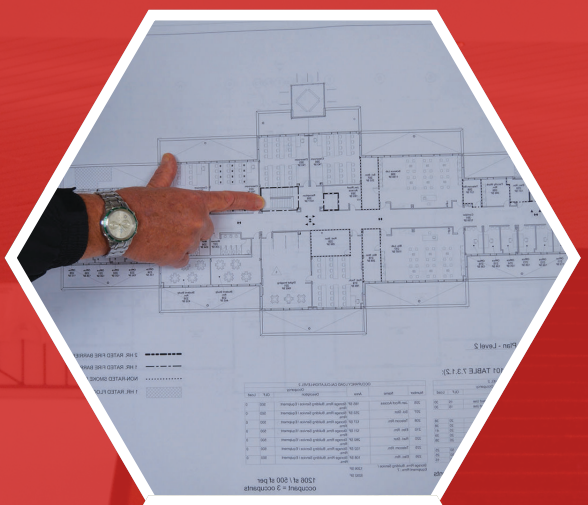

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Preface

Fire code enforcement is an important public safety function because unwanted fires injure and kill thousands annually. Unwanted fires also inflict a monetary impact on communities because fires remove businesses from the tax rolls while the damaged building is rebuilt. Statistics confirm that over 40 percent of the businesses that experience a fire never reopen because they lose their customer base. Of concern to any community is the accidental release of hazardous materials because of the potential for fire, explosion, or injury due to incapacitation by the chemical's constituents. All of these incidents require a response by the fire department, which places firefighters in danger, especially when an interior rescue and fire attack is required. Given the broad scope of hazards in society, the job of enforcing the fire code is challenging. This is especially true when dealing with hazardous materials, high-piled combustible storage and combustible dust-producing operations.

Fire Code Essentials: Based on the 2024 International Fire Code® (IFC®) was developed to address the need for an illustrated text explaining the basics of the fire code. It is intended to provide an

understanding of the proper application of the code to the most commonly encountered hazards found in many communities and cities. The text is presented and organized in a user-friendly manner with an emphasis on technical accuracy and clear noncode language. The content is directed to fire service professionals, code officials, designers, life safety professionals and others in the building construction industry.

The content of *Fire Code Essentials* is organized to correspond with the arrangement of the 2024 IFC. It commences with a review of the legal aspects associated with the adoption and enforcement of the fire code provisions, including permitting, right of entry and inspector liability. It progresses through common hazards that can be found in any occupancy; site and building features that must be addressed with any new construction; fire and life safety systems; hazards presented by special processes and operations; and it concludes with a review of the most commonly encountered hazardous materials. This format is useful to readers because it pulls together related information from the various sections of the IFC into one convenient location that does not necessarily follow the sequence in the code. Though the code format often results in requirements being found in different chapters, the book's format is intended to address a given situation or operation. This will provide a familiar frame of reference to those with code enforcement experience. The book is formatted to follow the steps of new building construction or renovation as well as areas of focus during any fire inspection. This format and arrangement offers the reader a means to understanding why fire code enforcement is an important public safety function and why it is so important to the safety of emergency responders.

Anyone involved in the design, construction or inspection of buildings or industrial processes and hazards will benefit from this book. Beginning and experienced fire inspectors, plans examiners, contractors, engineers, architects, environmental specialists, health and safety professionals, and students in fire science, fire protection, and building inspection technology curriculum or related fields of study and work will gain a fundamental understanding and practical application of the frequently used provisions of the 2024 edition of the IFC.

Reasonable and correct application of the code provisions is enhanced by a basic understanding of the fire code development process, the scope, intent and correlation of the family of the

International Codes, and the proper administration of those codes. This fundamental information is provided in the opening chapters of this book. The book also explains the interaction of the fire code with other local and state regulations. Because the content is focused on the fire code, the book includes prerequisite reading that is important in understanding the *International Building Code*® (IBC®) occupancy classification system, how buildings are assigned occupancy classifications, and how these classifications are used in the application of the IFC.

This book is not intended to cover all provisions of the IFC or all of the accepted materials and methods for the construction of fire protection systems, fire and life safety features, or the storage and handling of combustible and hazardous materials. Focusing in some detail on the most common hazards that are found in nearly every community affords an opportunity to fully understand the basics without exploring every variable and alternative. This is not to say that information not covered is any less important or valid. This book is best used as a companion to the IFC and appropriate National Fire Protection Association standards, which should be referenced for additional information.

Fire Code Essentials features full color illustrations and photographs to assist the reader in visualizing the application of the code requirements. Practical examples, simplified tables and highlights of particularly useful information also aid in understanding the provisions and determining code compliance. References to the applicable 2024 IFC sections are cited to assist readers in locating the corresponding code language and related topics in the code.

ABOUT THE INTERNATIONAL CODE COUNCIL®

The International Code Council is the leading global source of model codes and standards and building safety solutions that include product evaluation, accreditation, technology, codification, consulting, training and certification. The International Code Council's codes, standards and solutions are used to ensure safe, affordable and sustainable communities and buildings worldwide.

The International Code Council family of solutions includes the ICC Evaluation Service (ICC ES), S. K. Ghosh Associates, the

International Accreditation Service (IAS), General Code, ICC NTA, ICC Community Development Solutions, Alliance for National & Community Resilience (ANCR) and American Legal Publishing.

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ABOUT THE INTERNATIONAL FIRE CODE

The *International Fire Code*® (IFC®) is a comprehensive, stand-alone model code that regulates minimum fire and life safety requirements for new and existing buildings, facilities, storage and processes. The IFC addresses fire prevention, fire protection, egress and the storage and use of hazardous materials in new and existing buildings, facilities and processes. The IFC provides a total approach of mitigating hazards in all buildings and sites, regardless of the hazard being located indoors or outdoors.

The IFC contains criteria for design, construction and maintenance. For example, before one constructs a building, the site must be provided with an adequate water supply for firefighting operations and a means of building access for emergency responders in the event of a medical emergency, fire or natural or technological disaster. Depending on the building's occupancy and uses, the IFC regulates the various hazards that may be housed within the building, including refrigeration systems, application of flammable finishes, fueling of motor vehicles, storage of high-piled combustible materials and storage and use of hazardous materials. The IFC sets forth minimum requirements for these and other hazards and contains requirements for maintaining the life safety of building occupants, the protection of emergency responders, and to limit the damage to a building and its contents as the result of a fire, explosion or unauthorized hazardous material discharge.

ACKNOWLEDGMENTS

Scott Stookey, previously a Senior Technical Staff member with the International Code Council and currently with the Austin, Texas, Fire Department, authored the 2009 *Building Code Basics: Fire*. That book was the basis for this publication series. The 2012, 2015, 2018, 2021 and 2024 editions have built on that original text. *Fire Code Essentials* is the result of a collaborative effort, and the author is grateful for the valuable contributions by the following talented staff of ICC: Senior Staff Architect Jay Woodward, for his contributions throughout this project. As always, his assistance and guidance on various provisions were extremely helpful.

ABOUT THE AUTHOR

Kevin H. Scott

President

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Kevin Scott is President of KH Scott & Associates LLC. Kevin has extensive experience in the development of fire safety, building safety and hazardous materials regulations. Kevin has actively worked for over 35 years in the development of fire code, building code and fire safety regulations at the local, state, national and international levels. Kevin previously worked as a Senior Regional Manager with the International Code Council, and before that, he was Deputy Chief for the Kern County Fire Department, California, where he worked for 30 years. He has developed and presented many seminars on a variety of technical subjects including means of egress, high-piled combustible storage, hazardous materials, and plan review and inspection practices.

Kevin was a member of the original IFC Drafting Committee that worked to create the first edition of the IFC. He served for 7 years on the IFC Code Development Committee and was chairperson for the committee from 2001 to 2004. Kevin has actively participated in numerous technical committees to evaluate specific hazards and technologies, and to create regulations specific to those hazards. Some of the more significant committees include:

- High-piled Combustible Storage Committee
- Hydrogen Gas Ad Hoc Committee
- Task Group 400
- Technical Advisory Committee on Retail Storage of Group 'A' Plastic Commodities
- Underwriters Laboratories (UL) Fire Council.

Kevin's constant work to improve fire and life safety has been recognized on many levels. His contributions have been acknowledged by various organizations with the presentation of the following awards:

- William R. Goss Award for Fire & Life Safety in 2021—presented by California State Firefighters Association.
- Honorary Member of the International Code Council in 2016—nominated by peers and approved by the voting members of the International Code Council.
- Mary Eriksen-Rattan Award in 2013—presented by the Southern California State Fire Prevention Officers' Association.

- William Goss Award in 2009—presented by the California State Firefighters Association.
- Fire Official of the Year Award in 2005—presented by the California Building Officials.
- Robert W. Gain Award in 2003—presented by the International Fire Code Institute.

PREREQUISITE READING—OCCUPANCY CLASSIFICATION

Before readers of this book proceed into its content, they must understand that most communities regulate their buildings based on the occupancy classification, which is assigned based on the use and character of a building. A building's use is evaluated for life safety and fire risks, and its character represents the functions and activities that are expected to occur in the building. An occupancy classification is based on the relative hazards within a building, and similar uses are grouped into occupancy categories. A correct occupancy classification establishes the foundation for all the code requirements that are intended for the building's safe use.

Occupancies are classified into groups and subgroups using the requirements in the *International Building Code*® (IBC®). In most communities, the fire code official does not have the legal authority to assign an occupancy classification; this task is normally assigned to the building code official. The IBC addresses not only fire and life safety aspects, but also includes requirements for accessibility of mobility-impaired persons; building sanitation such as potable and wastewater systems; building ventilation such as the fresh air supply and heating, ventilating and air-conditioning systems as well as various structural loads of the building itself and external loads including snow, wind, rain and seismic ground movements. A building's occupancy classification influences these and other building code provisions. The *International Fire Code*® (IFC®) is primarily concerned with control of combustible materials and ignition sources; proper design, construction and maintenance of fire protection systems; safety of emergency responders and mitigation of processes or uses that represent a fire hazard or a high potential of injury or death, such as the release of hazardous materials, through safe design, construction, operation and maintenance.

The factors that govern the classification of a building's use must be carefully considered so that those uses or occupancies having approximately equivalent combustible content and similar fire and life hazard characteristics will be classified under the same occupancy heading. Occupancies are grouped so that fire protection requirements and height and area limitations applicable to the occupancy groups are rational for all building uses within that group. Every classification must be based on the premise that the uses covered by each will have similar fire hazards and life safety problems and that they share like characteristics. Within any given occupancy group or subgroup, no wide differentiation should exist between the fire hazards of the most hazardous and the least hazardous uses.

The occupancy groups include 10 major classifications as follows:

A Assembly
B Business
E Educational
F Factory/Industrial
H Hazardous
I Institutional
M Mercantile
R Residential
S Storage
U Utility and Miscellaneous

In addition to these major classifications, the occupancy groups of Assembly, Factory/Industrial, Hazardous, Institutional, Residential and Storage are further divided into subgroups in order to accommodate some variations in the hazards associated with the uses within each group (for example, hotel versus an apartment building in the Residential classification). The fire load characteristics in Factory/Industrial and Storage occupancies vary considerably depending on the product or process involved and, therefore, these uses are further classified into subgroups of low and moderate hazard, depending on the potential fire severity.

The occupancy subgroups for specific classifications are as follows:

A Assembly

A-1 Fixed seating for entertainment, i.e., theater or concert hall
A-2 Drinking and dining establishments

A-3 General assembly classification if others don't apply
A-4 Indoor sports facility
A-5 Outdoor sports facility

F Factory/Industrial

F-1 Moderate-hazard factory—manufacture or assembly of combustible products
F-2 Low-hazard factory—manufacture or assembly of noncombustible products

H Hazardous

H-1 Use or storage of hazardous materials with a detonation potential
H-2 Use or storage of hazardous materials with a deflagration potential
H-3 Use or storage of hazardous materials which present a significant physical hazard
H-4 Use or storage of hazardous materials which present a health hazard
H-5 Semiconductor fabrication facilities or research labs

I Institutional

I-1 24-hour care where a supervised environment or custodial care is provided
I-2 24-hour medical care or hospital facility
I-3 Detention facility or jail
I-4 Day care facility

R Residential

R-1 Hotel or motel—transient stay
R-2 Apartment or dormitory—nontransient stay
R-3 General residential classification if other classifications do not apply
R-4 Halfway house or group home

S Storage

S-1 Moderate-hazard storage—combustible products
S-2 Low-hazard storage—noncombustible products

As more and more buildings are being designed either for a single specialized purpose or as a part of a larger type of building complex, the need for more special code considerations has been recognized. Some examples of these special uses include automobile parking

structures, domed stadiums, high-rise buildings, covered mall and open mall buildings, airport terminals and large industrial complexes such as steel mills and assembly plants. For additional information or details of the various occupancy classifications, refer to Chapters 3 and 4 of the *International Building Code*.