Board of Building Standards

EDUCATION COMMITTEE MEETING
AGENDA (UPDATED 10/18/23)

DATE: OCTOBER 19, 2023
TIME: 10:00 AM
LOCATION: BBS LIBRARY, 6606 TUSSING ROAD, REYNOLDSBURG, OHIO
Click here to join the meeting

Call to Order

Consent Agenda

Course Applications

ER-1 2024 Educode Conference - ICC
Requested by potential attendee for committee consideration
Recommend approval for up to 40 hours (rather than approve specific courses out of 130 courses listed.)
Committee Recommendation:

Old Business

New Business

Adjourn

EDUCATION COMMITTEE MEETING
CONSENT AGENDA

Course Applications

EC-1 Significant Changes to the 2023 NEC, Part C (Electrical Trades Center)
All certifications (10 hours in three sessions: 3.5 + 3.5 + 3)

EC-2 Modern Kitchen Ventilation - CaptiveAire
1 hour, all certifications

EC-3 Fire Speaker Design and Limitations (Southwest Ohio Fire Safety Council)
All certifications (1 hour)

EC-4 NFPA 72 Updates to Chapter 24: Two-Way Communications (Southwest Ohio Fire Safety Council)
All certifications (1 hours)

EC-5 NFPA Updates and NFPA 3000 (Southwest Ohio Fire Safety Council)
All certifications (2 hours)

EC-6 Updated Clean Agent Protection (Southwest Ohio Fire Safety Council)
All certifications (1 hour)

File Attachments for Item:

ER-1 2024 Educode Conference - ICC

Requested by potential attendee for committee consideration

Recommend approval for up to 40 hours (rather than approve specific courses out of 130 courses listed.)

Committee Recommendation:

EduCODE international℠

Knowledge to build on

Twenty Seven Years of Building Code Education

www.educode.us

February 26 – March 1, 2024

Classes offered
live and virtual!

Feb. 26 – Mar. 1, 2024

1-888-ICC-SAFE (422-7233), ext. 33821

iccsafe.org/educode

Southern Nevada ICC
snicc.org
Dedicated to a Safe Built Environment
Incorporated 1991

S.N.B.O.
Southern Nevada Building Officials

ICC PREFERRED EDUCATION PROVIDER

ICC INTERNATIONAL CODE COUNCIL®

EduCODE international℠

Knowledge to build on

Twenty Seven Years of Building Code Education

www.educode.us

February 26 – March 1, 2024

Orleans Hotel & Casino Conference Center and Online Classes

Welcome to EduCODE 2024!

On behalf of the Southern Nevada Chapter of the International Code Council, we welcome you to our 27th year of providing outstanding educational programs. EduCODE is designed to provide the premier educational training in the country along with several networking opportunities to provide the best overall experience. EduCODE provides nationally acclaimed instructors, daytime and evening networking opportunities through the week, industry representatives showcasing their latest products, technology and services at our daily expo, and a staff that will provide outstanding customer service to make your visit beneficial, fun, and rewarding.

Where can you choose from over 130 classes both in person and online, each ICC Preferred Provider certified? Where can you brainstorm with instructors, building, fire and code enforcement professionals, students and staff, and have fun while learning? EduCODE 2024: that's where! Whether you attend for one day or for the entire week, virtually or in person, we are certain that you will have an exceptional experience that you will never forget.

During EduCode, should you have any questions or need assistance in any way, please do not hesitate to ask any of the numerous EduCODE volunteers for assistance. We will be glad to help. Welcome to EduCODE 2024! We are glad you are attending.

Sincerely,

Alan Ellis
EduCODE Director

What's New for 2024

Live Classes	**Virtual Classes**
Attending in person, check out the **Orange Tracks** for the In-Person classes offered at the Orleans Hotel.	Can't travel? Join us virtually! Check out the virtual offerings in the **Blue Tracks**.

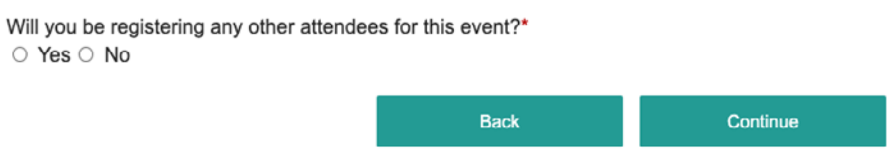
How do I register **Myself**?

If you are registering yourself and you will be the one attending classes at EduCODE, go to iccsafe.org/educode and click on **Individual Registration.** You will see the registration page as shown below. Click on New Registration and follow the prompts to complete your individual registration.

How do I register a **Group or Another Individual**?

There are two options for group registrations and registering another individual this year.

1. Click on Individual Registration (same process as above). Complete attendee #1. Once entered, you will be prompted if you will be registering any other attendees for this event:

   After you click Yes, you will be prompted to enter the information for the additional attendee. You may repeat this process until you register all your participants.

2. You may register groups by clicking **Group Registration** and completing the online form on the ICC EduCODE site as in previous years (iccsafe.org/educode). ICC will manually register all individuals on your online form within 7 days and send confirmation emails directly to the individuals. Please provide the specific attendee emails.

2024 IRC Significant Changes

LIVE
SESSION 1
TRACK 1

CEU: 0.8
Instructor: Sandra Hyde

This seminar reviews and analyzes selected significant changes from the 2021 IRC® to the 2024 IRC®. Discussions will assist code users in identifying the specific code changes that have occurred, and more importantly, understanding the reason behind the change. In addition, this seminar explains those code changes selected due to their frequency of application, special significance or change in application.

2024 IFC Significant Changes

VIRTUAL
SESSION 2
TRACK 2

CEU: 0.8
Instructor: Scott Adams

This seminar reviews and analyzes selected significant changes from the 2021 IFC® to the 2024 IFC®. Discussions will assist code users in identifying the specific code changes that have occurred, and more importantly, understanding the reason behind the change. The code changes to be addressed were selected due to their frequency of application, special significance or change in application.

2021 IRC Essentials

LIVE
SESSION 3
TRACK 3

CEU: 0.8
Instructors: Buddy Showalter & Jessie Sorensen

This seminar examines basic concepts of the 2021 International Residential Code (IRC) that provide a basis for the correct utilization of the code. A clear understanding of the identified requirements allows the code user to apply the IRC in specific situations and helps to build an understanding of the code's intended application. This seminar will also help the code user to correctly locate the applicable code requirements.

2021 IFC Essentials

VIRTUAL
SESSION 4
TRACK 4

CEU: 0.8
Instructor: Terrell Stripling

This seminar will introduce the application of many fundamental IFC provisions, including administrative functions, occupancy classification, general precautions against fire, emergency planning and preparedness, and fire service features. In addition, requirements for interior finish materials, decorative materials and furnishings, fire protection systems and means of egress will be discussed. An introduction to hazardous materials will also be provided. This seminar is designed to familiarize and assist code officials in locating, describing and applying applicable code requirements of the IFC to determine compliance or noncompliance.

IFC Chapter 32; High Piled Storage Requirements

LIVE ONLY
SESSION 5
TRACK 5

CEU: 0.8
Instructor:
Keith Heckler

This course is designed to sequentially follow the format of Chapter 32, section by section, step by step. A heavy emphasis will be placed on the details associated with the construction document requirements and the storage layout plan. The class will divert down supplemental pathways that lead to other sections in the IFC and external references. One of the objectives for the class will allow designers and reviewers to analyze the amount of time necessary in design or for review and the fundamental knowledge required for this topic.

2021 IBC Occupancy Classification (AM)

LIVE
SESSION 6
TRACK 6

CEU: 0.4
Instructor: Doug Thornburg

The initial determination for buildings regulated under the IBC is the classification of uses by occupancy. This seminar will focus on the importance of proper occupancy classification as each of the 26 classifications set forth in IBC Chapter 3 will be reviewed as to the anticipated hazards involved. In addition, the concept and application of the incidental use provisions will be discussed.

2021 IBC Use of Fire Sprinklers & Alarms (PM)

LIVE
SESSION 7
TRACK 6

CEU: 0.4
Instructor: Jay Woodward

This seminar identifies those conditions under which automatic sprinkler protection and/or fire alarm systems are required. The application of the fire area concept will be discussed, along with the varying extent of sprinkler protection required based upon specific situations. In addition, the discussion will address many of the key code conditions under which the presence of an automatic sprinkler system can be used to modify other requirements. Specific topics include:

- Overview of fire protection systems
- Definition and application of fire areas
- Required sprinkler and alarm protection based on occupancy classification
- Optional use of automatic sprinkler systems.

2021 IBC Occupancy Classification (AM)

VIRTUAL
SESSION 8
TRACK 7

CEU: 0.4
Instructor: Jay Woodward

The initial determination for buildings regulated under the IBC is the classification of uses by occupancy. This seminar will focus on the importance of proper occupancy classification as each of the 26 classifications set forth in IBC Chapter 3 will be reviewed as to the anticipated hazards involved. In addition, the concept and application of the incidental use provisions will be discussed.

2021 IBC Use of Fire Sprinklers & Alarm (PM)

VIRTUAL
SESSION 9
TRACK 7

CEU: 0.4
Instructor: George Mann

This seminar identifies those conditions under which automatic sprinkler protection and/or fire alarm systems are required. The application of the fire area concept will be discussed, along with the varying extent of sprinkler protection required based upon specific situations. In addition, the discussion will address many of the key code conditions under which the presence of an automatic sprinkler system can be used to modify other requirements. Specific topics include:

- Overview of fire protection systems
- Definition and application of fire areas
- Required sprinkler and alarm protection based on occupancy classification
- Optional use of automatic sprinkler systems.

2023 NEC Changes

LIVE
SESSION 10
TRACK 8

CEU: 0.8
Instructors:
Randy & Chris Hunter

This seminar will cover the major changes in the 2023 National Electrical Code®. Photos and illustrations will be used to show how the NEC® is changing and how those changes will affect electrical installations. Changes include over a dozen new Articles, new AFCI requirements, changes to lighting load calculations, new surge protection requirements, Class 4 power systems, and many more changes that affect installations and inspections. *Attendees should bring a 2023 NEC.*

NEC Requirements for Residential Installations

VIRTUAL
SESSION 11
TRACK 9

CEU: 0.8
Instructor: Keith Lofland

This program has been developed for those who are involved in the design, installation and inspection of electrical systems in new and existing one- and two-family dwelling units. This course will cover the general requirement and wiring methods as they apply to one- and two-family dwelling electrical systems. This includes requirements such as GFCI and AFCI requirements, receptacle spacing requirements, kitchen countertop receptacle outlet requirements, lighting outlets, branch circuit calculations, grounding and bonding, service requirements, and overcurrent protection and devices. This presentation will be based on the requirements of the 2020 edition of the National Electrical Code® (NEC). Relevant updated changes to the 2023 NEC will also be discussed. This seminar will assist attendees in learning to make more accurate, thorough, and safe installations and inspections of electrical installations at one- and two-family dwellings.

IRC Inspections

LIVE
SESSION 12
TRACK 10

SHUMS CODA ASSOCIATES

CEU: 0.8
Instructor:
Gil Rossmiller

This seminar examines basic concepts of the 2021 International Residential Code (IRC) that provide a basis for the correct utilization of the code. A clear understanding of the identified requirements allows the code user to apply the IRC in specific situations and helps to build an understanding of the code's intended application. This seminar will also help the code user to correctly locate the applicable code requirements.

Hazardous Materials for Building Officials

VIRTUAL
SESSION 13
TRACK 11

SHUMS CODA ASSOCIATES

CEU: 0.8
Instructor: Steve Thomas

This is a full-day class that covers the subject of hazardous materials to assist the Building Official in properly dealing with the more dangerous occupancies. The pertinent sections of the IBC regarding Hazardous Materials will be covered, including each type of H occupancy, as well as additional sections of some other codes. The class covers how to correctly classify materials, correctly determine when a label of "H" occupancy is appropriate and determines various manners of protection required to reduce risk. Control areas, storage, open and closed systems will all be discussed in depth. Tips on analyzing materials, going over available resources and special requirements will also be covered. Time will be spent helping to understand MSDS sheets and evaluating specific hazardous situations. Real life examples will be brought up with class participation encouraged in analyzing the possible dangers.

Leadership IMPACT – Communications

LIVE
SESSION 14
TRACK 12

AEGIS LEARNING

CEU: 0.8

VIRTUAL
SESSION 15
TRACK 13

Instructors: Tim Schneider & Kelley Reynolds

The ability to communicate effectively and at the right frequency is the core of success in leadership, business and life. Those that are able to relay instructions, vision and more, can connect with others, enhance personal productivity and avoid unneeded conflicts. This program will enhance the ability to listen, communicate clearly, manage communication tone, match communication style, and control non-verbal tone. Additionally, communication boundaries, frequency and the incredibly important skill of communication richness will be presented. Leadership IMPACT-Communications introduces participants to the powerful DiSC assessment as a highly accurate predictor of communication style and other key tendencies.

Nuisance Abatement After the Disaster (AM)

LIVE
SESSION 16
TRACK 14

CEU: 0.4
Instructor: Vincent Snyder

Attendees will learn how to plan and assess areas that have been affected by disasters through abatement of nuisances when your typical abatement procedures may not be practical. Illegal dumping can run rampant so this class will offer a softer approach for compliance prior to conducting court abatements on affected victims. This will be a powerful and very interactive presentation to help jurisdictions put a quick as well as a long-term plan into action after a natural disaster from a code nuisance perspective.

Building an Illegal Dumping Code Officer Program (PM)

LIVE
SESSION 17
TRACK 14

CEU: 0.4
Instructor: Vincent Snyder

- State code and local ordinance structure for the position authority
- Finding your candidate
- Job description parameters & scope of duty
- Developing a removal mitigation plan with Municipal Solid Waste or contractor
- Prevention. What works and what doesn't
- Illegal dumping and the growing homeless issues
- Report writing and court testimony
- Data collection for purposes of program building, expanding, and funding
- Program growing pains

This will be a very interactive class as no one jurisdiction has the exact same situation. It also will be very beneficial to have members of the class give their ideas and practices already in place.

Plan Check & Inspection of CPVC Fire Sprinkler Systems (AM)

LIVE
SESSION 18
TRACK 15

CEU: 0.4
Instructor: Scott Harrison

A presentation that provides an insight into the design and installation requirements of NFPA 13 (Light Hazard), NFPA 13D and NFPA 13R CPVC Fire Sprinkler Systems for the purpose of Plan Check and Inspections. The presentation provides field installation images, hands-on of actual pipe & fitting components and an open forum to address field installation and inspection issues.

CPVC Piping for Plumbing and Mechanical Applications (PM)

LIVE
SESSION 19
TRACK 15

CEU: 0.4
Instructor: Mario Orlando

This class will introduce participants to the fundamental science of plastic piping systems and the code guidance on the use and installation of such systems. The course will note references in both the IPC and UPC as well as industry recommendations for best results. Particular focus will be given to ABS, PVC, and CPVC as well as mention of PEX, polyethylene, polypropylene, and PVDF. Illustrations of proper and improper installations will be provided.

Wood: Fire Hazard and Fire-Rated Construction

VIRTUAL
SESSION 20
TRACK 16

CEU: 0.8
Instructors: Chris Athari, Jim Gogolski

This seminar will consist of three parts: fire-rated construction basics, fire-retardant-treated wood (FRTW) applications, and FRTW testing standard development. The first component will teach participants what to look for in proper installations of wood framing in floors, walls, and roofs as well as common code violations. The second part will define what FRTW is per the model codes, and identify code-compliant applications in building construction, including when building in the wildland-urban interface. The final part will cover how testing standards for FRTW are developed and accepted, including how to read and understand code evaluation reports and acceptance criteria.

Inspection Challenges of Firestopping

LIVE ONLY
SESSION 21
TRACK 17

Firestop Training

CEU: 0.8
Instructor: Brice Miller

This course, designed for Building and Fire Code Officials, Firestop Special Inspectors, Architects, Engineers, and Contractors, will focus on reviewing the firestopping requirements of the International Building Code, as well as discuss why firestop inspections have proven to be one of the most difficult challenges for code officials. We will provide code compliant solutions for effective and efficient firestop plan review and inspections, including methods to achieve inspection of firestop systems for joints, perimeter containment, and penetrations. This course will also touch on the new ASTM firestop inspection standards, as well as a brief overview of draftstopping and fireblocking. Overall, attendees will leave this program informed, encouraged, and equipped with numerous tips and techniques to help them in their field of work.

2024 IPC/UPC Significant Changes (AM)

LIVE
SESSION 22
TRACK 18

ICC INTERNATIONAL CODE COUNCIL®

CEU: 0.4
Instructor: Gary Gauthier

This seminar introduces participants to the major changes from the 2021 IPC and 2021 UPC to the 2024 IPC and 2024 UPC. Participants will discuss the changes, reasons for the changes, and take part in knowledge review activities. Information presented will allow participants to apply these new code requirements to design, plan review, and/or inspection.

2024 IMC/UMC Significant Changes (PM)

LIVE
SESSION 23
TRACK 18

ICC INTERNATIONAL CODE COUNCIL®

CEU: 0.4
Instructor: Richard Anderson

This seminar introduces participants to the major changes from the 2021 IMC and 2021 UMC to the 2024 IMC and 2024 UMC. Participants will discuss the changes, reasons for the changes, and take part in knowledge review activities. Information presented will allow participants to apply these new code requirements to design, plan review, and/or inspection.

2024 IMC/UMC Significant Changes (AM)

VIRTUAL
SESSION 24
TRACK 19

ICC INTERNATIONAL CODE COUNCIL®

CEU: 0.4
Instructor: Jim Cika

This seminar introduces participants to the major changes from the 2021 IMC and 2021 UMC to the 2024 IMC and 2024 UMC. Participants will discuss the changes, reasons for the changes, and take part in knowledge review activities. Information presented will allow participants to apply these new code requirements to design, plan review, and/or inspection.

2024 IPC/UPC Significant Changes (PM)

VIRTUAL
SESSION 25
TRACK 19

ICC INTERNATIONAL CODE COUNCIL®

CEU: 0.4
Instructor: Mark Fasel

This seminar introduces participants to the major changes from the 2021 IPC and 2021 UPC to the 2024 IPC and 2024 UPC. Participants will discuss the changes, reasons for the changes, and take part in knowledge review activities. Information presented will allow participants to apply these new code requirements to design, plan review, and/or inspection.

Simplified Structural Plan Review

LIVE
SESSION 26
TRACK 20

WC3

CEU: 0.8
Instructor: Chris Kimball

This seminar provides a step-by-step approach for performing a structural plan review to ensure that projects conform to the structural requirements of the 2021 IBC. The review process provided is strictly for residential to moderately sized commercial projects, as larger projects may require a more extensive structural review. The seminar does not teach how to perform structural calculations, but rather explains how to verify the project's design assumptions and overall compliance with the building code. Many examples will be given throughout in addition to sample plan review comments.

AM sessions start at 7:30 am PT | PM sessions start at 1:00 pm

IBC Chapter 3-6: Code Analysis Provisions

VIRTUAL
SESSION 27
TRACK 21

CEU: 0.8
Instructor: Todd Snider

This course will focus on the code analysis provisions outlined in Chapters 3 through 6 of the 2021 IBC. Understanding how the code analysis is performed and shown on the plans will help to quickly identify key code deficiencies that may exist in the design. The code analysis should provide a summary of key life safety elements to be incorporated into the project and to understand the architectural design assumptions made. Topics to be discussed will include occupancy classifications; the special detailed provisions of Chapter 4; allowable heights, number of stories, and areas; separated and nonseparated occupancies; mixed-occupancies; unlimited area provisions; types of construction; and fire-resistive construction requirements based upon the type of construction or proximity to the property line.

The Complete Permit Technician – 2 Days

LIVE ONLY
SESSION 28
TRACK 22

CEU: 1.6
Instructor: Steve Burger

This **2-day seminar** is intended to provide essential information in the areas of code administration and history, legal aspects, customer service, basic plan review, inspection process, zoning requirements, permit fee calculations, basic occupancy and construction types, basic means of egress and dealing with difficult customers. The seminar is also beneficial for preparing for the Permit Technician Certification Exam.

Required Materials: Calculator, 2015 or 2018 International Building Code®, 2015 or 2018 International Zoning Code®, Legal Aspects of Code Administration

Recommended Materials: Basic Code Enforcement

2021 B1 Residential Building Inspector Certification Test Academy – 3 Days

LIVE ONLY
SESSION 29
TRACK 23

CEU: 2.4
Instructors: John Gibson, Tim Ryan

The residential building inspector test academy is designed to assist you with taking the B1 Certification Exam. The test academy will cover in detail the topics of the exam. Throughout the academy you will be given an opportunity to answer questions that reference the exam resources. The topics that will be covered: code administration; building planning; footings and foundation; floor construction; wall construction and coverings; roof/ceiling construction and public safety and special construction of the residential building inspector certification exam.

Required Materials: For this academy, you will need the 2021 International Residential Code

NOTE: Exam not included but can be purchased separately.

2024 IBC Significant Changes

LIVE
SESSION 30
TRACK 1

CEU: 0.8
Instructors: Doug Thornburg, Sandra Hyde

This seminar reviews and analyzes selected significant changes from the 2021 to the 2024 edition of the International Building Code (IBC). Although the focus of the presentation is on revisions to the IBC fire- and life-safety provisions, additional areas of discussion include accessibility, construction materials and building services. The seminar assists building officials, fire officials, plans examiners, inspectors and design professionals in identifying the specific code changes that have occurred and understanding the reasoning behind the changes. A substantial number of significant structural changes will also be discussed.

2024 IRC Significant Changes

VIRTUAL
SESSION 31
TRACK 2

CEU: 0.8
Instructors: Buddy Showalter, Jessie Sorensen

This seminar reviews and analyzes selected significant changes from the 2021 IRC® to the 2024 IRC®. Discussions will assist code users in identifying the specific code changes that have occurred, and more importantly, understanding the reason behind the change. In addition, this seminar explains those code changes selected due to their frequency of application, special significance or change in application.

2021 IFC Essentials

LIVE
SESSION 32
TRACK 3

CEU: 0.8
Instructor: Terrell Stripling

This seminar will introduce the application of many fundamental IFC provisions, including administrative functions, occupancy classification, general precautions against fire, emergency planning and preparedness, and fire service features. In addition, requirements for interior finish materials, decorative materials and furnishings, fire protection systems and means of egress will be discussed. An introduction to hazardous materials will also be provided. This seminar is designed to familiarize and assist code officials in locating, describing and applying applicable code requirements of the IFC to determine compliance or noncompliance.

2021 IBC Essentials

VIRTUAL
SESSION 33
TRACK 4

CEU: 0.8
Instructor: Roger Axel

This seminar focuses on the basic concepts of the 2021 International Building Code (IBC), providing a basis for the correct utilization of the code's provisions. A clear understanding of the identified requirements allows the code user to properly apply the IBC and helps to build an understanding of the intent of the code and its application. The discussion will also provide a basis for beginning to develop a procedure for applying the IBC's requirements. Additionally, the seminar will address the code's scope and organization.

Kitchen Exhaust and Grease Duct Wrap

LIVE ONLY
SESSION 34
TRACK 5

CEU: 0.8
Instructor: Sharon Halpert

When it comes to commercial kitchens, it's not a matter of IF there will be a fire. It's more a matter of WHEN there is a fire. This class just might change how you look at grease duct wrap. General overview- after session participants will be able to

- Better understand how grease duct wrap testing has changed and why
- Understand the most common non-compliance issues
- Understand how to review some more unique applications
- Identify poor installations based on a few universal rules
- Know when banding is allowed or pinning is required- AND WHY
- Apply this new information in the field.

People who have attended this class make comments like, "We have never done this right, EVER" and "You talked codes and standards all class, but it was FUN. WOW, and I learned a lot, thanks!"

(We are not addressing VAD- only grease duct wrap)

2021 IBC Types of Construction (AM)

LIVE
SESSION 35
TRACK 6

CEU: 0.4
Instructor: Jay Woodward

Together with occupancy classification, one of the most critical steps in analyzing a building for code compliance is classifying it for type of construction purposes. This seminar based on IBC Chapter 6 will address the identification of the construction materials and fire-resistance-rated features associated with the varied individual construction types. The permissible use of combustible materials in Type I and II noncombustible buildings will also be addressed.

2021 IBC Allowable Heights & Areas (PM)

LIVE
SESSION 36
TRACK 6

CEU: 0.4
Instructor: Jay Woodward

Based on the provisions of IBC Chapter 5, this seminar focuses on how a building's occupancy classification and type of construction relate to the maximum building size permitted by the IBC. The approach to determining a building's maximum allowable height and area is explained, including use of Tables 504.3, 504.4 and 506.2 and all related permitted increases due to sprinkler protection and frontage open space. Detailed provisions related to mezzanines, unlimited area buildings, occupied roofs, fire walls and horizontal building separations are also addressed.

2021 IBC Types of Construction (AM)

VIRTUAL
SESSION 37
TRACK 7

CEU: 0.4
Instructor: George Mann

Together with occupancy classification, one of the most critical steps in analyzing a building for code compliance is classifying it for type of construction purposes. This seminar based on IBC Chapter 6 will address the identification of the construction materials and fire-resistance-rated features associated with the varied individual construction types. The permissible use of combustible materials in Type I and II noncombustible buildings will also be addressed.

2021 IBC Allowable Heights & Areas (PM)

VIRTUAL
SESSION 38
TRACK 7

CEU: 0.4
Instructor: George Mann

Based on the provisions of IBC Chapter 5, this seminar focuses on how a building's occupancy classification and type of construction relate to the maximum building size permitted by the IBC. The approach to determining a building's maximum allowable height and area is explained, including use of Tables 504.3, 504.4 and 506.2 and all related permitted increases due to sprinkler protection and frontage open space. Detailed provisions related to mezzanines, unlimited area buildings, occupied roofs, fire walls and horizontal building separations are also addresse

Branch Circuits & Feeders

LIVE | SESSION 39 | TRACK 8

CEU: 0.8
Instructor: Ryan Jackson

This class focuses on Articles 210 and 215 of the National Electrical Code®. The requirements for GFCI, AFCI, and GFPE protection are covered, as are circuit conductor identification, conductor sizing and overcurrent protection, required outlets and transformer circuits. ***Attendees should bring 2020 or 2023 NEC.***

2023 NEC Changes

VIRTUAL | SESSION 40 | TRACK 9

CEU: 0.8
Instructors:
Randy & Chris Hunter

This seminar will cover the major changes in the 2023 National Electrical Code®. Photos and illustrations will be used to show how the NEC® is changing and how those changes will affect electrical installations. Changes include over a dozen new Articles, new AFCI requirements, changes to lighting load calculations, new surge protection requirements, Class 4 power systems, and many more changes that affect installations and inspections. ***Attendees should have a 2023 NEC.***

IRC Plan Review

LIVE | SESSION 41 | TRACK 10

CEU: 0.8
Instructor:
Steve Thomas

Designed to provide a broad overview of the process for residential plan review, this one-day course will provide the basic steps involved to complete a comprehensive review of a residence. The class will discuss the tools and process for conducting a residential plan review. It will also increase your awareness of the necessary items required to ensure code compliance of the homes built in your jurisdiction.

IRC Inspections

VIRTUAL | SESSION 42 | TRACK 11

CEU: 0.8
Instructor:
Gil Rossmiller

This seminar provides new residential inspectors with basic techniques and an understanding of conducting inspections of one & two dwelling and townhouse buildings. The discussion will include preparation, presentation and inspections of the building, plumbing, mechanical and electrical portions of a building.

Team Member Engagement (AM)

LIVE | SESSION 43 | TRACK 12

VIRTUAL | SESSION 45 | TRACK 13

CEU: 0.4

Instructors: Tim Schneider &
Kelley Reynolds

Unlock half of your influence with team members with this learning program. Team members that are engaged will have more loyalty, work harder, produce higher quality and deliver outstanding customer service. Leaders with engaged teams and healthy work cultures experience much greater results and have better levels of personal job satisfaction. The return on investment for team member engagement is achieved by using the strategies of relationship building and depth, managing leadership tone and understanding team member motivating factors. Creating a healthy working culture and connecting team members to the purpose of the organization are provided as extra resources in this program.

Coaching Skills (PM)

LIVE | SESSION 44 | TRACK 12

VIRTUAL | SESSION 46 | TRACK 13

CEU: 0.4

Instructors: Tim Schneider &
Kelley Reynolds

At the heart of great leaders is a great coach. A person that can provide positive feedback easily, corrective feedback without alienating a team member and someone who uses coaching to release the rest of their influence with team members. Coaching, when done correctively and well, will dramatically improve workplace performance, team member engagement and unlock the potential of all team members. In addition to positive feedback and corrective feedback, this program presents skills associated with selecting team members, releasing team members when needed and providing teaching-type coaching

The Blueprint – Creating & Maintaining an Effective Code Compliance Program (AM)

LIVE ONLY
SESSION 47
TRACK 14

CEU: 0.4
Instructor: Marcus Kellum

"The Blueprint" class will be a guide for making, maintaining, or building a team, a project, or a code enforcement initiative. Attendees will create a template, design or pattern for success that can be followed and used in any local government space. Each community has its own pulse, so "The Blueprint" is only a model that can be customized to meet individual needs while attendees design a pattern for any local government to follow. High-performing teams have clearly defined goals and understand their role in achieving them. Attendees will develop personal and team goals to align themselves for success. Attendees will practice compassion and empathy in enforcement and learn how both refer to a caring response to someone else's distress.

The Intangibles of Regulatory Enforcement (PM)

LIVE ONLY
SESSION 48
TRACK 14

CEU: 0.4
Instructor: Marcus Kellum

In code enforcement, there are several aspects of the job that can be considered intangible or unable to be touched, grasped, or not having physical presence. While we have processes and metrics to guide us, there are abstract qualities and attributes of effective code enforcement, and this class is designed to highlight the intangible assets used by code officials that do not appear in an SOP or contained in a policy. The attendee will be introduced to the concept of valuing intangible assets. The attendee will acquire new insights on how the intangibles can have meaningful impact on generating compliance in the community and building value that exceeds community expectations. The attendee will be introduced to the intangibles on a learning pathway that include a series of skill sets, in consecutive modules, that help learners build knowledge in a specific competency or group of related competencies.

Wood: Fire Hazard and Fire-Rated Construction

LIVE
SESSION 49
TRACK 15

CEU: 0.8

Instructors: Chris Athari, Jim Gogolski

This seminar will consist of three parts: fire-rated construction basics, fire-retardant-treated wood (FRTW) applications, and FRTW testing standard development. The first component will teach participants what to look for in proper installations of wood framing in floors, walls, and roofs as well as common code violations. The second part will define what FRTW is per the model codes, and identify code-compliant applications in building construction, including when building in the wildland-urban interface. The final part will cover how testing standards for FRTW are developed and accepted, including how to read and understand code evaluation reports and acceptance criteria.

Protecting our Most Vulnerable – Fire and Smoke Protection in Key Occupancies (AM)

VIRTUAL
SESSION 50
TRACK 16

CEU: 0.4
Instructor: Octavio Valdavia

This training will cover key fire and smoke considerations for hospitals, senior living, ambulatory care and others.

Occupiable Vertical Openings – Fire, Smoke, and Egress (PM)

VIRTUAL
SESSION 51
TRACK 16

CEU: 0.4
Instructor: Tom Crewdson

This training will cover key fire and smoke considerations in a variety of spaces with vertical openings, including atriums, 2 story openings, elevator shafts and more.

Fire-Resistance-Rated Construction Requirements of the 2021 IBC

LIVE ONLY
SESSION 52
TRACK 17

CEU: 0.8
Instructor: Rich Walke

This program provides an in-depth look at the requirements of the 2021 International Building Code for fire-resistance-rated construction. It will start with a detailed look at what is fire-resistance-rated construction, where it is required and what is the required rating. From there, it will cover the practical aspects as detailed in Chapter 7, including the unique requirements for structural elements, walls and horizontal assemblies, the referenced standards, the testing process described in the referenced standards, and the available methods of demonstrating code compliance.

2021 IMC/UMC Essentials

LIVE
SESSION 53
TRACK 18

CEU: 0.8
Instructor: Richard Anderson

This seminar will cover the essential provisions for applying the 2021 IMC or 2021 UMC to the most encountered mechanical practices. Participants will discuss scenarios, how the IMC and UMC can be applied, and take part in knowledge review activities. Information presented will allow participants to have a more complete understanding of code requirements and how to apply when designing, installing, and inspecting a building mechanical system.

2021 IPC/UPC Essentials

VIRTUAL
SESSION 54
TRACK 19

CEU: 0.8
Instructor: Lisa Reiheld

This seminar will cover the essential provisions for applying the 2021 IPC or 2021 UPC to the most encountered plumbing and fuel gas practices. Participants will discuss scenarios, how the IPC and UPC can be applied, and take part in knowledge review activities. Information presented will allow participants to have a more complete understanding of code requirements and how to apply when designing, installing, and inspecting a plumbing and/or fuel gas system.

IBC Chapter 3-6: Code Analysis Provisions

LIVE
SESSION 55
TRACK 20

CEU: 0.8
Instructor: Chris Kimball

This course will focus on the code analysis provisions outlined in Chapters 3 through 6 of the 2021 IBC. Understanding how the code analysis is performed and shown on the plans will help to quickly identify key code deficiencies that may exist in the design. The code analysis should provide a summary of key life safety elements to be incorporated into the project and to understand the architectural design assumptions made. Topics to be discussed will include occupancy classifications; the special detailed provisions of Chapter 4; allowable heights, number of stories, and areas; separated and nonseparated occupancies; mixed-occupancies; unlimited area provisions; types of construction; and fire-resistive construction requirements based upon the type of construction or proximity to the property line.

Simplified Structural Plan Review

VIRTUAL
SESSION 56
TRACK 21

CEU: 0.8
Instructor: Todd Snider

This seminar provides a step-by-step approach for performing a structural plan review to ensure that projects conform to the structural requirements of the 2021 IBC. The review process provided is strictly for residential to moderately sized commercial projects, as larger projects may require a more extensive structural review. The seminar does not teach how to perform structural calculations, but rather explains how to verify the project's design assumptions and overall compliance with the building code. Many examples will be given throughout in addition to sample plan review comments.

2024 IFC Significant Changes

LIVE
SESSION 57
TRACK 1

CEU: 0.8
Instructor: Scott Adams

This seminar reviews and analyzes selected significant changes from the 2021 IFC® to the 2024 IFC®. Discussions will assist code users in identifying the specific code changes that have occurred, and more importantly, understanding the reason behind the change. The code changes to be addressed were selected due to their frequency of application, special significance or change in application.

2024 IBC Significant Changes

VIRTUAL
SESSION 58
TRACK 2

CEU: 0.8
Instructors: Terrell Stripling, Buddy Showalter

This seminar reviews and analyzes selected significant changes from the 2021 to the 2024 edition of the International Building Code (IBC). Although the focus of the presentation is on revisions to the IBC fire- and life-safety provisions, additional areas of discussion include accessibility, construction materials and building services. The seminar assists building officials, fire officials, plans examiners, inspectors and design professionals in identifying the specific code changes that have occurred and understanding the reasoning behind the changes. Significant structural changes will also be discussed.

2021 IBC Essentials

LIVE
SESSION 59
TRACK 3

CEU: 0.8
Instructor: George Mann

This seminar focuses on the basic concepts of the 2021 International Building Code (IBC), providing a basis for the correct utilization of the code's provisions. A clear understanding of the identified requirements allows the code user to properly apply the IBC and helps to build an understanding of the intent of the code and its application. The discussion will also provide a basis for beginning to develop a procedure for applying the IBC's requirements. Additionally, the seminar will address the code's scope and organization.

2021 IRC Essentials

VIRTUAL
SESSION 60
TRACK 4

CEU: 0.8
Instructors: Roger Axel

This seminar examines basic concepts of the 2021 International Residential Code (IRC) that provide a basis for the correct utilization of the code. A clear understanding of the identified requirements allows the code user to apply the IRC in specific situations and helps to build an understanding of the code's intended application. This seminar will also help the code user to correctly locate the applicable code requirements.

Storage Occupancies

LIVE ONLY
SESSION 61
TRACK 5

CEU: 0.8
Instructor: Bob Caputo

This presentation will review the general requirements for storage in NFPA 13 and guide participants through the layout of the general storage chapter highlighting commodity classification, storage arrangements, storage heights (miscellaneous/low-piled/high-piled), and clearance. In addition, the installation requirements for the three types of sprinklers that are used in storage occupancies — control mode density area (CMDA), control mode specific application (CMSA), and early suppression fast-response (ESFR) sprinklers — will be discussed. This seminar will discuss the unique installation and obstruction rules based on the requirements of NFPA 13 and the listings for each of these types of sprinklers.

2021 IBC Means of Egress

LIVE
SESSION 62
TRACK 6

CEU: 0.8
Instructor: Doug Thornburg

This seminar addresses numerous provisions in the 2021 IBC pertaining to establishing a compliant means of egress system in buildings. The seminar is intended to assist designers, plan reviewers, inspectors and code officials in applying the concepts and applications of both the egress design provisions and the egress component requirements. General topics of discussion include the determination of occupant loads, exit access design, including egress distribution, common path of egress travel, egress illumination and exit signs, and exit components, such as interior exit stairways, exit passageways and horizontal exits.

2021 IBC Means of Egress

VIRTUAL
SESSION 63
TRACK 7

CEU: 0.8
Instructor: Jay Woodward

This seminar addresses numerous provisions in the 2021 IBC pertaining to establishing a compliant means of egress system in buildings. The seminar is intended to assist designers, plan reviewers, inspectors and code officials in applying the concepts and applications of both the egress design provisions and the egress component requirements. General topics of discussion include the determination of occupant loads, exit access design, including egress distribution, common path of egress travel, egress illumination and exit signs, and exit components, such as interior exit stairways, exit passageways and horizontal exits.

Solar PV Plan Reviews and Inspections

LIVE
SESSION 64
TRACK 8

CEU: 0.8
Instructor: Doug Smith

This full-day (8 hour) course will cover key requirements of the National Electrical Code (NEC) that governs solar PV systems. The first half of the course will focus on residential solar PV plan reviews. Topics to be covered during this portion of the presentation include wire/breaker sizing, wire derating, cold temperature voltage, rapid shutdown of systems, disconnect locations, interconnection requirements, roof fire access clearances, equipment/wiring installation, and signage. The second half of this course will explain key concepts of what to look for during installations and inspections covering residential and commercial solar PV systems. This course will be beneficial for plan reviewers, inspectors and installers and is based on the 2020 NEC. ***Attendees should bring 2020 or 2023 NEC.***

Branch Circuits & Feeders

VIRTUAL
SESSION 65
TRACK 9

CEU: 0.8
Instructor: Ryan Jackson

This class focuses on Articles 210 and 215 of the National Electrical Code®. The requirements for GFCI, AFCI, and GFPE protection are covered, as are circuit conductor identification, conductor sizing and overcurrent protection, required outlets and transformer circuits. ***Attendees should bring 2020 or 2023 NEC.***

IRC Sites, Soils, Footings, Foundations & Locations on the Lot

LIVE
SESSION 66
TRACK 10

SHUMS CODA ASSOCIATES

CEU: 0.8
Instructor: Gil Rossmiller

This seminar provides in-depth training on the IRC code provisions for getting a "building out of the ground." The seminar is applicable to all aspects of the regulatory/design/construction community, including contractors, design professionals, plans examiners and inspectors. Major topics include: Soils and Geotechnical Reports, Soils Drainage, Use of Prescriptive Tables, Slabs on Ground, Slope Requirements, Basements and Crawl Spaces.

IRC Plan Review

VIRTUAL
SESSION 67
TRACK 11

CEU: 0.8
Instructor:
Steve Thomas

Designed to provide a broad overview of the process for residential plan review, this one-day course will provide the basic steps involved to complete a comprehensive review of a residence. The class will discuss the tools and process for conducting a residential plan review. It will also increase your awareness of the necessary items required to ensure code compliance of the homes built in your jurisdiction.

Self-Mastery

LIVE
SESSION 68
TRACK 12

VIRTUAL
SESSION 69
TRACK 13

CEU: 0.8

Instructors: Tim Schneider & Kelley Reynolds

"No one is fit to command another that cannot command himself" said William Penn and he could not be more right. The ability to manage and master your own behaviors will have an enormous impact on your ability to lead and maintain credibility with your team. Team members look to their leaders for calm, controlled and hopeful responses, especially during tough times. This program will dive deeply into self-awareness, understanding the real and authentic you, uncovering blind spots in your behavior, looking at reaction hot buttons and noting core emotional composition. From there, the power comes with enhanced confidence, optimism, resilience, self-control and the ability to encourage others. Leadership IMPACT-Self-Mastery utilizes the powerful DiSC assessment to assist in discovering blind spots and other behavioral traits.

Code Enforcement Zoning and Development (AM)

LIVE ONLY
SESSION 70
TRACK 14

CEU: 0.4
Instructor: Victor Martinez

The goal of this class is to introduce students into reading proper legal descriptions, blueprints and looking at the different types of deed documents and types of ownerships that exist.

Expanded Code Enforcement – Research, Mediation, Env. Issues, Revitalization and Abatement (PM)

LIVE ONLY
SESSION 71
TRACK 14

CEU: 0.4
Instructor: Victor Martinez

The goal of this lesson is to introduce the expanded components of code enforcement and provide the skills to the students which will enable them to efficiently performing their daily duties and responsibilities.

Combustible Decorative Features and Unique Themed Environments (AM)

LIVE
SESSION 72
TRACK 15

CEU: 0.4
Instructor: Doug Evans, P.E.

Many of the facilities on The Las Vegas Strip include unique themed environments and contain artificial trees, large statues, giant signs/LED screens, hand painted canvas murals adhered to walls and even buildings within the main structure. The materials used are most apt to be regulated by Chapters 8 and 26 of the IBC as Interior finishes and plastics in building construction, but a number of additional requirements apply. These regulations along with applicable portions of the IFC are used to provide an understanding of not only those subjects, but the ability to extrapolate to unique applications. This class covers notable fire losses, present code requirements and applicable fire tests, as well as provides a way to think about unique applications to achieve a reasonable level of fire safety.

How to Interpret Deflection Points in UL 2079 (PM)

LIVE
SESSION 73
TRACK 15

CEU: 0.4
Instructor: Mike Tullis

The foundation of any building starts with the dynamic joint at the Head-of-Wall (Top-of-wall). Understanding the vertical deflection starts the process of determining the track flange size, the No-Fly Zone for MEP trades and the drywall gap required for 3dynamic Head-of-wall joint. This class will walk through the components of proper deflection joint as per the UL certification. If you have any specific examples, please them. We can research on UL product IQ and walk through the determination process.

Plan Check & Inspection of CPVC Fire Sprinkler Systems (AM)

VIRTUAL
SESSION 74
TRACK 16

CEU: 0.4
Instructor: Scott Harrison

A presentation that provides an insight into the design and installation requirements of NFPA 13 (Light Hazard), NFPA 13D and NFPA 13R CPVC Fire Sprinkler Systems for the purpose of Plan Check and Inspections. The presentation provides field installation images, hands-on of actual pipe & fitting components and an open forum to address field installation and inspection issues.

Plastic Piping Systems for Waste and Water (PM)

VIRTUAL
SESSION 75
TRACK 16

CEU: 0.4
Instructor: Mario Orlando

This class will introduce participants to the fundamental science of plastic piping systems and the code guidance on the use and installation of such systems. The course will note references in both the IPC and UPC as well as industry recommendations for best results. Particular focus will be given to ABS, PVC, and CPVC as well as mention of PEX, polyethylene, polypropylene, and PVDF. Illustrations of proper and improper installations will be provided.

Construction Rated Joint Inspection (AM)

LIVE ONLY
SESSION 76
TRACK 17

CEU: 0.4
Instructor: Sharon Halpert

This class will change the way you look at the firestop joints on your project.

- ASTM E119, ASTM E1966, ASTM E2307 understand how firestop is tested and why it matters during your inspection
- readily find the necessary UL listed detail in a firestop submittal
- easily identify the key information in a UL listed system
- understand a list of common firestop non-compliance issues
- understand the key differences between the test conducted on through penetrations versus rated joints
- look at firestop rated joints in a whole new way
- We will talk about the two most overlooked applications for fire rated joints- smoke barriers and movement requirements.

Firestop Special Inspection (PM)

LIVE ONLY
SESSION 77
TRACK 17

CEU: 0.4
Instructor: Sharon Halpert

Chapter 17 included special inspection of firestop in 2012 and many special inspection firms added it to their list of offerings. Some do so without understanding the requirements of the standards or the level of granularity one must go through to adhere to these rigorous requirements. Are the individuals on your jobsites capable and qualified of adhering to the codes and standards? We look at the requirements of the IBC and ASTM E2174, ASTM E2393 and touch on ASTM E3038.

At the end of this session inspectors, architects and developers will understand how to ensure the individuals doing firestop special inspection are qualified and capable. Participants will understand the various educational opportunities such as the IFC Certificate, Interteks IQP and the new ICC CLA. They will know a few key questions to use to evaluate a potential inspector and how to keep the hacks out of their jurisdiction.

We will also discuss why each of these questions is so important. When this class is over, participants will be able to vet a special inspector before they are allowed to work on the project, evaluate the reports for conformance with the standards, understand what is required in the final inspection report and how to use this to vet the inspectors before approving them.

2021 IPC/UPC Essentials

LIVE
SESSION 78
TRACK 18

CEU: 0.8
Instructor: Gary Gauthier

This seminar will cover the essential provisions for applying the 2021 IPC or 2021 UPC to the most encountered plumbing and fuel gas practices. Participants will discuss scenarios, how the IPC and UPC can be applied, and take part in knowledge review activities. Information presented will allow participants to have a more complete understanding of code requirements and how to apply when designing, installing, and inspecting a plumbing and/or fuel gas system.

2021 IMC/UMC Essentials

VIRTUAL
SESSION 79
TRACK 19

CEU: 0.8
Instructor: Jim Cika

This seminar will cover the essential provisions for applying the 2021 IMC or 2021 UMC to the most encountered mechanical practices. Participants will discuss scenarios, how the IMC and UMC can be applied, and take part in knowledge review activities. The information presented will allow participants to have a more complete understanding of code requirements and how to apply when designing, installing, and inspecting a building mechanical system.

IRC Braced Wall Provisions & Structural Concerns in Residential Construction

LIVE
SESSION 80
TRACK 20

CEU: 0.8
Instructor: Chris Kimball

This course is broken into two parts. The first part covers the braced wall provisions of the 2021 IRC in detail. Multiple examples will be given to build each attendees knowledge and understanding. A key component will be to understand the detailing requirements for conventional construction. The second part of the class will be spent reviewing specific construction and framing errors identified by licensed structural engineers and the Engineered Wood Association (APA). Load paths will be discussed in detail as well as common site conditions that should be reviewed for each project. This portion of the class will assist inspectors in the field to be able to check common framing errors such as overdriven fasteners, excess notches or holes, misplaced holdowns, etc. The residential deck provisions will also be discussed.

TRACK	Monday Feb. 26	Tuesday Feb. 27	Wednesday Feb. 28	Thursday Feb. 29	Friday March 1
Track 1: 2024 I-Codes *LIVE*	**2024 IRC Significant Changes** Session 1	**2024 IBC Significant Changes** Session 30	**2024 IFC Significant Changes** Session 57	**2024 IFC Transition from the 2018 IFC** Session 83	**2024 IBC Transition from the 2018 IBC** Session 118
Track 2: 2024 I-Codes *VIRTUAL*	**2024 IFC Significant Changes** Session 2	**2024 IRC Significant Changes** Session 31	**2024 IBC Significant Changes** Session 58	**2024 IBC Transition from the 2018 IBC** Session 84	**2024 IFC Transition from the 2018 IFC** Session 119
Track 3: 2021 I-Codes *LIVE*	**2021 IRC Essentials** Session 3	**2021 IFC Essentials** Session 32	**2021 IBC Essentials** Session 59	**Demystifying Loads for Building Officials – 2024 IBC and ASCE 7-22** Session 85	**Wind and Single-Family Homes** AM Session 120 **Earthquakes and Single-Family Homes** PM Session 121
Track 4: 2021 I-Codes *VIRTUAL*	**2021 IFC Essentials** Session 4	**2021 IBC Essentials** Session 33	**2021 IRC Essentials** Session 60	**Wind and Single-Family Homes** AM Session 86 **Earthquakes and Single-Family Homes** PM Session 87	**Demystifying Loads for Building Officials – 2024 IBC and ASCE 7-22** Session 122
Track 5: Fire *LIVE ONLY*	**IFC Chapter 32; High Piled Storage Requirements** Session 5	**Kitchen Exhaust & Grease Duct Wraps** Session 34	**Storage Occupancies** Session 61	**Sprinkler System Installation** AM Session 88 **Keeping up with NFPA 13** PM Session 89	**Fire Alarm Plan Development, Submittal and Review** Session 123
Track 6: Fire and Life Safety *LIVE*	**2021 IBC Occupancy Classification** AM Session 6 **2021 IBC Use of Fire Sprinklers & Alarms** PM Session 7	**2021 IBC Types of Construction** AM Session 35 **2021 IBC Allowable Heights & Areas** PM Session 36	**2021 IBC Means of Egress** Session 62	**2021 IBC Use of Fire & Smoke Separations** AM Session 90 **2021 IBC Exterior Wall & Opening Protection** PM Session 91	**2021 IBC Special Building Types, Features and Hazards** AM Session 124 **2021 IBC Interior Finishes** PM Session 125

AM sessions start at 7:30 am PT | PM sessions start at 1:00 pm

TRACK	Monday Feb. 26	Tuesday Feb. 27	Wednesday Feb. 28	Thursday Feb. 29	Friday March 1
Track 7: Fire and Life Safety *VIRTUAL*	**2021 IBC Occupancy Classification** AM Session 8 **2021 IBC Use of Fire Sprinklers & Alarms** PM Session 9	**2021 IBC Types of Construction** AM Session 37 **2021 IBC Allowable Heights & Areas** PM Session 38	**2021 IBC Means of Egress** Session 63	**2021 IBC Use of Fire & Smoke Separations** AM Session 92 **2021 IBC Exterior Wall & Opening Protection** PM Session 93	**2021 IBC Special Building Types, Features and Hazards** AM Session 126 **2021 IBC Interior Finishes** PM Session 127
Track 8: Electrical *LIVE*	**2023 NEC Changes** Session 10	**Branch Circuits and Feeders** Session 39	**Solar PV Plan Reviews and Inspections** Session 64	**Wiring Methods** Session 94	**Emergency Systems** AM Session 128 **Motor Calculations** PM Session 129
Track 9: Electrical *VIRTUAL*	**Residential/NEC Installations** Session 11	**2023 NEC Changes** Session 40	**Branch Circuits and Feeders** Session 65	**Emergency Systems** AM Session 95 **Motor Calculations** PM Session 96	
Track 10: Advanced Special Topics *LIVE*	**IRC Inspections** Session 12	**IRC Plan Review** Session 41	**IRC Sites, Soils, Footings, Foundations & Locations on the Lot** Session 66	**IBC Accessibility Requirements** Session 97	**Hazardous Materials for Building Officials** Session 130
Track 11: Advanced Special Topics *VIRTUAL*	**Hazardous Materials for Building Officials** Session 13	**IRC Inspections** Session 42	**IRC Plan Review** Session 67	**IRC Sites, Soils, Footings, Foundations & Locations on the Lot** Session 98	**IBC Accessibility Requirements** Session 131
Track 12/13: Leadership, Management & Personal Development *LIVE* *VIRTUAL*	**Leadership IMPACT – Communications** Session 14 Session 15	**Leadership IMPACT – Team Member Engagement** AM Session 43 AM Session 45 **Leadership IMPACT – Coaching** PM Session 44 PM Session 46	**Leadership IMPACT – Self-Mastery** Session 68 Session 69	**Leadership IMPACT – Decision Making and Ethics** AM Session 99 AM Session 101 **Leadership IMPACT – Personal Power and Relationships** PM Session 100 PM Session 102	**Leadership IMPACT – Innovation and Change** AM Session 132 AM Session 134 **Leadership IMPACT – Success Skills for Leaders** PM Session 133 PM Session 135

AM sessions start at 7:30 am PT | PM sessions start at 1:00 pm PT

TRACK	Monday Feb. 26	Tuesday Feb. 27	Wednesday Feb. 28	Thursday Feb. 29	Friday March 1
Track 14: Code Enforcement *LIVE ONLY*	**Nuisance Abatement After the Disaster** AM Session 16	**The Blueprint-Creating & Maintaining an Effective Code Compliance Program** AM Session 47	**Code Enforcement Zoning and Development** AM Session 70	**2021 IPMC** AM Session 103	**Administrative Citations vs. Criminal Prosecution/Building Codes for Code Enforcement Officers** AM Session 136
	Building an Illegal Dumping Code Officer Program PM Session 17	**The Intangibles of Regulatory Enforcement** PM Session 48	**Expanded Code Enforcement- Research, Mediation, Env. Issues, Revitalization and Abatement** PM Session 71	**Code Tech VS. Code Officer** PM Session 104	**High Risk Management/Animal Interactions and Dangers** PM Session 137
Track 15: Building Specialties *LIVE*	**Plan Check & Inspection of CPVC Fire Sprinkler Systems** AM Session 18	**Wood: Fire Hazard and Fire-Rated Construction** PM Session 49	**Combustible Decorative Features and Unique Themed Environments** AM Session 72	**Protecting our Most Vulnerable – Fire and Smoke Protection in Key Occupancies** AM Session 105	**Stationary Energy Storage Systems** PM Session 138
	CPVC Piping for Plumbing and Mechanical Applications PM Session 19		**How to Interpret Deflection Points in UL 2079** PM Session 73	**Occupiable Vertical Openings – Fire, Smoke, and Egress** PM Session 106	
Track 16: Building Specialties *VIRTUAL*	**Wood: Fire Hazard and Fire-Rated Construction** Session 20	**Protecting our Most Vulnerable – Fire and Smoke Protection in Key Occupancies** AM Session 50	**Plan Check & Inspection of CPVC Fire Sprinkler Systems** AM Session 74	**Coordinated Code Compliance for Thermal Envelope Applications of Foam Plastics and Continuous Insulation** AM Session 107	
		Occupiable Vertical Openings – Fire, Smoke, and Egress PM Session 51	**Plastic Piping Systems for Waste and Water** PM Session 75	**2021 IBC Exterior Wall & Opening Protection** PM Session 93	
Track 17: Passive Fire Protection *LIVE ONLY*	**Inspection Challenges of Firestopping** Session 21	**Fire-Resistance-Rated Construction Requirements** Session 52	**Construction Rated Joint Inspection** AM Session 76	**Doors** AM Session 108	**A Field Gal and a Lab Guy Walk into a Bar – The Firestop Version** Session 139
			Firestop Special Inspection PM Session 77	**Protecting Duct & Air Transfer Openings** PM Session 109	

AM sessions start at 7:30 am PT | PM sessions start at 1:00 pm

TRACK	Monday Feb. 26	Tuesday Feb. 27	Wednesday Feb. 28	Thursday Feb. 29	Friday March 1
Track 18: Plumbing & Mechanical *LIVE*	**2024 IPC/UPC Significant Changes** AM Session 22	**2021 IMC/UMC Essentials** Session 53	**2021 IPC/UPC Essentials** Session 78	**A2L Refrigerants and Related Changes to the 2024 I-Codes** AM Session 110	**Medical Gas Basics** AM Session 140
	2024 IMC/UMC Significant Changes PM Session 23			**Hydrogen Gas in the Built Environment** PM Session 111	**Introduction to Backflow** PM Session 141
Track 19: Plumbing & Mechanical *VIRTUAL*	**2024 IMC/UMC Significant Changes** AM Session 24	**2021 IPC/UPC Essentials** Session 54	**2021 IMC/UMC Essentials** Session 79	**Medical Gas Basics** AM Session 112	**A2L Refrigerants and Related Changes to the 2024 I-Codes** AM Session 142
	2024 IPC/UPC Significant Changes PM Session 25			**Introduction to Backflow** PM Session 113	**Hydrogen Gas in the Built Environment** PM Session 143
Track 20: Special Topics *LIVE*	**Simplified Structural Plan Review** Session 26	**IBC Chapter 3–6: Code Analysis Provisions** Session 55	**IRC Braced Wall Provisions & Structural Concerns in Residential Construction** Session 80	**Fire Sprinkler Plan Review – The Basics** Session 114	**Fire Alarm Plan Review – The Basics** Session 144
Track 21: Special Topics *VIRTUAL*	**IBC Chapter 3–6: Code Analysis Provisions** Session 27	**Simplified Structural Plan Review** Session 56	**Fire Alarm Plan Review – The Basics** Session 81	**IRC Braced Wall Provisions & Structural Concerns in Residential Construction** Session 115	**Fire Sprinkler Plan Review – The Basics** Session 145
Track 22: Office & Field Skills *LIVE ONLY*	**The Complete Permit Technician** Session 28		**So, You Want to be a Building Official** Session 82	**Inspector Skills** Session 116	**Application & Administration of the I-Codes** AM Session 146
					Report Writing PM Session 147
Track 23: Certification Test Academy/Energy *LIVE ONLY*	**2021 B1 Residential Building Inspector Certification Test Academy** Session 29			**Residential Energy Provisions: From Design to Plans to the Field** Session 117	**Commercial Energy Provisions: From Design to Plans to the Field** Session 148

AM sessions start at 7:30 am PT | PM sessions start at 1:00 pm PT

Fire Alarm Plan Review: The Basics

VIRTUAL
SESSION 81
TRACK 21

CEU: 0.8
Instructor: Bob King

This course will walk the attendee through the basic steps required to perform a thorough plan review of a fire alarm submittal. This includes the review of the fire alarm shop drawings, voltage drop and battery calculations, and equipment data sheets. The specific requirements of NFPA 72 (2019 version as referenced in 2021 IFC) will be addressed, and common design issues will be highlighted. Acceptance testing and completion documentation will also be clearly noted.

So You Want to be a Building Official

LIVE ONLY
SESSION 82
TRACK 22

CEU: 0.8
Instructor: Steve Burger

This seminar is designed for any Building Department employees who would like more information on just what it takes to be a successful Building Official OR Manager/ Supervisor. The seminar will discuss basic decision-making, legal and ethical topics, customer service, image of the Building Department and its employees, political issues, professional development, dealing with the media, staffing and budgeting. The discussion will be kept at a level that can be understood by all attendees and will encourage an abundance of input and discussion. Who should attend: Building Officials, Plans Examiners, Building Inspectors, Permit Technicians, Code Enforcement Officers or Department Directors.

2024 IFC Transition from the 2018 IFC

LIVE
SESSION 83
TRACK 1

CEU: 0.8
Instructor: Scott Adams

This seminar will assist participants in implementing the transition from the 2018 IFC to the 2024 IFC. It will include relevant changes in the 2021 and 2024 editions of the IFC. This interactive training will focus on the key changes presented in the participant material. The information presented will allow for the application of these code requirements to the design, plan review, and/or inspection functions.

2024 IBC Transition from the 2018 IBC

VIRTUAL
SESSION 84
TRACK 2

CEU: 0.8
Instructor: John Gibson

This seminar will assist participants in implementing the transition from the 2018 IBC to the 2024 IBC. It will include relevant changes in the 2021 and 2024 editions of the IBC. This interactive training will focus on the key changes presented in the participant material. Emphasis will be placed on the intent and application of the changes in respect to the functions of design, plan review and inspection.

Demystifying Loads for Building Officials – 2024 IBC and ASCE 7-22

LIVE
SESSION 85
TRACK 3

CEU: 0.8
Instructor: Buddy Showalter

This full-day course will provide information to assist building officials during the plan review process on the proper evaluation of structural loads per the 2024 International Building Code® (IBC®) and the IBC-referenced 2022 ASCE/SEI 7 Minimum Design Loads and Associated Criteria for Buildings and Other Structures (ASCE 7-22). An overview of each topic along with changes that have occurred to the 2024 IBC and ASCE 7-22 will be provided along with examples to show their application. The following topics will be presented:

- Load Path, Load Combinations and Risk Categories
- Dead, Live and Rain Loads
- Snow and Ice Loads
- Wind and Tornado Loads
- Earthquake Loads
- Flood and Tsunami Loads
- Temporary Structures

Wind and Single-Family Homes (AM)

VIRTUAL
SESSION 86
TRACK 4

CEU: 0.4
Instructor: Sandra Hyde

Mid-career residential inspectors and plans examiners will find this seminar insightful as will designers looking for a review of high wind requirements for single family homes. With a focus on wood construction, this seminar dives into the details for designing and inspecting a home built to resist thunderstorm and hurricane winds. Minimum requirements for foundations, walls, roofs and floors are covered as well as a discussion of beyond code minimum options.

Earthquakes and Single-Family Homes (PM)

VIRTUAL
SESSION 87
TRACK 4

CEU: 0.4
Instructor: Sandra Hyde

Mid-career residential inspectors and plans examiners will find this seminar insightful as will designers looking for a review of earthquake related requirements for single family homes. With a focus on wood construction, this seminar dives into the details for designing and inspecting a home built to resist earthquakes. Minimum requirements for foundations, walls, roofs and floors are covered as well as building irregularity requirements.

Sprinkler System Installation (AM)

LIVE ONLY
SESSION 88
TRACK 5

CEU: 0.4
Instructor: Bob Caputo

This seminar details the requirements for the installation of sprinkler systems per NFPA 13, Standard of the Installation of Sprinkler Systems. The content will summarize the layout of the standard and the requirements of the standard. Specific content will consist of terminology, general requirements, sprinkler location requirements, and sprinkler installations requirements.

Keeping up with NFPA 13 (PM)

LIVE ONLY
SESSION 89
TRACK 5

CEU: 0.4
Instructor: Bob Caputo

This presentation will review the recent changes to NFPA 13 including the major reorganization of the standard that occurred with the 2019 edition. It includes topics on single point density designs, open racks, area of discharge, nitrogen systems, working plans, and signage. Keeping up with the changes will aid in keeping the attendee current in new requirements of NFPA 13.

2021 IBC Use of Fire & Smoke Separations (AM)

LIVE
SESSION 90
TRACK 6

CEU: 0.4
Instructor: George Mann

This seminar identifies the many and varied conditions identified in the IBC where fire and/or smoke separations are required. The discussion will focus on those required locations where fire-resistance-rated wall and horizontal assemblies, as well as smoke-resistive wall and horizontal assemblies are either required by the IBC or utilized by design professionals as alternative approaches to code compliance. Such locations include the selective or mandated use of fire walls, fire barriers, fire partitions, smoke barriers, horizontal assemblies and other separation elements. :

2021 IBC Exterior Wall & Opening Protection (PM)

LIVE
SESSION 91
TRACK 6

CEU: 0.4
Instructor: Doug Thornburg

This seminar addresses the various provisions in the IBC dealing with the fire-resistance of exterior walls, projections and parapets, and the fire protection of doors and windows in such walls, based on fire separation distance. Although exterior walls are primarily regulated due to their location on the lot, including where two or more buildings occur on the same lot, many other requirements are set forth in the code. Exterior bearing walls are regulated by Table 601, while the use of exterior exit stairways, egress courts and exterior areas of assisted rescue will also typically mandate some degree of fire-resistance.

2021 IBC Use of Fire & Smoke Separations (AM)

VIRTUAL
SESSION 92
TRACK 7

INTERNATIONAL CODE COUNCIL®

CEU: 0.4
Instructor: Jay Woodward

This seminar identifies the many and varied conditions identified in the IBC where fire and/or smoke separations are required. The discussion will focus on those required locations where fire-resistance-rated wall and horizontal assemblies, as well as smoke-resistive wall and horizontal assemblies are either required by the IBC or utilized by design professionals as alternative approaches to code compliance. Such locations include the selective or mandated use of fire walls, fire barriers, fire partitions, smoke barriers, horizontal assemblies and other separation elements.

2021 IBC Exterior Wall & Opening Protection (PM)

VIRTUAL
SESSION 93
TRACK 7

INTERNATIONAL CODE COUNCIL®

CEU: 0.4
Instructor: George Mann

This seminar addresses the various provisions in the IBC dealing with the fire-resistance of exterior walls, projections and parapets, and the fire protection of doors and windows in such walls, based on fire separation distance. Although exterior walls are primarily regulated due to their location on the lot, including where two or more buildings occur on the same lot, many other requirements are set forth in the code. Exterior bearing walls are regulated by Table 601, while the use of exterior exit stairways, egress courts and exterior areas of assisted rescue will also typically mandate some degree of fire-resistance.

Wiring Methods

LIVE
SESSION 94
TRACK 8

CEU: 0.8
Instructor: Ryan Jackson

This class focuses on Chapter Three of the National Electrical Code®. Article 300 applies to nearly every electrical installation and will be covered in great detail, followed by a discussion of the various wiring methods allowed in Articles 320-399. ***Attendees should bring 2020 or 2023 NEC.***

Emergency Systems (AM)

VIRTUAL
SESSION 95
TRACK 9

CEU: 0.4
Instructors:
Randy & Chris Hunter

Emergency systems are critical life safety installations within many of our places of assembly, like high-rise buildings and sports arenas. Learn about code-compliant installations of electrical wiring and equipment using Article 700 for Emergency Systems, Article 701 for Legally Required Standby Systems, and Article 702 for Optional Standby systems, including changes in the 2023 NEC. ***Attendees should bring 2020 or 2023 NEC.***

Motor Calculations (PM)

VIRTUAL
SESSION 96
TRACK 9

CEU: 0.4
Instructors:
Randy & Chris Hunter

Learn how to size conductors, overloads, and short-circuit and ground-fault protection for motors. We will use Article 430 of the NEC to determine sizing for branch and feeder circuit components. This can be one of the more challenging articles of the NEC and understanding the code applications for motor installations will be covered in depth. Participants will have practical examples and do relevant activities during class. ***Attendees should bring 2020 or 2023 NEC.***

IBC Accessibility Requirements

LIVE
SESSION 97
TRACK 10

SHUMS CODA ASSOCIATES

CEU: 0.8
Instructor:
Steve Thomas

Overview of the scoping provisions for accessibility in the International Building Code and the technical provisions of the ICC/ANSI A117.1 Accessible and Usable Buildings and Facilities. The seminar will also discuss differences between the provisions enforced by the building department and the American Disabilities Act Accessibility Guidelines.

IRC Sites, Soils, Footings, Foundations & Locations on the Lot

VIRTUAL
SESSION 98
TRACK 11

SHUMS CODA ASSOCIATES

CEU: 0.8
Instructor:
Gil Rossmiller

This seminar provides in-depth training on the IRC code provisions for getting a "building out of the ground." The seminar is applicable to all aspects of the regulatory/design/construction community, including contractors, design professionals, plans examiners and inspectors. Major topics include: Soils and Geotechnical Reports, Soils Drainage, Use of Prescriptive Tables, Slabs on Ground, Slope Requirements, Basements and Crawl Spaces.

Decision Making and Ethics (AM)

LIVE
SESSION 99
TRACK 12

AEGIS LEARNING

CEU: 0.4

VIRTUAL
SESSION 101
TRACK 13

Instructors: Tim Schneider & Kelley Reynolds

A leader's decisions become a lasting part of his or her legacy. Making the right decision, in the right time frame, with the correct information and involving the right people is one key focus of this program. The delicate balance between rash or too quick decisions and overly deliberative decisions is the starting point followed by examining decision making levels and who should be making those decisions. Understanding unintended consequences and applying some basic critical thinking will improve decision quality tremendously. As important as decisions are, making sure those decisions and other choices maintain ethical congruence is equally important. This program will provide participants with the tools to keep integrity always, refer to an organization's ethical values and avoid pitfalls associated with personal morality and beliefs. When ethical values are strong, a leader maintains the highest credibility with her or his team and can continue to successfully lead.

Personal Power & Relationships (PM)

LIVE
SESSION 100
TRACK 12

AEGIS LEARNING

CEU: 0.4

VIRTUAL
SESSION 102
TRACK 13

Instructors: Tim Schneider & Kelley Reynolds

Although the word "power"has certain stigma attached, leaders need power to operate and to lead. This program will provide the skills to manage the types of leadership power and create an effective balance between the five power types for a more successful connection with team member and more sustained organizational results. Relationship power is the most critical of the power types and building networks of influence using relationship techniques will be provided. Additional tools for Leadership Success-Personal Power and Relationships include seeing the big picture or global perspective, appreciation of workplace diversity and creating some charismatic charm for your role as a leader. Because this leadership competency is about the outward you, key skills related to teamwork, empathy and dealing successfully with conflict will also be presented.

AM sessions start at 7:30 am PT | PM sessions start at 1:00 pm

2021 IPMC (AM)

LIVE ONLY
SESSION 103
TRACK 14

CEU: 0.4
Instructor: Bryan Wagner

This class will highlight the 2024 updates from the 2021 International Property Maintenance Code.

Code Tech -vs- Code Officer (PM)

LIVE ONLY
SESSION 104
TRACK 14

CEU: 0.4
Instructor: Christylla Miles

This class will briefly discuss duties and responsibilities performed by each. What is your area of expertise? Are you that person? Both positions require a superior level of customer service along with the know- how and disciplines of providing supporting documentation using computer programs. Comments, documents and verbiage must be presented with accuracy as they may fall under the Open Records Act. Information placed must be factual, non-opinionated and not biased. The interpretation and application of codes and ordinances shall be fair and consistent by code officers and code techs. Resulting cases using the correct milestones is imperative as these are official documents of record.

Protecting our Most Vulnerable – Fire and Smoke Protection in Key Occupancies (AM)

LIVE
SESSION 105
TRACK 15

CEU: 0.4
Instructor: Dave Bauer

This training will cover key fire and smoke considerations for hospitals, senior living, ambulatory care and others.

Occupiable Vertical Openings – Fire, Smoke, and Egress (PM)

LIVE
SESSION 106
TRACK 15

CEU: 0.4
Instructor: Chad Quarrey

This training will cover key fire and smoke considerations in a variety of spaces with vertical openings, including atriums, 2 story openings, elevator shafts and more.

Coordinated Code Compliance for Thermal Envelope Applications of Foam Plastics and Continuous Insulation (AM)

VIRTUAL
SESSION 107
TRACK 16

continuousinsulation.org
modernbuildingalliance.us

CEU: 0.4
Instructors:
Jay Crandell, Eric Banks

Foam plastics and continuous insulation (ci) are commonly-used insulation materials and methods for achieving compliance with the energy code and its intent for the effective use and conservation of energy over the life of a building. Code-compliant use of insulation, including ci and foam plastic, requires coordination across multiple building code requirements that integrate fire safety, moisture/vapor control, water-resistive barrier, cladding installation, window installation, etc. In particular, foam plastic insulation materials have multi-functional capabilities that provide design flexibility and optimization in meeting these code requirements. This workshop will provide an in-depth review of applicable code requirements and include discussion of examples of ci and foam plastic insulation use in building foundation, exterior wall, and roof assemblies. The workshop will be supplemented with on-line resources that can assist with plan review and design for code compliance.

Protect Your Openings – Fire Doors and Fire Windows (AM)

LIVE ONLY
SESSION 108
TRACK 17

CEU: 0.4
Instructor: Rich Walke

This program provides a detailed look at the requirements of Chapter 7 of the 2021 International Building Code for protection of fire door and fire window assemblies. For each topic, the program includes a discussion of code requirements, the referenced standards, the testing process, the installation process, and the available methods of demonstrating code compliance. In addition, it will cover the maintenance requirements of the International Fire Code.

Protecting Duct and Air Transfer Openings (PM)

LIVE ONLY
SESSION 109
TRACK 17

CEU: 0.4
Instructor: Rich Walke

This program provides a detailed look at the requirements of Chapter 7 of the 2021 International Building Code for protecting duct and air transfer opening, in most cases with dampers. The program includes a discussion of code requirements, the referenced standards, the testing process, the installation process, and the available methods of demonstrating code compliance. In addition, it will cover the maintenance requirements of NFPA 80 and the International Fire Code.

A2L Refrigerants and Related Changes to the 2024 I-Codes (AM)

LIVE
SESSION 110
TRACK 18

CEU: 0.4
Instructor: Richard Anderson

This webinar provides an overview of the HVAC industry transition from HFC refrigerants to A2L refrigerants within the built environment. Topics addressed include recent Federal regulations that are driving the use of A2L refrigerants, the timeline for the phasedown of HFC refrigerants, the impacts on the latest codes and standards, and ways to adapt and prepare for the transition to A2L refrigerants.

Hydrogen Gas in the Built Environment (PM)

LIVE
SESSION 111
TRACK 18

CEU: 0.4
Instructor: Gary Gauthier

This seminar provides an overview of the global advancement of the use of hydrogen gas, including actions taken by the U.S. federal government to support the hydrogen industry. The introduction of natural gas/hydrogen fuel into the built environment as well as resources for the safe use of hydrogen by building and fire officials will be discussed. Current requirements for the installation of gaseous hydrogen systems as regulated by Chapter 7 of the 2021 International Fuel Gas Code (IFGC) will be discussed.

Medical Gas Basics (AM)

VIRTUAL
SESSION 112
TRACK 19

CEU: 0.4
Instructor: Scott Winn

This introduction to Medical Gas reviews the basics of source equipment, piping, valves, inlets/outlets and alarms. This seminar will include information on requirements for installation, inspection, verification and maintenance.

Introduction to Backflow (PM)

VIRTUAL
SESSION 113
TRACK 19

CEU: 0.4
Instructor: Scott Winn

This presentation will introduce you to the backflow requirements that are included in the IPC. It will address the needs of code officials, contractors, installers, and plumbers. The seminar will include information regarding the requirements for protecting the potable water supply from contamination.

Fire Sprinkler Plan Review: The Basics

LIVE
SESSION 114
TRACK 21

CEU: 0.8
Instructor: Craig Hanson

This course will walk the attendee through the basic steps required to perform a thorough plan review of a fire sprinkler submittal. This includes the review of the fire sprinkler shop drawings, hydraulic calculations, sway bracing calculations, and material cut sheets. The specific requirements of NFPA 13 (2019 version as referenced in 2021 IFC) will be addressed, and common design issues will be highlighted. Acceptance testing and as-built requirements will also be clearly noted.

IRC Braced Wall Provisions & Structural Concerns in Residential Construction

VIRTUAL
SESSION 115
TRACK 21

CEU: 0.8
Instructor: Chris Kimball

This course is broken into two parts. The first part covers the braced wall provisions of the 2021 IRC in detail. Multiple examples will be given to build each attendees knowledge and understanding. A key component will be to understand the detailing requirements for conventional construction. The second part of the class will be spent reviewing specific construction and framing errors identified by licensed structural engineers and the Engineered Wood Association (APA). Load paths will be discussed in detail as well as common site conditions that should be reviewed for each project. This portion of the class will assist inspectors in the field to be able to check common framing errors such as overdriven fasteners, excess notches or holes, misplaced holdowns, etc. The residential deck provisions will also be discussed.

Inspector Skills

LIVE ONLY
SESSION 116
TRACK 22

CEU: 0.8
Instructor: Tim Ryan

This seminar addresses the necessary soft skills for success as an inspector—those non-technical traits and behaviors that enhance an inspector's ability to interact with others and to successfully carry out their job duties. These include people skills such as effective communication, diplomacy and customer service, but also include skills for problem solving, professionalism, integrity, and time management. In addition to a solid understanding of the technical provisions of the codes, developing appropriate soft skills are essential in pursuing the goal of safe, healthy and durable buildings for the community. Developed specifically for construction inspectors in all disciplines, the topics covered are equally important to all employees of public service agencies including permit technicians, plan reviewers, managers, building officials and fire code officials. The information is also beneficial for developing policies and procedures to promote consistent and fair inspection practices while improving communications and public relations.

Residential Energy Provisions: from Design to Plans to the Field

LIVE ONLY
SESSION 117
TRACK 23

CEU: 0.8
Instructor: Hope Medina

A house doesn't just appear. It takes the process of planning the design of the building, to details on a set of plans, to bringing it to life out in the field. The question becomes what do I need to provide on the plans for it to be reviewed and to get the desired results in the field by the contractors and for the inspectors. No matter where you fit into this process, this class is for you. We will answer these questions with examples from plans and pictures from the field, both good and not so good.

2024 IBC Transition from the 2018 IBC

LIVE
SESSION 118
TRACK 1

CEU: 0.8
Instructor: Doug Thornburg

This seminar will assist participants in implementing the transition from the 2018 IBC to the 2024 IBC. It will include relevant changes in the 2021 and 2024 editions of the IBC. This interactive training will focus on the key changes presented in the participant material. Emphasis will be placed on the intent and application of the changes in respect to the functions of design, plan review and inspection.

2024 IFC Transition from the 2018 IFC

VIRTUAL
SESSION 119
TRACK 2

CEU: 0.8
Instructor: Scott Adams

This seminar will assist participants in implementing the transition from the 2018 IFC to the 2024 IFC. It will include relevant changes in the 2021 and 2024 editions of the IFC. This interactive training will focus on the key changes presented in the participant material. The information presented will allow for the application of these code requirements to the design, plan review, and/or inspection functions.

Wind and Single-Family Homes (AM)

LIVE
SESSION 120
TRACK 3

CEU: 0.4
Instructor: Sandra Hyde

Mid-career residential inspectors and plans examiners will find this seminar insightful as will designers looking for a review of high wind requirements for single family homes. With a focus on wood construction, this seminar dives into the details for designing and inspecting a home built to resist thunderstorm and hurricane winds. Minimum requirements for foundations, walls, roofs and floors are covered as well as a discussion of beyond code minimum options.

Earthquakes and Single-Family Homes (PM)

LIVE
SESSION 121
TRACK 3

CEU: 0.4
Instructor: Sandra Hyde

Mid-career residential inspectors and plans examiners will find this seminar insightful as will designers looking for a review of earthquake related requirements for single family homes. With a focus on wood construction, this seminar dives into the details for designing and inspecting a home built to resist earthquakes. Minimum requirements for foundations, walls, roofs and floors are covered as well as building irregularity requirements.

Demystifying Loads for Building Officials – 2024 IBC and ASCE 7-22

VIRTUAL
SESSION 122
TRACK 4

CEU: 0.8
Instructor: Buddy Showalter

This full-day course will provide information to assist building officials during the plan review process on the proper evaluation of structural loads per the 2024 International Building Code® (IBC®) and the IBC-referenced 2022 ASCE/SEI 7 Minimum Design Loads and Associated Criteria for Buildings and Other Structures (ASCE 7-22). An overview of each topic along with changes that have occurred to the 2024 IBC and ASCE 7-22 will be provided along with examples to show their application. The following topics will be presented:

- Load Path, Load Combinations and Risk Categories
- Dead, Live and Rain Loads
- Snow and Ice Loads
- Wind and Tornado Loads
- Earthquake Loads
- Flood and Tsunami Loads
- Temporary Structures

Fire Alarm Plan Development, Submittal and Review

LIVE ONLY
SESSION 123
TRACK 5

CEU: 0.8
Instructor: Brad Cronin

This application course describes the common corrections associated with the plan review process and offers suggestions for improvement by providing plan review and acceptance test checklists, spreadsheets to determine battery and voltage drop calculations, exercises to determine proper spacing of smoke detectors, exercises to determine proper audibility of fire alarm notification appliances and proper sizing and placement of visible notification appliances.

2021 IBC Special Building Types, Features and Hazards (AM)

LIVE
SESSION 124
TRACK 6

CEU: 0.4
Instructor: Jay Woodward

Based on selected provisions from Chapter 4, this seminar focuses on several special building types, features and hazards. High-rise buildings, underground buildings, mall buildings, parking garages, aircraft hangars and special amusement buildings are specialized structures that have their own unique considerations. Atriums, stages and platforms are building features that are evaluated in a special manner due to the uniqueness of their use. High-hazard conditions are regulated specifically through provisions addressing combustible storage, hazardous materials, Group H occupancies, spray application of flammable finishes, medical gas storage rooms and higher education laboratories.

2021 IBC Interior Finishes (PM)

LIVE
SESSION 125
TRACK 6

CEU: 0.4
Instructor: George Mann

Focused primarily on Chapter 8, this seminar addresses the allowances and limitations of various finish materials of floors, walls and ceilings. In addition, the provisions dealing with the use of foam plastic insulation are examined in detail. The discussion includes the review of a number of test standards applicable to various finish conditions.

2021 IBC Special Building Types, Features and Hazards (AM)

VIRTUAL
SESSION 126
TRACK 7

CEU: 0.4
Instructor: John Gibson

Based on selected provisions from Chapter 4, this seminar focuses on several special building types, features and hazards. High-rise buildings, underground buildings, mall buildings, parking garages, aircraft hangars and special amusement buildings are specialized structures that have their own unique considerations. Atriums, stages and platforms are building features that are evaluated in a special manner due to the uniqueness of their use. High-hazard conditions are regulated specifically through provisions addressing combustible storage, hazardous materials, Group H occupancies, spray application of flammable finishes, medical gas storage rooms and higher education laboratories.

2021 IBC Interior Finishes (PM)

VIRTUAL
SESSION 127
TRACK 7

CEU: 0.4
Instructor: Terrell Stripling

Focused primarily on Chapter 8, this seminar addresses the allowances and limitations of various finish materials of floors, walls and ceilings. In addition, the provisions dealing with the use of foam plastic insulation are examined in detail. The discussion includes the review of a number of test standards applicable to various finish conditions.

Emergency Systems (AM)

LIVE
SESSION 128
TRACK 8

CEU: 0.4
Instructor: Randy & Chris Hunter

Emergency systems are critical life safety installations within many of our places of assembly, like high-rise buildings and sports arenas. Learn about code-compliant installations of electrical wiring and equipment using Article 700 for Emergency Systems, Article 701 for Legally Required Standby Systems, and Article 702 for Optional Standby systems, including changes in the 2023 NEC. ***Attendees should bring 2020 or 2023 NEC.***

AM sessions start at 7:30 am PT | PM sessions start at 1:00 pm PT

Motor Calculations (PM)

LIVE
SESSION 129
TRACK 8

CEU: 0.4
Instructor: Randy & Chris Hunter

Learn how to size conductors, overloads, and short-circuit and ground-fault protection for motors. We will use Article 430 of the NEC to determine sizing for branch and feeder circuit components. This can be one of the more challenging articles of the NEC and understanding the code applications for motor installations will be covered in depth. Participants will have practical examples and do relevant activities during class. ***Attendees should bring 2020 or 2023 NEC.***

Hazardous Materials for Building Officials

LIVE
SESSION 130
TRACK 10

SHUMS CODA ASSOCIATES

CEU: 0.8
Instructor: Steve Thomas

This is a full-day class that covers the subject of hazardous materials to assist the Building Official in properly dealing with the more dangerous occupancies. The pertinent sections of the IBC regarding Hazardous Materials will be covered, including each type of H occupancy, as well as additional sections of some other codes. The class covers how to correctly classify materials, correctly determine when a label of "H" occupancy is appropriate and determines various manners of protection required to reduce risk. Control areas, storage, open and closed systems will all be discussed in depth. Tips on analyzing materials, going over available resources and special requirements will also be covered. Time will be spent helping to understand MSDS sheets and evaluating specific hazardous situations. Real life examples will be brought up with class participation encouraged in analyzing the possible dangers.

IBC Accessibility Requirements

VIRTUAL
SESSION 131
TRACK 11

SHUMS CODA ASSOCIATES

CEU: 0.8
Instructor: Bill Clayton

Overview of the scoping provisions for accessibility in the International Building Code and the technical provisions of the ICC/ANSI A117.1 Accessible and Usable Buildings and Facilities. The seminar will also discuss differences between the provisions enforced by building department and the American Disabilities Act Accessibility Guidelines.

Innovation and Change (AM)

LIVE
SESSION 132
TRACK 12

AEGIS LEARNING

CEU: 0.4

VIRTUAL
SESSION 134
TRACK 13

Instructors: Tim Schneider & Kelley Reynolds

We have more memory and storage in our phones compared to the first computers we owned. Drones deliver packages to our doorstep. Human organs are being grown in a laboratory and you can't give away CD's, DVD's or VHS tapes at a garage sale.Change and innovation are everywhere and successful leaders both embrace change and stimulate innovation; both personally and with their team. This program provides the powerful tools to reduce the loss of productivity associated with any change event, build partnerships with those affected by change and work to condition their team and selves to embrace change. Leadership TRANSFORMATION-Innovation and Change also presents the skills needed to become more innovative, creative and produced sustained and impacting change in the working environment.

Success Skills for Leaders (PM)

LIVE
SESSION 133
TRACK 12

AEGIS LEARNING

CEU: 0.4

VIRTUAL
SESSION 135
TRACK 13

Instructors: Tim Schneider & Kelley Reynolds

The challenges of day-to-day operational reality for leaders is a large. To effectively lead, a set of personal skills is needed to enhance efficiency, take care of self and deal with the difficult people that pop up. Leadership TRANSFORMATION Success Skills for Leaders provides the personal skill set needed to navigate successfully and thrive in the modern working environment. Beginning with the key elements of time management including prioritizing, time/task blocking, reducing time parasites and scheduling, this program will enhance your personal productivity immediately. Stress management tools follow that help you cope and better understand the stress and from where it originates. The final set of skills will help you diffuse and win over difficult people. The Aegis Learning model of Listen, Validate, Respond will help you with those prickly team members, customers and even family.

Administrative Citations vs. Criminal Prosecution/Building Codes for Code Enforcement Officers (AM)

LIVE ONLY
SESSION 136
TRACK 14

CEU: 0.4
Instructor: Eugene Alper

This seminar will demonstrate the advantages and intricacies of the administrative citation—an essential tool of code enforcement—and turn those who still do not believe in it into loyal admirers. You will learn how to change your Code, implement the administrative citation program, bring financial rewards to your city, and—most importantly—improve compliance. Leave behind the beast of criminal prosecution and live happily ever after with the beauty of the administrative citation! If you are a building inspector going daily to construction sites, the set of approved plans and the current Building Codes are your go-to documents. But if you are a code enforcement officer responding to complaints about pre-existing buildings, you have no plans on hand and the current Codes may not apply. In this class, we explore when code enforcement can use the Building Codes and what to do when it cannot. We will consider what parts of the Codes apply to pre-existing buildings, what work requires permits, and how to research older codes and zoning ordinances.

High Risk Management/Animal Interactions and Dangers (PM)

LIVE ONLY
SESSION 137
TRACK 14

CEU: 0.4
Instructors: Chris Mandala, Darrell Revier

Whether you are a seasoned inspector or on your first day, managing cases and job sites are a daily task. Not every case or inspection is the same. Some cases involve repeat violators or contractors. In this course you will learn how to identify cases or projects that pose an exceptional risk to your safety. We will also discuss how to mitigate those risks in order to live to see another day. The instructor will draw examples and content from actual cases. This course will cover:

- Predictive Analytics
- Risk Mitigation
- Profiling
- Intelligence Gathering
- Case Planning
- Tactical Considerations
- Off-Duty Survival
- Stress Management

Animal interactions with Code Enforcement Officers, Building Inspectors and Zoning Officials are an everyday occurrence. Avoiding potentially dangerous encounters is not always possible, but we can mitigate the likelihood of a negative encounter. This course will teach the following risk-reducing techniques:

- Understanding basic animal psychology
- Non-verbal communication a.k.a. body language-theirs and ours
- Verbal communication-theirs and ours
- Do's and don'ts of animal interactions

Stationary Energy Storage Systems

LIVE
SESSION 138
TRACK 15

CEU: 0.8
Instructors: Brian Scholl

Stationary Battery Energy Storage Systems are becoming more and more common in our communities. Although these systems provide us great benefits, they can also be dangerous when not properly installed. This class is designed to assist students with an overview of what a stationary battery energy storage system is, its function and its components. We will then discuss historical incidents involving these battery systems to get a better understanding on why we need to understand them better and why we need to regulate them. Finally, this class will discuss the requirements in both the International Fire Code and NFPA standard to ensure that they are being installed with all the safety provisions required. At the completion of the class, the student will have a better understanding on how to regulate any battery energy storage system that comes to their jurisdiction.

A Field Gal and a Lab Guy Walk into a Bar – The Firestop Version

LIVE ONLY
SESSION 139
TRACK 17

CEU: 0.8
Instructors: Sharon Halpert & Rich Walke

Although no longer a new industry, firestopping is still this weird topic that is often misunderstood. The people who test the materials don't often spend time in the field and the people in the field don't often spend time testing. This class will give you the best of both worlds. A former UL staff member who knows everything about fire testing, and race cars is going to sit down with a field person and former kindergarten teacher to talk about common bad installations that she wants to see people stop doing. We will address an issue, the common problematic installation, the required installation and what might happen if that installation was placed on a furnace and subject to a trial by fire. This class will be unlike any other you have ever taken. You will also be able to throw in your own questions as we work through our list, so please bring your own photos so we can include them in the class.

Medical Gas Basics (AM)

LIVE
SESSION 140
TRACK 18

ICC INTERNATIONAL CODE COUNCIL®

CEU: 0.4
Instructor: Scott Winn

This introduction to Medical Gas reviews the basics of source equipment, piping, valves, inlets/outlets and alarms. This seminar will include information on requirements for installation, inspection, verification and maintenance.

Introduction to Backflow (PM)

LIVE
SESSION 141
TRACK 18

ICC INTERNATIONAL CODE COUNCIL®

CEU: 0.4
Instructor: Scott Winn

This presentation will introduce you to the backflow requirements that are included in the IPC. It will address the needs of code officials, contractors, installers, and plumbers. The seminar will include information regarding the requirements for protecting the potable water supply from contamination.

A2L Refrigerants and Related Changes to the 2024 I-Codes (AM)

VIRTUAL
SESSION 142
TRACK 19

ICC INTERNATIONAL CODE COUNCIL®

CEU: 0.4
Instructor: Jim Cika

This seminar provides an overview of the HVAC industry transition from HFC refrigerants to A2L refrigerants within the built environment. Topics addressed include recent Federal regulations that are driving the use of A2L refrigerants, the timeline for the phasedown of HFC refrigerants, the impacts on the latest codes and standards, and ways to adapt and prepare for the transition to A2L refrigerants.

Hydrogen Gas in the Built Environment (PM)

VIRTUAL
SESSION 143
TRACK 19

CEU: 0.4
Instructor: Mark Fasel

This seminar provides an overview of the global advancement of the use of hydrogen gas, including actions taken by the U.S. federal government to support the hydrogen industry. The introduction of natural gas/hydrogen fuel into the built environment as well as resources for the safe use of hydrogen by building and fire officials will be discussed. Current requirements for the installation of gaseous hydrogen systems as regulated by Chapter 7 of the 2021 International Fuel Gas Code (IFGC) will be discussed.

Fire Alarm Plan Review: The Basics

LIVE
SESSION 144
TRACK 20

CEU: 0.8
Instructor: Bob King

This course will walk the attendee through the basic steps required to perform a thorough plan review of a fire alarm submittal. This includes the review of the fire alarm shop drawings, voltage drop and battery calculations, and equipment data sheets. The specific requirements of NFPA 72 (2019 version as referenced in 2021 IFC) will be addressed, and common design issues will be highlighted. Acceptance testing and completion documentation will also be clearly noted.

Fire Sprinkler Plan Review – The Basics

VIRTUAL
SESSION 145
TRACK 21

CEU: 0.8
Instructor: Craig Hanson

This course will walk the attendee through the basic steps required to perform a thorough plan review of a fire sprinkler submittal. This includes the review of the fire sprinkler shop drawings, hydraulic calculations, sway bracing calculations, and material cut sheets. The specific requirements of NFPA 13 (2019 version as referenced in 2021 IFC) will be addressed, and common design issues will be highlighted. Acceptance testing and as-built requirements will also be clearly noted.

Application & Administration of the I-Codes (AM)

LIVE ONLY
SESSION 146
TRACK 22

CEU: 0.4
Instructor: Tim Ryan

Chapter 1 of each of the I-Codes is arguably the most important chapter in each of those publications. Although many jurisdictions modify the chapter to some degree, the fundamental concepts and principles typically remain to guide users in the code's proper application and administration. The seminar will focus on two primary areas of emphasis: 1) application of the provisions based on the concepts of minimum standard, AHJ interpretative authority, alternate methods of materials and coordination of potential conflicting provisions, and 2) administrative functions including code official, plan review and inspector responsibilities. This seminar, although based primarily on the IBC, is applicable to an understanding of Chapter 1 in all of the I-Codes.

Report Writing (PM)

LIVE ONLY
SESSION 147
TRACK 22

CEU: 0.4
Instructor: Tim Ryan

Effective writing is vital to your career as an inspector. Notices of violation, letters and reports are public documents that may be read by supervisors, attorneys, judges, citizens, design professionals, contractors and reporters. What you write can become the basis for appeal hearings and criminal and civil trials but also could prevent cases from going to court. Your inspection reports and notices of violation will compel a property owner to take action. Your writing skills can help to advance your career. This seminar provides knowledge and skills for effectively writing reports and violation notices for code professionals of all levels. Participants will learn the importance of writing a good report, writing professional sentences and choosing the correct terminology to use. Through examples and practice opportunities, participants will become more skilled at writing and editing their work.

Commercial Energy Provisions: from Design to Plans to the Field

LIVE ONLY
SESSION 148
TRACK 23

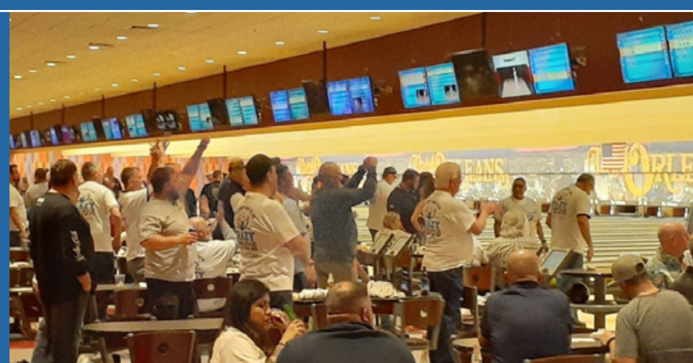
SHUMS CODA ASSOCIATES

CEU: 0.8
Instructor: Hope Medina

A building doesn't just appear. It takes the process of planning the design of the building, to details on a set of plans, to bringing it to life out in the field. The question becomes what do I need to provide on the plans for it to be reviewed and to get the desired results in the field by the contractors and for the inspectors. No matter where you fit into this process, this class is for you. We will answer these questions with examples from plans and pictures from the field, both good and not so good.

Join us for several networking events and opportunities to connect with peers.

- Bowling
- Expo
- Game Night
- And more



REGISTRATION INFORMATION

Please visit **iccsafe.org/educode** to register.
Registration is online only.

If you need assistance, please contact ICC Training at (888) ICC-SAFE or learn@iccsafe.org

Registration fees include: instruction, reference materials or books (when applicable), lunch and break refreshments (In Person Only). Codes and other reference books are NOT provided and are the responsibility of the student. For your convenience, code books and reference materials may be purchased from the International Code Council (ICC) either online at shop.iccsafe.org or onsite at the ICC Bookstore. Please review the session descriptions for required reference materials or supplies.

Attendees who have signed up for the virtual classes will receive an email with class login information before the seminar.

REGISTRATION COSTS

IN PERSON REGISTRATION
$125 – Half Day
$250 – Full Day
$900 – Full Five-Day Week per Registrant

VIRTUAL REGISTRATION
$75 – Half Day
$150 – Full Day
$600 – Full Five-Day Week per Registrant

CANCELLATION POLICY

If you need to cancel, EduCODE must receive notification in writing by January 19, 2024 to receive a full refund. All refund requests after this date will be credited toward a future EduCODE conference attendance only. Please contact learn@iccsafe.org with cancellation requests.

Should circumstances beyond the control of the Southern Nevada Chapter of the International Code Council (SNICC) arise; such as acts of God, war, acts of terrorism, civil unrest, government regulations or mandates, disaster, strikes or curtailment of transportation facilities – to the extent that such circumstances make it impossible or illegal for SNICC to provide EduCODE, SNICC, its officers, members, employees and contractors shall not be held liable or responsible beyond providing a refund for the seminar.

SUBSTITUTIONS

Whenever a registrant is unable to attend a paid seminar, a written request for substitution may be made by contacting ICC Training at learn@iccsafe.org. Include the name and email address of the current registrant and the name and email address of the registrant who will be attending. Also include the names of the courses that will be impacted. *Please note that each registration may only be substituted with one person.*

CONTINUING EDUCATION INFORMATION

All EduCODE sessions are recognized by ICC's Preferred Provider Program for CEUs toward maintenance of your ICC certifications. Please check the website for updated AIA approvals at iccsafe.org/educode. Check with your local licensing board for additional CEU requirements.

ICC PREFERRED EDUCATION PROVIDER

EDUCODE EVENTS

- Tuesday Night (Feb. 27) | 5:30 PM – 7:30 PM
  Student Appreciation and Networking Social
  Come join us for food, drinks and fun!
- Wednesday Night (Feb. 28) | 5:30 PM – 7:30 PM
  Exhibitor and Industry Networking Game Night
  Food, drinks, games, prizes and tons of fun.
- Thursday Night (Feb. 29) | 6:00 PM – 9:00 PM
  Annual Bowling Networking Event
  Come and join us for yet another opportunity to network outside of the classroom with your fellow students, instructors and tradeshow partners. Food, drink and prizes and lots of fun!
- EduCODE Expo | M – TH 7:00 AM – 5:00 PM
  Come visit the various suppliers of products and services that affect our built environment.
- ICC Resource Center | M – TH 7:00 AM – 5:00 PM

CERTIFICATION & TESTING

Exams will be offered on Wednesday (Feb. 28) and Thursday (Feb. 29). Exams will begin at 5:30 PM.

Please check **iccsafe.org/educode** for more detailed information including tests offered and pricing.

EduCODE International Conference & EXPO 2024

iccsafe.org/educode

1-888-ICC-SAFE (422-7233), ext. 33821

EduCODE international℠
Knowledge to build on
Twenty Seven Years of Building Code Education
www.educode.us
February 26 – March 1, 2024

REGISTRATION CHECKLIST

Contact the International Code Council
at 1-888-422-7233, extension 33821
or online at **iccsafe.org/educode**

- Best Value $$ – Full week Registration
- Deadline February 21, 2024
- For registration questions, contact the International Code Council at (888) 422-7233 Ext 33821 or learn@iccsafe.org

Pre-Registered?

- Virtual: A link will be emailed prior to the seminar with login instructions
- On-Site: Go directly to the Registration Desk and pick up your registration packet

On Site Registration Hours

- Sunday: 5:00 – 7:00 PM, M–F: 6:30 AM – 3:00 PM

HOTEL CHECKLIST

- Contact The Orleans Hotel at 1-800-675-3267 or www.orleanscasino.com/groups
- Use EduCODE Group Code AEC4C02
- Deadline January 24, 2024

SCHEDULE (VIRTUAL AND IN-PERSON)

Full-Day Class Schedule (0.8 CEU)

- Classes Start 7:30 AM Pacific Time
- Lunch Break 1½-hour break
- Classes End 5:00 PM Pacific Time

Half-Day Class Schedule (0.4 CEU)

- A.M. Classes 7:30 AM – 11:30 AM Pacific Time
- Lunch Break 1½-hour break
- P.M. Classes 1:00 PM – 5:00 PM Pacific Time

International Code Council
Training Department
4051 Flossmoor Road
Country Club Hills, IL 60478

Southern Nevada ICC

S.N.B.O. Southern Nevada Building Officials

ICC PREFERRED EDUCATION PROVIDER

www.snicc.org

www.educode.us

File Attachments for Item:

EC-1 Significant Changes to the 2023 NEC, Part C (Electrical Trades Center)

All certifications (10 hours in three sessions: 3.5 + 3.5 + 3)

Application for Continuing Education Course Approval

Application for Continuing Education Course Approval

Provider Information

Name *	Organization	Email *	Phone Number *
Trent Parker	The Electrical Trades Center-	parker@electricaltrades.org	(614) 463-5282

Address *	City *	State *	Zip Code *
947 GOODALE BLVD	COLUMBUS	OH	43212

Website	Conference Sponsor (if applicable)	Conference Email
electricaltrades.org		

☐ Check here if Course Renewal

Prior course number(s)' (i.e. BBS2018-429)

Renewals will only be granted for identical content and hours, within the current code cycle. Attach a copy of prior course approval letter for confirmation. No further information is required

New Course Information

Course title	Course instructor
Significant Changes to the 2023 NEC Part C	Sam Cronk

Course description

This extensive and popular program analyzes the major changes to Chapters 5-8 of the 2023 NEC. Members of the twenty code-making panels contributed to the development of the authoritative text, which covers more than 400 of the most significant changes and includes interpretations by the group that enforces the NEC. This comprehensive course will provide users a solid understanding and application of the requirements contained in Chapters 5-8 of the 2023 NEC.
This course will meet for 3 nights . Nights one and two will meet for 3.5 hours. The last night will meet for 3 hours.

Instructional hours per session	Number of Sessions	Course Date	Course Location
3.5	3	2023-12-11	947 Goodale Blvd. Columbus

Special Content

- ☐ Code Administration
- ☐ Existing Buildings
- ☑ Electrical Instruction
- ☐ Plumbing Instruction

Conference Course	Conference Name	Conference location

Course to be offered online?

- ☐ Yes
- ☑ No

☐ On Demand ☐ Webinar

Course Website

Detail online course participation confirmation method (i.e. test, quizlets, participant activity confirmation):

This extensive and popular program analyzes the major changes to Chapters 5-8 of the 2023 NEC. Members of the twenty code-making panels contributed to the development of the authoritative text, which covers more than 400 of the most significant changes and includes interpretations by the group that enforces the NEC. This comprehensive course will provide users a solid understanding and application of the requirements contained in Chapters 5-8 of the 2023 NEC.

Course applicable for the following certifications *

- [ ] Residential Certifications Only
- [x] Administrative Course, All Certifications
- [ ] Commercial and Residential Certifications

Application materials included *

- [x] Course Outline or Course Learning Objectives
- [x] Presentation Materials/Slides (not required for roundtable courses)
- [ ] Assessment Materials (for online courses)
- [x] Presenter Bio
- [ ] Prior Course Approval Letter

Upload less than 100mb (Please attach PDF files only) *

File Name	Size
OBBS PART C 2023.pdf	17.93 MB

Applicant Full Name *

Trent Parker

Date of Submission

09/13/2023

Instructions for new Continuing Education Approval form

Provider Information
1. Please include all contact information.
2. If course is not part of a conference, leave conference sponsor and email blank.

Course Renewal
1. Indicate if the course is being submitted for renewal. Include prior approval letter and write in prior course number.
2. Certification approval for courses has now changed: all existing courses being renewed will be approved within the new classification system.
 a. Courses previously approved for only residential certifications will be approved for all residential certifications.
 b. Courses previously approved for at least one commercial certification will now be approved for all commercial certifications and all residential certifications.
 c. Courses on required instruction topics, Ohio Ethics, Code Administration and Existing Buildings, will be noted as Administrative Courses and be approved for all certifications.
3. Courses being renewed should skip the New Course information section and are not required to submit outline, agenda, slides or other instructional materials for review.
Skip to Special Content, and mark any item that applies to the course.

New Course Information
1. Enter course title, name of instructor, and a brief description of the course content.
Learning objectives may be substituted for course description, if desired.
2. Number of instructional hours per session is the length of instructional time.
3. Number of sessions: can be 1 or the number of sessions planned.
4. Course date(s) and location: not necessary at this time, enter if known.

Special Content
1. Indicate if the course will meet instructional time in Code Administration or Existing Buildings.
2. Indicate if the course is a plumbing or electrical course, for ESIAC review and trainee course tracking.
3. If the course is associated with a conference, indicate the conference name and location, as this will allow BBS to coordinate approvals with the conference provider.
4. If the course will be offered online, specify whether it will be on demand or offered as a virtual webinar, or both. Include website where the course will be provided.

Application for Continuing Education Course Approval

Application for Continuing Education Course Approval

Provider Information

Name *	Trent Parker
Organization	The Electrical Trades Center-
Email *	parker@electricaltrades.org
Phone Number *	(614) 463-5282
Address *	947 GOODALE BLVD
City *	COLUMBUS
State *	OH
Zip Code *	43212
Website	electricaltrades.org
Conference Sponsor (if applicable)	
Conference Email	

☐ Check here if Course Renewal

Prior course number(s)' (i.e. BBS2018-429)

Renewals will only be granted for identical content and hours, within the current code cycle. Attach a copy of prior course approval letter for confirmation. No further information is required

New Course Information

Course title: Significant Changes to the 2023 NEC Part C

Course instructor: Sam Cronk

Course description

This extensive and popular program analyzes the major changes to Chapters 5-8 of the 2023 NEC. Members of the twenty code-making panels contributed to the development of the authoritative text, which covers more than 400 of the most significant changes and includes interpretations by the group that enforces the NEC. This comprehensive course will provide users a solid understanding and application of the requirements contained in Chapters 5-8 of the 2023 NEC.
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Special Content

- ☐ Code Administration
- ☐ Existing Buildings
- ☑ Electrical Instruction
- ☐ Plumbing Instruction

Conference Course

Conference Name

Conference location

Course to be offered online?

- ☐ Yes
- ☑ No

☐ On Demand ☐ Webinar

Course Website

Detail online course participation confirmation method (i.e. test, quizlets, participant activity confirmation):

This extensive and popular program analyzes the major changes to Chapters 5-8 of the 2023 NEC. Members of the twenty code-making panels contributed to the development of the authoritative text, which covers more than 400 of the most significant changes and includes interpretations by the group that enforces the NEC. This comprehensive course will provide users a solid understanding and application of the requirements contained in Chapters 5-8 of the 2023 NEC.

Course applicable for the following certifications *

- [ ] Residential Certifications Only
- [x] Administrative Course, All Certifications
- [ ] Commercial and Residential Certifications

Application materials included *

- [x] Course Outline or Course Learning Objectives
- [x] Presentation Materials/Slides (not required for roundtable courses)
- [ ] Assessment Materials (for online courses)
- [x] Presenter Bio
- [ ] Prior Course Approval Letter

Upload less than 100mb (Please attach PDF files only) *

File Name	Size
OBBS PART C 2023.pdf	17.93 MB

Applicant Full Name *

Trent Parker

Date of Submission

09/13/2023

Instructions for new Continuing Education Approval form

Provider Information

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Course Renewal

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New Course Information

1. Enter course title, name of instructor, and a brief description of the course content.
Learning objectives may be substituted for course description, if desired.
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4. Course date(s) and location: not necessary at this time, enter if known.

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2. Indicate if the course is a plumbing or electrical course, for ESIAC review and trainee course tracking.
3. If the course is associated with a conference, indicate the conference name and location, as this will allow BBS to coordinate approvals with the conference provider.
4. If the course will be offered online, specify whether it will be on demand or offered as a virtual webinar, or both. Include website where the course will be provided.

File Attachments for Item:

EC-2 Modern Kitchen Ventilation - CaptiveAire

1 hour, all certifications

Application for Continuing Education Course Approval

Application for Continuing Education Course Approval

Provider Information

Name *	Organization	Email *	Phone Number *
Grant	CaptiveAire	grant.homan@captiveaire.co	(513) 256-9266

Address *	City *	State *	Zip Code *
5288 Autumnwood Dr	Cincinnati	OH	45242

Website	Conference Sponsor (if applicable)	Conference Email

☐ Check here if Course Renewal

Prior course number(s)' (i.e. BBS2018-429)

Renewals will only be granted for identical content and hours, within the current code cycle. Attach a copy of prior course approval letter for confirmation. No further information is required

New Course Information

Course title	Course instructor
Modern Kitchen Ventilation	Grant Homan

Course description

We will cover the following:
Hood and Exhaust Design: Design ideals for efficient removal of smoke and heat with hoods, duct and exhaust fans
Make-up Air Design: Evaluating the historical and current best design practices for replacement air, including DOAS technology
Latest Code Updates: Discussing the 2018 and newer updates to IMC, NFPA 96, and IECC as they relate to kitchen ventilation design

Instructional hours per session	Number of Sessions	Course Date	Course Location
1	1	2023-11-15	TBD

Special Content

☐ Code Administration
☐ Existing Buildings
☐ Electrical Instruction
☐ Plumbing Instruction

Conference Course	Conference Name	Conference location

Course to be offered online?

☐ Yes
☐ No

☐ On Demand ☐ Webinar

Course Website

Detail online course participation confirmation method (i.e. test, quizlets, participant activity confirmation):

Course applicable for the following certifications *

- [ ] Residential Certifications Only
- [x] Administrative Course, All Certifications
- [ ] Commercial and Residential Certifications

Application materials included *

- [ ] Course Outline or Course Learning Objectives
- [x] Presentation Materials/Slides (not required for roundtable courses)
- [ ] Assessment Materials (for online courses)
- [x] Presenter Bio
- [ ] Prior Course Approval Letter

Upload less than 100mb (Please attach PDF files only) *

File Name	Size
Modern_KVS_Design_PDH.pdf	22.14 MB

Applicant Full Name *

Grant Richard Homan

Date of Submission

10/12/2023

Instructions for new Continuing Education Approval form

Provider Information
1. Please include all contact information.
2. If course is not part of a conference, leave conference sponsor and email blank.

Course Renewal
1. Indicate if the course is being submitted for renewal. Include prior approval letter and write in prior course number.
2. Certification approval for courses has now changed: all existing courses being renewed will be approved within the new classification system.
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   c. Courses on required instruction topics, Ohio Ethics, Code Administration and Existing Buildings, will be noted as Administrative Courses and be approved for all certifications.
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New Course Information
1. Enter course title, name of instructor, and a brief description of the course content.
Learning objectives may be substituted for course description, if desired.
2. Number of instructional hours per session is the length of instructional time.
3. Number of sessions: can be 1 or the number of sessions planned.
4. Course date(s) and location: not necessary at this time, enter if known.

Special Content
1. Indicate if the course will meet instructional time in Code Administration or Existing Buildings.
2. Indicate if the course is a plumbing or electrical course, for ESIAC review and trainee course tracking.
3. If the course is associated with a conference, indicate the conference name and location, as this will allow BBS to coordinate approvals with the conference provider.
4. If the course will be offered online, specify whether it will be on demand or offered as a virtual webinar, or both. Include website where the course will be provided.

Hello,

My name is Grant Homan and I am a technical sales engineer for CaptiveAire's Western OH region. I graduated Ohio State University with a bachelor's degree in electrical engineering in 2021. I have been working with CaptiveAire over two years, supporting local mechanical engineers and mechanical contractors in Western OH.

Grant R. Homan
Western OH Mechanical Technical Sales
CaptiveAire, Inc.

MODERN KITCHEN VENTILATION

ENGINEERING & DESIGN

TODAY'S GOALS

Hood and Exhaust Design: Design ideals for efficient removal of smoke and heat with hoods, duct and exhaust fans

Make-up Air Design: Evaluating the historical and current best design practices for replacement air, including DOAS technology

Latest Code Updates: Discussing the 2018 and newer updates to IMC, NFPA 96, and IECC as they relate to kitchen ventilation design

SPEAKER

Grant Homan

CaptiveAire - Western OH Technical Sales

Topic 1

Hoods, Duct and Exhaust Fans

MARKETPLACE ADVANCEMENTS

- User expectations increasing, i.e. no more "hot kitchens"
- Expectations of energy efficiency
- Systems must work all the time (redundancy)
- Flexibility with layout
- Display cooking

GOALS OF THE HOOD SYSTEM

- Fire protection
- Improve IAQ by eliminating smoke, grease and odor from the indoor environment with the lowest possible exhaust rate

CAN WE MEET USER NEEDS?

By helping users make smart choices, we can keep the exhaust rates as low as possible.

Low exhaust rates help by:

- Reducing duct size, fan size, noise
- Reducing capacity (heating, cooling) of replacement air system (Make-up Air)
- Overall reduction in utility costs as a result

VELOCITY THEORY

For centuries, humans have cooked indoors using fireplaces

The closer we can get to mimicking a fireplace, the lower the overall exhaust rate we can achieve

50 YEARS AGO

Joe Knapp, testing engineer for McDonalds corporation, set out to objectively quantify the ideal ventilation design.

Conclusions:

- Low velocity HVAC air from the space creating a uniform wall of air is least disruptive to hood (logical)
- Hoods enclosed to increase velocity of incoming air from the space perform best

TYPE-1 HOODS (GREASE RATED)

How does an engineer pick the correct hood for a given application?

Duty Classification, section 507.5 of IMC:

- *Light duty (Type 1 or Type 2)*
- *Medium duty (Type 1 only, 450 degrees)*
- *Heavy duty (Type 1, open flame, 600 degrees)*
- *Extra Heavy Duty (Solid fuel, 700 degrees)*

Table 32.1
Cooking appliances

Appliance duty	Test appliance	Minimum nominal cooking surface size square inch, in^2 (square meter, m^2)	Minimum rated input	Minimum average cooking surface temperature °F (°C)
Extra-heavy	Solid fuel charcoal broiler or gas char-broiler	540 (0.348)	25 lbs charcoal briquettes or 60,000 BTUH	700 (357)
Heavy	Gas char-broiler	540 (0.348)	60,000 BTUH	600 (301)
Medium	Electric griddle	540 (0.348)	8 kW, Ø	400 (190)
Light	Electric range boiling water	12 in. (305 mm) dia by 8 in. (203 mm) high; Min. 3 in. (76 mm) water depth	2.0 kW	212 (100)

Duty Classification Standards from UL-710

DUTY CLASSIFICATION CODE UPDATES (2018 IMC)

Certain Smokers now defined as heavy duty instead of extra heavy duty.

EXTRA-HEAVY-DUTY COOKING APPLIANCE. Extra-heavy-duty cooking appliances are those utilizing open flame combustion of solid fuel at any time.

In practice, limited to electric smoker ovens or very specific listed gas applications with fuel soaked in water.

NOTE: NFPA 96 has not been updated to match

LOWERING EXHAUST RATES

Current IECC code (2018) requires the use of hoods tested and listed to lower airflows per UL-710 to remain below **maximum** exhaust rates:

Table 6.5.7.1.3 Maximum Net Exhaust Flow Rate, CFM per Linear Foot of Hood Length

Type of Hood	Light Duty Equipment	Medium Duty Equipment	Heavy Duty Equipment	Extra Heavy Duty Equipment
Wall mounted canopy	140	210	280	385
Single island	280	350	420	490
Double island (per side)	175	210	280	385
Eyebrow	175	175	Not allowed	Not allowed
Backshelf/Pass-over	210	210	280	Not allowed

LOWERING EXHAUST RATES

Numerous factors keep exhaust rates high:

- Highly turbulent supply air from HVAC (4-way diffusers, economizer operation)
- Kitchen HVAC return grills
- Trend towards display cooking (islands)
- Undersized hoods
- Removal of end panels

TYPE-1 HOODS (GREASE RATED)

Wall Canopy

Back shelf

Island

WALL CANOPY (TYPE 1)

The Wall Canopy Hood Design offers the best mix of fire protection and low exhaust rates:

- Flexible appliance layout for user
- Best capture volume for effluent
- Lowered radiant heat load
- End panels are required for low exhaust rates

BACKSHELF (TYPE 1)

Backshelf hoods offer comparable exhaust rates to wall canopy hood with end panels, however they lack fire protection and increase radiant loads on the kitchen.

Backshelf hoods should be utilized for light and medium duty, non-open flame applications only.

ISLAND (TYPE 1)

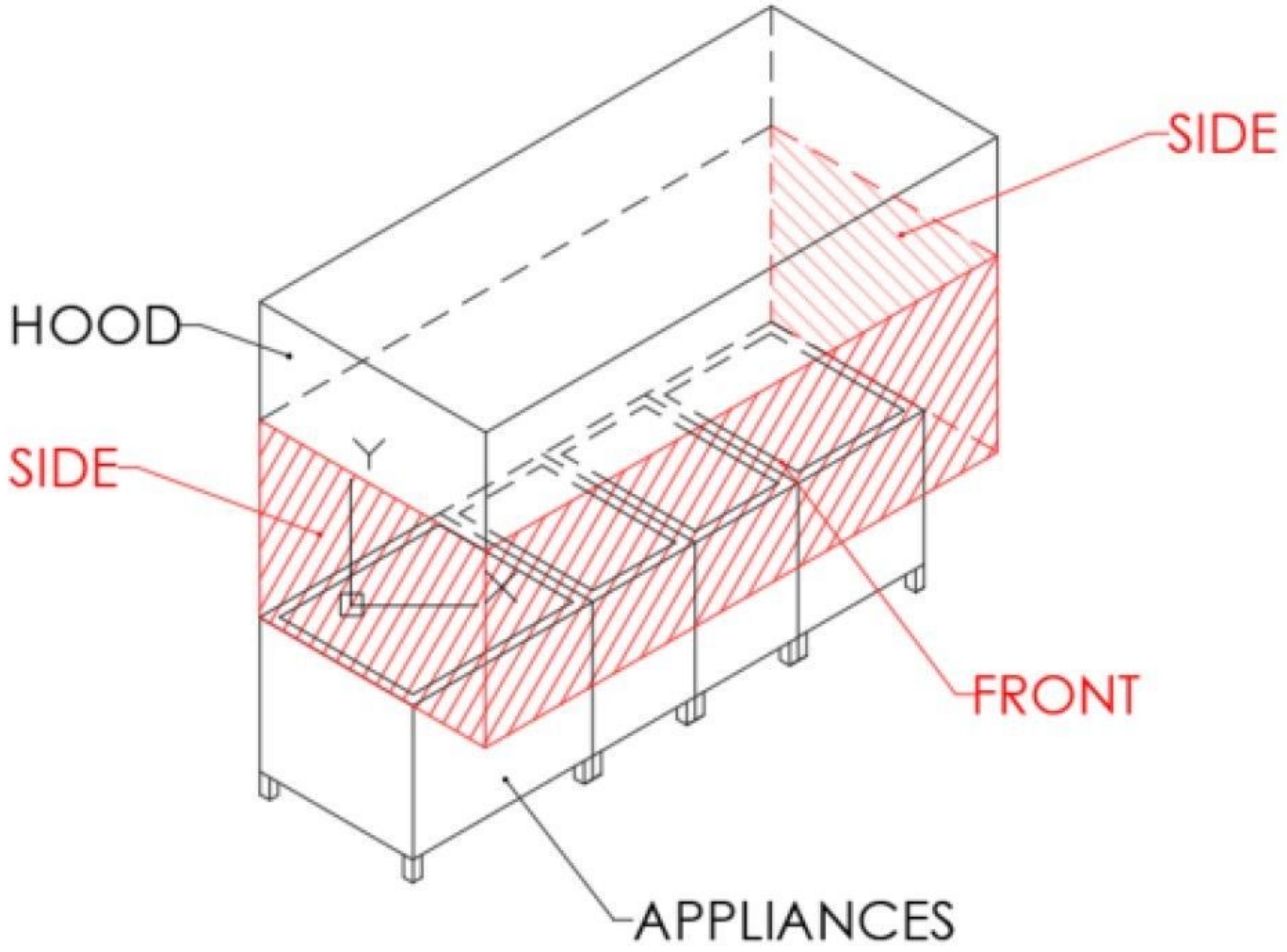
For a given application, they are generally 2 to 3 times the expense and overall airflow vs a wall mounted hood.

Most users are not aware of this and it is the responsibility of the design team to educate the user as a fiduciary.

VERTICAL END PANELS

- **Vertical End Panels should not be optional, critical for safety and efficiency**
- End panels keep equipment under the hood
- Increase incoming air velocity for hood from the room creating a pressure wall
- Reduces drafting from HVAC diffusers
- Allows substantial reduction in exhaust rates

VELOCITY THEORY



VERTICAL END PANELS

Depending on the application, an end panel or wall enclosure (alcove) design can reduce airflow up to 30% below typical requirements

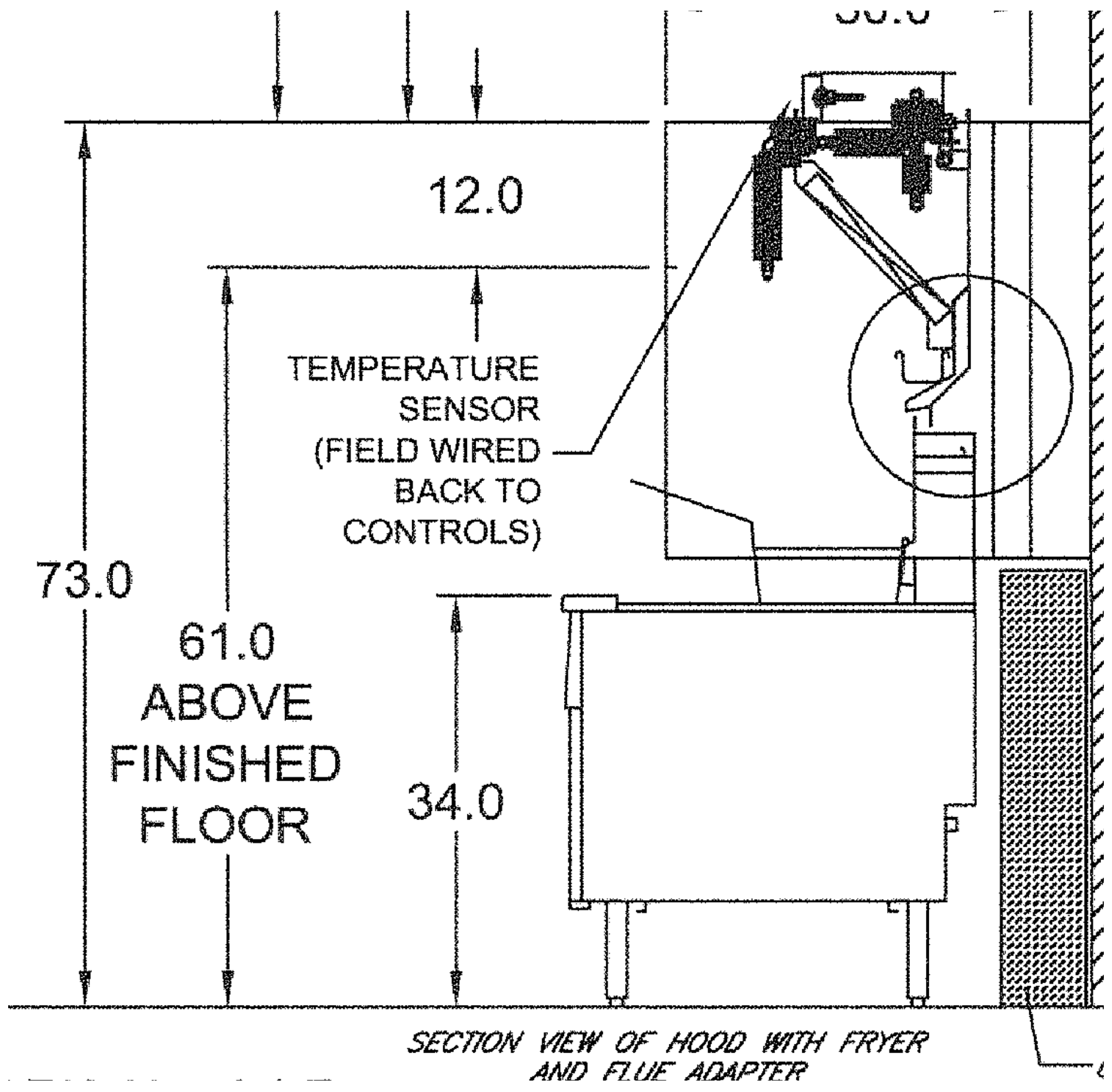
OTHER TYPE-1 HOODS

Technology to avoid:

Flue Bypass hoods directly vent the flue gas into the hood, avoiding the filters.

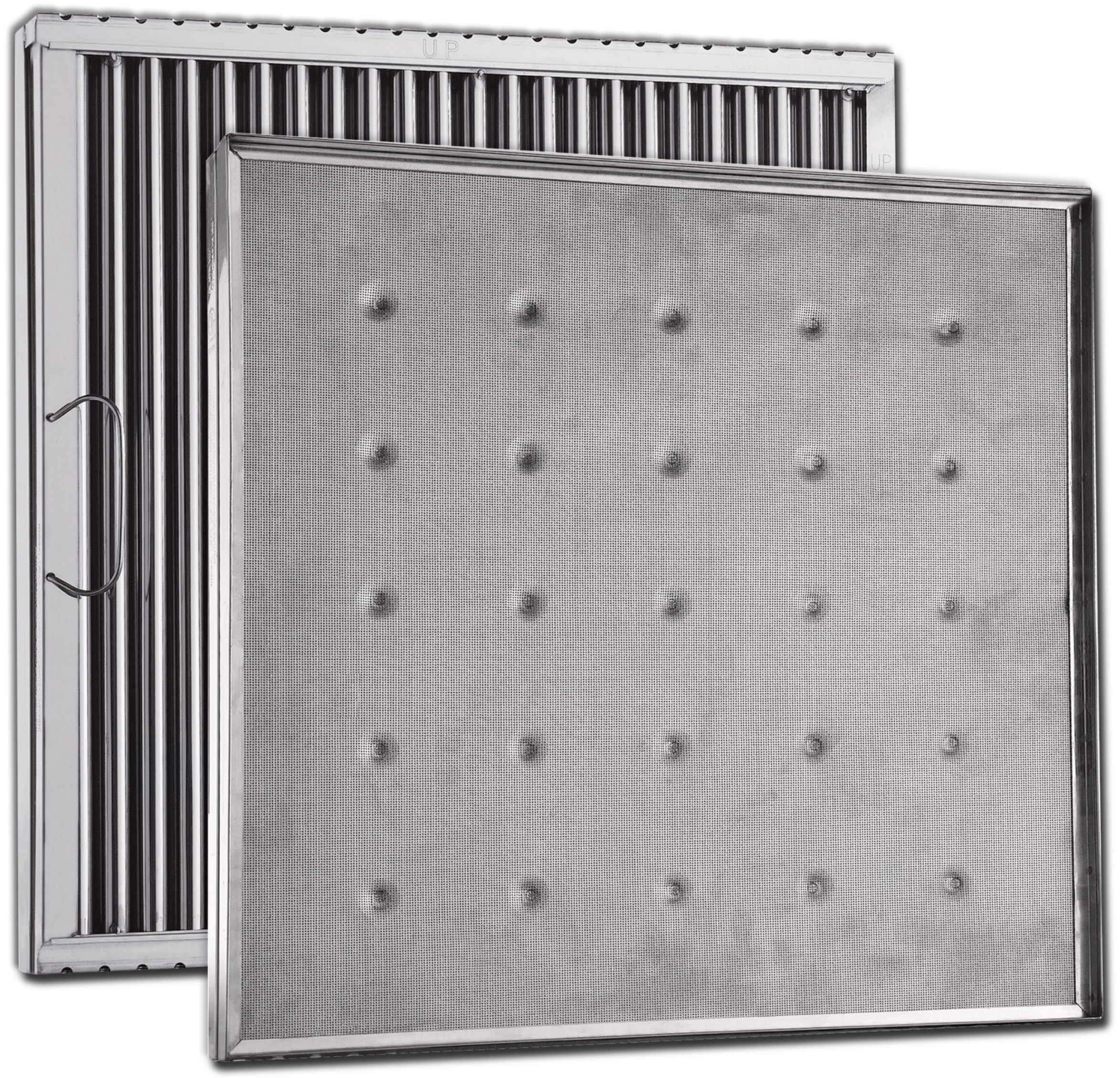
Although some energy benefit may exist, in a fan failure the flue temperature can ignite grease/effluent in the duct and hood plenum.

A fan failure will occur during the life of the restaurant .

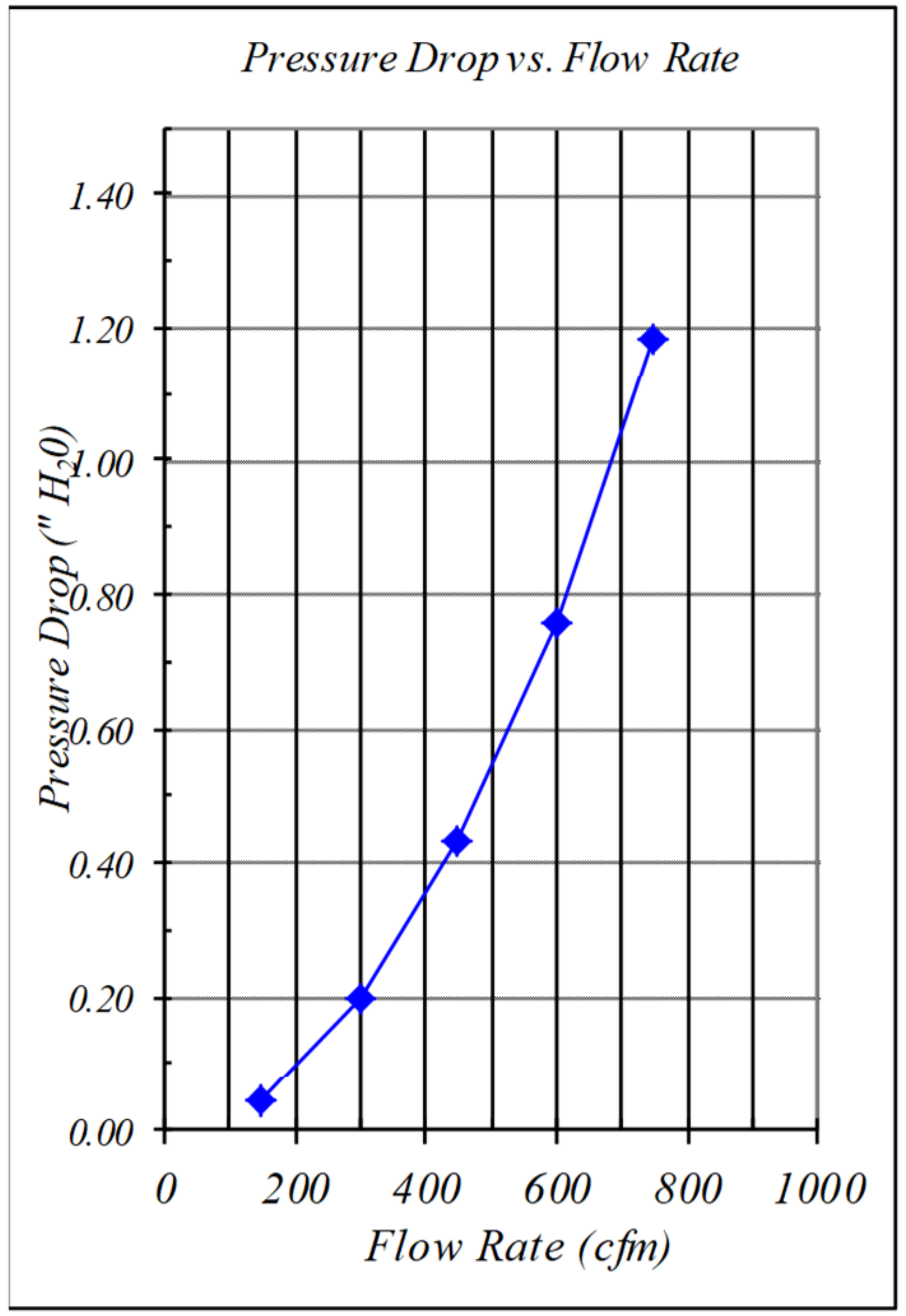


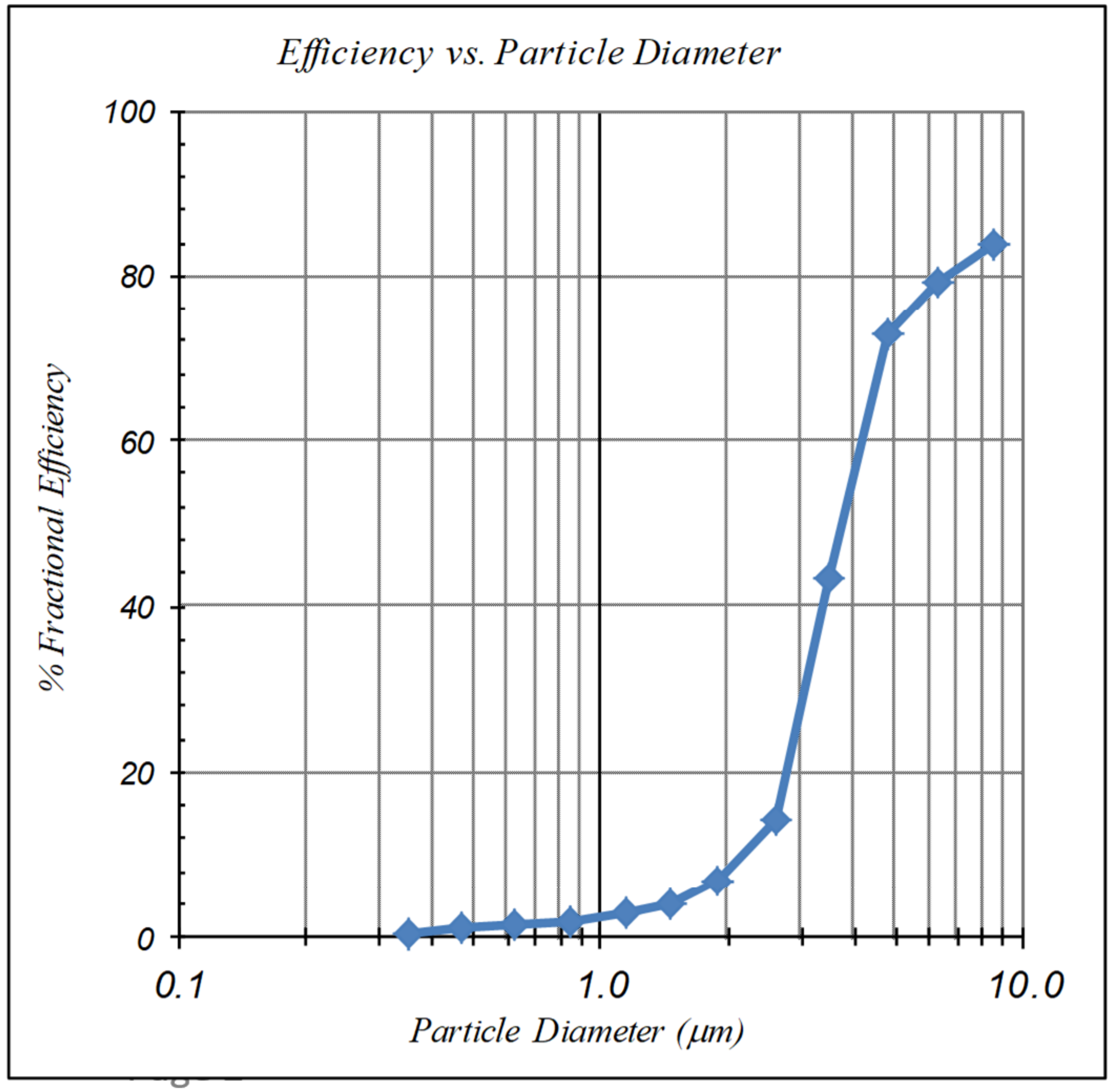
TYPE 1 HOOD FILTRATION

- Preventing grease buildup in the duct and plenum is the best defense against fires
- Specify UL-1046 rated, ASTM tested grease exhaust filters
- Efficiency must be considered not by mass, but within 3 - 8 micron range
- Balance high velocity with noise and static pressure



HOOD FILTERS





TYPE-1 FILTERS

- A low resistance filter may have less static pressure, but it comes at the expense of higher overall airflow to get flow to the ends of the hood
- Even more critical at low exhaust rates
- High quality filters flatten the "bell curve", reducing overall airflow which is a net energy savings vs. disposable filters

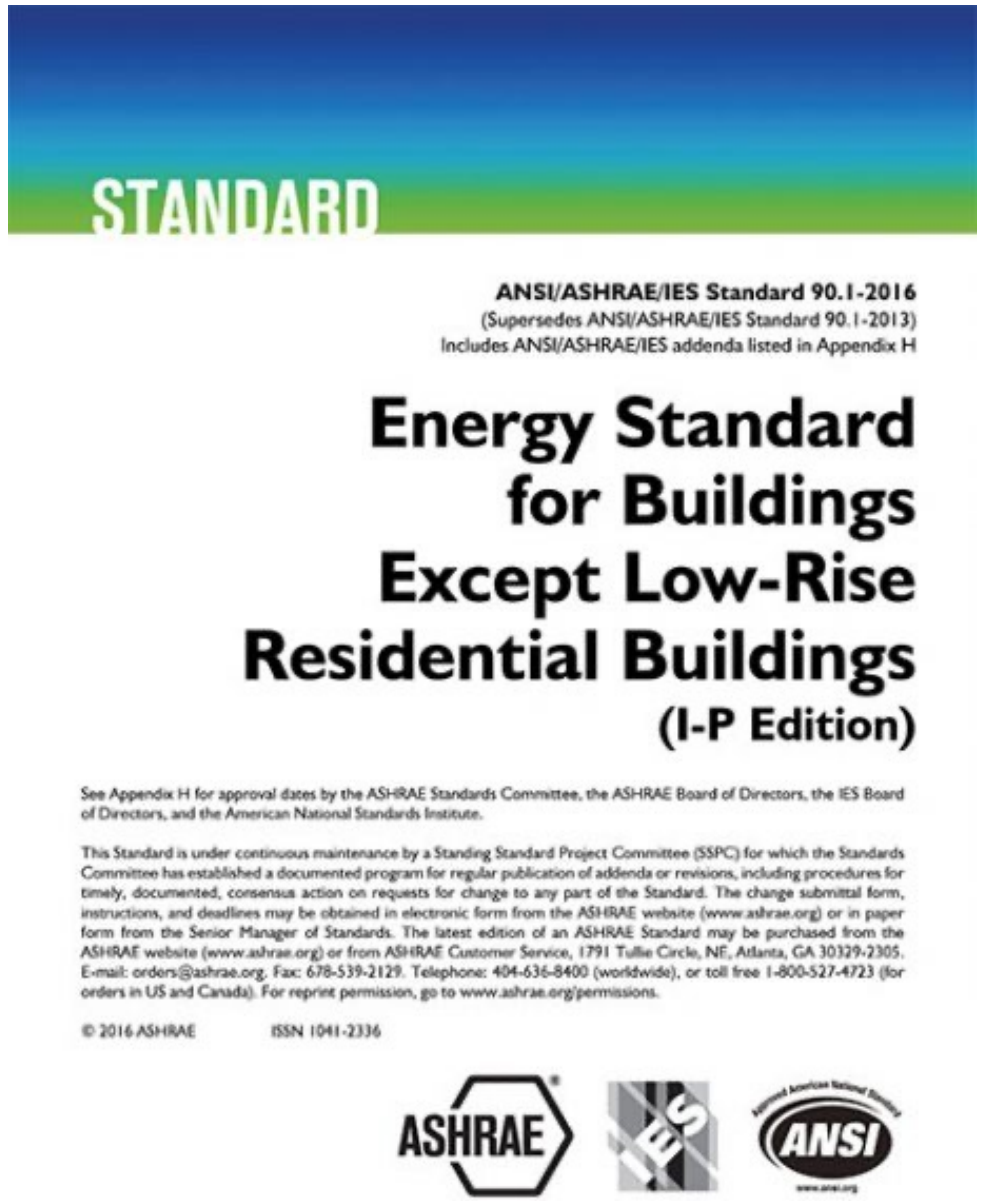
TYPE-2 HOODS

- Type 2 hoods are employed where grease/smoke is not generated
- Typically dishwasher and light duty appliance classifications (ovens, steam only applications)
- Type 2 hoods do not require grease rated ductwork or hood filtration

DISHWASHER DESIGN FAILURES

- **Dish hoods are a major source of latent loads on spaces due to undersizing (no overhang)**
- Type-2 hoods do not have filters (typical), no bell curve
- ASHRAE Study RP-1469 determined that dishwashing room temperatures were as high as 84 degrees and 71% RH
- **Any moisture not captured migrates to HVAC system returns grilles**
- **Often left on by staff overnight, bringing in moisture from outdoors**

DEMAND CONTROL KITCHEN VENTILATION (DCKV)


STANDARD

ANSI/ASHRAE/IES Standard 90.1-2016
(Supersedes ANSI/ASHRAE/IES Standard 90.1-2013)
Includes ANSI/ASHRAE/IES addenda listed in Appendix H

Energy Standard for Buildings Except Low-Rise Residential Buildings (I-P Edition)

See Appendix H for approval dates by the ASHRAE Standards Committee, the ASHRAE Board of Directors, the IES Board of Directors, and the American National Standards Institute.

This Standard is under continuous maintenance by a Standing Standard Project Committee (SSPC) for which the Standards Committee has established a documented program for regular publication of addenda or revisions, including procedures for timely, documented, consensus action on requests for change to any part of the Standard. The change submittal form, instructions, and deadlines may be obtained in electronic form from the ASHRAE website (www.ashrae.org) or in paper form from the Senior Manager of Standards. The latest edition of an ASHRAE Standard may be purchased from the ASHRAE website (www.ashrae.org) or from ASHRAE Customer Service, 1791 Tullie Circle, NE, Atlanta, GA 30329-2305. E-mail: orders@ashrae.org. Fax: 678-539-2129. Telephone: 404-636-8400 (worldwide), or toll free 1-800-527-4723 (for orders in US and Canada). For reprint permission, go to www.ashrae.org/permissions.

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6.5.7.2.3

If a kitchen/dining facility has a total kitchen hood exhaust airflow rate greater than 5000 cfm then it shall have one of the following:

a. At least 50% of all *replacement air* is *transfer air* that would otherwise be exhausted.

b. *Demand ventilation systems* on at least 75% of the exhaust air. Such *systems* shall be capable of and configured to provide at least 50% reduction in exhaust and *replacement air system* airflow rates, including *controls* necessary to modulate airflow in response to appliance operation and to maintain full capture and containment of smoke, effluent, and combustion products during cooking and idle.

c. Listed *energy* recovery devices that result in a sensible *energy* recovery ratio of not less than 40% on at least 50% of the total exhaust airflow. A 40% sensible *energy* recovery ratio shall mean a change in the dry-bulb temperature of the *outdoor air* supply equal to 40% of the difference between the *outdoor air* and entering exhaust air dry-bulb temperatures at *design conditions*.

DEMAND CONTROL KITCHEN VENTILATION (DCKV)

DCV Technologies:

- Temperature only
- Temperature and optical/IR
- The key is in tuning
- **Remote monitoring is an essential requirement for DCKV, no matter the technology utilized**
- Focus on specifying a system which allows for remote tuning

FAN ENERGY SAVINGS FROM LOW EXHAUST RATES

Question: What if we could run the lower rate always, eliminating the need for modulation?

Ultra low CFM kitchens may not need DCKV.

Reduce Exhaust CFM	Savings in Fan Energy	Increase Exhaust CFM	Increase in Fan Energy
10%	27%	10%	33%
20%	47%	20%	73%
30%	66%	30%	120%
40%	78%	40%	174%
50%	87%	50%	237%

TYPE 1 GREASE RATED DUCTWORK

506.3.1.1 Grease duct materials.

Grease ducts serving Type I hoods shall be constructed of steel having a minimum thickness of 0.0575 inch (1.463 mm) (No. 16 gage) or stainless steel not less than 0.0450 inch (1.14 mm) (No. 18 gage) in thickness.

Exception: Factory-built commercial kitchen grease ducts *listed* and *labeled* in accordance with UL 1978 and installed in accordance with Section 304.1.

Traditional field fabricated ductwork:

- 16 gauge, built on site, welded requirement (chapter 7, NFPA 96)
- Cannot be factory insulated, field wrapping common
- Supports have to be engineered, heavy
- Subject to leaks, limited quality control
- Access doors field cut and installed
- Engineer cannot control final static pressure

DUCT DESIGN

- Clean out doors required at 20' intervals (IMC) or 12’ (NFPA 96)
- Slope required to prevent accumulation of grease, 1/4” per ft up to 75’. 1” per ft over 75’
- Low points require plumbed clean-out or self-cleaning sumps.
- Cannot mix Extra-Heavy Duty exhaust with other exhaust types

DUCT DESIGN

Disadvantages of black iron duct:

- Leaking widespread
- Not suitable for high static pressure applications
- Creates grease collection points internally

DUCT ENCLOSURE DESIGN

When is a duct enclosure required?

- Any time the duct is concealed or within 18" of a combustible, the duct must be in a fire rated enclosure for entirety of duct run.
- Drop in ceilings qualify as concealed duct, requiring fire wrap.
- Penetrating from one fire rated space to another is another common catalyst.

LISTED GREASE DUCTWORK (UL-1978, UL-2221, UL-103HT)

Single Wall

Double Wall

Direct Vented

LISTED GREASE DUCTWORK (UL-1978, UL-2221, UL-103HT)

Factory Built Grease Ductwork:

- UL-1978, single wall 18" clearance to combustibles
- UL-2221, double wall factory insulated - qualifies as a fire rated chase/enclosure inherently
- No welding on site
- Engineered supports
- Known static pressure and clean-out locations
- Reduced slope requirements, 1/16” per ft up to 75’, 3/16” per ft over 75’

DUCT DESIGN

FACTORY VS FIELD

DUCT MAINTENANCE

CLEANING AND INSPECTION BASED ON DUTY CLASSIFICATION

Table 11.4 Schedule of Inspection for Grease Buildup

Type or Volume of Cooking	Inspection Frequency
Systems serving solid fuel cooking operations	Monthly
*Systems serving high-volume cooking operations	Quarterly
Systems serving moderate-volume cooking operations	Semiannually
†Systems serving low-volume cooking operations	Annually

*High-volume cooking operations include 24-hour cooking, charbroiling, and wok cooking.
†Low-volume cooking operations include churches, day camps, seasonal businesses, and senior centers.

14.8.3 The flue or chimney shall be inspected weekly for the following conditions:

(1) Residue that might begin to restrict the vent or create an additional fuel source
(2) Corrosion or physical damage that might reduce the flue's capability to contain the effluent

DUCT DESIGN, DIRECT VENT

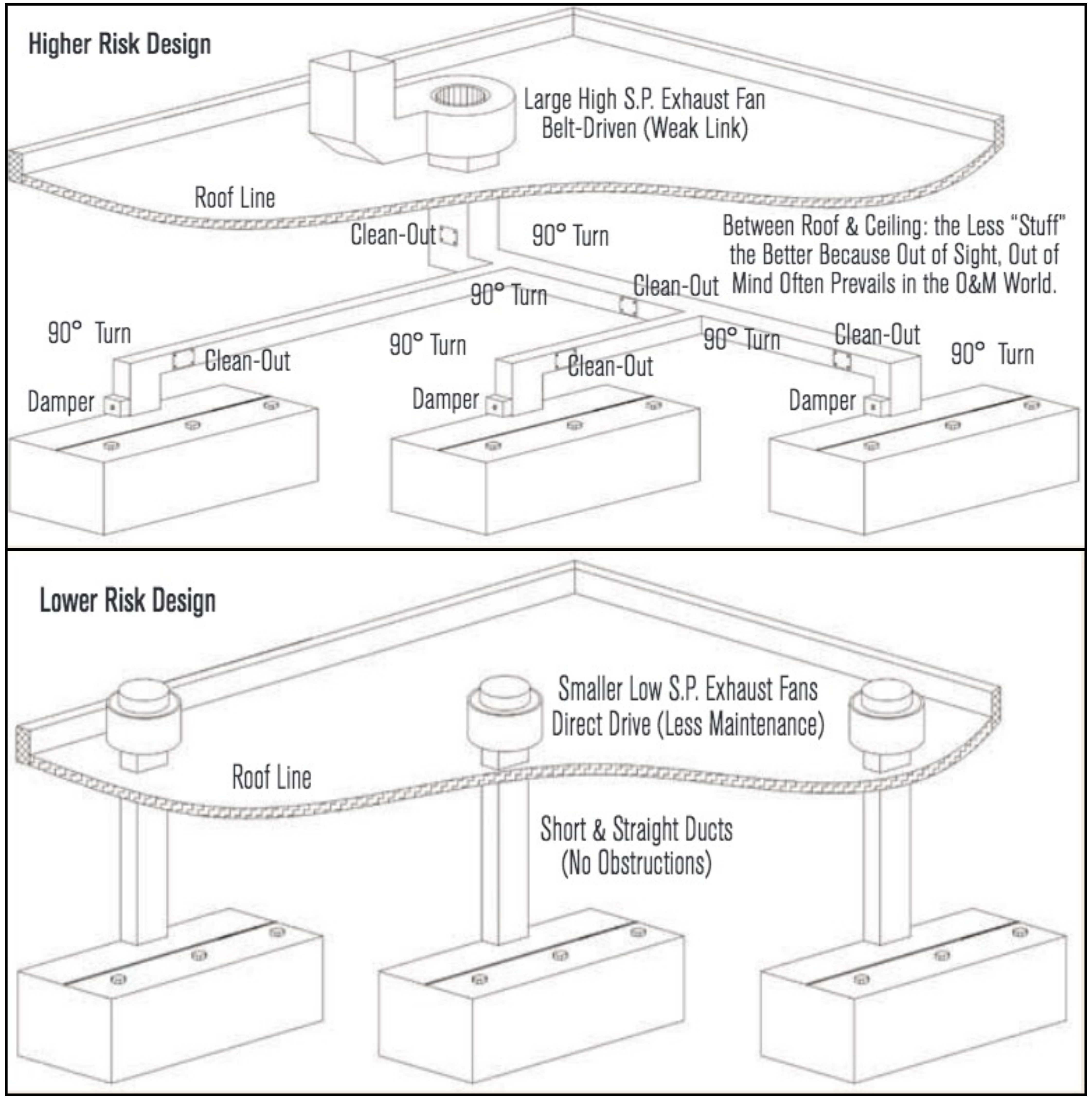
Certain kitchen appliances may be direct vented, such as pizza ovens. In this case, a hood is not required, however UL-103HT ductwork is required:

- Ductwork cannot have a fan at the termination
- Ductwork may not run more than 30 degrees from vertical
- Ductwork may not have more than 4 fittings (2 offsets)

DESIGNING FOR REDUNDANCY

Multi-hood exhaust duct runs should be avoided:

- Entire operation can be out of service with equipment failure
- Large fan motors are heavy and difficult to source
- Large fans are under heavy stress
- Hood to hood balancing is very difficult

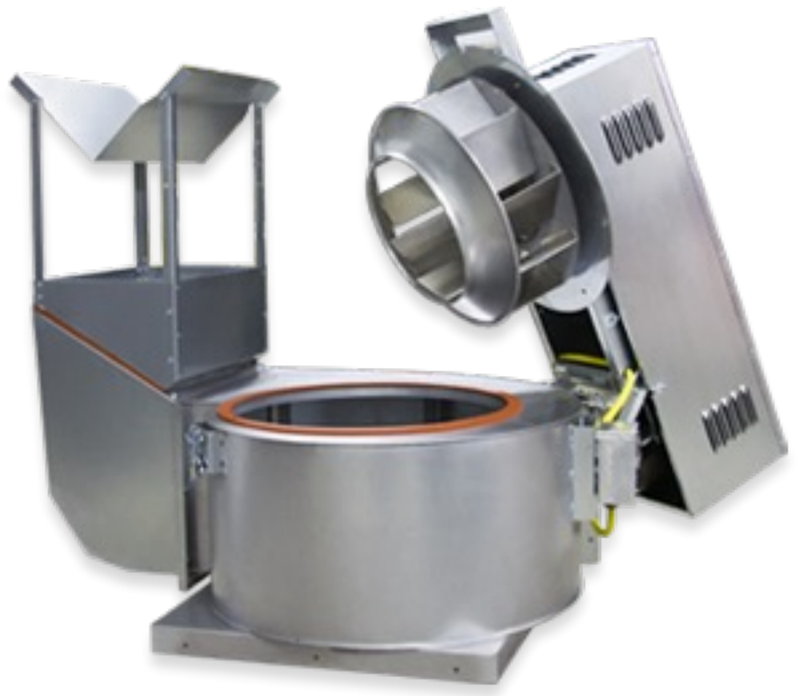


Images courtesy Steve Melink, Melink Corporation

GREASE RATED EXHAUST FANS (UL-762)

Upblast

Utility Set



Hybrid Utility Set

Inline

PCU

UPBLAST GREASE FANS

Advantages include:

- Low cost
- Low noise
- Moderate static pressure capabilities
- Low Horsepower Requirements

UTILITY SET GREASE FANS

Advantages include:

- Heavy Duty High Static Applications

Disadvantages:

- May have higher noise
- Requires a side inlet for grease ductwork
- If not sized properly, may throw grease on roof

HYBRID UTILITY SET GREASE FANS

Same advantages as a utility set fan, however allows for a bottom inlet like an Upblast fan.

For extra heavy duty applications, specify utility set fans with steel wheels

DIRECT DRIVE EXHAUST FAN TECHNOLOGY

Advantages include:

- Fewer parts to fail
- Up to 3x adjustability vs belts and pulleys
- Remote tuning (monitored, adjusted from kitchen instead of rooftop)
- Higher efficiency, no belt drive losses
- Sustainable test and balance
- Large sizes now available with ECM or VFD based motors

INLINE FANS

Inline UL-762 Grease Fans have many difficulties and should be avoided unless absolutely required:

- Grease cups not likely maintained
- Fans difficult to service
- Increased fire hazard (18” clearance to combustibles)
- Excessive noise and vibration closer to users

POLLUTION CONTROLS UNITS

WHAT IT IS A PCU?

PCU TECHNOLOGIES

- **Mechanical filtration**
- **Electrostatic Precipitator (ESP)**

Important note: ESP always have up and downstream mechanical filtration, therefore all PCUs are mechanical filtration units

PCU CODE UPDATES (2018 IMC)

506.5.2 Pollution-control units.

The installation of pollution-control units shall be in accordance with the manufacturer's installation instructions and all of the following:

1. Pollution-control units shall be listed and labeled in accordance with UL 1978.
2. Fans serving pollution-control units shall be listed and labeled in accordance with UL 762.

5. A clearance of not less than 18 inches (457 mm) shall be maintained between the pollution-control unit and combustible material.

9. Pollution-control units shall be provided with a factory-installed fire suppression system.

PCU CLEARANCE TO COMBUSTIBLES

- PCU listings to UL-1978, UL-762
- There is not a current UL-2221 PCU listing, i.e. they ***must*** be in a fire rated chase, 18" clearance to combustibles, or other mitigation measures if indoors
- PCUs need to be maintainable
- Drip pans and drains should always be included
- UL-8782 is new code which will impact future designs and standardize PCU technologies

Topic 2

Make-Up Air Delivery

MAKE-UP AIR DELIVERY (MUA)

Up until the early 2000s, make up air delivery was highly dynamic:

- Front face supply
- Back Return
- Internally Compensating

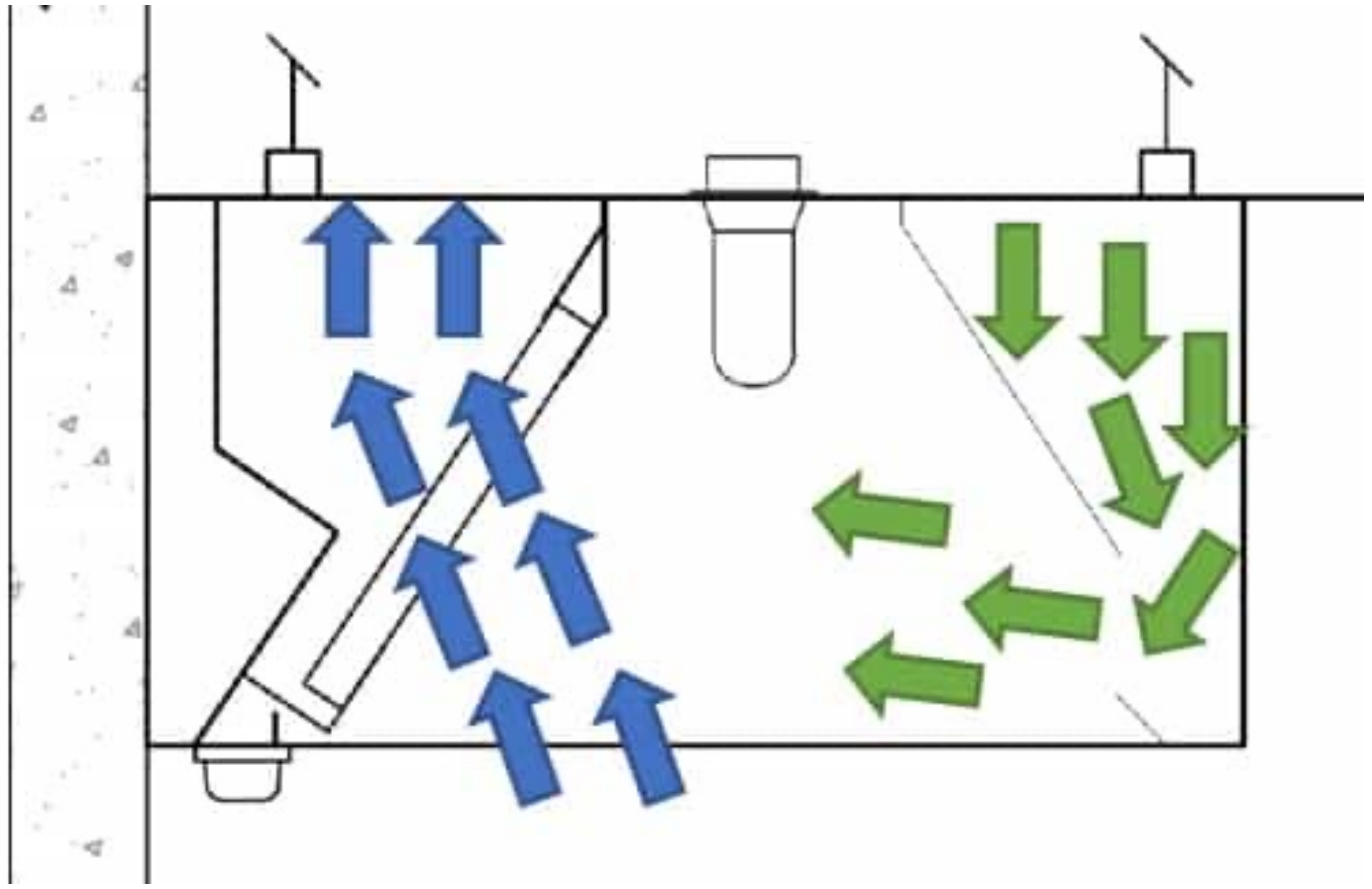
Gimmicks left market as Perforated Front Supply Plenums (PSP) gained popularity

MAKE-UP AIR DELIVERY (MUA)

Internally compensating hoods are not allowed, per 2018 IECC, to have more than 10% of MUA vs. exhaust rate.

C403.7.5 Kitchen exhaust systems (Mandatory). P

Replacement air introduced directly into the exhaust hood cavity shall not be greater than 10 percent of the hood exhaust airflow rate.



Internally compensating hoods are those which deliver MUA within the hood capture volume.

NFPA 96 Requires a listed fire damper for any supply air duct which is internal to the hood.

5.3.4.1 A fire-actuated damper shall be installed in the supply air plenum at each point where a supply air duct inlet or a supply air outlet penetrates the continuously welded shell of the assembly.

MAKE-UP AIR DELIVERY (MUA)

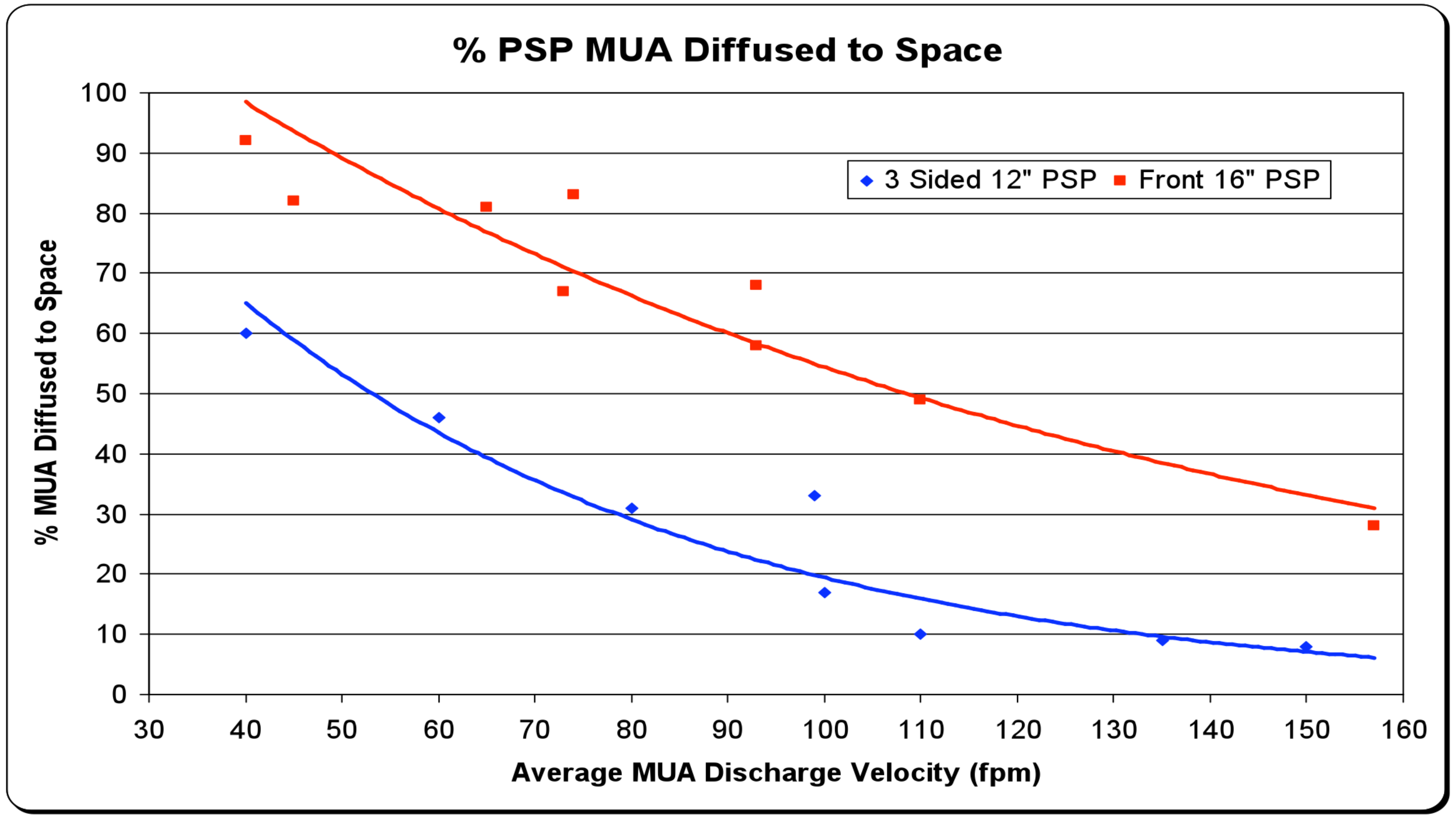
- For the last 20 years, the vast majority of kitchens have make-up air delivered via PSP.
- Make-up air is heated, or heated and moderately cooled, based on climate
- **Although a valid technology, this approach is not in harmony with hood velocity theory, as we are increasing turbulence near the hood**

MAKE-UP AIR DELIVERY (MUA)

Make-up air recapture rates are highly variable

Factors which decrease recapture:

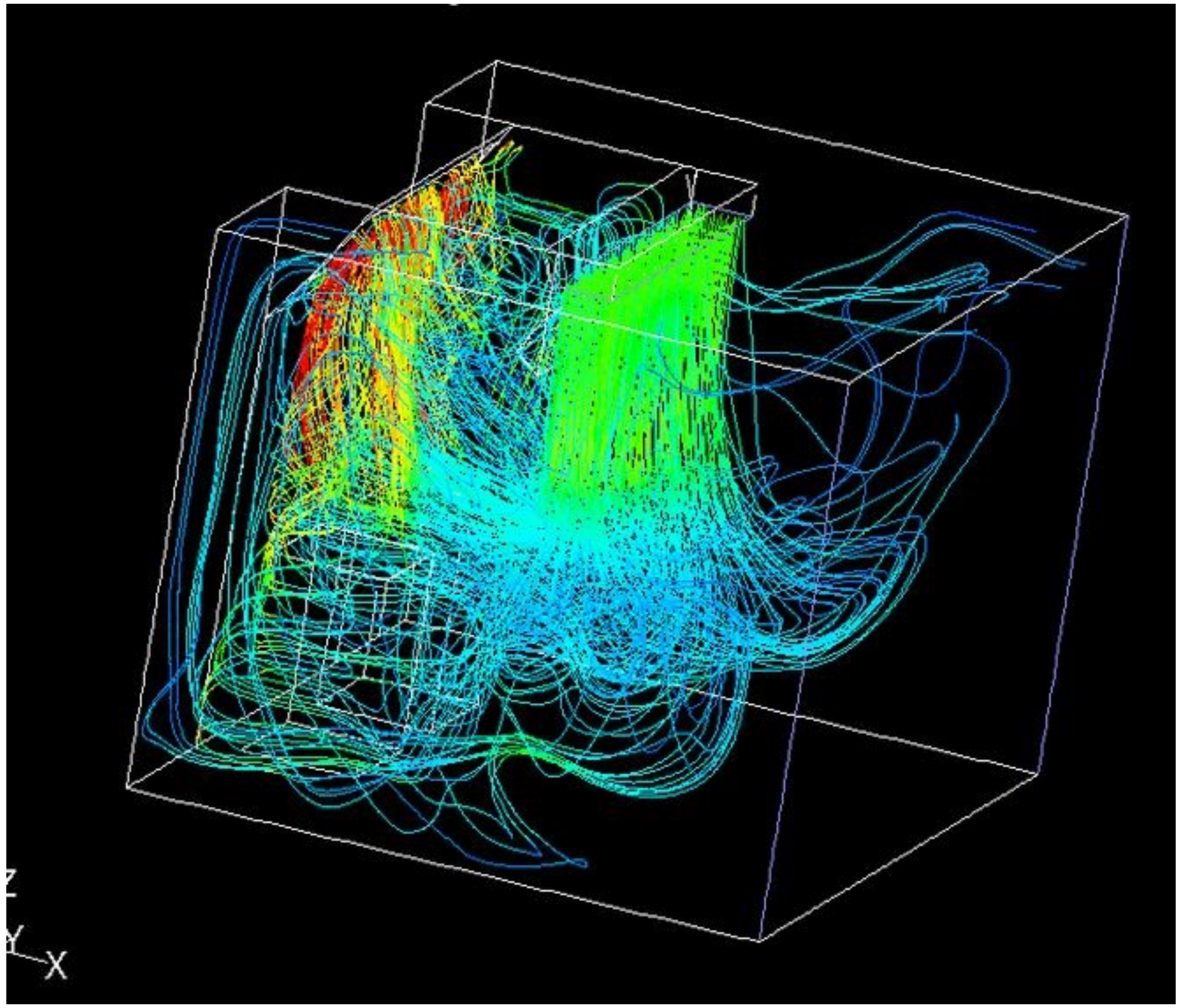
- Hot/humid air is buoyant
- Cold air falls too quickly
- **HVAC returns in the kitchen**
- HVAC directional diffusers in the kitchen



PERFORATED SUPPLY PLENUM DESIGN (PSP)

Critical point:

As exhaust rates fall, the diffusion of make-up air increases



CODE REQUIREMENT FOR CONDITIONING MAKE UP AIR

FROM INTERNATIONAL MECHANICAL CODE

508.1.1 Makeup air temperature.

The temperature differential between *makeup air* and the air in the conditioned space shall not exceed 10ºF (6ºC) except where the added heating and cooling loads of the *makeup air* do not exceed the capacity of the HVAC system.

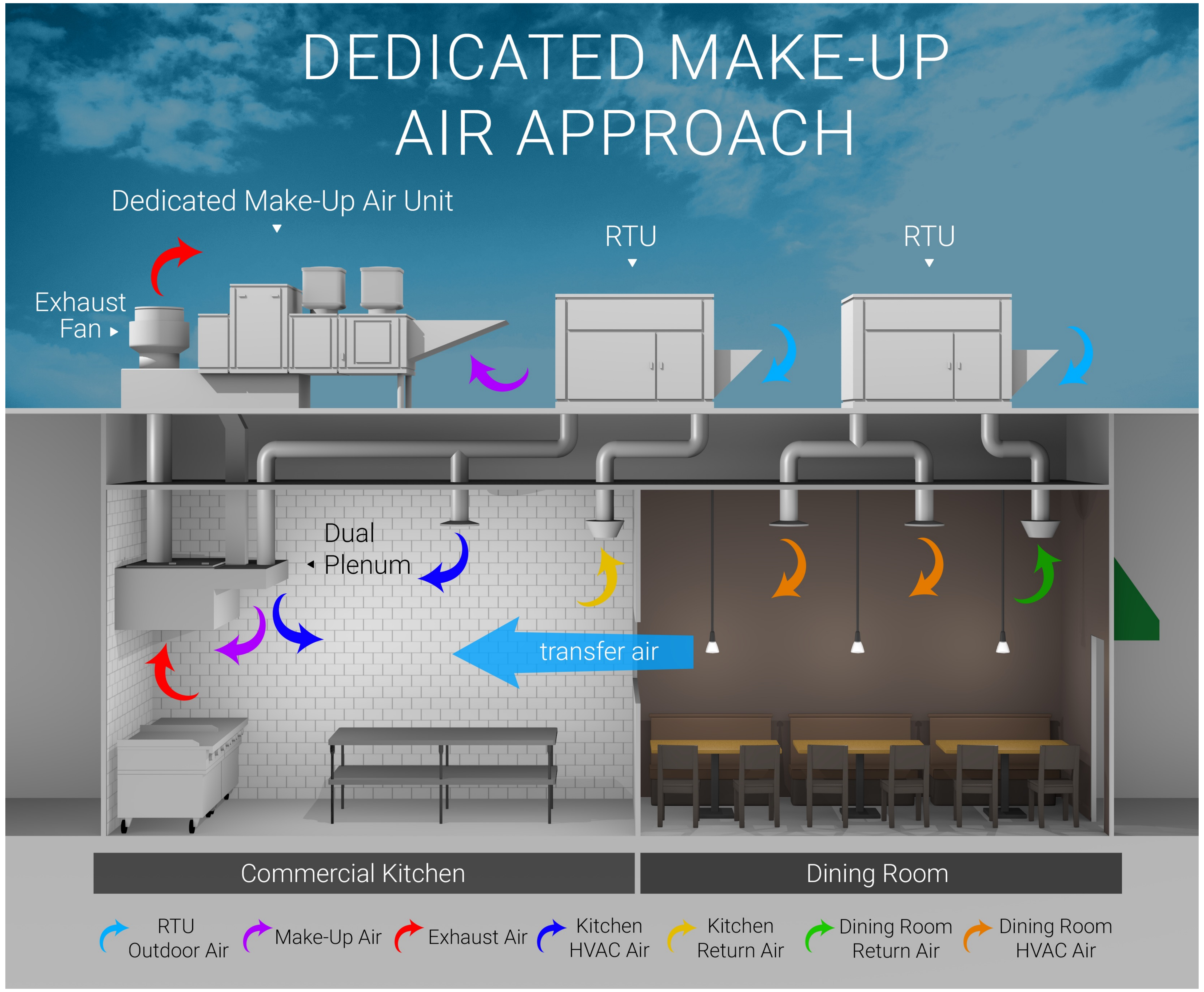
PERFORATED SUPPLY PLENUM DESIGN (PSP)

ASHRAE recommends ***at least*** 50% of the load from a PSP be considered as part of the HVAC load, based in leaving air conditions of the dedicated MUA

Outdoor Air Loads

If the outdoor air is not conditioned to a space-neutral (or space design) condition, then the sensible and latent loads from this volume of air will impact the existing HVAC system at least to some extent because however the air is introduced into the kitchen some of it will enter the kitchen space especially if that air is hot and humid. Table 13 summarizes the relevant equations from Chapter 18 of the 2017 *ASHRAE Handbook—Fundamentals*. It is recommended that the load from at least 50% of the outdoor air brought into the kitchen to replace the exhaust air be used in the heat gain calculations.

TRADITIONAL KITCHEN HEAT LOAD DESIGN



TRADITIONAL KITCHEN HEAT LOAD DESIGN

Many factors in kitchen heat loads commonly treated as unknowns:

- MUA diffusion
- Unknown and unhooded appliances
- Poor hood capture

Common practice to add additional tonnage (and CFM) to HVAC system to cover these "unknown" loads

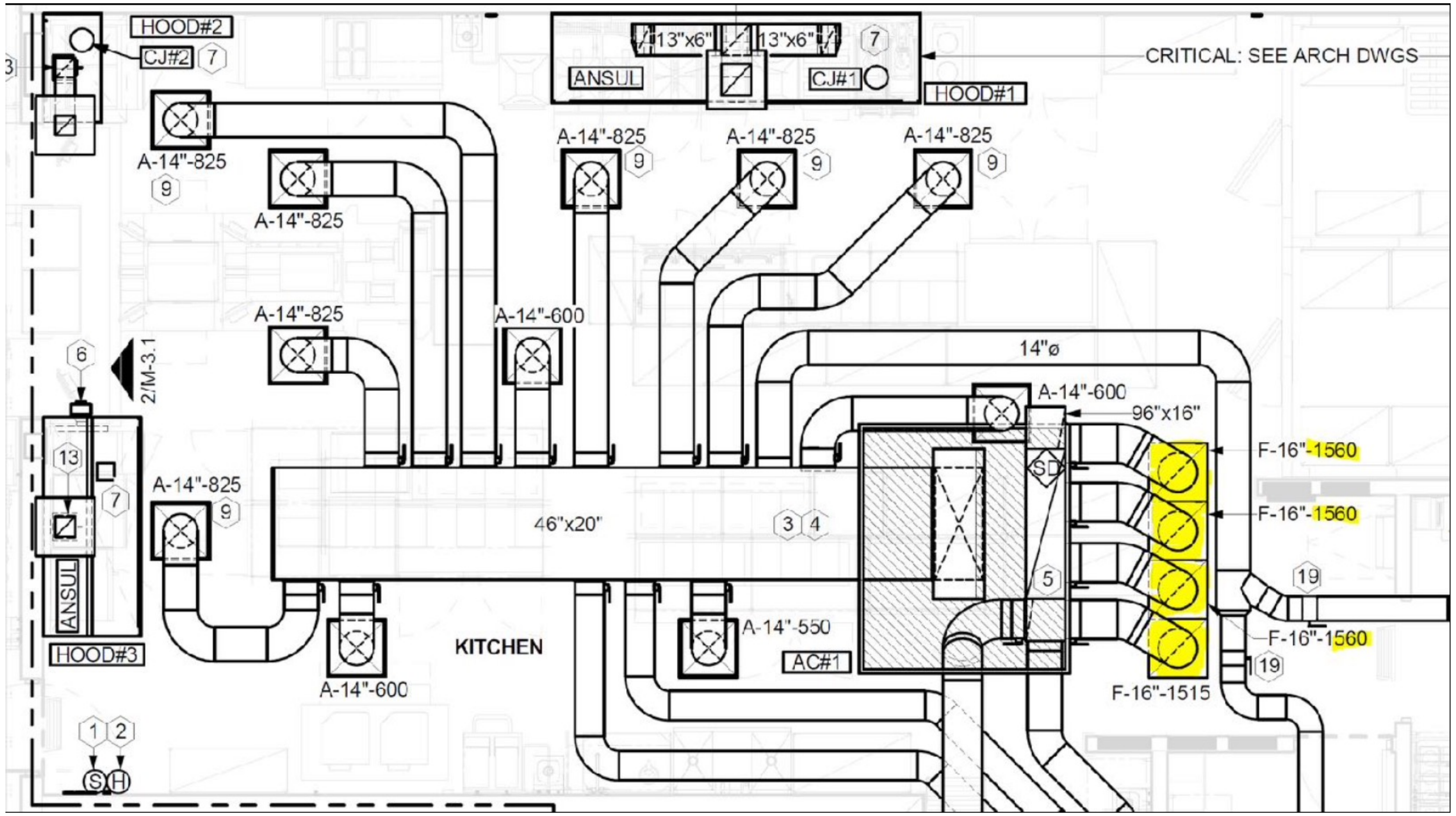
RTU-1

	COOLING COIL PEAK				CLG SPACE PEAK	
	Peaked at Time:	Mo/Hr: 8 / 17			Mo/Hr: 6 / 19	
	Outside Air:	OADB/WB/HR: 92 / 78 / 122			OADB: 88	
	Space Sens. + Lat. Btu/h	Plenum Sens. + Lat Btu/h	Net Total Btu/h	Percent Of Total (%)	Space Sensible Btu/h	Percent Of Total (%)
Envelope Loads						
Skylite Solar	0	0	0	0	0	0
Skylite Cond	0	0	0	0	0	0
Roof Cond	0	2,172	2,172	1	0	0
Glass Solar	2,105	0	2,105	1	2,215	2
Glass/Door Cond	426	0	426	0	380	0
Wall Cond	1,051	278	1,329	1	1,693	1
Partition/Door	0		0	0	0	0
Floor	0		0	0	0	0
Adjacent Floor	0	0	0	0	0	0
Infiltration	0		0	0	0	0
Sub Total ==>	3,582	2,450	6,032	3	4,288	4
Internal Loads						
Lights	2,042	511	2,553	1	2,042	2
People	2,500	0	2,500	1	1,250	1
Misc	113,295	0	113,295	52	113,295	94
Sub Total ==>	117,837	511	118,348	55	116,587	96

TRADITIONAL KITCHEN HEAT LOAD DESIGN

This excess airflow results in:

- Added disruption of air in space
- Negative impacts to hood capture
- Continued cycle of oversizing equipment



What is the solution?

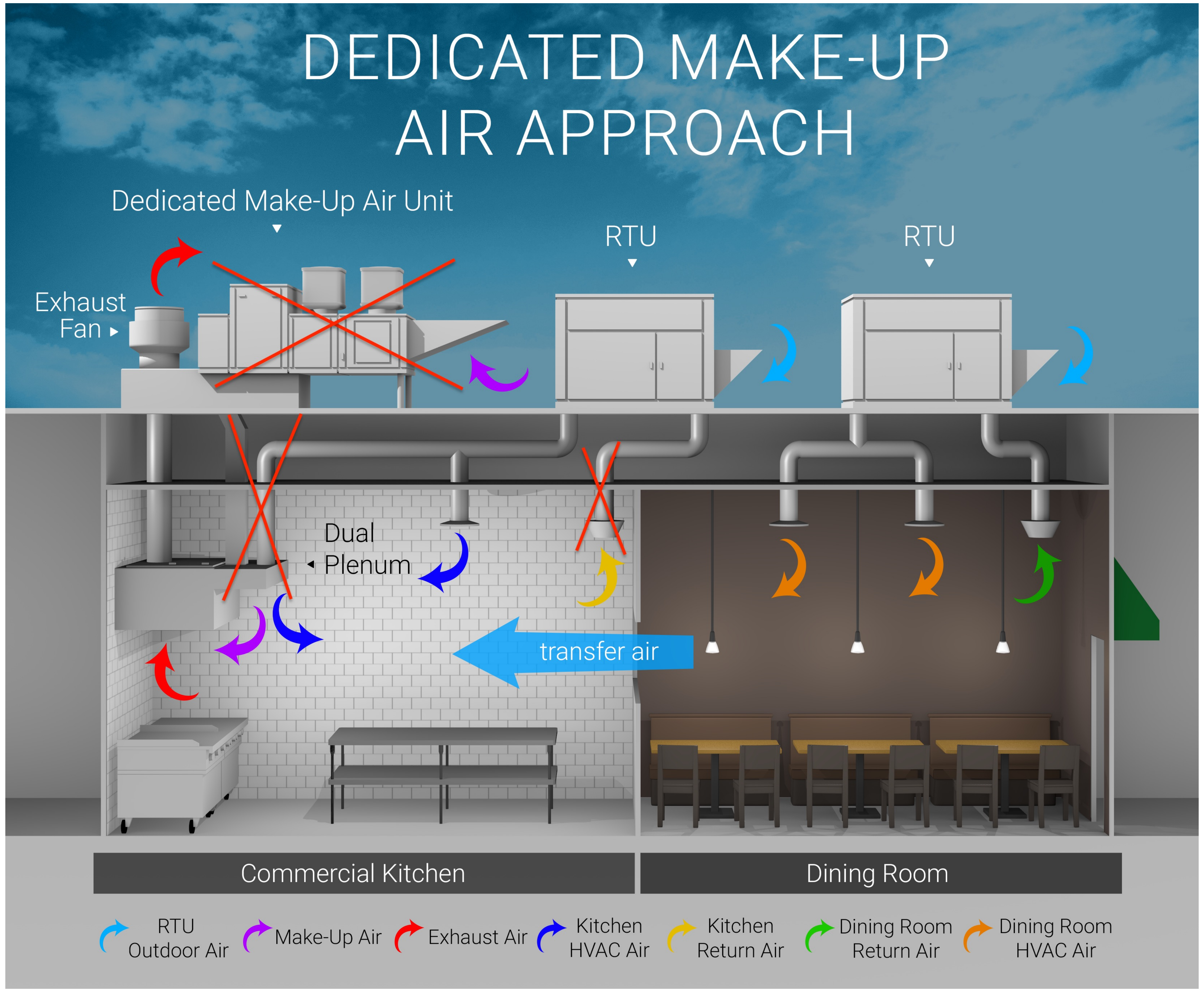

Air Quality
Take a deep breath -
Ventilation in this building
brings in 30% more fresh air
than required.
This stainless steel was repurposed from retired kitchen food trays.

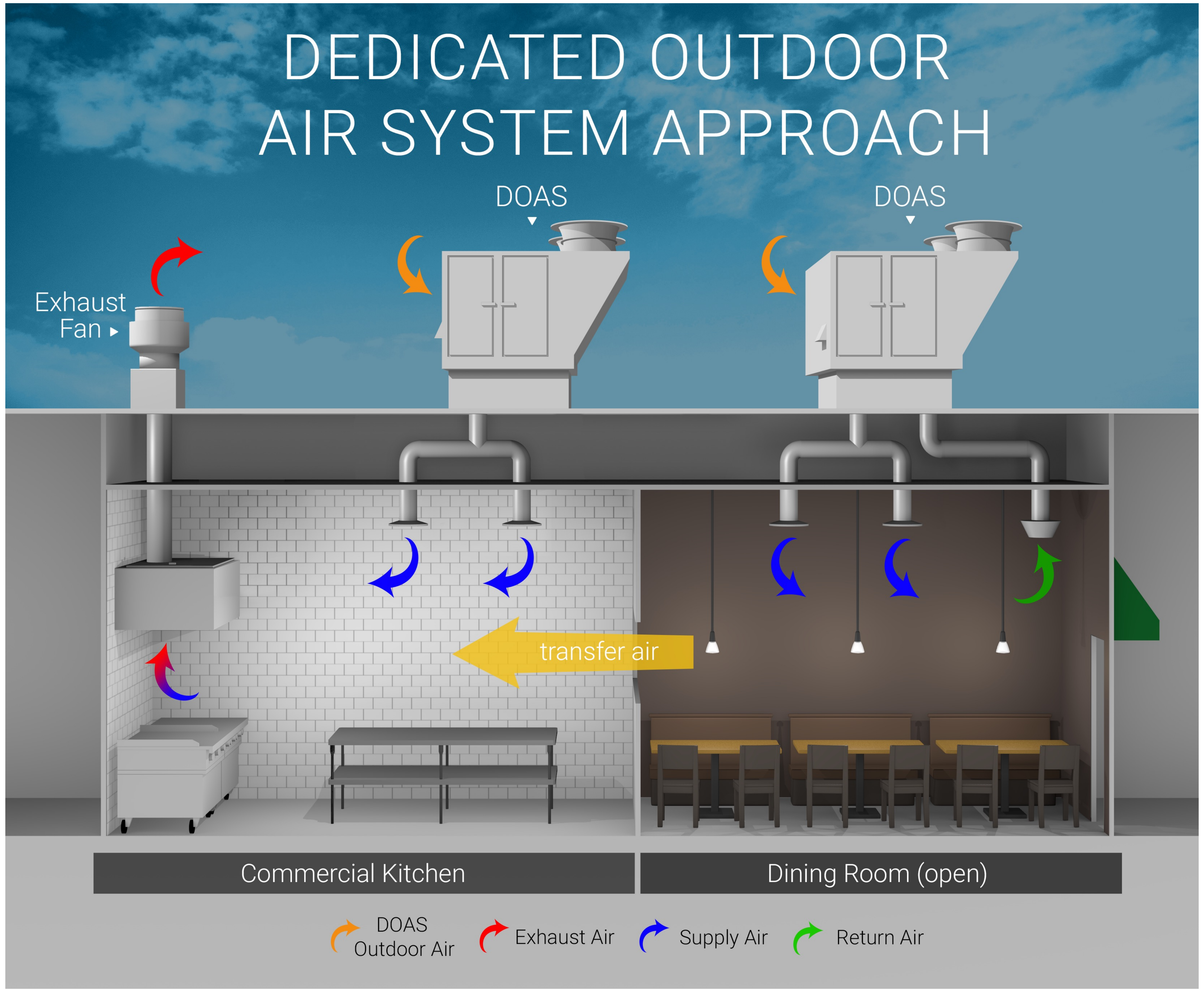
FRESH AIR RESTAURANT SYSTEM (FARS)

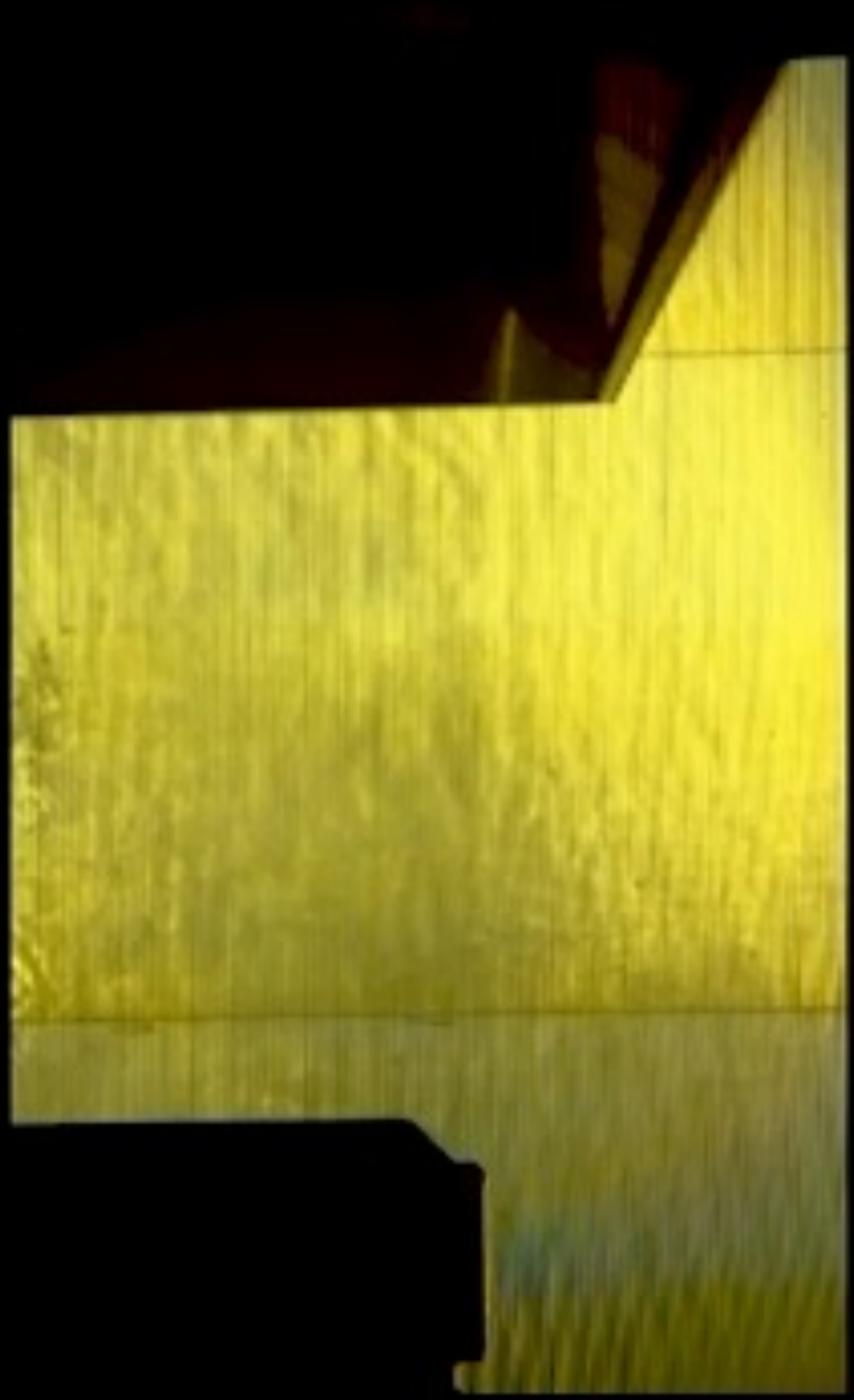
What is FARS?

- Combine the traditional MUA and kitchen/dining RTU system into one, using new ***Dedicated Outdoor Air System (DOAS) Equipment***
- Eliminate all HVAC Returns in the kitchen environment
- Eliminate dedicated MUA duct

FRESH AIR RESTAURANT SYSTEM (FARS)







KITCHEN AIR DISTRIBUTION (FARS)

- Ensure all supply air delivered at low velocity, further away from hoods
- *Dual layer* perforated supply diffusers - especially important near hoods
- The traditional PSP is eliminated, reducing installation costs dramatically

MODERN KITCHEN HEAT LOAD DESIGN

Traditional thinking:

Every CFM of outdoor air delivered is closely scrutinized, knowing that it can be expensive to condition and dehumidify.

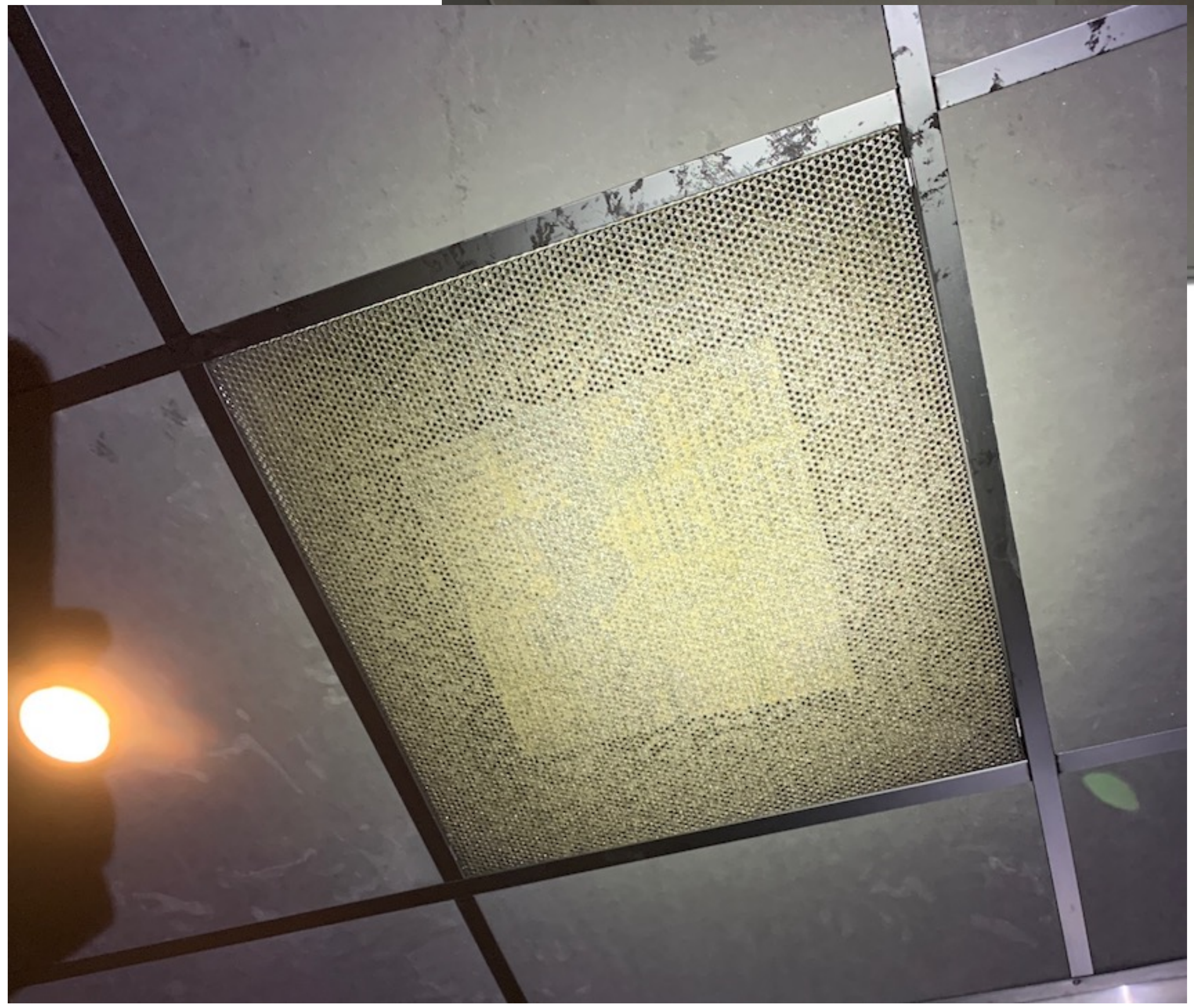
Current thinking:

Kitchen return air is often just as extreme as outdoor air (sensible/latent), and has the added risk of grease/smoke recirculation which degrades equipment and building IAQ.

FRESH AIR RESTAURANT SYSTEM (FARS)

Critical Point: HVAC returns fight with hood exhaust and rapidly degrade the kitchen environment.

The FARS approach eliminates all kitchen HVAC returns.



RTUs NOT DESIGNED FOR PROCESSING OUTDOOR AIR

Major RTU Manufacturer Manual:

However, most HVAC units are not designed to handle high quantities or the high extreme conditions of outdoor air. During winter months, the outdoor air can be very cold and requires a high amount of heat. During summer months when the outdoor air is humid, a lot of energy is required to cool and dehumidify. During some periods of the year, the outdoor air may not require much conditioning at all.

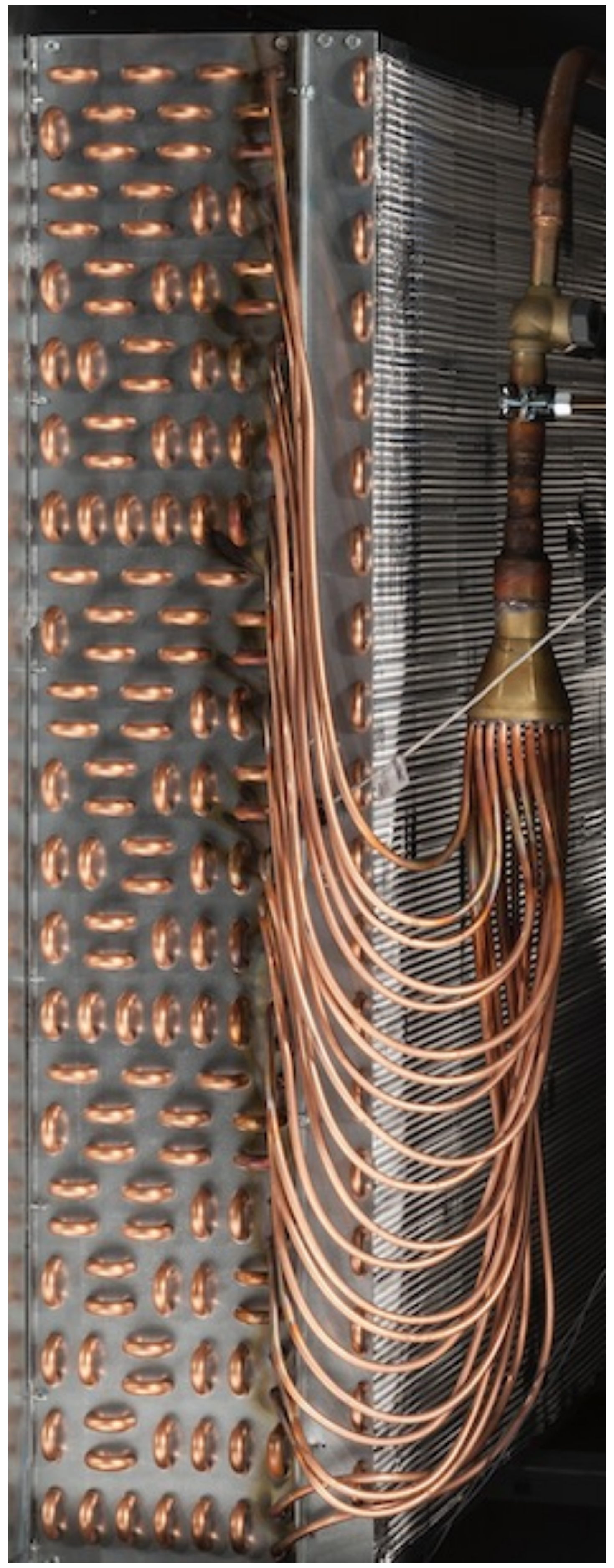
Oversizing a traditional HVAC unit to handle the high heating and dehumidification loads of outdoor air can result in poor control of zone air temperature and humidity, leading to poor occupant comfort. By separating the conditioning of ventilation air and zone air to different systems, each system can be optimally sized for the appropriate load condition to ensure proper system comfort.

Source: 2018 Carrier 62X-3PD Product Data Manual:https://www.utcccs-cdn.com/hvac/docs/1005/Public/0A/62X-3PD.pdf

RTUs NOT DESIGNED FOR PROCESSING OUTDOOR AIR

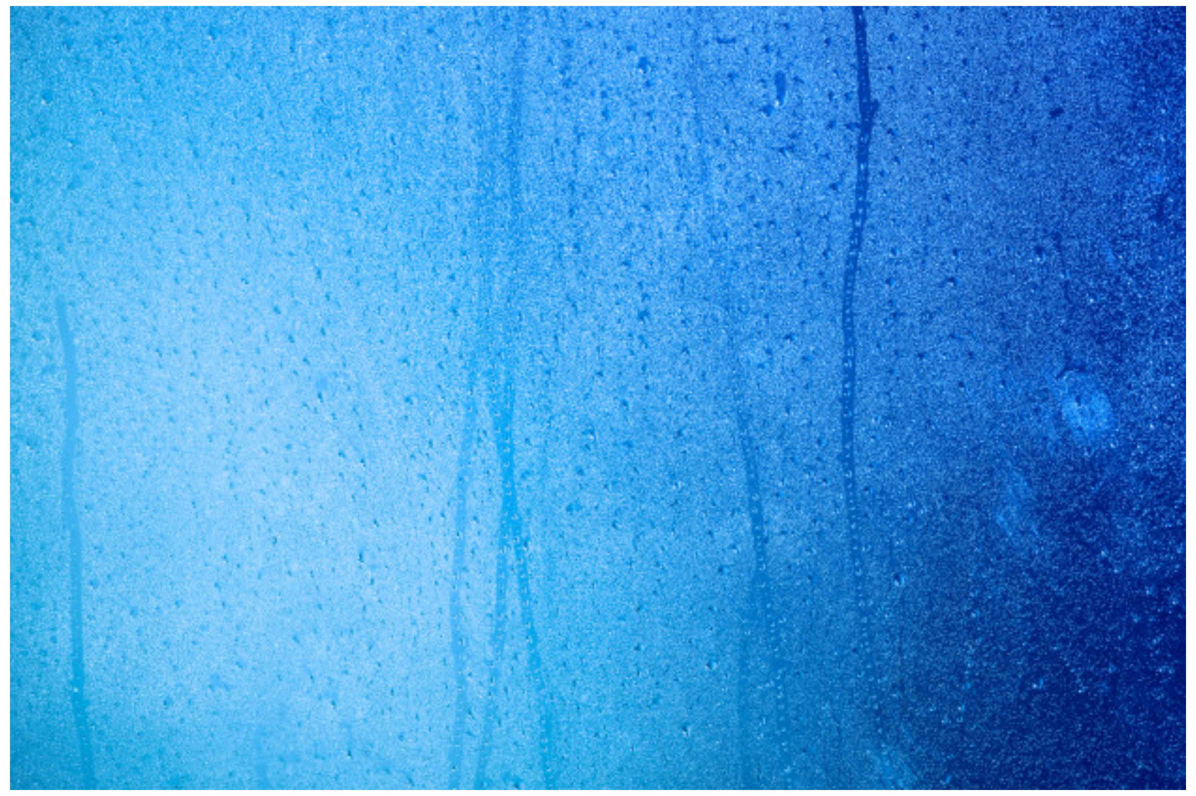
- Coils not designed with enough rows to reduce latent load sufficiently - not enough air residence time in coils
- Inadequate filtration when dealing with outdoor air conditions - typical 1” mesh
- Lack of modulating components to deal with varying outdoor load conditions
- Designed to process a steady return air condition


RTU Coil


DOAS Coil

SHORTCOMINGS OF RTUs PROCESSING OUTDOOR AIR

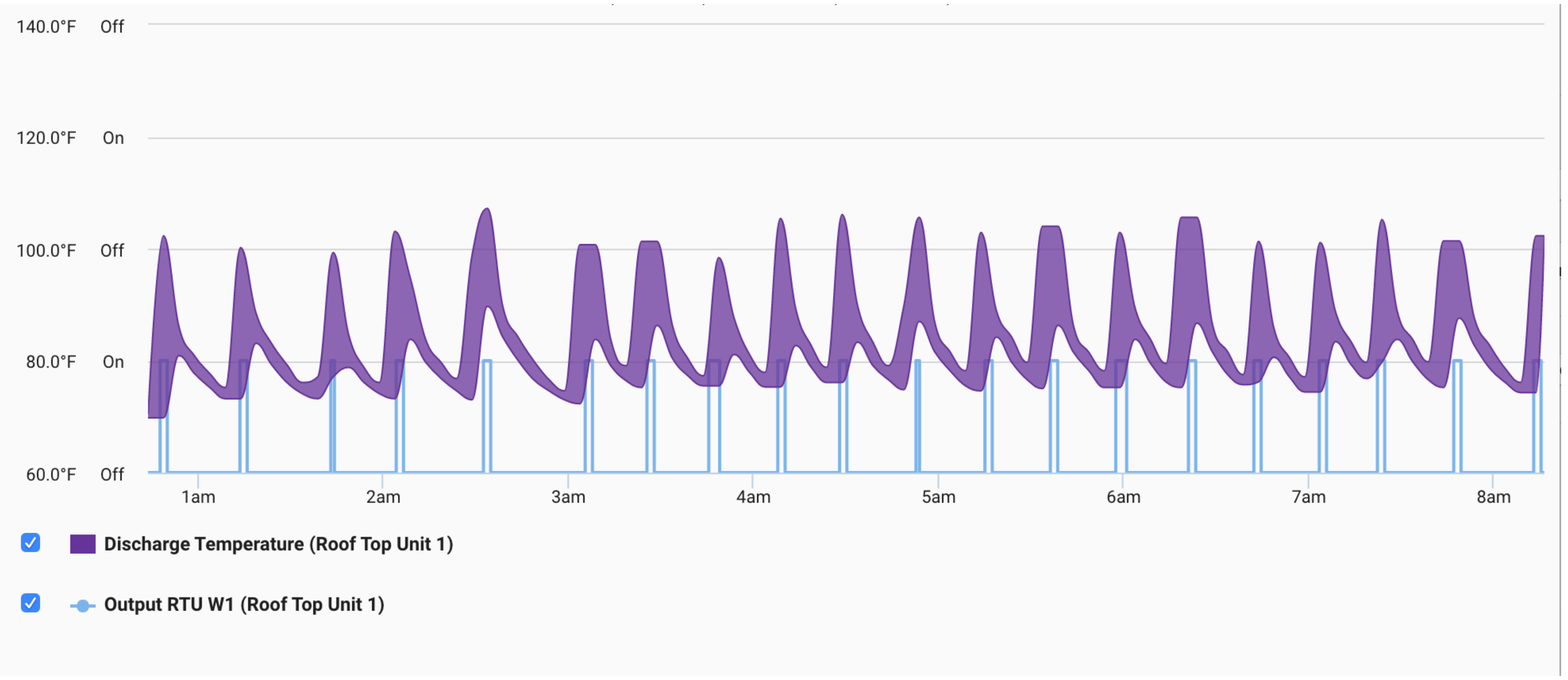
- Poor space comfort - high temps, humidity problems
- Outdoor air dampers being manually screwed shut after poor comfort complaints – resulting in negative pressure & infiltration



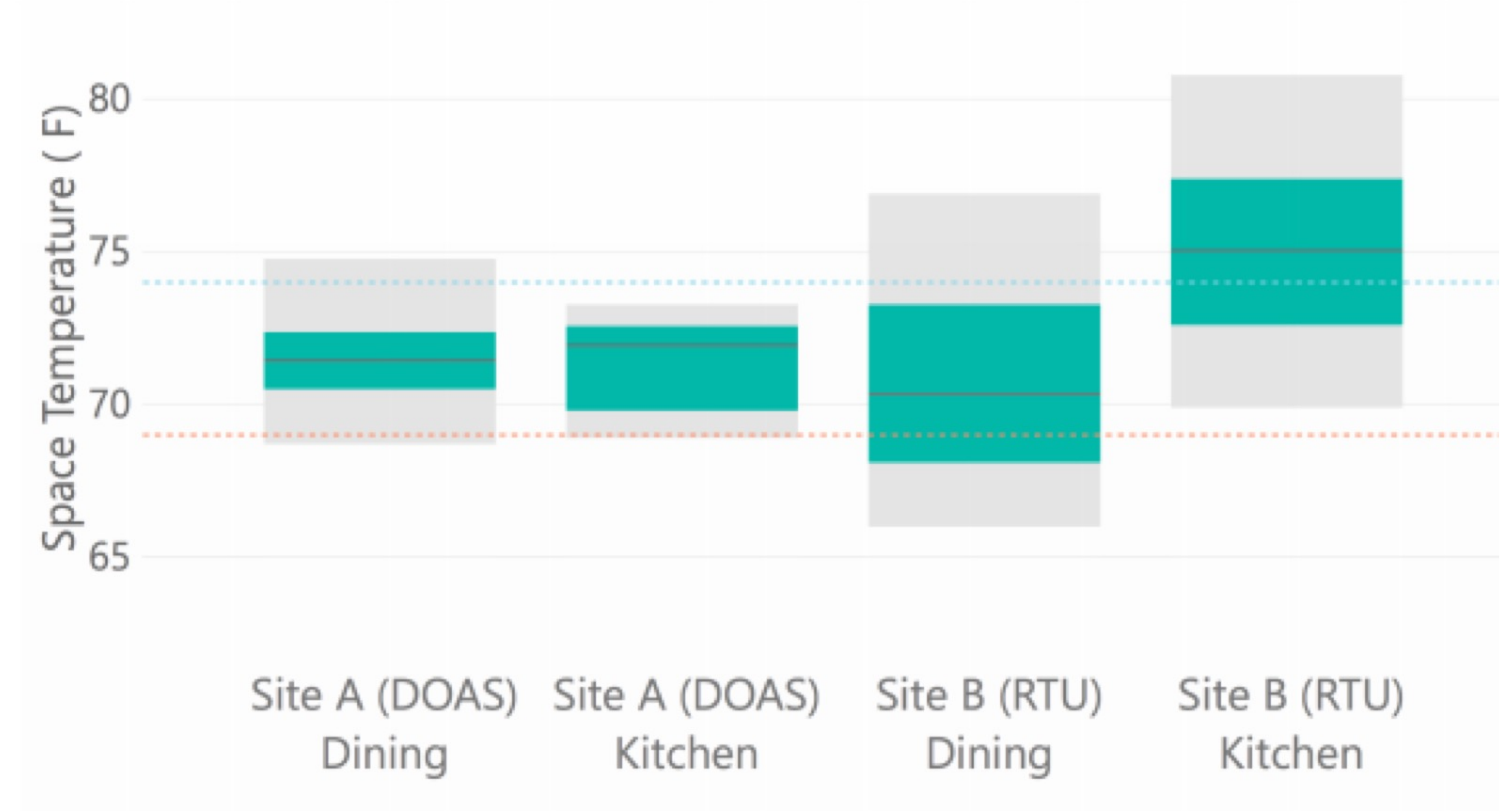
SHORTCOMINGS OF RTUs PROCESSING OUTDOOR AIR

Inconsistent delivery conditions:

- “Auto” Fans - no air when fans off
- “Continuous” Fans - no way to dehumidify when space temps met - does not monitor intake conditions
- Compressor lifespan rated on number of starts
- Inconsistent discharge temps with fixed speed equipment



DOAS VS. RTUs



Space Temperature Ranges When Occupied

DOAS VS. RTUs

Location	Customer Volume	Electricity	Natural Gas
Site A (DOAS)	156,575	$24,884	$5,257
Site B (RTU)	148,175	$25,675	$6,242
Comparison	6% Busier	3% Savings	16% Savings

Utility Comparison – Site A (DOAS) to Site B (RTU)

DOAS ECONOMICS

- RTU prices continue to rise as code raises efficiency standards
- More options are added to meet efficiency needs (hot gas bypass, economizer options, hot gas reheat, etc.) driving prices up and adding complexity

DOAS ECONOMICS

Use of DOAS can offset other costs:

- Smaller ductwork and reduced supply CFM
- Lower tonnage on remainder of RTUs when applicable
- Removal of expensive “economizer” dampers from RTU

Against common perception, the financial gap between these two types of equipment has narrowed, making DOAS the low cost selection when considering all construction costs.

MAKE-UP AIR CONCLUSIONS:

- The Fresh Air Design System (FARS) utilizing DOAS equipment is the only reliable method to control building balance
- FARS design provides a substantially higher level of thermal comfort and humidity control
- The lowest possible exhaust rate can only be achieved through lowering MUA and HVAC Supply air turbulence in the kitchen space
- HVAC Returns should never be utilized in the kitchen environment


QUESTIONS?

File Attachments for Item:

EC-3 Fire Speaker Design and Limitations (Southwest Ohio Fire Safety Council)

All certifications (1 hour)

Ohio | Department of Commerce

Mike DeWine, Governor
Jon Husted, Lt. Governor

Sheryl Maxfield, Director

Board of Building Standards

Application for Continuing Education Course Approval

Provider Information:

Name: WHAT'S NEW IN NFPA 72 & OTHER THINGS YOU NEED TO KNOW

Organization: SOUTHWEST OHIO FIRE SAFETY COUNCIL

Address: 8320 McEWEN RD. CENTERVILLE, OHIO 45458

E-mail: WILLIAM.SUTTER@WASHINGTONTWP.ORG Telephone: 937-433-3083

Website: SWOFSC.ORG

Conference Sponsor (if applicable) SWBC & MVBOC Conference Email: WILLIAM.SUTTER@WASHINGTONTWP.ORG

Check here if Course Renewal:_______ Prior course number ______________ (*i.e. BBS2018-429*)

Renewals will only be granted for identical content and certifications, within the current code cycle.
Attach a copy of prior course approval letter for confirmation. No further information is required.

New Course Information:

Course title: FIRE SPEAKER DESIGN & LIMITATIONS

Course instructor: NICHOLAS TEMPLETON - ADT

Course description: BEST PRACTICES FOR FIRE ALARM LAYOUT & THE LIMITATIONS OF SPEAKERS & SPEAKER STROBES.

QUESTIONS & ANSWERS

Instructional hours per session:__________ Number of Sessions:__________

Course Date(s) and Location:__________

Special Content:

Code Administration: [X]
Existing Buildings: [X]
Electrical Instruction: [X]
Plumbing Instruction: [ ]

Conference Course:__________
Conference Name:__________
Conference location:__________

Course to be offered online? [ ] **On Demand** [X] **Webinar** [ ]

Course Website: NONE TO SPEAK OF AT THIS TIME

Detail online course participation confirmation method (*i.e. test, quizlets, participant activity confirmation*):

Course applicable for the following certifications

Residential Certifications Only: [ ]
Administrative Course, All Certifications: [X]
Commercial Certifications: [X]

Application materials included:

- [X] Course Outline or Course Learning Objectives
- [X] Presentation Materials/Slides (not required for roundtable courses)
- [ ] Assessment Materials (for online courses)
- [X] Presenter Bio

Please submit application and materials in .pdf format to: michael.lane@com.ohio.gov or BBS@com.ohio.gov

"Best Practices for Speaker/Strobe Appliances – Guide to Fire Alarm Components"

My name is Nick Templeton and I'm an Executive Security Consultant for ADT Commercial. I've been in the security industry for 9 years and I specialize in Voice Evacuation Fire Alarm Systems, Access Control, Camera Systems, and Security Systems. I enjoy bringing new technology to my new and exisitng customers. That way the customer can implement the correct technology for their unique security solutions. Every facility is different and that is why it is always great to be able to provide a customer with multiple cost effect solutions and as always keep their facility and the people safe so they can enjoy their workplace and have a peace of mind.

Best regards, Nick

Outline:

- Spe4aker Applications
- Speaker Limitations
- Lengths of Cable Runs – Loss on NAC/Speaker Circuite
- Basic Fire Alarm Attachement

Edwards Systems Technology

Speaker Application Guide

Layout of Speakers for Adequate Fire Alarm Signaling and Emergency Voice Communication

85000-0033 Issue 2

It is our intention to keep the product information current and accurate. We can not cover specific applications or anticipate all requirements. All specifications are subject to change without notice. For more information or questions relative to this document contact EST.

2 Behavior of Sound

2.1 General

In theory, sound waves generated from an ideal "point source" will spread out in all directions, similar to the wave pattern generated by dropping a stone into water. Most sound generators are not "point sources", and most applications require that sound sources be directed or concentrated in one or more directions. Cupped hands, megaphones or horn speakers are examples of how we can direct sound.

Since sound travels through air in the form of quickly changing variations in air pressure, we speak of the loudness of sound to be its "sound pressure level", or SPL. The sound pressure level is measured in dB (decibels). Since the loudest SPL which our ear can hear without damage is 1,000,000 times greater than the softest SPL, we use a logarithmic scale to help describe SPL in numbers which we can more easily relate to.

Unfortunately, sound pressure decibels are not the scale that the human ear uses to judge loudness. This is because our ears are generally more sensitive to higher frequencies. Sound with frequencies between 1,000-6,000 Hz (Hz = "Hertz" = "cycles per second") are the easiest to hear; sound with lower frequencies are more difficult.

This **"frequency selectivity"** of the human ear is shown if a person hears three single frequency sounds at 50, 500, and 5,000 Hz. When their strength is adjusted until they sound equally loud, you will find that the 50 Hz sound must be 19 dB stronger than the 5,000 Hz sound, and 12 dB stronger than the 500 Hz sound.

The threshold of audibility is 0 dB. It is the softest SPL that an average person could hear. A 3 dB increase or decrease in the sound pressure level is "just noticeable" to the human ear. **The threshold of pain is 120 dB. The maximum sound level attainable under atmospheric conditions is 194 dB.**

2.2 Measurement of Sound

Two types of sound chambers are commonly used to determine a speaker's sound level rating - reverberant and anechoic. Sound pressure levels for audible fire alarm signals determined in a reverberant room are typically lower than for the same sound source in an anechoic chamber. This is because the reverberant results include an acoustic averaging of the response at all angles, whereas the anechoic readings are typically taken on-axis which is usually defined as the angle of maximum output.

Reverberant room sound levels describe the device operation as might be found in a large 'live' room having several hard surfaces, where room reflections (reverberation) will be significant. Anechoic readings in conjunction with polar plots provide an indication of the device's operation in a fairly

1 Foreword

Fire alarm systems alert occupants of a building and inform them that an emergency exists. Usually the intent is to initiate evacuation. In high rise buildings a voice communication system is provided to give the occupants more information, such as the nature and location of the fire or instructions for evacuation. The system fails to meet its goals if the signal is not heard and clearly understood by the occupants.

.... Robert P. Schifiliti, P.E.

This application guide provides information on the placement/layout of EST speakers for adequate fire alarm tone signaling and emergency voice communication. The suggested placement should provide safe, adequate coverage. In certain cases, the speaker spacing can be stretched. However, many factors affect the transmission and attenuation of sound as it travels from a source to a target. Some of these are:

- ambient temperature, humidity and air viscosity.
- signal or tone (sound) frequency.
- location of the sound source (speaker) relative to the target (ear).
- room construction and materials of walls, floors and ceilings.
- room furnishings in the signaling area.

All of these factors must be considered when designing or analyzing a signaling system. For maximum safety, EST recommends that fire alarm strobes be used to supplement audible signals.

The following standards, codes, and guides are referenced in this document and should be used to supplement information contained herein.

• ANSI/NFPA 72 National Fire Alarm Code - 1993 Edition
• UL 464 Audible Signal Appliances
• UL 1480 Speakers for Fire Protective Signaling Systems
• ADA(AG) Americans with Disabilities Act Accessibility Guidelines
• National Building Code of Canada - 1995 Edition
• CAN/ULC S525 Audible Signal Appliances for Fire Alarm Systems
• CAN/ULC S541 Standard for Speakers for Fire Alarm Systems
• CAN/ULC S524 M91 Standard for the Installation of Fire Alarm Systems
• ANSI A117.1 1992 Standard for Accessible and Usable Buildings and Facilities

UL's confirmed speaker ratings begin at 75 dBA, and move in 3 dBA (usually upward) bench marks, ie. 75, 78, 81, 84, 87, 90, 93 dBA etc. All speakers tested by UL will get one or more of those dBA ratings. For example, if UL tests a speaker at its 2 watt tap and it consistently achieves 89.9 dBA output, they would allow a published rating of only 87 dBA for that model. Almost a full 3 dBA less than the speaker's actual performance!

It's essential to understand this especially when comparing the performance of two different speakers. Here's why:

Speaker:	UL Confirmed SPL Rating:	Actual UL SPL Test Result:
Model A	90	92.9
Model B	87	87.1
Model C	90	90.1
Model D	87	89.9

Model A vs Model B - UL says: *3 dBA difference; Actual: 5.8 dBA difference*
Model C vs Model D - UL says: *3 dBA difference; Actual: 0.2 dBA difference*

This also applies when testing speaker/strobes. Lets assume we test a speaker (without strobe), then mount a strobe in front of the grille and re-test. **If there is only a 1 dBA loss bringing the speaker output just below a "milestone", UL lowers the rating by a full 3 dBA.** However, there is no need to be overly concerned. **A 3 dBA change in sound output, is really only "just noticeable" to the human ear.** Good end results are achieved with optimal product application, not just by the product alone.

2.2.2 Anechoic Chamber Testing

Anechoic testing is used by ULC (Underwriter's Laboratories of Canada) as their standard method of determining sound level emitted from audible devices including fire alarm speakers. As the word implies, anechoic ("allowing no echoes") tests are performed in environments free from echoes.

In most cases this would be a chamber typically having walls, ceilings and floor covered with sound absorbent materials, often having conical or triangular shapes designed to trap the sound waves. At times a remote outdoor location is found and the source and microphone are mounted high above the ground. It is important to have no reflecting surfaces nearby.

In an anechoic environment, unlike a reverberant room, a sound pressure level meter placed at a distance from the sound source will only measure the sound generated in that direction. Thus it 'dead' room, perhaps having curtains, soft wall covering, rugs, or many people. (People are generally quite sound-absorbant.) In a 'dead' environment, sound reaches the occupants primarily directly from the source, in which case it is important to note the signaling device's polar output relative to position within the room.

The dB sound pressure level can be measured with a sound level meter. It is very important to know on what "scale" you are measuring.

Two scales commonly used are:

dB - "flat" response measures sound intensity without regard to the characteristics of the ear.

dBA - a measurement where a filter is added to adjust the response (A-Weighting) to give greater consideration to the sounds with frequencies between 5,000 and 10,000 Hz so that the sound meter responds closer to the characteristics of the human ear.

The weighting of the various frequencies is established by an internationally accepted A-Weighting curve. **If a sound pressure level is expressed in dB rather than dBA, the corresponding frequency must be given for it to have any meaning as far as perceived loudness is concerned.**

For instance, a 1,000 Hz signal at 20 dB in a room with no background noise would be audible. A 100 Hz signal at 20 dB would not be heard. A-Weighting allows a single number to describe the sound pressure level produced by a signal containing frequencies between 20 and 20,000 Hz. Hence, a 200 Hz signal at 50 dBA would sound approximately as loud as a 10,000 Hz signal at 50 dBA.

2.2.1 Reverberant Room Testing

Reverberant room testing is used by ULI (Underwriter's Laboratories, Inc. U.S.A.) as their standard method of determining sound level for audible devices including fire alarm speakers. This method employs a reverberant chamber and is specified in the ANSI S1.21 standard. This concept of sound level testing is much different from anechoic testing. Here, an enclosed room is used which has hard, sound reflecting walls in order to capture the total sound emitted from a source.

Measurements are made using one or more microphones placed in specific locations in the chamber or else swept through an arc inside the chamber. The "total" sound captured during the measuring time is used to calculate sound power, from which the equivalent average sound pressure level at 10 ft (3.05 m) is derived.

In most cases, EST publishes "Reverberant Room" values as confirmed through testing at UL's laboratories. **What you need to realize, is that UL rates audible signal output in predetermined 3 dBA steps or "milestones".** In the case of speakers, this is very important!

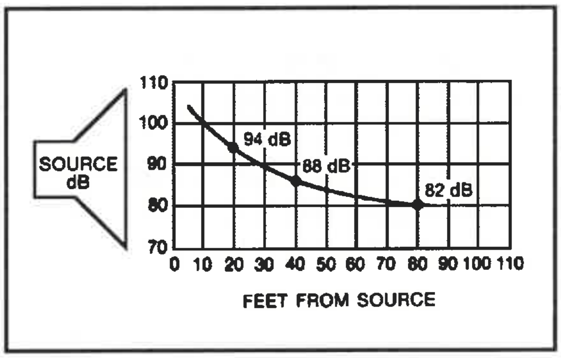
2.4 Effect of Distance

Under the "Anechoic" condition (see Section 2.2.2 above), the sound pressure level will change approximately 6 dBA for each halving or doubling of distance from the source to the target.

This can be shown as:

base distance x 0.5 = base sound level + 6 dBA
BASE DISTANCE x 1 = BASE SOUND LEVEL
base distance x 2 = base sound level - 6 dBA
base distance x 4 = base sound level - 12 dBA
base distance x 8 = base sound level - 18 dBA
base distance x 16 = base sound level - 24 dBA

The illustration below shows how the sound pressure level changes with distance under ideal conditions. Sound absorbing or reflecting materials in the listening area can modify the curve.



2.5 Effect of Power (watts)

Doubling or halving the power input to a speaker causes an increase or decrease of 3 dBA. This is very significant when calculating amplifier size for sound distribution systems. Each time the amplifier size is doubled, the potential sound pressure level (SPL) output from speakers is increased by *only* 3 dBA, a "just noticeable" rise.

This can be shown as:

base power x 0.5 = base sound level - 3 dBA
BASE POWER x 1 = BASE SOUND LEVEL
base power x 2 = base sound level + 3 dBA
base power x 4 = base sound level + 6 dBA
base power x 8 = base sound level + 9 dBA
base power x 16 = base sound level + 12 dBA

is possible to measure the sound level at various angles off-axis from a given source, and produce a “polar plot” to describe sound level versus listening angle. These polar plots are the basis for the design examples used in this guide.

For speakers, we expect that the most demanding applications will require complex changing wave forms such as speech. Polar plots at various high and low frequencies are therefore needed to fully describe the speaker’s full polar behavior.

2.3 Voice Tones and Speech

Although 20 Hz to 20,000 Hz (wavelengths from 55 ft to 0.66 in long) is usually quoted as our hearing range, most people cannot hear above approximately 16,000 Hz.

The human voice has most of its power in the 200 Hz to 3,000 Hz region. The voice frequencies above 3,000 Hz contain very little energy. The frequencies in the 800 Hz to 3,000 Hz range contribute the most to voice intelligibility. **Audibility and intelligibility, however, are two different issues.**

Audibility usually refers to the ability to **“hear”** a particular signal over the ambient noise level. This is often the foremost consideration in selection and placement of horn or bell signals.

Intelligibility usually refers to the ability to **“understand”** messages or instructions delivered by a sound system, typically involving loudspeakers. Excessive reverberation or distortion can cause a very loud, audible signal to be unintelligible.

If the average ambient noise level in a space is found to be 75 dBA, it might be concluded that the alarm signal level throughout the area should be between 80 to 90 dBA. But to achieve that sound level 25 feet (7.6 m) from a speaker, the level in the area very near or just below the speaker might be as high as 100 to 110 dBA. That alarm signal level would be clearly *audible*, however, the high sound level close to the speaker might be *too loud*. Certainly potential distortion and the effect of reverberation may make a voice message *unintelligible*.

Sound Output Ratings

Input Voltage	Watts/ Impedance	dB SPL (Peak @ 1m)	dB SPL (Max @1m)	*dB SPL (Reverb @ 10 ft)	Usabl (Feet
25	0.5	119	114	90	1
25	1	122	117	96	2
25	1.5	124	119	98	2
25	2	126	121	99	3
25	3	128	123	100	4
70	4	129	124	102	5
70/100	8	131	126	104	6
70	12	133	128	107	8
70/100	16	134	129	107	9
70/100	24	136	131	109	1
100	32	137	132	110	1.
100	45	139	134	112	1
22	8 Ohm	139	134	112	1
22	4 Ohm	142	137	114	2.

Best regards, Nick

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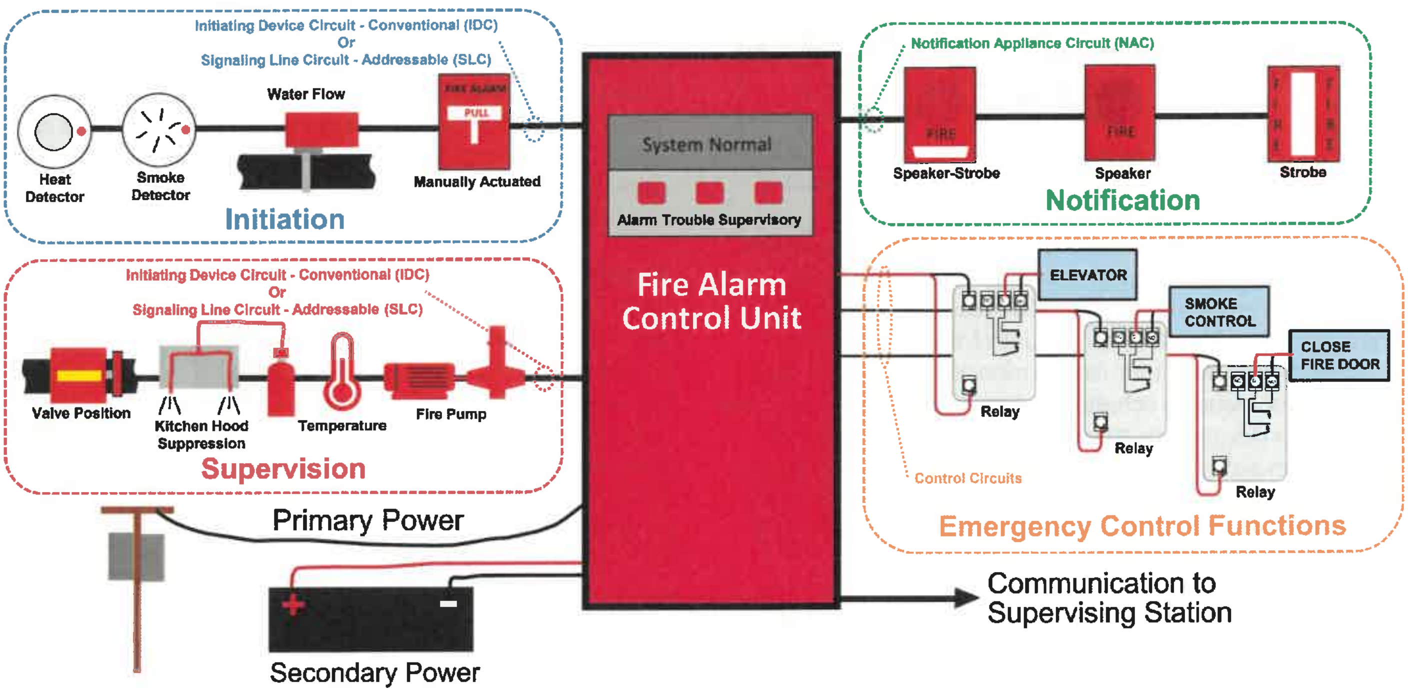
NATIONAL FIRE PROTECTION ASSOCIATION
The leading information and knowledge resource on fire, electrical and related hazards

A GUIDE TO FIRE ALARM BASICS

A fire alarm system is a crucial part of the overall fire protection and life safety strategy of a building. A fire alarm system serves many functions and the differences between the functions can be a bit confusing, so this visual guide to fire alarm basics was created. The objective of this document is to discuss some of the major components and functions of a fire alarm system.

FIRE ALARM SYSTEMS | DIAGRAM



FACU - Fire Alarm Control Unit

The fire alarm control unit serves as the brain of the fire alarm system by monitoring all the inputs and controlling all the outputs. Some may also refer to this as a fire alarm control panel or fire alarm panel. The different types of conditions that can be seen at the fire alarm control unit are alarm, supervisory, and trouble, these conditions can also result in a signal being sent to the supervising station.

Alarm

An alarm condition means there is an immediate threat to life, property, or mission. An example of this would be a smoke detector sending a signal to the fire alarm control unit that there is a presence of smoke, which would initiate notification to the occupants to evacuate.

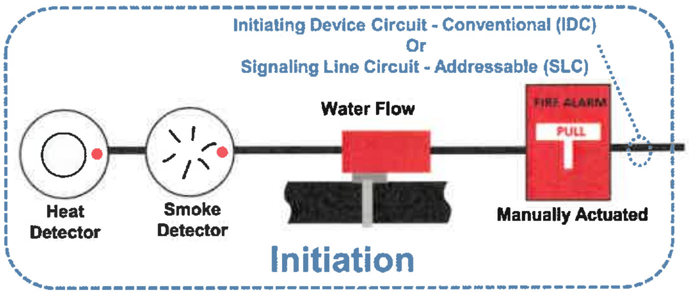
Trouble

A trouble condition means there is an issue or fault with the fire alarm system. An example would be a break in an initiating device circuit. This would show up as a trouble signal on the control unit.

Supervisory

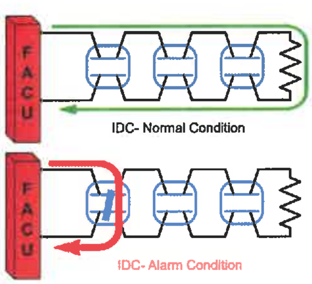
A supervisory condition means there is an issue with a system, process, or equipment that is monitored by the fire alarm control unit (see Part 2 on Supervision). An example of this would be a sprinkler system valve being closed, this would show up as a supervisory signal on the control unit.

PART 1 Initiation



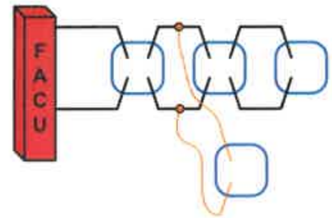
The main function of the initiation portion of a fire alarm system is to report the status of a protected space or the existence of a fire. The components include all devices and circuits that send a signal to a fire alarm control unit (FACU) such as heat detectors, smoke detectors, carbon monoxide detectors, water flow switches, manually actuated devices, and pressure switches. Depending on the system, the signal from an initiating device can create an alarm condition or a supervisory condition. Based on the type of detectors and FACU, the signals can be sent over an initiating device circuit (IDC) for conventional systems, or a signaling line circuit (SLC) for addressable systems.

Initiating Device Circuit



Conventional initiating devices are typically detectors that use a switch contact to short both sides of the initiating device circuit together. By doing so, the initiating device causes an increase in current flowing through the circuit, which the FACU interprets as an alarm signal. Once one device shorts the circuit, no other device on that circuit or "zone" can send a signal. Because of this, any device on the circuit or zone will put the entire zone into an alarm state. Zones are typically designed to enable someone to easily identify an area where the alarm is located, for example, in a school you may have a gymnasium zone circuit and an auditorium zone circuit that each contain multiple devices.

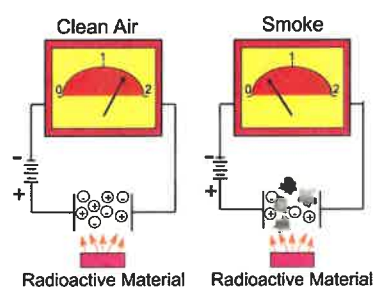
Signaling Line Circuit



Addressable devices are either initiating devices or control/notification appliances that are capable of communicating a unique identification number or address to a control unit via a signaling line circuit. This identification consists of a binary string of 1s and 0s that indicate the address or location of that device on the circuit. When the FACU polls an initiating device, the initiating device responds with its status (normal, alarm, etc.) and address. The device address allows for the location of the detector to be identified at the FACU. When one initiating device is activated on a signaling line circuit, the FACU is still able to poll the other devices unlike a conventional initiating device circuit.

Additionally, some addressable initiating devices are able to also transmit to the FACU a range of values of smoke density, temperature variation, water level, water pressure changes, and other variables. And then the control unit software determines the set points for initiation of an alarm, supervisory, or trouble signal. These types of initiating device circuits are known as analog addressable as they are able to tell the FACU their address and their value.

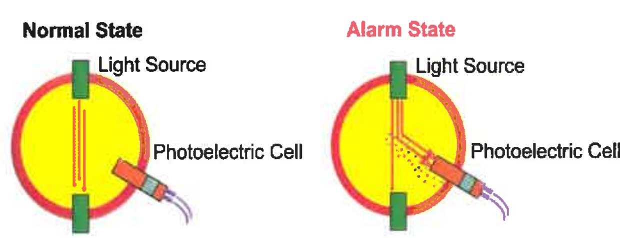
Ionization Smoke Detector



Ionization smoke detectors utilize a small amount of radioactive material to ionize air molecules into positively and negatively charged molecules that create a small electric current. The introduction of smoke into that ionized air will reduce the amount of current and cause an alarm signal.

Photoelectric smoke detectors utilize a light source and a photosensitive cell. When smoke enters the chamber, light scatters and is picked up by the photosensitive cell, causing an alarm signal.

Photoelectric Smoke Detector

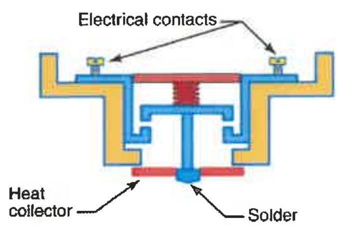


A beam smoke detector is like a photoelectric detector, except it is designed to cover a large area. A transmitter and receiver or reflector are placed to create a light beam across a space, when the amount of light being received by the receiver or reflected to the transmitter falls below a certain percentage, an alarm signal is sent.

Beam Smoke Detector

A non-restorable fixed temperature heat detector utilizes solder that holds up a plunger. The solder melts at a specific temperature and causes the plunger to drop, which shorts the contacts and causes an alarm signal.

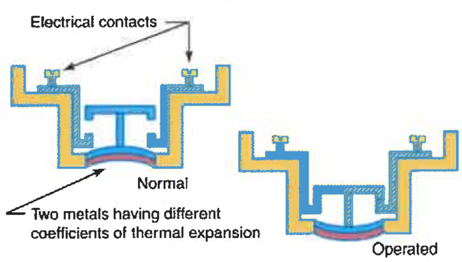
Fixed Temperature Heat Detector Non-Restorable



When solder melts, plunger drops and contacts are shorted.

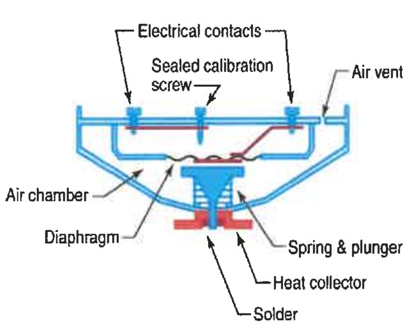
A restorable fixed temperature heat detector utilizes two metals that have different thermal expansion coefficients. At a specific temperature, these metals will bend and cause the plunger to short the contacts, which causes an alarm condition. When the metal cools it will bend back in the other direction and restore itself.

Fixed Temperature Heat Detector Restorable



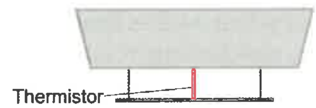
A rate-of-rise detector utilizes an air chamber and a diaphragm. When a fire causes the air in the chamber to expand faster than it can escape out the vent, the increased pressure forces the diaphragm to close the contacts and initiate an alarm signal. This rate-of-rise detector also contains a fixed temperature plunger that will operate if the temperature exceeds the determined temperature.

Rate-of-Rise Heat Detector



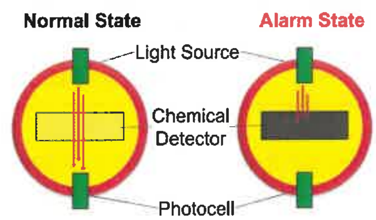
An analog addressable heat detector utilizes a thermistor element to constantly monitor the temperature. The response criteria, which can be a temperature above a specified level, or a specific rate of rise in the temperature, is programmed at the FACU.

Analog Addressable Heat Detector



There are many different types of carbon monoxide (CO) detectors. One example of a CO detector is a Colorimetric detector. Like a photoelectric smoke detector, this detector contains a light source and a photocell that are constantly measuring for light being reflected from a chemical detector. In the presence of carbon monoxide, the chemical detector will change to a black color and light will no longer be reflected to the photocell, which will result in an alarm signal.

Carbon Monoxide Detector



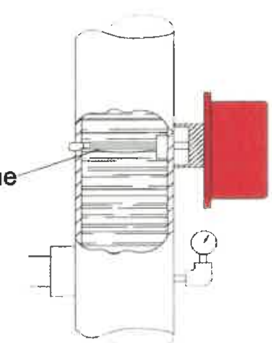
Sometimes called manual fire boxes, pull stations, or call points, manually actuated initiating devices initiate an alarm signal when there is an input from a person, such as pulling a lever or pushing a button. These can require multiple actions to initiate such as lifting a cover or breaking glass prior to actuating the device.

Manually Actuated Initiating Device

Flow switches are installed inside the piping of a sprinkler system and have a vane that moves with the flow of water. When water begins to flow within the pipe, the vane operates a switch that initiates an alarm.

Vane Waterflow Switch

Vane Waterflow Switch

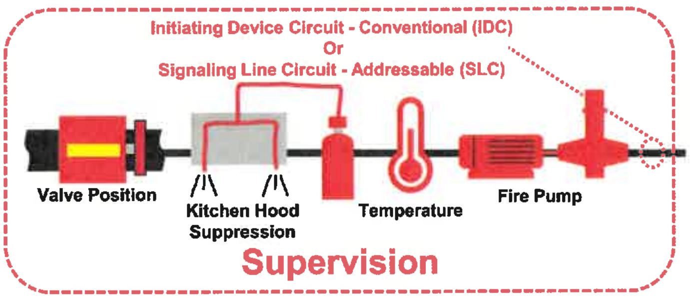


Installed in Pipe

Pressure switches are installed on sprinkler systems to monitor for a change in water pressure. A signal will be sent to the FACU when there is an increase in water pressure, which means that water is flowing though the sprinkler alarm valve.

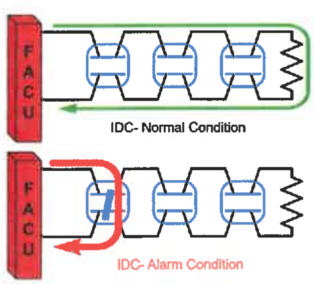
Pressure Switch

PART 2 Supervision



It is common and often required to utilize a fire alarm system to monitor the condition of other systems, processes, or equipment that are related to the building's fire and life safety or other systems that the owner would like to monitor. Supervision can include but is not limited to valves on fire protection systems, other fire protection systems such as kitchen hood suppression systems, valve room or storage tank temperatures, and fire pump condition. Issues with these systems would provide a signal to the fire alarm control unit via an initiating device circuit (IDC) for conventional systems, or a signaling line circuit (SLC) for addressable systems and would create a supervisory condition at the fire alarm control unit (FACU).

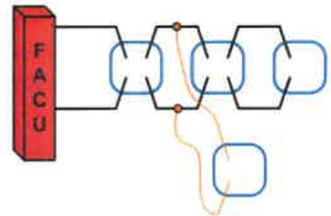
Initiating Device Circuit



Conventional supervisory devices are devices that are used on an initiating device circuit and use a switch contact to short both sides of the device circuit together. By doing so, the device causes an increase in current flowing through the circuit, which the FACU interprets as a supervisory signal. Once one device shorts the circuit, no other device on that circuit or "zone" can send a signal. Because of this, any device on the circuit or zone will put the entire zone into a supervisory state. Zones are typically designed to enable someone to easily identify an area where the supervisory is located, for example, you may have all of the valve supervisory switches for one system on its own zone so the supervisory comes up as "supervisory wet pipe system 1."

Addressable supervisory devices are capable of communicating a unique identification number or address to a control unit via a signaling line circuit. This identification consists of a binary string of 1s and 0s that indicate the address or location of that device on the circuit. When the FACU polls a supervisory device, the device responds with its status (normal, supervisory, etc.) and address. The device address allows for the location to be identified at the FACU. When one supervisory device is activated on a signaling line circuit, the FACU is still able to poll the other devices unlike a conventional initiating device circuit.

Signaling Line Circuit



Additionally, some addressable supervisory devices are also able to transmit to the FACU a range of values such as temperature, water level, pressure, and other variables, and then the control unit software determines the set points for initiation of a supervisory signal. These types of supervisory devices are known as analog addressable as they are able to tell the FACU their address and their value.

Valve Position

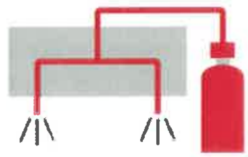
Valves that can shut off the water supply for a fire suppression system such as a sprinkler system are required to be supervised to ensure that they are not closed while the system is in service. One way of supervising these valves is the use of the fire alarm system. This is done by installing a switch, which will send distinct signals to indicate that either a control valve has been moved from its normal position (typically meaning that the valve has been shut) or that the control valve has been restored back to its normal position.

Room Temperature

Water-based fire suppression systems are required to be maintained above a temperature of 40°F (4°C) where the system piping is filled with water. One way to ensure that these systems are not subject to freezing temperatures is to utilize the fire alarm system. This is done by placing temperature devices that can send a signal to the fire alarm control unit when the temperature in a space has dropped below 40°F (4°C) and for when the temperature has been restored to a temperature above 40°F (4°C).

If a building has a fire suppression system other than a sprinkler system such as a kitchen hood suppression system, or an inert gas system, it may be required to be monitored by the fire alarm system. Based on the system type and the building occupancy, some of the signals may appear on the fire alarm control unit as a supervisory signal, which indicates that there is an issue with the suppression system that must be addressed. The other suppression systems may be connected directly to the building fire alarm control unit, or the other suppression system is controlled by its own fire alarm control unit (known as a releasing panel) that is then connected to the buildings main fire alarm control unit.

Other Suppression Systems



Some water-based fire suppression systems such as a dry pipe or preaction sprinkler system may require the use of pressurized air or nitrogen within the system piping. In some cases, the pressure within the piping is required to be supervised by the fire alarm system. This is done using pressure transducers or pressure switches that are connected to the fire alarm control unit. A supervisory condition may then be created if the pressure in the piping is too high, or too low.

Fire Pump

If the building has a fire pump that supplies a water-based fire suppression system such as a sprinkler system or a standpipe system, the fire alarm control unit is connected to the fire pump controller to monitor for the following conditions:

- Pump or engine running
- Controller main switch off normal
- Trouble with the controller or engine
- Main power to electric fire pump disconnected
- Phase reversal on electric fire pump
- Loss of phase on electric fire pump

For more information on fire pumps take a look at this **blog**.

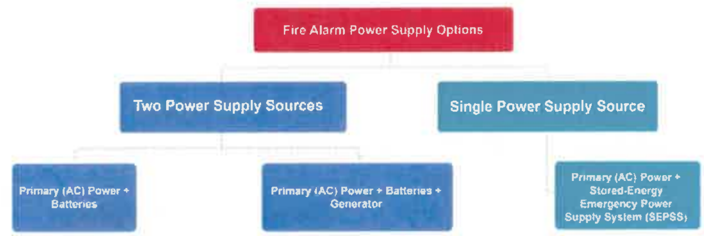
Water Tank

If a water tank is used to supply a water-based fire suppression system, the water level in the tank and the temperature of the water may need to be monitored. This is done by installing water level sensors within the tank that can send a signal if the water level drops by a specified level, and the installation of water temperature sensors that can send signals if the temperature drops below 40°F (4°C) and for when the temperature has been restored to a temperature above 40°F (4°C).

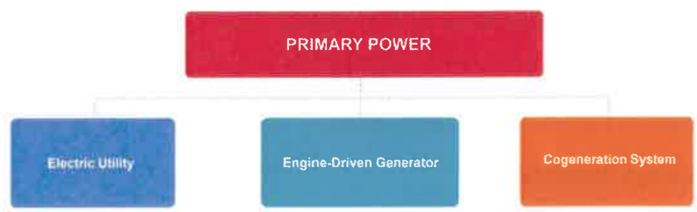
PART 3 Power Supply

It is important for a fire alarm system to be provided with reliable power so it can operate during any emergency. There are a few different options when it comes to choosing a reliable power supply, as well as some calculations that are necessary to ensure that the fire alarm system is provided with sufficient backup power.

There are a few different options out there when it comes to providing a reliable power source. They include providing an additional power source in addition to the primary power such as batteries or an emergency generator so there is backup power if primary power is lost or providing power through a single source such as a stored-energy emergency power supply system (SEPSS).

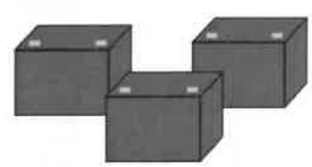


Primary power to the fire alarm system can be provided by the electric utility, an engine-driven generator (this is not a standby generator, however it is a site generator meeting the requirements in NFPA 72®, *National Fire Alarm and Signaling Code®*, and SEPSS, or a cogeneration system.



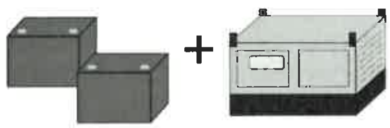
Batteries are a common way to provide a secondary power supply, the most common type of battery is a valve-regulated lead-acid battery and they are typically located within the fire alarm control unit enclosure, or in a separate battery box located near the fire alarm control unit. Batteries need to be sized so that they can provide power to the entire fire alarm system for 24 hours in standby and 5 minutes in alarm, if the system is an emergency voice alarm communication system (EVACS), then the batteries need to provide capacity for 15 minutes in alarm in addition to the 24 hours in standby. The additional time is required to allow for a longer evacuation time as buildings with an EVACS typically utilize a partial evacuation that would require constant communication with the occupants during the evacuation.

Batteries



Another common way of providing a secondary power supply for a fire alarm system is the use of an emergency generator designed, installed, and maintained in accordance with NFPA 110, *Standard for Emergency and Standby Power Systems*, which provides power to the fire alarm system through an automatic transfer switch. If using an emergency generator, you are still required to provide batteries as well just in case there is an issue with getting the emergency generator started. These batteries however, only need to provide a capacity for 4 hours instead of the 24 hours in standby.

Batteries and Generator



Instead of providing two separate power supplies, you are permitted to provide power via a SEPSS otherwise known as an energy storage system (ESS) or an uninterruptible power supply (UPS). The SEPSS must be configured in accordance with NFPA 111 and provide 24 hours of backup battery. The SEPSS is also fed via a compliant primary power supply such as utility power or an on site generator.

Stored-Energy Emergency Power Supply System (SEPSS)

As noted below, if batteries are part of the secondary power source for a fire alarm system then they must be sized to provide capacity to run the system for 24 hours in standby and then either 5 minutes in alarm or 15 minutes in alarm for EVACS. A simple calculation for a basic fire alarm can be seen below.

Battery Calculations

1

Item	Standby Current (AMPS)	QTY	Total Standby Current (AMPS)	Alarm Current (AMPS)	QTY	Total Alarm Current (AMPS)
Fire Alarm Control Unit	0.1	1	0.1	0.2	1	0.2
Smoke Detector	0.001	4	0.004	0.05	4	0.2
Horn Strobe	0	10	0	0.075	10	0.75
	Total System Standby Current (AMPS)		0.104	Total System Alarm Current (AMPS)		1.15

2

Required Standby Time (HRS)	X	Total System Standby Current (AMPS)	=	Required Standby Capacity (AMP-HRS)
24	X	0.104	=	2.496

Required Alarm Time (HRS)	X	Total System Alarm Current (AMPS)	=	Required Alarm Capacity (AMP-HRS)
0.083 (5 mins)	X	1.15	=	0.095

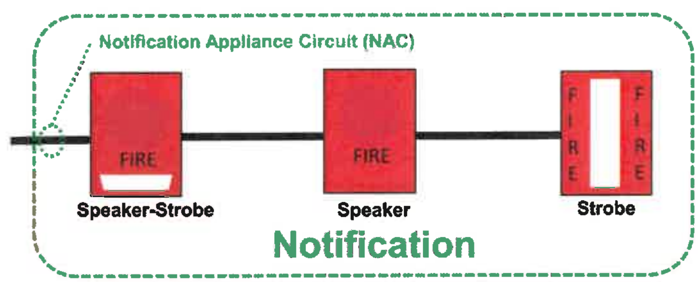
3

Required Standby Capacity (AMP-HRS)	+	Required Alarm Capacity (AMP-HRS)	=	Total Capacity (AMP-HRS)	X	Safety Factor (25%)	=	Required Battery Capacity (AMP-HRS)
2.496	+	0.095	=	2.59	X	1.25	=	3.24

1. First the total system standby current and the total system alarm current is calculated. This is done by multiplying the standby current and alarm current for each piece of equipment by the total quantity of each piece of equipment and adding them together, the result is the total amps required in standby and alarm. Both the standby current and the alarm current for equipment can be found from the manufacturer in the data sheet.
2. Next total standby capacity is required by multiplying the total system standby current by the required 24 hours to achieve the required standby capacity in amp-hrs. The same is done with the alarm capacity, however, instead of 24 hours, the current is multiplied by either 5 minutes (0.083 hours) or 15 minutes (.25 hours) to achieve the required alarm capacity in amp-hrs.
3. Finally, both the standby capacity and the alarm capacity is added together and a 25% safety factor is applied to arrive at the total required battery capacity.

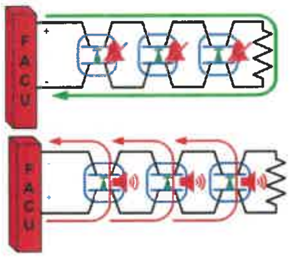
PART 4 Notification

A fire alarm system can notify the occupants and in some cases on site emergency forces of an emergency. Notification is provided via visible and audible notification appliances. The visible notification is typically provided via strobes, and audible notification is provided by either speakers, which can provide different tones and voice signals, or horns, which can only provide a single sound. The fire alarm control unit provides the signal to the notification appliances via a notification appliance circuit (NAC). When a fire alarm system is installed within a building, the requirements for the type of notification (audible, visible, and voice) is driven by the building code, fire code, or life safety code that is adopted in that jurisdiction.



Notification appliances are controlled by the fire alarm control unit (FACU) using a notification appliance circuit (NAC). Each notification appliance has a diode in it that only allows current to pass through it in one direction (think of it like a one way valve). In a non-alarm condition, the FACU will send a small supervisory voltage through the circuit to monitor it for integrity (typically 6 vdc). The supervisory voltage is sent through in a direction such that the diodes do not allow any current to pass through the notification appliances. If the FACU no longer sees the supervisory voltage, it knows that there is an issue and it will create a trouble condition. During an alarm condition the FACU will reverse the polarity of the voltage (switch the direction of the current flow) and increase it (typically to 24 vdc). Since the direction of the flow has changed, the diodes will allow the current to flow through the notification appliances and cause the audible and or visual notification.

Notification Appliance Circuit

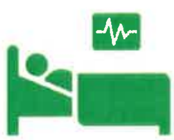


The audible notification can consist of either tones and a voice message, or just tones. Fire alarm speakers are used to create tones and voice messages, while a horn can only create a tone or single sound. Notification appliances can just be speakers or horns, or they can be a combination unit which provides a strobe light in addition to the speaker or horn. You may see these appliances mounted on the wall or on the ceiling.

Audible Notification

The audible notification is designed to produce a specific sound pressure level (volume). This sound pressure level is measured in decibels. The design is based on producing a sound level that is over the ambient sound level of the space. The required sound level is based upon the type of signaling mode the system is using, it can be either public mode signaling, or private mode signaling. There is not a requirement for the specific sound that is used, however, there is a requirement for the sound pattern, and in some cases, there is a requirement for the frequency (pitch) of the sound.

Public Vs Private Mode

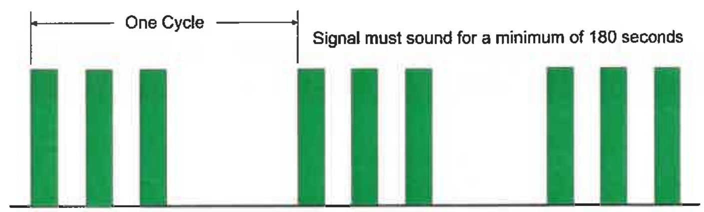


Public mode signaling is used when you want to alert all the occupants within the building that there is an emergency, while private mode signaling is used to only alert the occupants responsible for responding that there is an emergency. For example, a fire alarm system within a restaurant would utilize public mode signaling to alert all the occupants that there is an emergency and that they need to evacuate. On the other hand, in a hospital the fire alarm system may utilize private mode signaling to alert the hospital staff that there is an emergency, and they need to begin evacuating or relocating the patients in accordance with their emergency action plan. For more information on private operating mode, take a look at this **blog**.

Public mode signaling is required to have a sound level that is at least 15 decibels above the average ambient sound level and 5 decibels above the maximum sound level having a duration of 60 seconds, while public mode signaling is only required to have a sound level that is at least 10 decibels above the average ambient sound level and 5 decibels above the maximum sound level having a duration of 60 seconds. In addition to public and private operating mode, there are some requirements that are specific to areas in which occupants may be sleeping.

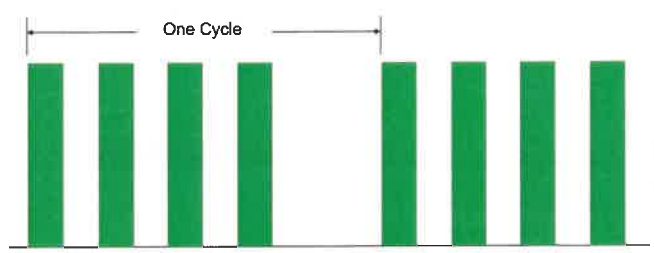
While these operating modes address how a system must be designed in regard to the sound level, it is important to note that some buildings may utilize different zoned notification strategies. For example, a high-rise building may implement a notification strategy where they notify the occupants on the fire floor along with the occupants on the floor above and the floor below. After those floors are evacuated, other floors can be notified to evacuate.

Temporal 3 – Evacuation / Relocation



If the fire alarm system is notifying the occupants that they need to evacuate or relocate, the system must utilize the temporal 3 pattern. There is no requirement for the sound that is used to create the pattern, it can be a horn, bell, chime, or even a slow whoop. In the case of sleeping areas, the sound is required to have a low frequency 520 Hz (typical fire alarm notification frequencies are in the 3150 Hz range) as studies have shown that this low frequency is more effective at waking occupants. For fire alarm systems utilizing a voice message, the voice message will proceed the temporal 3 signal. For an example of a temporal 3 signal take a look at this **video**.

Temporal 4 – Carbon Monoxide



Where the occupants are required to be notified of carbon monoxide within a building, a temporal 4 pattern is to be used. For an example of the temporal 4 take a look at this **video**.

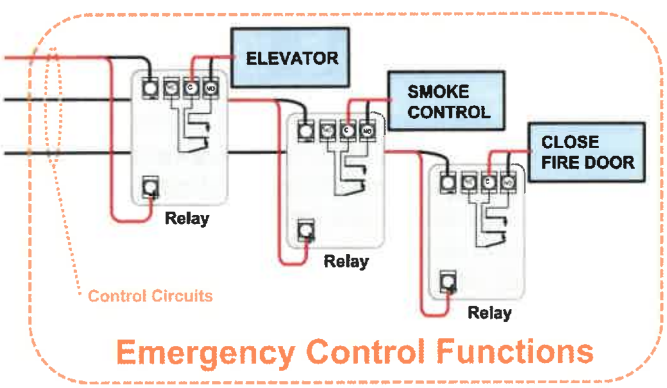
Visual Notification

Speaker-Strobe or **Horn-Strobe** — **Strobe**

Types of visual signaling from a fire alarm system include strobe lights, textual signals, and graphical signals. The most common type of visual signals provided to occupants from a fire alarm system is the use of strobes. The notification appliances that create these visual signals can be just a strobe or can be a combination speaker-strobe or horn-strobe. You may see these appliances mounted on either the wall or the ceiling.

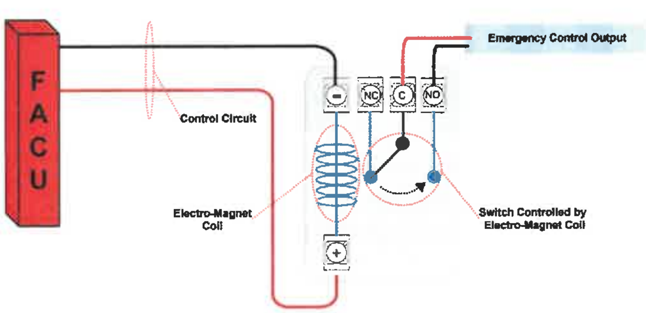
The systems are designed to produce a given amount of light over the area in which notification is required, this light level is measured in lumens/ft^2 or lumens/m^2. Based on the type of notification being provided (private mode or public mode) strobes may be placed to provide notification to all the occupants, or only the occupants responsible for responding.

PART 5 Emergency Control Functions



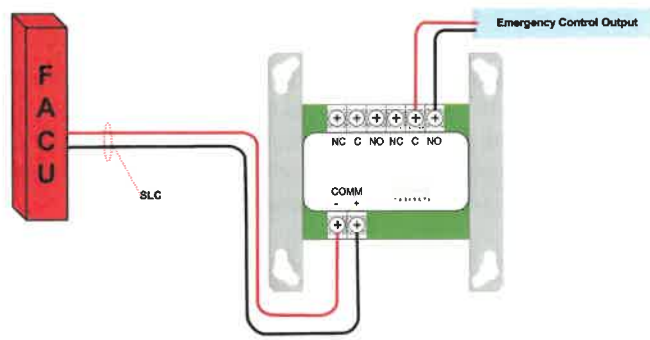
The fire alarm control unit can be used to control the function of other systems such as elevator recall, automatic door closers, smoke control systems, and so on. The most common way that the fire alarm can do this is through the use of a control circuit and a relay.

Relay



A control circuit is essentially a notification appliance circuit (NAC) that is used to send power to a relay instead of notification appliances. A relay is a switch that is open and closed electromechanically and allows the fire alarm control unit to operate emergency control functions. As seen above, power sent from the fire alarm control unit will energize an electro-magnet coil, which will cause the switch, which is controlling power coming into the common terminal (C) to move from the normally closed (NC) position to the normally open (NO) position. This switch can then be used to control other systems.

Output Module

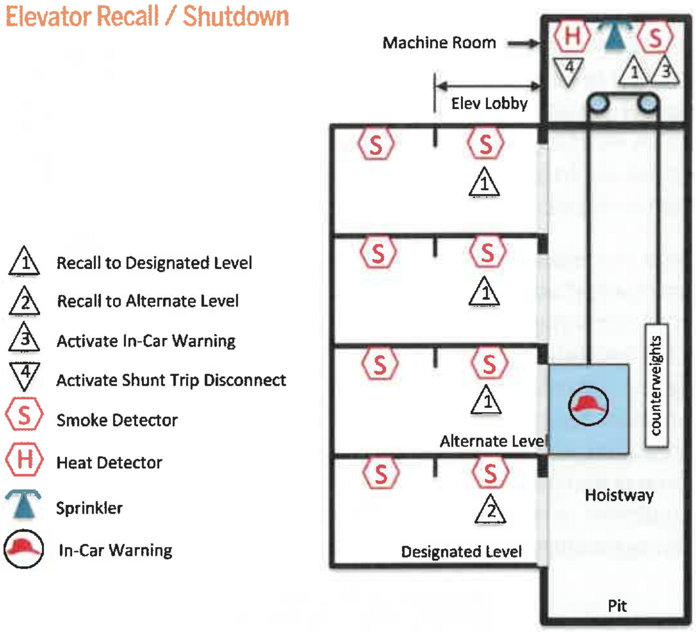


The control outputs from a fire alarm control unit can also be sent out on a signaling line circuit (SLC) to an addressable output module, which can open or close a contact based on information sent from the fire alarm control unit on the SLC to the COMM terminals. This is beneficial because multiple output modules can be controlled by the same SLC, which can control each module separately. For example, all output modules controlling all of the door hold opens in a building could be on the same SLC, but based on the specific input to the control unit, only specific doors can be closed. If all of these modules were on the same control circuit, the control unit would only be able to close all the doors.

The fire alarm control unit can also be used to send a signal to the elevator controller to initiate elevator recall or shutdown. The fire alarm control unit will send a signal to send the elevator to the designated level (typically street level) when a smoke detector on any floor lobby or in the elevator machine room detects smoke, if smoke is detected in the designated level lobby the elevator will be sent to the alternate level (typically the level above the designated level). This is done to protect any of the occupants in the elevator by ensuring that they exit the building and do not go to a floor that has a fire on it.

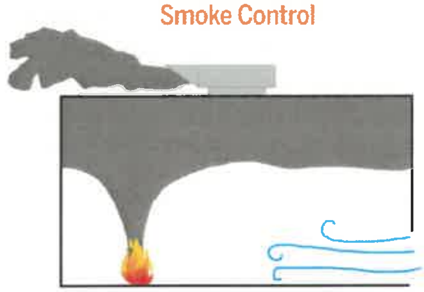
If the elevator hoist way, pit, or machine room is required to have sprinklers, the fire alarm control unit is used to cut power to the elevator via a shunt trip prior to sprinkler activation to protect occupants. This is done by either placing a heat detector with a lower response time index (RTI) next to the sprinkler or by using a waterflow switch next to the sprinkler. The lower RTI means the heat detector would activate before the sprinkler, if a waterflow switch is used, it would need to have a 0 second time delay.

Elevator Recall / Shutdown



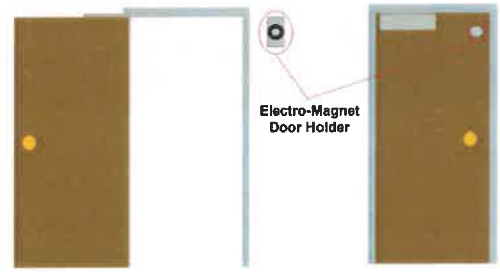
Many building designs include the use of large open spaces such as atriums that connect multiple floors of a building. To keep occupants safe in the event of a fire, a smoke control system may be needed to maintain the level of smoke above the occupants as they are exiting the building. These systems may be composed of exhaust fans and makeup air openings that are all controlled by a separate smoke control panel. The fire alarm control unit is responsible for sending a signal to the smoke control panel to initiate smoke removal when specific smoke detectors, pull stations, and waterflow alarms within the protected space are actuated. Additionally, the fire alarm control unit may be responsible for closing specific fire doors and dampers to enclose the smoke control zone. Want to learn more about smoke control systems? Check out this **blog**.

Smoke Control



If a fire were to start within a building, an important objective is to contain the fire and products of combustion within an enclosed space for as long as possible. This is accomplished through construction that can resist the passage of fire. In most buildings these fire-resistant barriers can be found in corridor walls, and shafts (including stairwells). Openings within the fire-resistant construction need to be protected with fire doors. For these doors to be effective they need to be closed, so they are equipped with automatic closers. In some cases, the fire alarm can be used to hold these doors open with an electro-magnet door holder. Upon alarm, the fire alarm control unit will send a signal to cut power to the electro-magnets allowing the door to close.

Automatic Door Closer



A key piece of documentation for the fire alarm system is known as the input/output matrix. This table outlines all the outputs from the fire alarm control unit when a given input is received. Above is a portion of the input/output matrix outlining elevator recall. An example shown on this chart would be when the fire alarm control unit receives an input from the 1st floor elevator lobby smoke detector (row 6) it will activate the NAC circuit 1 and NAC circuit 2 as well as send a signal to the elevator controller to recall the elevator to the alternate level. This document is key to the proper design of a fire alarm system and is also a crucial when performing testing to ensure that all of these systems are working as intended.

Input Output Matrix

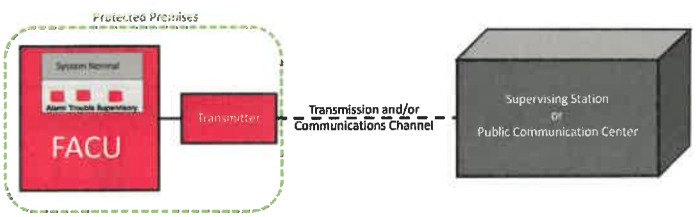
		System Outputs				
		NAC Ckt 1	NAC Ckt 2	Elev. Recall to Designated Level	Elev. Recall to Alternate Level	Machine or Control Space
	Input	A	B	C	D	E
1	Basement	●	●			
2	1st	●	●			
3	2nd	●	●			
4	3rd	●	●			
5	Basement Elev. Lobby SD	●	●		●	
6	1st Elev. Lobby SD	●	●		●	
7	2nd Elev. Lobby SD	●	●	●		
8	3rd Elev. Lobby SD	●	●	●		
9	Elevator Pent. SD	●	●	●		●
10	Elev. Hoist. SD (if used)	●	●	●		●
11	Atrium Beam Det.	●	●			

When a fire alarm control unit controls another system, it is known as system integration. It is crucial that the fire alarm system along with all integrated systems are tested properly. For more information on integrated fire protection and life safety system testing take a look at this **fact sheet** on NFPA 4. **Go here** for an interactive learning module on integrated system testing.

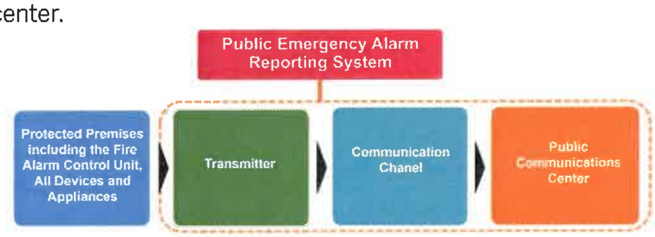
PART 6 Off-Premises Signaling and Supervising Stations

When talking about fire alarm systems, the term premises includes the entire area monitored by the fire alarm, this could include the entire building or even an entire campus. Off premises signaling is important because it allows signals from the fire alarm system to be sent to a constantly attended location (supervising station or a public communication center) to ensure the proper response.

The purpose of off-premises signaling is to provide dedicated, 24-hour monitoring for a fire alarm and signaling system and to initiate the appropriate response to those signals. In the case of a fire alarm condition (fire detected in the building), the appropriate response usually includes the dispatching of the local fire department or fire brigade. In the case of a supervisory condition, such as a closed sprinkler valve, the appropriate response might be the notification of designated maintenance personnel or outside contractors.



If a fire alarm and signaling system is sending signals off premises, it is either (1) sending signals through a public emergency alarm reporting system, or (2) the fire alarm system is part of a supervising station alarm system. Regardless of the system, in today's world they all consist of a type of transmitter at the protected premises that uses a transmission and/or communications channel and pathway to send signals to a receiver at the supervising station or public communications center.

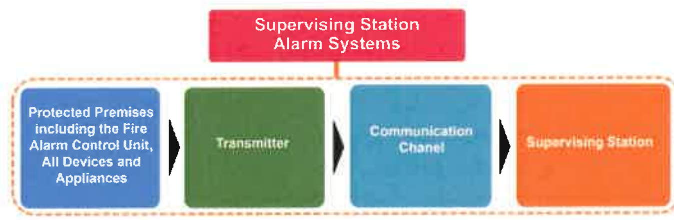


A public emergency alarm reporting system (PEARS), otherwise known as a municipal emergency (fire) alarm system is a communication infrastructure, other than a public telephone network that is used to communicate with a communication center. Typically, this communication infrastructure is owned, operated, and controlled by a public agency. The system itself does not include the fire alarm control unit or any of the equipment that is located on the protected premise, instead, it starts at the transmitter and ends at the public communication center.

One way the interface between the fire alarm control unit and the PEARS is completed is using a master fire alarm box, which is an addressable manual pull station on the PEARS system that has an interface circuit that allows a fire alarm control unit to actuate the master box when the system initiates a fire alarm signal.

Master Box

Large municipalities usually locate the communications center at a facility designed for the purpose. Small communities often locate the communications center at the fire station, police station, sheriff's office, or a private agency that has been contracted to provide public emergency communications services. NFPA 1221, *Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems*, provides requirements for the installation, performance, operation, and maintenance of communications systems and facilities.



If off-premises signaling is provided by a private company, it is most likely completed using a supervising station alarm system. A supervising station alarm system consists of everything connected to the supervising station, including the protected premises fire alarm control unit and devices.

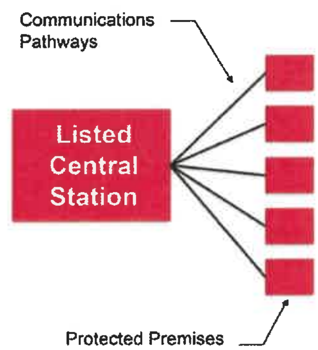
Supervising station alarm systems are further divided into three specific types. They are:

1. Central Station Service Alarm Systems
2. Proprietary Supervising Station Alarm Systems
3. Remote Supervising Station Alarm Systems

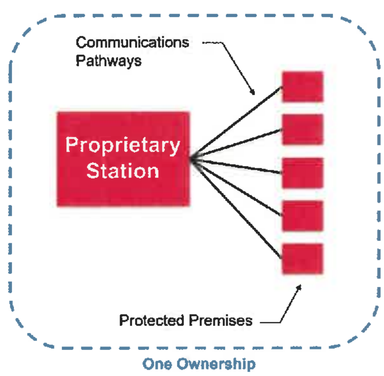
A central station service alarm system consists of a remotely located supervising station that is listed for central station service to UL 827, *Standard for Central-Station Alarm Services*, in addition to monitoring, it provides several other services including record keeping and reporting, testing services, and runner service. This can either be required by code or some insurance companies for certain occupancies. This option can also be chosen by a building owner who wants to have a single contract with a provider who supplies monitoring as well as inspection, testing, and maintenance and other services required of central stations.

A proprietary supervising station alarm system consists of a supervising station under the same ownership as the protected building that it supervises. These can be useful to owners who have very large buildings or a campus or for owners who have numerous buildings in many locations and who are able to dedicate the space and staffing levels to accomplish this. Proprietary supervising stations can be located on the same premises as the fire alarm system or at another location; these are most often used by large airports, industrial plants, college campuses, large hospitals, and retail chains, among other facilities. An example of this is a big box store that has a dedicated location that monitors all of its store locations. Additional fire alarm services including record keeping, equipment installation, inspection, testing, and maintenance are the responsibility of the owner and can be accomplished in-house or be contracted out to an outside contractor.

Central Station Service

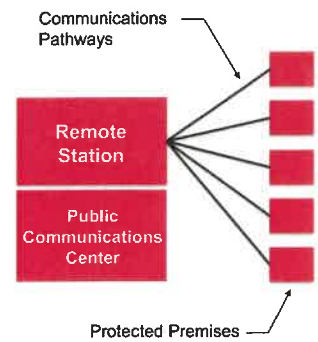


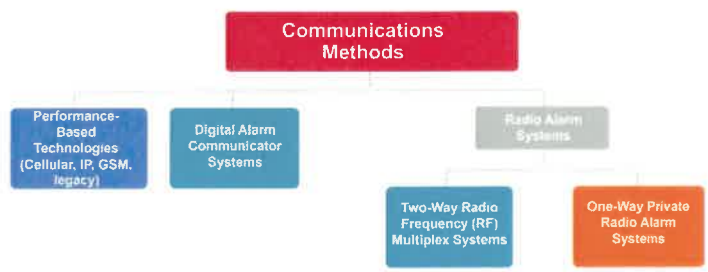
Proprietary Supervising Station



A remote supervising station alarm systems consists of a constantly attended location that receives signals from various protected premises typically owned by different parties. Unlike central station fire alarm systems, contracts for this service are typically limited to the monitoring and recording of signals from the fire alarm system. Additional services including equipment installation, inspection, testing, and maintenance are the responsibility of the owner. This is an option for owners who are not required or do not want to provide central service and for whom a proprietary supervising station does not make sense. It also may be common for a municipality to operate a remote supervising station as a way to receive signals at their communication center if they are not utilizing a public emergency alarm reporting system.

Remote Supervising Station





There are many different methods that can be used for the fire alarm control unit to communicate to the supervising station, and NFPA 72 outlines the requirements for four different types that are permitted in new installations, which includes both wired and wireless methods.

NFPA References Cited

NFPA 4, *Standard for Integrated Fire Protection and Life Safety System Testing*, 2021 edition

NFPA 72®, *National Fire Alarm and Signaling Code®*, 2022 edition

NFPA 110, *Standard for Emergency and Standby Power Systems*, 2022 edition

NFPA 111, *Standard on Stored Electrical Energy Emergency and Standby Power Systems*, 2022 edition

NFPA 1221, *Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems*, 2019 edition

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File Attachments for Item:

EC-4 NFPA 72 Updates to Chapter 24: Two-Way Communications (Southwest Ohio Fire Safety Council)

All certifications (1 hours)

Ohio | Department of Commerce

Mike DeWine, Governor
Jon Husted, Lt. Governor

Sheryl Maxfield, Director

Board of Building Standards

Application for Continuing Education Course Approval

Provider Information:

Name: WHAT'S NEW IN NFPA 72 & OTHER THINGS YOU NEED TO KNOW

Organization: SOUTHWEST OHIO FIRE SAFETY COUNCIL

Address: 8320 MCEWEN RD. CENTERVILLE, OHIO 45458

E-mail: WILLIAM.SUTTER@WASHINGTONTWP.ORG Telephone: 937-433-3083

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Renewals will only be granted for identical content and certifications, within the current code cycle.
Attach a copy of prior course approval letter for confirmation. No further information is required.

New Course Information:

Course title: NFPA 72 - UPDATES TO CHAPTER 24 - TWO WAY COMMUNICATIONS

Course instructor: ROB TSCHIMPERLE - BATH COMMUNICATIONS

Course description: COVER THE CHANGES & REQUIREMENTS OF NFPA 72 CHAPTER 24 TWO WAY COMMUNICATIONS REQUIREMENTS

QUESTION & ANSWER TIME

Instructional hours per session: 1 Number of Sessions: 1

Course Date(s) and Location: 11/02/2023 WASHINGTON TWP TRAINING CENTER

Special Content:

Code Administration: [X]
Existing Buildings: [X]
Electrical Instruction: [X]
Plumbing Instruction: [ ]

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Conference Name: ________
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Course to be offered online? [ ] **On Demand** [X] **Webinar** [ ]

Course Website: NONE TO SPEAK OF AT THIS TIME

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[X] Course Outline or Course Learning Objectives
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[X] Presenter Bio

Please submit application and materials in .pdf format to: michael.lane@com.ohio.gov or BBS@com.ohio.gov

Rob Tschimperle is a Senior Territory Sales Manager with Rath Communications. He has been with Rath for over a decade specializing in the life safety division. With over 15 years' experience, Rob has educated countless industry professionals on Area of Rescue code requirements as well as other life safety systems. In his current role, Rob works with contractors on system design, A/Es on code interpretation, and AHJs with system and code requirements for enforcement and inspections. Rob resides outside of Milwaukee, WI and manages the Midwest territory as well as all national accounts for Rath Communications.

RATH

CONTINUING EDUCATION AIA

Area of Refuge & Elevator Landing Two-Way Communication

AIA/CES Packet

- Communication Requirements
- Signage Requirements
- Code Requirements
- Scope & Design

N56W24720 N. Corporate Circle • Sussex, WI 53089
800-451-1460 • www.rathcommunications.com

Area of Refuge & Elevator Landing Two-Way Communication

Lunch & Learn Program

RATH® is a Registered Provider with the American Institute of Architects (AIA) Continuing Education System (CES). Credit earned on completion of this program will be reported to CES Records for AIA members. Certificates of Completion for non-AIA members available upon request.

This program is registered with the AIA/CES for continuing professional education. As such, it does not include content that may be deemed or construed to be an approval or endorsement by the AIA of any material of construction or any method or manner of handling, using, distributing, or dealing in any material or product. Questions related to specific materials, methods, and services will be addressed at the conclusion of this presentation.

Learning Objectives

International Building Code (IBC) Requirements

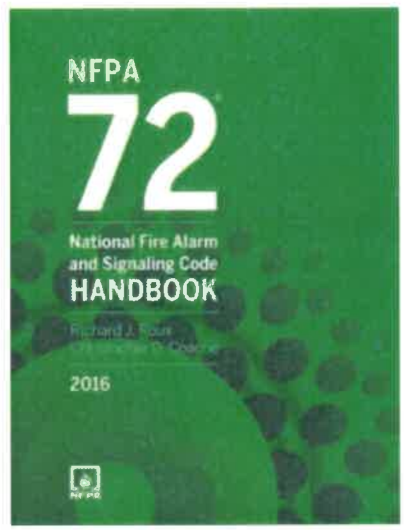
National Fire Protection Association (NFPA) Requirements

Communication Requirements

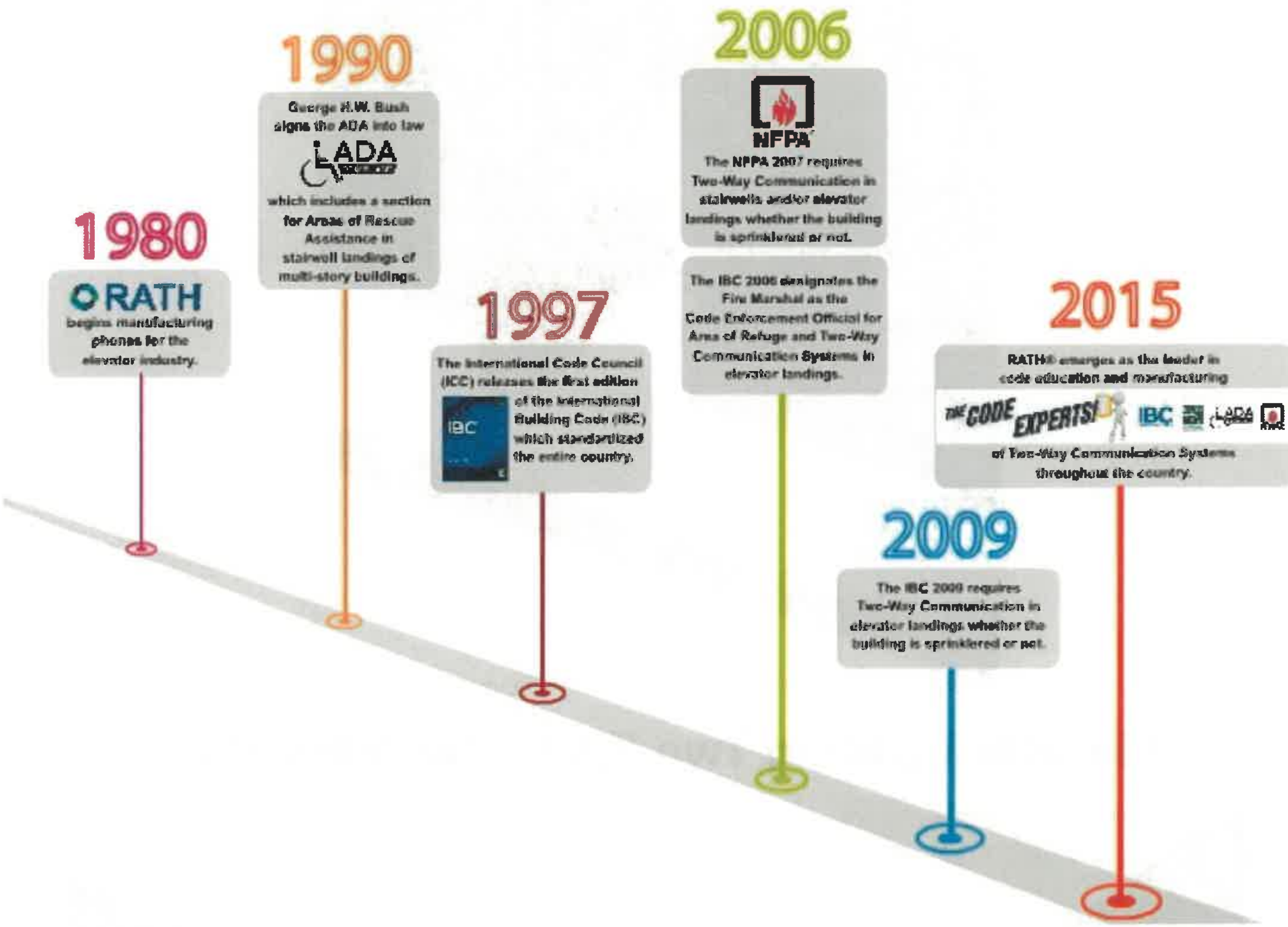
Signage Requirements

Scope & Design

Code Enforcement



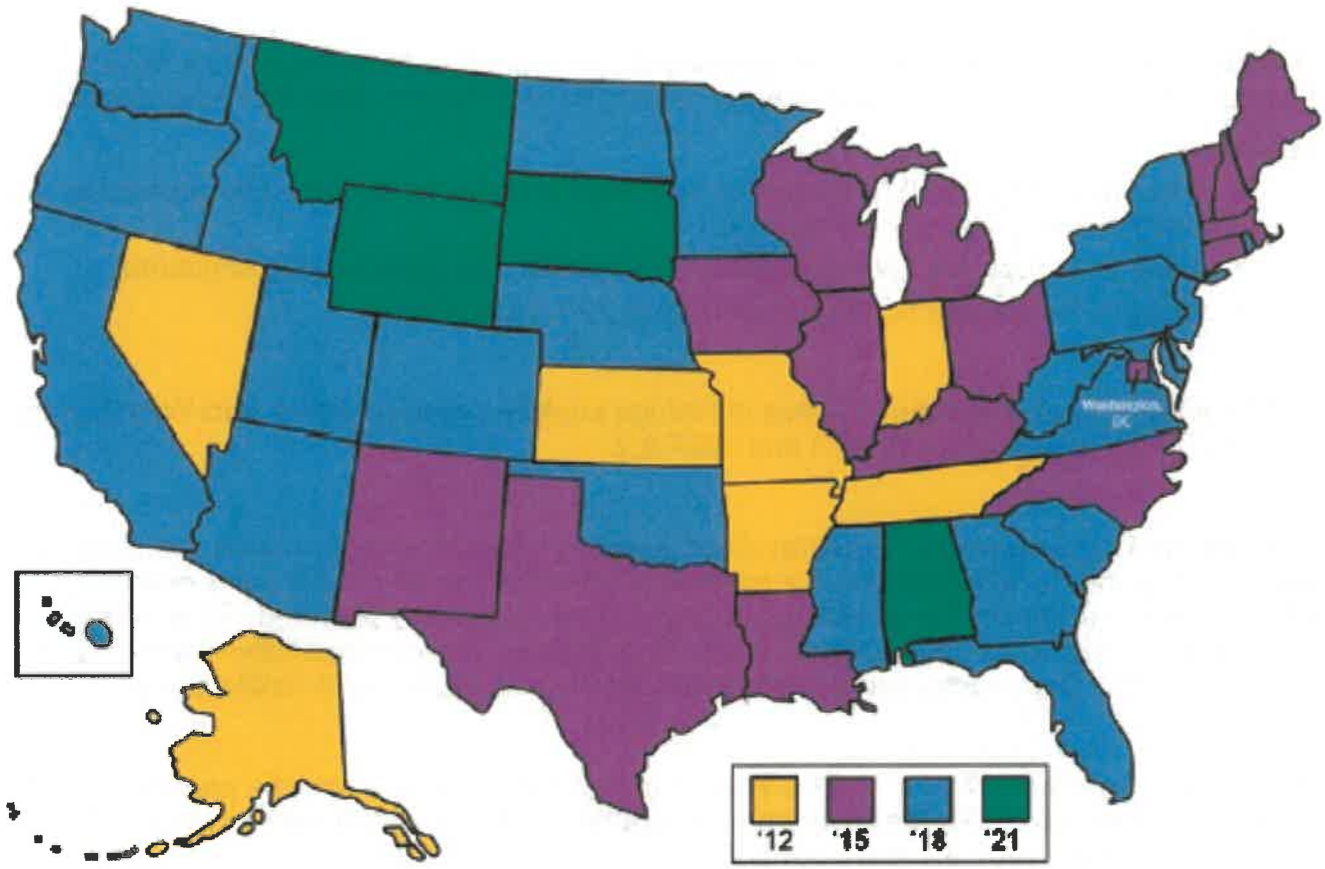
Code Timeline



Area of Refuge Two-Way Communication

Elevator Landing Two-Way Communication

IBC Enforcement



<u>Note:</u> Your area may be enforcing a different version of the code. Please check with your local Authority Having Jurisdiction (AHJ).

1007.3 Stairways. Shall either incorporate an Area of Refuge within an enlarged floor level landing or shall be accessed from either an Area of Refuge complying with section 1007.6 or a horizontal exit.

- **Exceptions:**
    - Areas of Refuge are not required at stairways in buildings equipped throughout by an automatic sprinkler system installed.
    - Areas of Refuge are not required at stairways serving open parking structures.
    - Areas of Refuge are not required in Group R-2 occupancies.

1007.6.3 Two-Way Communication. Areas of Refuge shall be provided with a Two-Way Communication System complying with sections 1007.8.1 and 1007.8.2.

1007.8.1 System Requirements. Two-Way Communication Systems shall provide communication between each required location and the fire command center or central control point locations approved by the fire department. Where the central control point is not constantly attended, a Two-Way Communication System shall have a timed automatic telephone dial-out capability to a monitoring location or 911. The Two-Way Communication System shall include both audible and visible signals.

1007.8 Two-Way Communication. A Two-Way Communication System shall be provided at the elevator landing on each accessible floor that is one or more stories above or below the story of exit discharge complying with Sections 1007.8.1 and 1007.8.2.

- **Exceptions:**
    1. Two-Way Communication Systems are not required at the elevator landing where the Two-Way Communication System is provided within Areas of Refuge in accordance with Section 1007.6.3.
    2. Two-Way Communication Systems are not required on floors provided with exit ramps conforming to the provisions of Section 1010.

1009.6.5 Two-Way Communication. Area of Refuge shall be provided with a Two-Way Communication System complying with Sections 1009.8.1 and 1009.8.2.

1009.8 Two-Way Communication. A Two-Way Communication System complying with Sections 1009.8.1 and 1009.8.2 shall be provided at the landing serving each elevator or bank of elevators on each accessible floor that is one or more stories above or below the level of exit discharge.

Exceptions:

1. Two-Way Communication Systems are not required at the landing serving each elevator or bank of elevators where the Two-Way Communication System is provided within Areas of Refuge in accordance with Section 1009.6.5.
2. Two-Way Communication Systems are not required on floors provided with ramps conforming to the provisions of Section 1012.
3. Two-Way Communication Systems are not required at the landings serving only service elevators that are not designated as part of the accessible means of egress or serve as part of the required accessible route into a facility.
4. Two-Way Communication Systems are not required at the landings serving only freight elevators.
5. Two-Way Communication Systems are not required at the landing serving a private residence elevator.
6. Two-Way Communication Systems are not required in Group I-2 or I-3 facilities (2018 IBC).

1009.8.1 System Requirements. Two-Way Communication Systems shall provide communication between each required location and the fire command center or a central control point location approved by the fire department. Where the central control point is not a constantly attended location, a Two-Way Communication System shall have a timed automatic telephone dial-out capability to a monitoring location or 911. The Two-Way Communication System shall include both audible and visible signals.

1009.8.2 Directions. Directions for the use of the Two-Way Communication System, instructions for summoning assistance via the Two-Way Communication System and written identification of the location shall be posted adjacent to the Two-Way Communication System. Signage shall comply with the ICC A117.1 requirements for visual characters.

1009.9 Signage. Signage indicating special accessibility provisions shall be provided as shown:

1. Each door providing access to an Area of Refuge an adjacent floor area shall be identified by a sign stating: AREA OF REFUGE.
2. Each door providing access to an exterior Area for Assisted Rescue shall be identified by a sign stating: EXTERIOR AREA FOR ASSISTED RESCUE.

- Signage shall comply with the ICC A117.1 requirements for visual characters and include the International Symbol of Accessibility. Where exit sign illumination is required by Section 1013.3, the signs shall be illuminated. Additionally, visual characters, raised character and braille signage complying with ICC A117.1 shall be located at each door to an Area of Refuge and exterior Area for Assisted Rescue in accordance with Section 1013.4.

1009.10 Directional Signage. Directional signage indicating the location of all other means of egress and which of those are accessible means of egress shall be provided at the following:

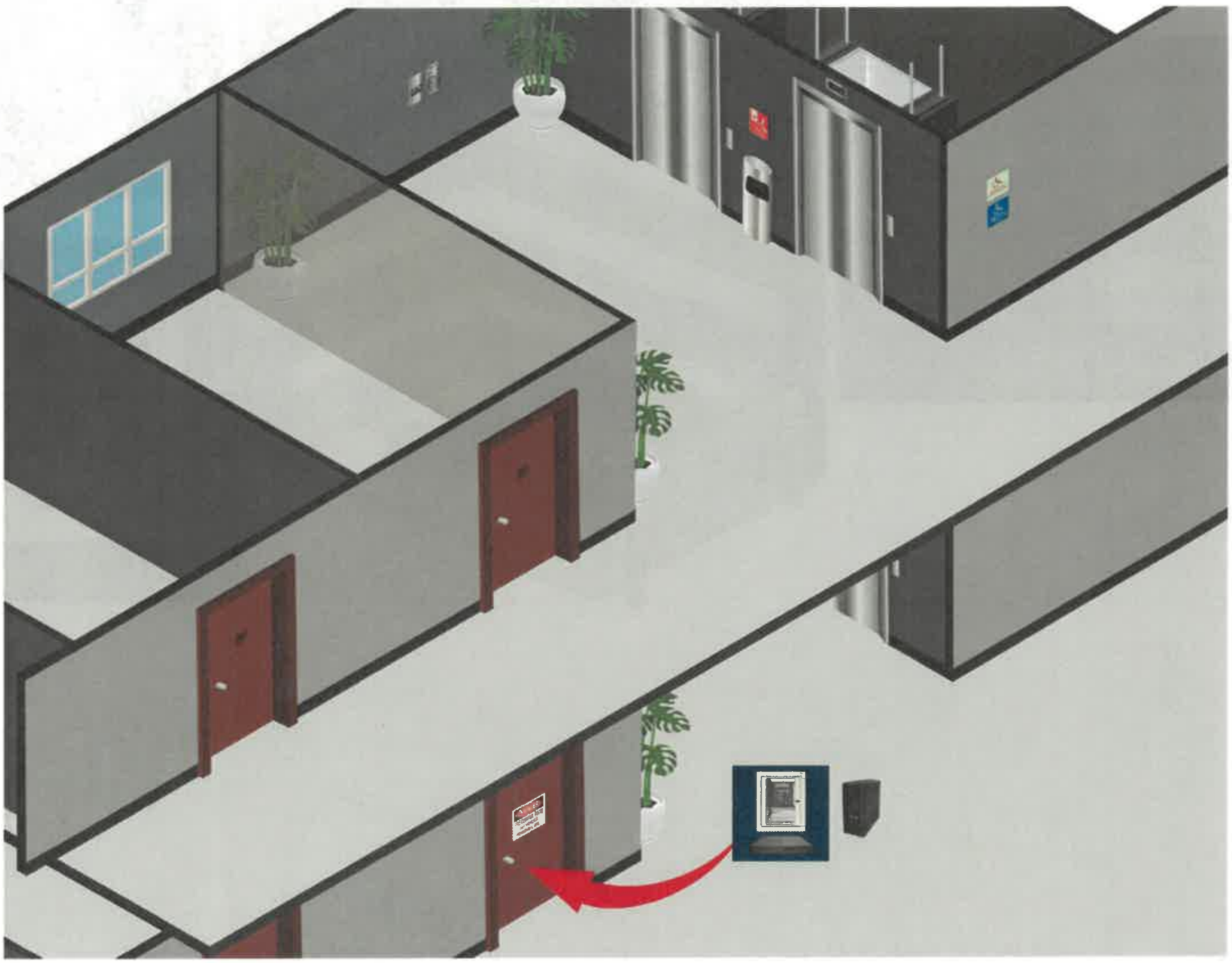
1. At exits serving a required accessible space but not providing an approved accessible means of egress
2. At elevator landings
3. Within Area(s) of Refuge

1009.11 Instructions. In Areas of Refuge and exterior Areas for Assisted Rescue, instructions on the use of the area under emergency conditions shall be posted. Signage shall comply with the ICC A117.1 requirements for visual characters. The instructions shall include all of the following:

1. Persons able to use the exit stairway do so as soon as possible, unless they are assisting others.
2. Information on planned availability of assistance in the use of stairs or supervised operation of elevators and how to summon such assistance.
3. Directions for use of the Two-Way Communication System where provided.

Components

- **Base Station:** With two-way voice off-site communication capabilities (if not attended 24/7)
- **Call Box:** In stairwell or elevator landing on each floor above or below exit story of discharge
- **Power Supply (System Must Include Battery Backup Power)**
- **Signage At Each Location**



IBC 2009- 403.5.3.1

Stairway Communication System. A telephone or other two-way communications system connected to an approved constantly attended station shall be provided at not less than every fifth floor in each stairway where the doors to the stairway are locked.

NFPA 72- 2016

Two-Way Communication Requirements:

- **24.10.1:** Where required by the building code in force, an area of rescue assistance two-way communication system shall be installed in accordance with 24.10.
- **24.10.2:** The area of refuge (rescue assistance) emergency communications system shall be comprised of remotely located area of refuge stations and a central control point.
- **24.10.5:** If the central control point is not constantly attended, it shall have a timed automatic communications capability to connect with a constantly attended monitoring location acceptable to the Authority Having Jurisdiction where responsible personnel can initiate the appropriate response.
- **24.10.6:** The physical location of the central control point shall be as designated by the building code in force or the Authority Having Jurisdiction.
- **24.10.8:** Instructions for the use of the two-way communication system, instructions for summoning assistance via the two-way communication system, and written identifications, including in braille, of the location shall be posted adjacent to the two-way communications system.

Supervision Requirements:

- **24.10.4:** All pathways between a remote area of refuge station and the central control point shall be monitored for integrity.
- **24.13.4.1:** All control units shall meet the power supply requirements of section 10.6.
- **10.6.9: Monitoring Integrity of Power Supplies.**
  - **10.6.9.1:** Unless otherwise permitted or required by 10.6.9.1.3 and 10.6.9.1.6, all primary and secondary power supplies shall be monitored for the presence of voltage at the point of connection to the system.
    - **10.6.9.1.1:** Failure of either the primary or secondary power supply shall result in a trouble signal in accordance with section 10.14.
- **10.6.7.2.1:** The secondary power supply (battery backup) shall have sufficient capacity to operate the system under quiescent load (system operating in a non-alarm condition) for a minimum of 24 hours and, at the end of that period, shall be capable of operating all alarm notification appliances used for evacuation or to direct aid to the location of an emergency for 5 minutes.
  - **10.6.7.2.1.1:** Battery calculations shall include a minimum 20 percent safety margin above the calculated amp-hour capacity required.

NFPA 72- 2016 Continued

Cable Requirements:

24.3.13.9.1: Area of refuge emergency communication systems shall have a pathway survivability of Level 2 or Level 3 (Level 1 is permitted where the building is less than 2 hour fire-rated construction).

12.4.3 Pathway Survivability Level 2 shall consist of one or more of the following:
(1) 2 hour fire-rated circuit integrity (CI) or fire-resistive cable
(2) 2 hour fire-rated cable system (electrical circuit protective systems)
(3) 2 hour fire-rated enclosure or protected area
(4) performance alternatives approved by the Authority Having Jurisdiction

12.4.4 Pathway Survivability Level 3 shall consist of pathways in buildings that are fully protected by an automatic sprinkler system in accordance with NFPA 13 and one or more of the following:
(1) 2 hour fire-rated circuit integrity (CI) or fire-resistive cable
(2) 2 hour fire-rated cable system (electrical circuit protective systems)
(3) 2 hour fire-rated enclosure or protected area
(4) performance alternatives approved by the Authority Having Jurisdiction

Testing Requirements:

Table 14.3.1 #25:
"Periodic testing frequency" – Annual

INSPECTION, TESTING, AND MAINTENANCE 72-83

Table 14.3.1 ***Continued***

Component	Initial Acceptance	Periodic Frequency	Method	Reference
24. Reserved				
25. Area of refuge two-way communication system	X	Annual	Verify location and condition.	
26. Reserved				
27. Supervising station alarm systems-receivers				
(a) Signal receipt	X	Daily	Verify receipt of signal.	
(b) Receivers	X	Annual	Verify location and normal condition.	
28. Public emergency alarm reporting system transmission equipment			Verify location and condition.	
(a) Publicly accessible alarm box	X	Semiannual		
(b) Auxiliary box	X	Annual		
(c) Master box				
(1) Manual operation	X	Semiannual		
(2) Auxiliary operation	X	Annual		
29. Reserved				

7.2.12: Area of Refuge (Area of Rescue Assistance) Emergency Communications Systems

7.2.12.1: General.

7.2.12.1.1: An area of refuge used as part of a required accessible means of egress in accordance with 7.5.4; consisting of a story in a building that is protected throughout by an approved, supervised automatic sprinkler system in accordance with Section 9.7; and having an accessible story that is one or more stories above or below a story of exit discharge shall meet the following criteria:

1. Each elevator landing shall be provided with a two-way communication system for communication between the elevator landing and the fire command center or a central control point approved by the Authority Having Jurisdiction.
2. Directions for the use of the two-way communication system, instructions for summoning assistance via the two-way communication system and written identification of the location shall be posted adjacent to the two-way communication system.
3. The two-way communication system shall include both audible and visible signals.

7.2.12.2.5: The area of refuge shall be provided with a two-way communication system for communication between the area of refuge and a central control point. The door opening to the stair enclosure or the elevator door and the associated portion of the area of refuge that the stair enclosure door opening or elevator door serves shall be identified by signage. (See 7.2.12.3.5)

7.2.12.2.6: Instructions for summoning assistance via the two-way communication system and written identification of the area of refuge location shall be posted adjacent to the two-way communication system.

7.2.12.3.5: Each area of refuge shall be identified by a sign that reads as follows: AREA OF REFUGE.

7.2.12.3.5.1: The sign required by 7.2.12.3.5 shall conform to the requirements of ICC/ANSI A117.1 (American National Standard for Accessible and Usable Buildings and Facilities) for such signage and shall display the international symbol of accessibility. Signs also shall be located as follows:

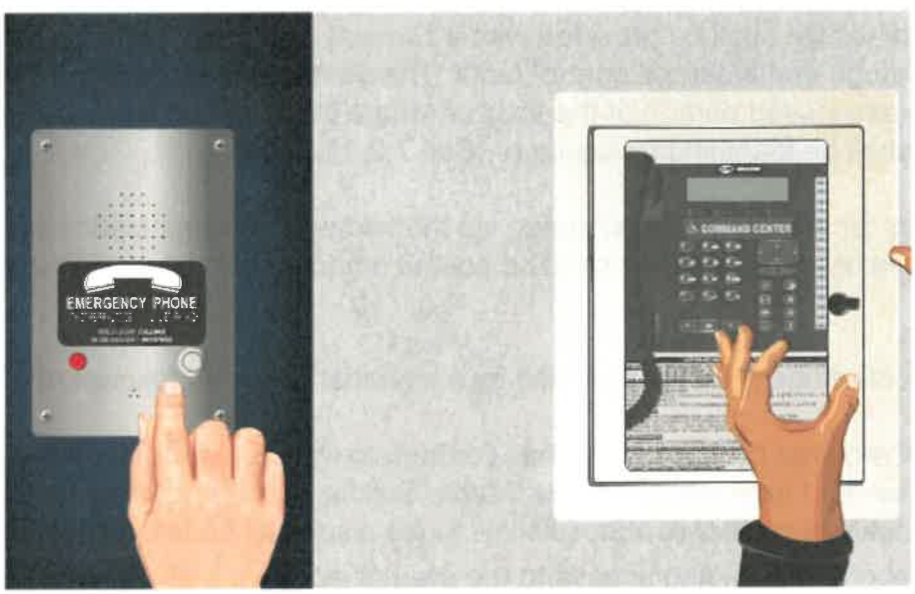
1. At each door opening providing access to the area of refuge.
2. At all exits not providing an accessible means of egress, as defined in 3.3.170.1.
3. Where necessary to indicate clearly the direction to an area of refuge.

7.2.12.3.5.2: Signs required by 7.2.12.3.5 shall be illuminated as required for exit signs where exit sign illumination is required.

7.2.12.3.6: Tactile signage complying with ICC/ANSI A117.1 shall be located at each door opening to an area of refuge.

Communication Requirements

- Provide audible and visual communication between each Call Box and central control point (Base Station)
- If the central control point is not constantly attended, the Two-Way Communication System shall call off-site with Two-Way Communication
- The Call Box shall provide hands-free Two-Way Communication
- Provide an audible and visible indication to the receiver which Call Box location is sending a signal
- A visual indicator on the Call Box letting the calling party know that the call has been placed and that help is on the way
- System shall be on battery backup
- Remote Call Box should be mounted 48” from floor to push button
- Base Station should be mounted 60” from floor to center of unit



Call Box | **Central Control Point (Base Station)**

Offsite Communication Options

Analog/POTS Line (no interface needed)

Digital Phone Line (no interface needed)

Cellular Interface

- NFPA 72 supervision compliance
- Carrier availability

VoIP Interface

- NFPA 72 supervision compliance
- SIP server or SIP service provider

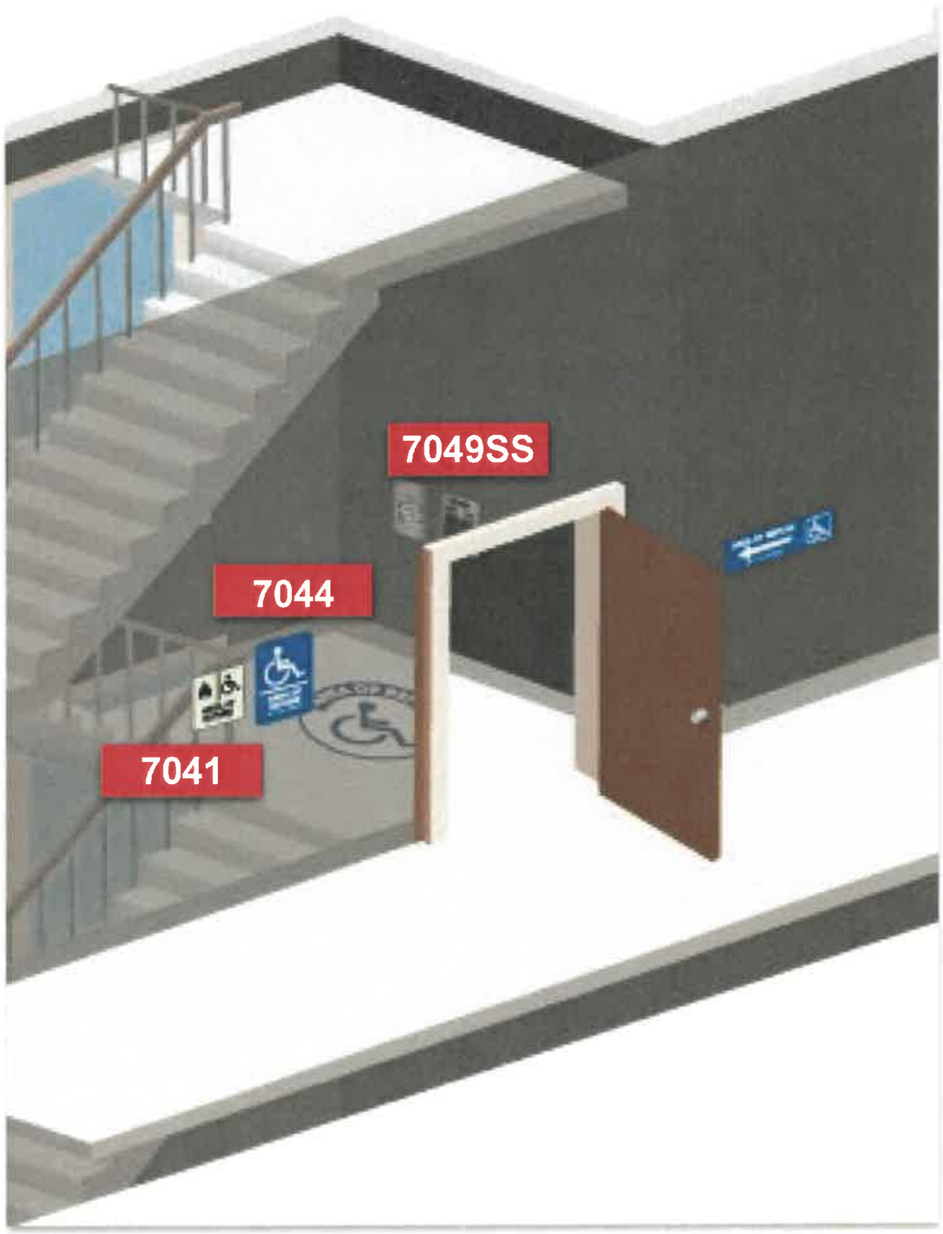
Area of Refuge
Signage Requirements

- Contain the words *AREA OF REFUGE*
- Must display the International Symbol of Accessibility
- Signs must be illuminated when exit signs are illuminated (**7041**)
- Raised letter and braille (tactile) signage required at the entrance to the Area of Refuge (**7044**)
- Directions and instructions on use (**7049SS**)

7041

7044

7049SS



Elevator Landing Signage Requirements

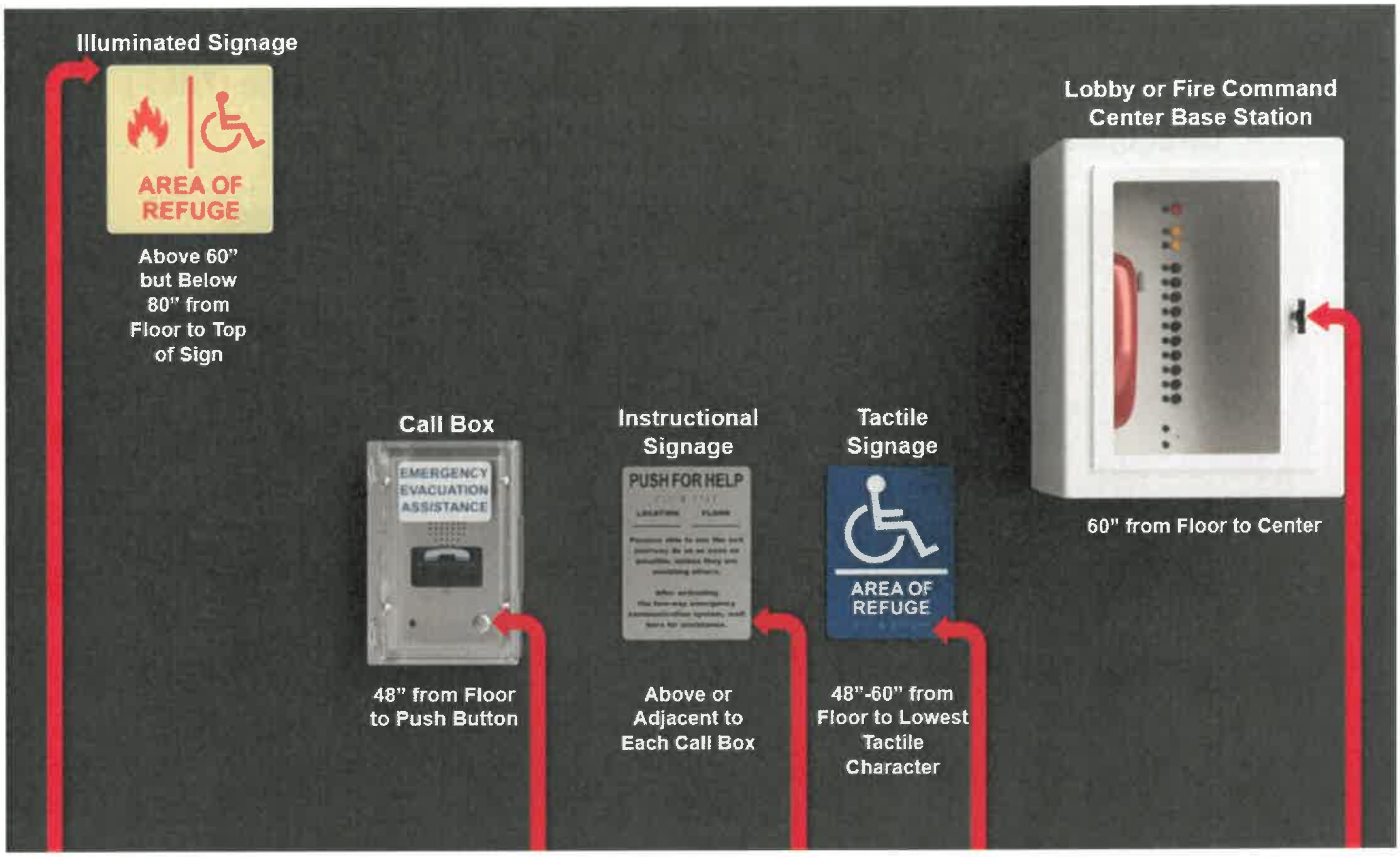
- Must display the International Symbol of Accessibility
- Signs must be illuminated when exit signs are illuminated (**7041E**)
- Raised letter and braille (tactile) signage required at entrance (**7087**)
- Directions and instructions on use (**7049SS**)

7041E

7087

7049SS

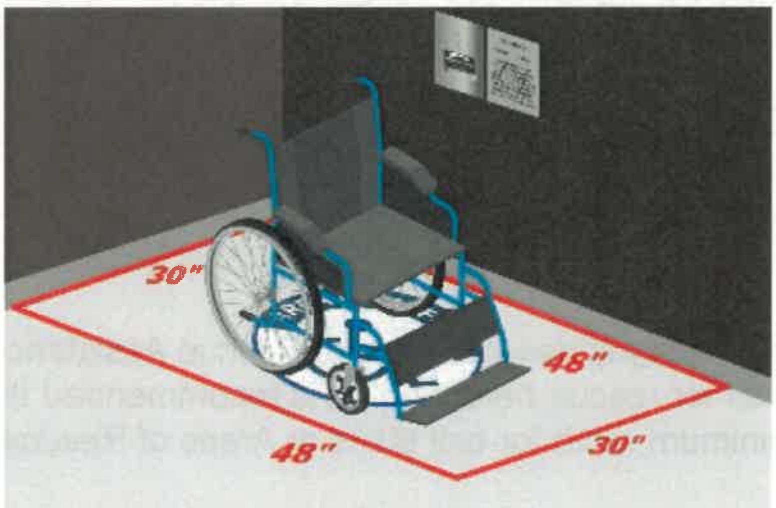
Required Mounting Heights



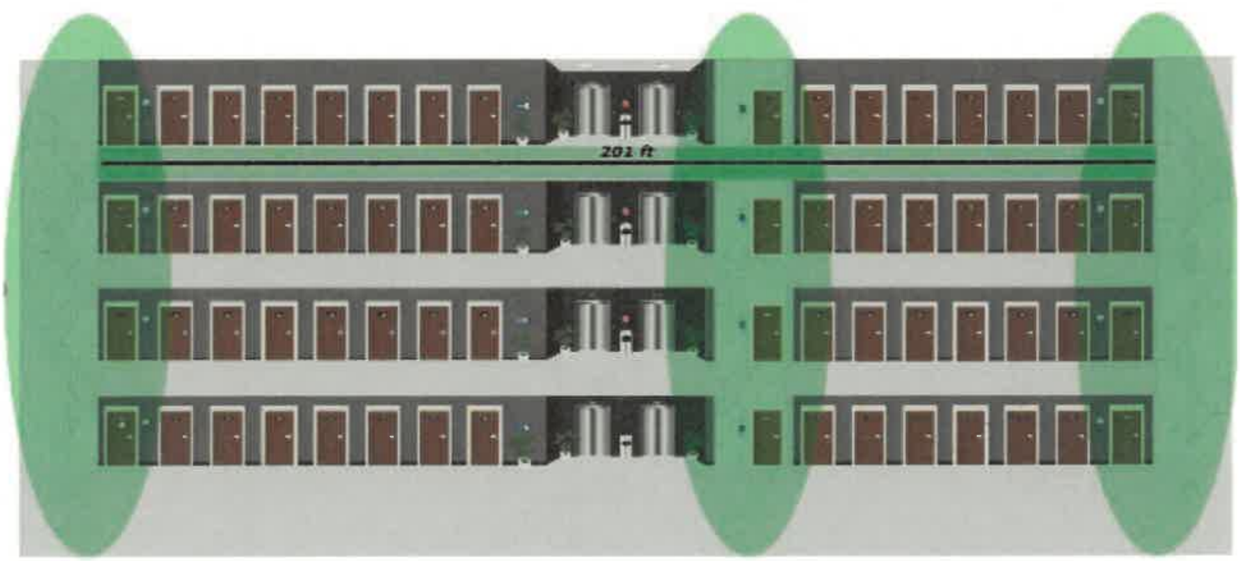
ADAAG Suggested Locations

- Pressurized elevator lobby (IBC suggests as primary)
- Vented stairway landing
- Exterior balcony

Area of Refuge "Real Estate"

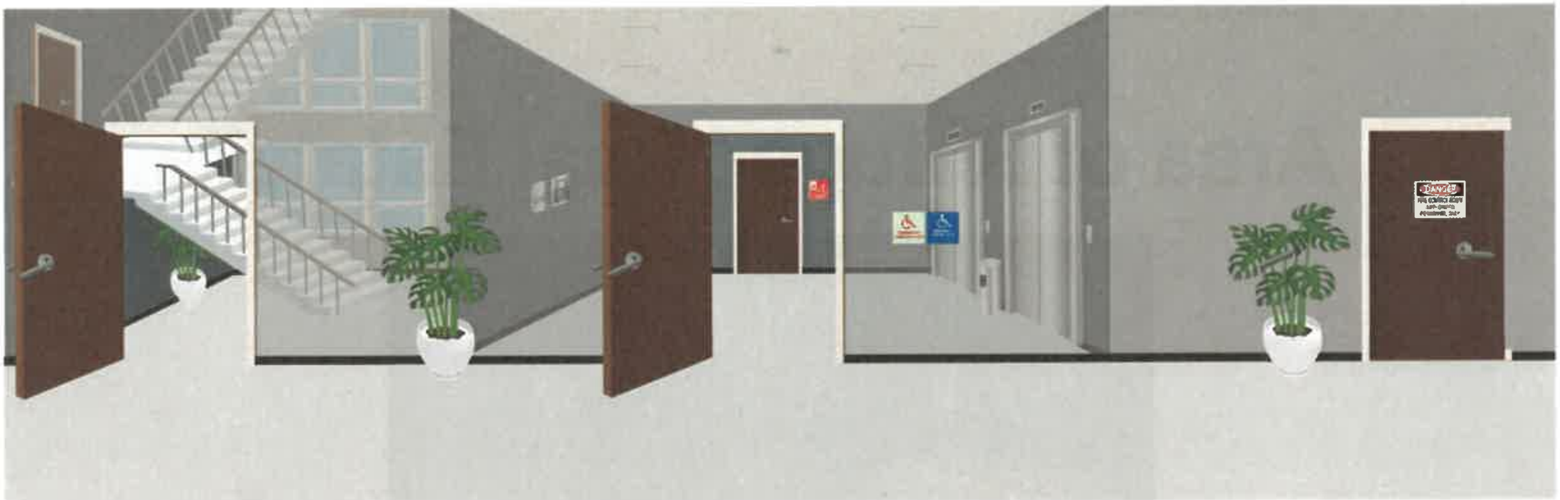


For every 200 occupants on each floor, there shall be (1) 30" x 48" location in the Area of Refuge for a wheelchair.



If a person must travel 200' or more to any given Area of Refuge, another location is required on the same floor (elevator lobby or a different stairwell).

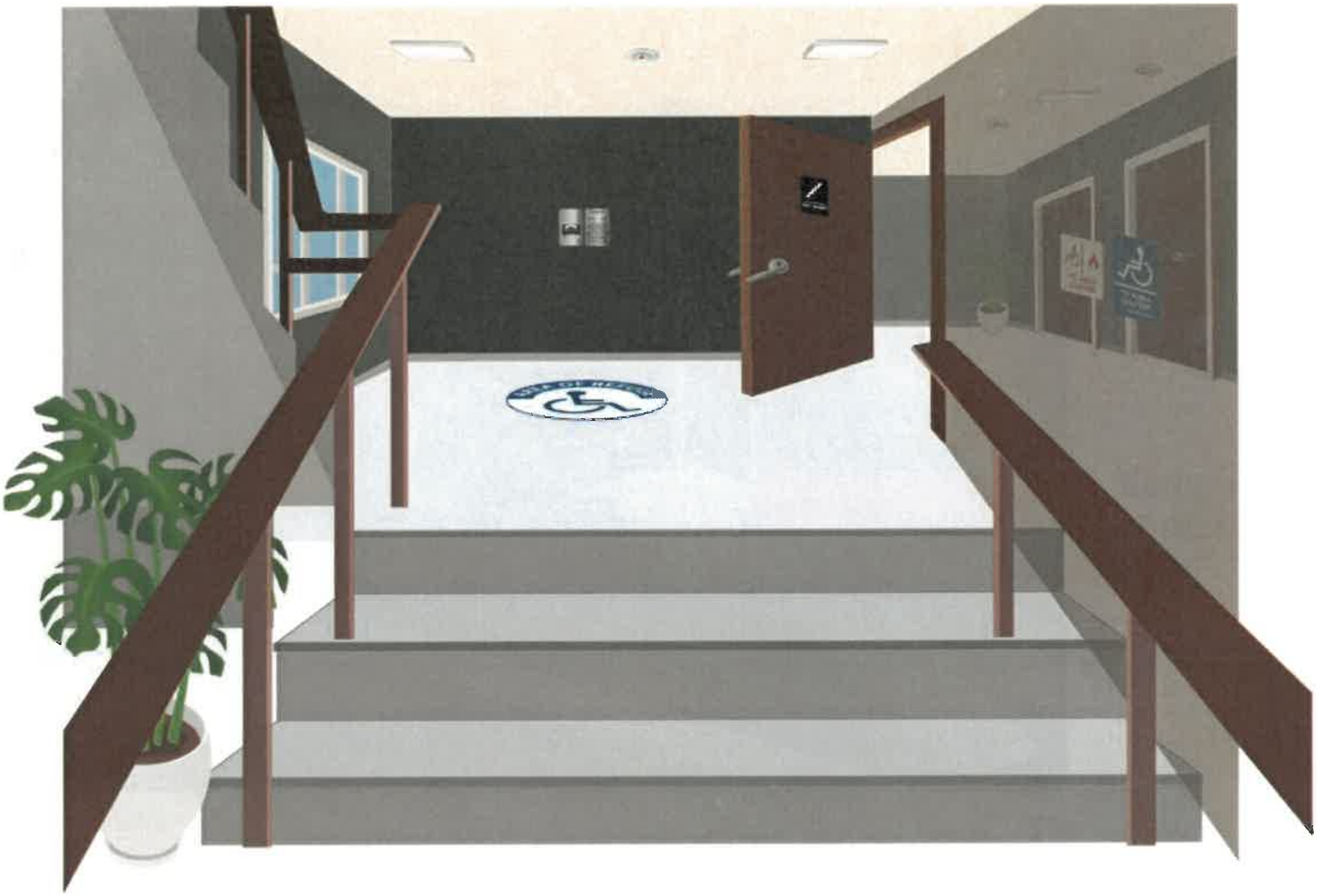
Elevator Lobby



When an elevator lobby is used as Area of Rescue Assistance, there should be an adjacent stair for rescue personnel. It is recommended that this stair have the 48” minimum width for exit stairs at Areas of Rescue Assistance.

Exterior Balcony

Vented Stair Landing



Questions?


LOST
CONFUSED
UNSURE
UNCLEAR
PERPLEXED
DISORIENTED
BEWILDERED

Thank you for your time!

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Sussex, WI 53089
Phone: 800-451-1460
www.rathcommunications.com

Lunch & Learn Program: In Person or via Webinar

Course Description:
RATH's "AREA OF REFUGE" Lunch & Learn program is a 50 minute presentation with an additional 10 minutes of questions and discussion.

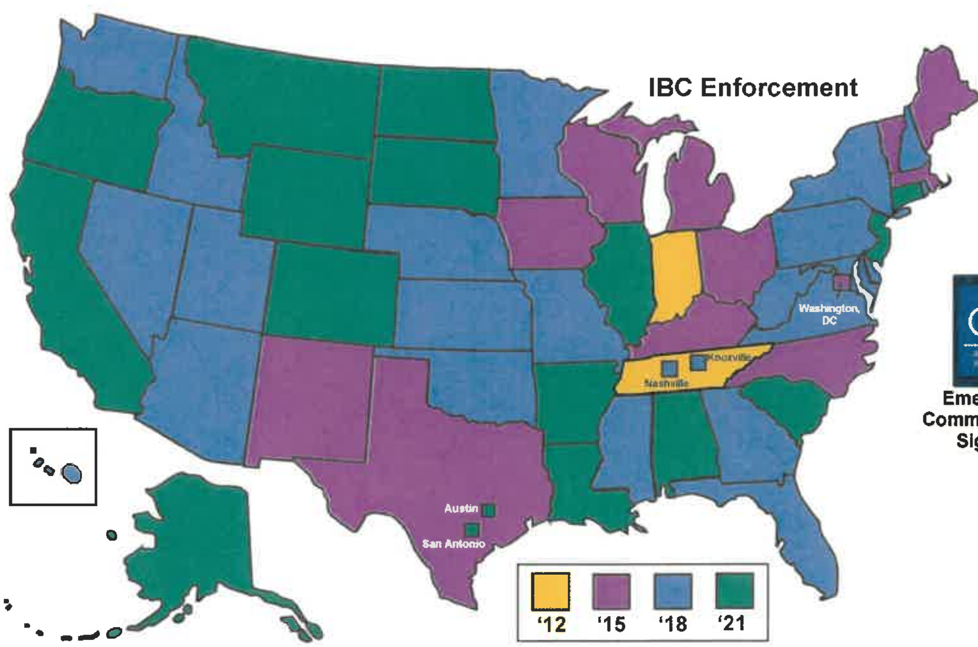
The Course Covers:
- Scope & Design
- Communication & Signage Requirements
- IBC, NFPA & ADA Code Requirements

Location:
Course can be completed at your office or via webinar as part of our distance learning program.

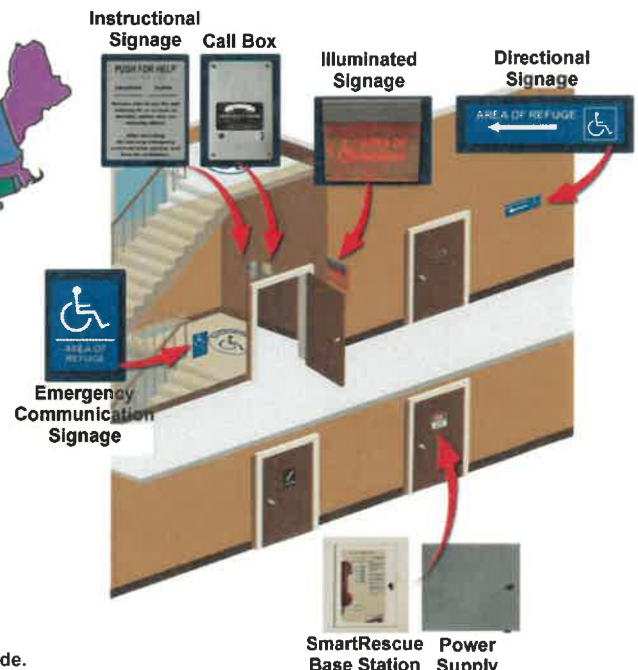
Lunch:
Free catered lunch provided for all attendees.

Continuing Education Units (CEU):
1 AIA CEU in Health, Safety, and Welfare.

Area of Refuge Code Requirements



Note: Your area may be enforcing a different version of the code. Please check with your local Authority Having Jurisdiction (AHJ).



All states require a two-way communication system in all new construction in Elevator Landings or Areas of Refuge, whether or not there is a sprinkler system in the building. Significant remodels or change of use of a building may also require these two-way communication systems.

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CES Course Evaluation
RATH® Area of Refuge

We want to ensure that our training sessions are as meaningful as possible and appreciate your candid feedback of the course.

Please complete and drop off before you leave or mail to:
N56W24720 N. Corporate Circle Sussex, WI 53089 ***Fax #:*** *262-246-4828*

SESSION TITLE: ______________________ AIA #: ______________________

DATE: ______________________ LOCATION: ______________________

Please indicate your role:

☐ Architect ☐ Engineer ☐ Specification Writer ☐ Intern

CIRCLE ONE NUMBER PER QUESTION:

	POOR			EXCELLENT
1. Overall satisfaction with this session:	1	2	3	4
2. Course learning objectives clearly stated and met:	1	2	3	4
3. Satisfaction with the *format* of this workshop:	1	2	3	4
4. Met overall personal objectives for attending:	1	2	3	4
5. Overall quality of training aids (handouts, audio/visual, etc.):	1	2	3	4
6. Quality of session content:	1	2	3	4
7. Overall knowledge and presentation of speaker:	1	2	3	4
8. Applicability/value of new knowledge, ideas, or information:	1	2	3	4

9. This course was non-biased, non-promotional of product, material, or service Yes ☐ No ☐

If no, please explain: ______________________

How could this session be improved? ______________________

____

____

What other topics would be of interest? ______________________

____

Additional Comments: ______________________

Please offer any additional feedback on the reverse of this evaluation. Thanks!

RATH

Cable Requirements:

24.3.13.9.1:

Area of refuge emergency communications systems shall have a pathway survivability of Level 2 or Level 3 (Level 1 is permitted where the building is less than 2 hour fire-rated construction).

12.4.3 Pathway Survivability Level 2 shall consist of one or more of the following:

(1) 2 hour fire-rated circuit integrity (CI) or fire-resistive cable.
(2) 2 hour fire-rated cable system (electrical circuit protective systems).
(3) 2 hour fire-rated enclosure or protected area.
(4) performance alternatives approved by the Authority Having Jurisdiction.

12.4.4 Pathway Survivability Level 3 shall consist of pathways in buildings that are fully protected by an automatic sprinkler system in accordance with NFPA 13 and one or more of the following:

(1) 2 hour fire-rated circuit integrity (CI) or fire-resistive cable.
(2) 2 hour fire-rated cable system (electrical circuit protective systems).
(3) 2 hour fire-rated enclosure or protected area.
(4) performance alternatives approved by the Authority Having Jurisdiction.

Testing Requirements:

- **Table 14.3.1 #25:**

"Periodic testing frequency" – Annual

INSPECTION, TESTING, AND MAINTENANCE 72-83

Table 14.3.1 ***Continued***

Component	Initial Acceptance	Periodic Frequency	Method	Reference
24. Reserved				
25. Area of refuge two-way communication system	X	Annual	Verify location and condition.	
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27. Supervising station alarm systems-receivers				
(a) Signal receipt	X	Daily	Verify receipt of signal.	
(b) Receivers	X	Annual	Verify location and normal condition.	
28. Public emergency alarm reporting system transmission equipment			Verify location and condition.	
(a) Publicly accessible alarm box	X	Semiannual		
(b) Auxiliary box	X	Annual		
(c) Master box				
(1) Manual operation	X	Semiannual		
(2) Auxiliary operation	X	Annual		
29. Reserved				

File Attachments for Item:

EC-5 NFPA Updates and NFPA 3000 (Southwest Ohio Fire Safety Council)

All certifications (2 hours)

Ohio | Department of Commerce

Mike DeWine, Governor
Jon Husted Lt. Governor

Sheryl Maxfield, Director

Board of Building Standards

Application for Continuing Education Course Approval

Provider Information:

Name: What's New in NFPA72 & Other Things you Need to Know

Organization: Southwest Ohio Fire Safety Council

Address: 8320 McEwn Rd. Centerville, Ohio 45458

E-mail: william.sutter@washingtontwp.org Telephone: 937-433-3083

Website: swofsc.org

Conference Sponsor (if applicable) SWOFSC & MVBOC Conference Email: william.sutter@washingtontwp.org

Check here if Course Renewal:______ Prior course number __________ *(i.e. BBS2018-429)*

Renewals will only be granted for identical content and certifications, within the current code cycle. Attach a copy of prior course approval letter for confirmation. No further information is required.

New Course Information:

Course title: NFPA Updates & NFPA 3000 - Active Shooter and Fire Alarm

Course instructor: Meredith Hawes - NFPA

Course description: NFPA - Updates: Public Ed., NFPA Research Foundation, Current NFPA Projects, How to get involved

NFPA 3000 : Incident Data, How NFPA got involved, 4 Main Concepts of NFPA 3000, Resources & Traing

QUESTION & ANSWER SESSION

Instructional hours per session: 1 Hour & 1 Hour Number of Sessions: 1

Course Date(s) and Location: 11/02/2023 - Washington Twp. Training Center - Centerville, Ohio

Special Content:

Code Administration: [X]

Existing Buildings: [X]

Electrical Instruction: [X]

Plumbing Instruction: [ ]

Conference Course: ______

Conference Name: ______

Conference location: ______

Course to be offered online? [ ] **On Demand** [X] **Webinar** [ ]

Course Website: None to speak of at this time

Detail online course participation confirmation method *(i.e. test, quizlets, participant activity confirmation)*:

Handouts, questions & answers, open dialogue

Course applicable for the following certifications

Residential Certifications Only: [ ]

Administrative Course, All Certifications: [X]

Commercial Certifications: [X]

Application materials included:

- [X] Course Outline or Course Learning Objectives
- [X] Presentation Materials/Slides (not required for roundtable courses)
- [ ] Assessment Materials (for online courses)
- [X] Presenter Bio

Please submit application and materials in .pdf format to: michael.lane@com.ohio.gov or BBS@com.ohio.gov

Meredith Hawes is the North Central Regional Director under Field Operations at the National Fire Protection Association. She works to provide technical assistance and support on fire & life safety public education outreach and initiatives. She also promotes the use of NFPA codes and standards at all levels of government; building relationships with a wide variety of stakeholders; and serving as the regional spokesperson for all codes, standards, and advocacy issues on behalf of NFPA. Meredith is responsible for organizing the fire service, building officials, electrical industry, health advocates, facility managers, installers, designers and others to support NFPA's fire safety mission in the states of; Illinois, Indiana, Iowa, Michigan, Minnesota, Ohio, Pennsylvania, and Wisconsin.

Meredith has over 20 years of experience in education. She graduated cum laude with her bachelor's degree in education from Central Michigan University, receiving Michigan Teaching Certification for K-8 with a ZA Endorsement. Her work experience ranges from non-profit administration, corporate training, and public education on a local, state, national, and international level. Meredith previously served as a Regional Education Specialist for NFPA covering a territory of 22 states in the Northwest, Mid-West and Mid-Atlantic Regions of the U.S. Before that, Meredith served as an Education Advisor for the NFPA for five years, and began her work in Public Education with Grand Traverse Metro Fire Department.

As a community builder, Meredith has belonged to many civic organizations and boards. She has coordinated of the Traverse Bay Area Task Force on Hoarding for over nine years, and served as the President of the Board of Directors for the National Cherry Festival in 2021.

In 2010 Meredith received the Educator of the Year Award from the Michigan Fire Inspector's Society, while with the Grand Traverse Metro Fire Department. She also received the Leland Gayheart Award from the University of Michigan Burn Center, is a recipient of the Rolf Jensen Award from the NFPA for innovative programming in public education. In 2020, Meredith was bestowed the President's Award from the Michigan Fire Inspector's Society.

Meredith and her husband Garrett live downtown Traverse City, in Northern Michigan, with their 10 year old son Beckett. And they are proud Navy parents of their 20 year old son Hunter.

NFPA Updates & LiNK

What NFPA resources can do for you!

Meredith Hawes, Regional Director – North Central Region

Today

- NFPA Updates!
  - Public Education
  - Training & Certification
  - Projects
  - Resources – **LiNK!**

Public Education

2023 Fire Prevention Week™

October 8th – 14th

100 YEARS 1922-2022
NFPA FIRE PREVENTION WEEK™

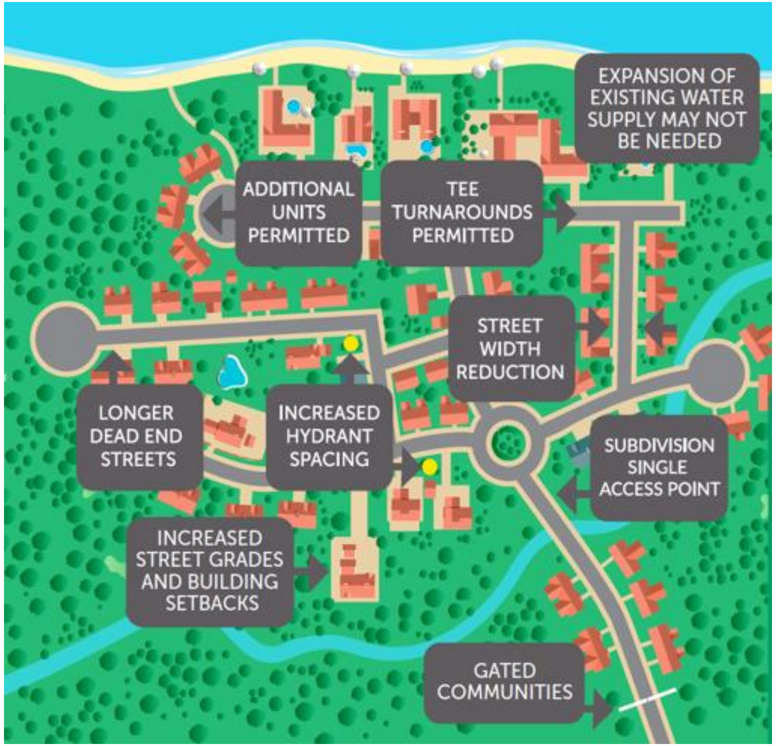
Home Fire Sprinkler Week – May 2024

FIRE SPRINKLER INITIATIVE
Bringing Safety Home

HOME FIRE SPRINKLER COALITION

Home fire sprinkler incentives

- Locally negotiated trade ups that AHJs offer to developers in exchange for installing home fire sprinklers in developments
- Different in each community
- Does not require change in local code/ordinance
- Reduce construction costs and increase builder profit.
- Protect occupants and firefighters.



Homefiresprinkler.org


NOBODY KNOWS MORE ABOUT RISK THAN CRAIG.
LEARN MORE

Completing your Community Risk Assessment?

CRAIG 1300 does the hard work for you.

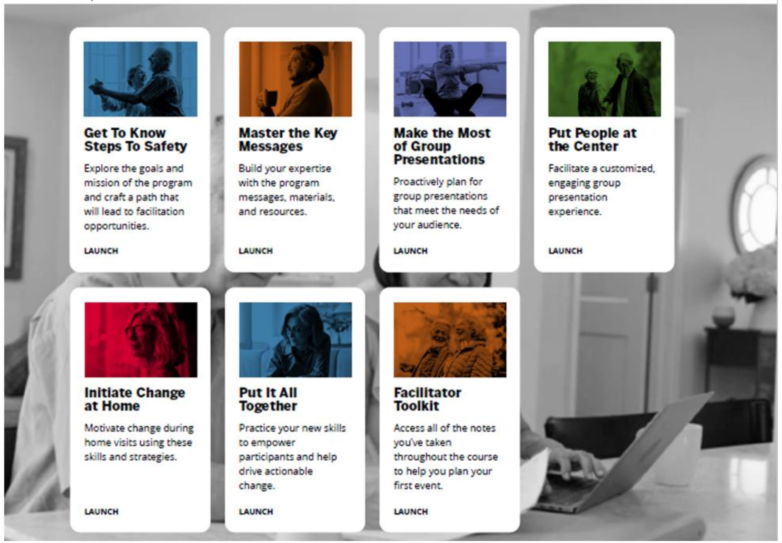
- Aligned to NFPA 1300
- Explores a wide-range of hazards
- Enables trend discovery by presenting multiple years of data
- Provides graphs, charts, and maps to answer Who? What? When? & Where?
- Page descriptors explain why the data sets matter to your community
- Links to helpful resources for CRR planning
- Easily export visualizations and raw data to build presentations and reports
- Mobile optimized & ADA compliant

NFPA.ORG/CRAIG1300

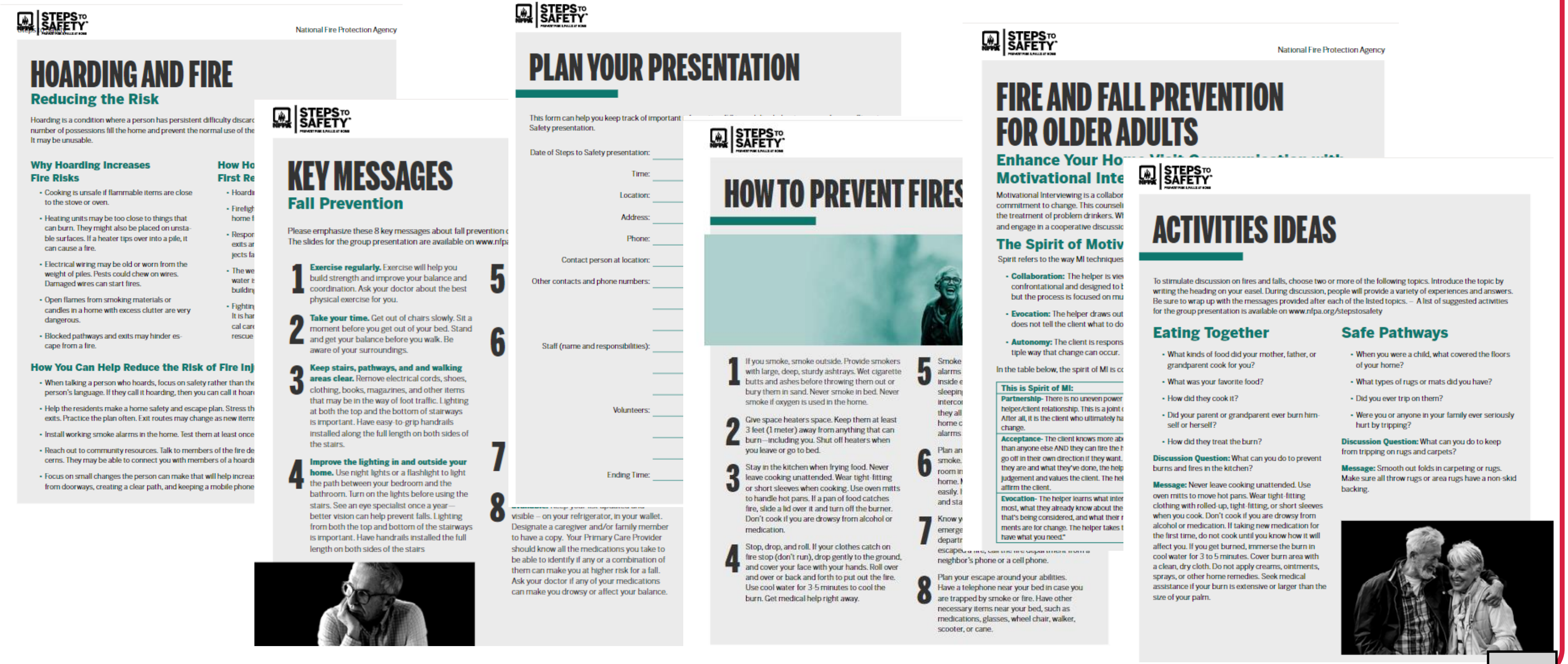
Created in the 90's to pair fire service with community partners to educate and empower older adults to reduce risk of fire and falls

NEW: On-line Learning Curriculum

- Learning Modules with motion graphics and branching activities
  - Group presentations
  - Home visits
  - Fire & Fall messages
  - Personal action planner
- 360-degree Home Visit Simulation
  - Initiating conversations
  - Identifying and addressing hazards
  - Hoarding situations



Job Aids embedded in the curriculum



Safety Tips Sheets

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Campaigns & resources

- Fire Prevention Week www.firepreventionweek.org
- Home Fire Sprinklers www.homefiresprinklers.org
- Wildfire and Firewise www.nfpa.org/wildfire
- Teacher & educator portal www.sparkyschoolhouse.org
- Kids page www.sparky.org

Fire Protection Research Foundation

RESEARCH FOUNDATION

RESEARCH FOR THE NFPA MISSION

For emergency responders

- BETTER HEART: Building Evaluations That Translate Evidence and Research to Heart Evaluations and Related Training (PDF)
- Enhanced Cleaning to Reduce Firefighter Exposure to Carcinogens (PDF)
- Analysis of Firefighter Eating and Sleeping Patterns: Optimizing Daily Eating Time to Reduce Cardio-Metabolic Disease (PDF)
- Crew Resource Management (CRM) Training Development for the Fire Service (PDF)
- Female Firefighter PPE: Investigation of Design, Comfort, and Mobility Issues for Female Firefighter Personal Protective Clothing (PDF)
- Firefighter Exposure to Wildland Fire Smoke (PDF) *(Advisory service project)*
- Occupational Exposure of Firefighters – A Literature Review (PDF)
- Public Safety Small Unmanned Aerial Systems (sUAS) Compliance Training (PDF)
- Firefighter Suicide Prevention Training (PDF) *(Advisory service project)*
- Fire Fighter Cancer Cohort Study (PDF) *(Advisory service project)*
- Economic and Emotional Impact of Active Shooter / Hostile Events (PDF)
- An Analysis of Firefighter Breathing Air Replenishment Systems (PDF)
- Development of Training Materials to Support the Implementation of NFPA 1700, Guide for Structural Fire Fighting (PDF)
- Stranded Energy Within Lithium-Ion Batteries
- Validation of Cleaning Procedures for Fire Fighter Personal Protective Equipment and Other Fire Service Gear

ENERGY STORAGE & SOLAR SYSTEMS

SAFETY TRAINING PROGRAM

NFPA is keeping pace with the surge in energy storage and solar technology by undertaking initiatives including training, standards development, and research so that various stakeholders can safely embrace renewable energy sources and respond if potential new hazards arise.

Live Chat

Refrigerants

Nearly 200 countries have signed an agreement to reduce hydrofluorocarbons (HFCs) - the hydrogen, carbon, fluorine-based compound that is commonly used in refrigerators and air conditioners.

Live Chat

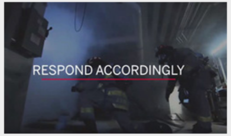
Emerging Issues

ENERGY STORAGE & SOLAR SYSTEMS

SAFETY TRAINING PROGRAM

NFPA is keeping pace with the surge in energy storage and solar technology by undertaking initiatives including training, standards development, and research so that various stakeholders can safely embrace renewable energy sources and respond if potential new hazards arise.

Resources



Updated and expanded online energy storage and solar training

This training now includes solar safety, new research and testing considerations.

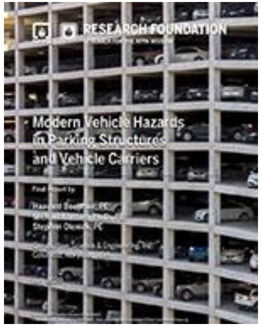
The three-hour, self-paced module with engaging videos, animations, simulations, and review exercises provides basic knowledge of electrical

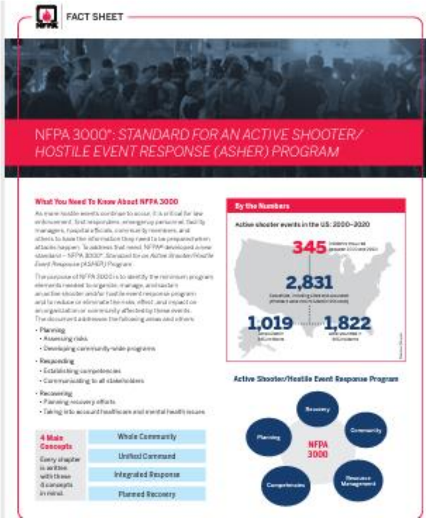
Fact sheet*

The rise in the number of ESS installations requires the need for a heightened understanding of the hazards involved and more extensive measures to reduce the risks.

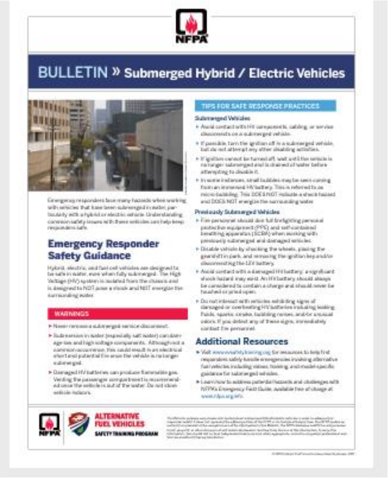
Download the fact sheet.

www.nfpa,org/ess





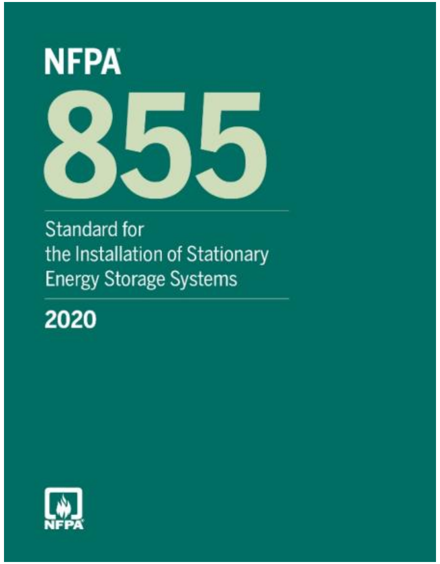
Photovoltaics



E-Bikes & E-Scooters

- Micromobility Device Safety Website
- www.nfpa.org/ebikes
- Safe Charging and Storing

NFPA 855 – Standard on the Installation of Stationary Energy Storage Systems



<u>Standard addresses</u>

- Design
- Construction
- Installation
- Fire Protection
- Fire Prevention
- Commissioning
- Operation
- Maintenance
- Decommissioning

Training & Certification

Certification Learning Paths

• **Premium**
  • **$1045, 44 modules**
• **Primer**
  • **$945, 41 modules**
	• **Premium**
	  • **$699**
	  • **27 modules**
	• **Primer**
	  • **$379**
	  • **8 modules**
		• **Premium:**
		  • **$899**
		  • **31 modules**
		• **Primer:**
		  • **$520**
		  • **10 modules**

- 100% online learning, certification application fee and books sold separately
- Practice Exam - $75 - 400 questions
- à la carte - $54.95
- At learner's pace – 1 full year access
- Great for individuals seeking to improve career
- Great for departments looking to skill up without pulling people off to attend classes
- Group sales available

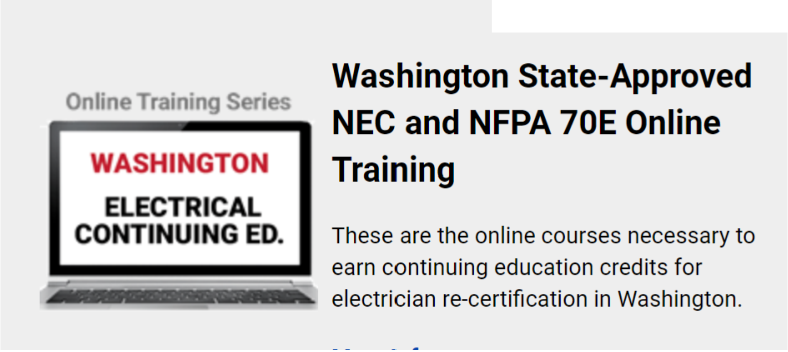
Explorer

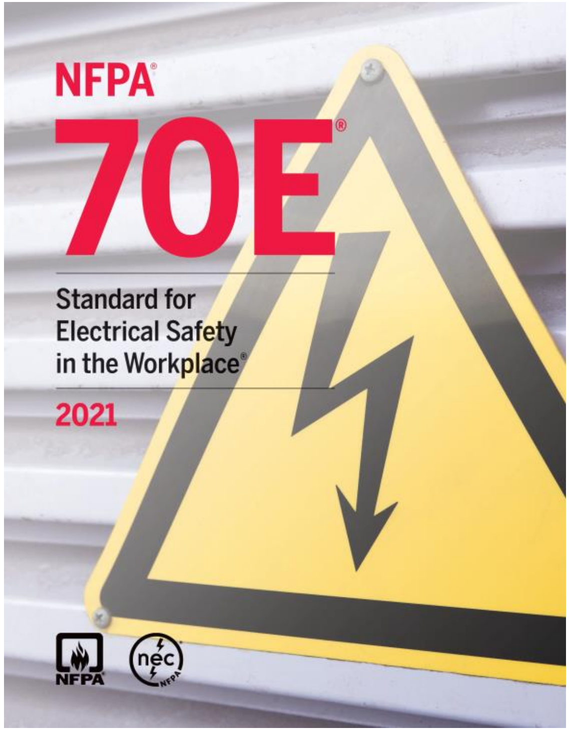
Progress Board

Discount Books

NFPA 70E – Standard for Electrical Safety in the Workplace

- On-line
- Live virtual
- State-approved





Drone Training

NFPA | PUBLIC SAFETY DRONE PROGRAM

 |

Alternative Fuel Vehicles

- Hybrids
- Plug in Hybrids
- Emergency Operation Procedures
- Electric
- AC & DC Charging Stations
- High Voltage Vehicle Safety Systems
- Fuel Cell

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www.evsafetytraining.org

Canadian Customers | International Customers

Welcome Back Meredith. (Not Meredith)

CART MY PROFILE SIGN IN

Search

CATALOG

HOME ADVANCED SEARCH LIST OF CODES AND STANDARDS NEC® CONTACT US

CATEGORIES

- NFPA 70: National Electrical Code (NEC)
- NFPA LiNK®
- Codes and Standards
- Training & Certification
- NFPA Membership - New or Renew
- National Fire Codes Subscription - New or Renew
- Browse Products By Topic
- Top Sellers
- Resources
- Translated Products

Home > Training & Certification > Online Training >

Alternative Fuel Vehicles Safety Training

Sort: Most Popular

Displaying 1 - 11 of 11 results

Electric Vehicle Safety Online Training – Tow and Salvage Edition

More Info

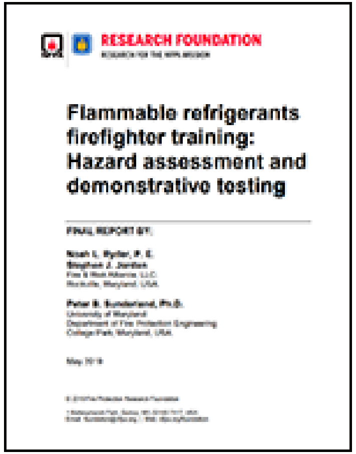
Electric Vehicle Community Preparedness Online Training – Charging Station Installer Edition

More Info

Electric Vehicle Community Preparedness Online Training – Insurance Adjuster Edition

More Info

Flammable Refrigerants Training – 1 hour

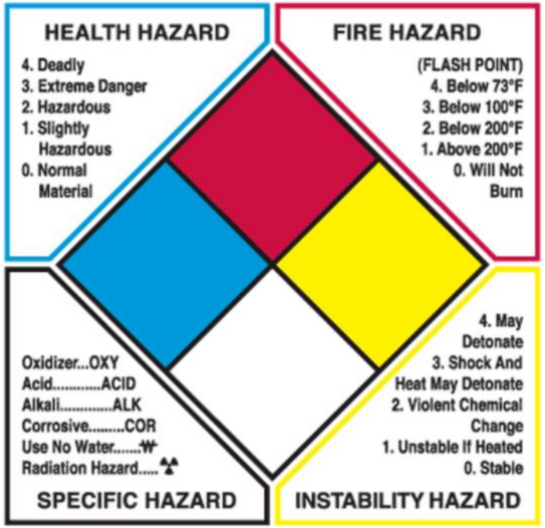

RESEARCH FOUNDATION

Flammable refrigerants firefighter training: Hazard assessment and demonstrative testing

Increased use of environmentally-friendly refrigerant fluids, however, they are also highly flammable.


WAREHOUSE AND RETAIL
FIRE PROTECTION ONLINE TRAINING
Learn More
KEEP YOURSELF AND YOUR
WORKPLACE SAFER.

Hazardous Materials Training
Hazardous Materials Management Training



- NFPA 400, Hazardous Materials Code
- NFPA 30, Flammable & Combustible Liquids Code

Water Based Inspection Testing Maintenance (WBITM)

New Projects

NFPA Standards Consolidation Project

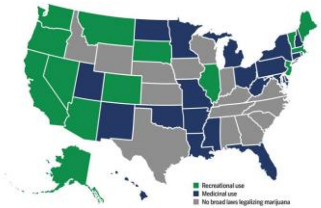
- Consolidating 114 NFPA Emergency Response and Responder Safety standards into approximately 43 documents.
- Creates a single source of information for each technical area
- Reduces conflicts between standards
- Reduces meeting costs for the volunteers
- Provides opportunities for committees to coordinate
- Will allow emergency responders better access to the information in the standards that they need to do their jobs.

www.nfpa.org/errs

2026

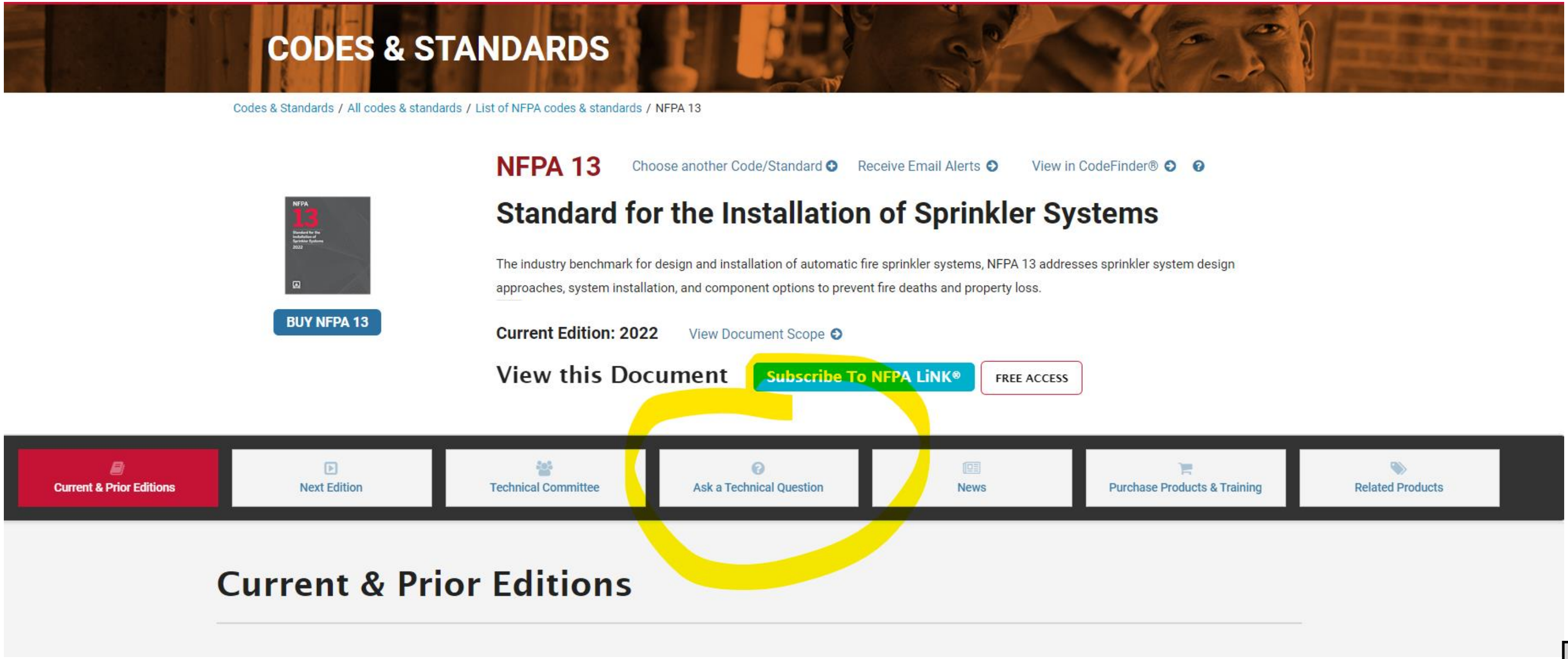
New & Proposed Standards

New and Proposed Standards

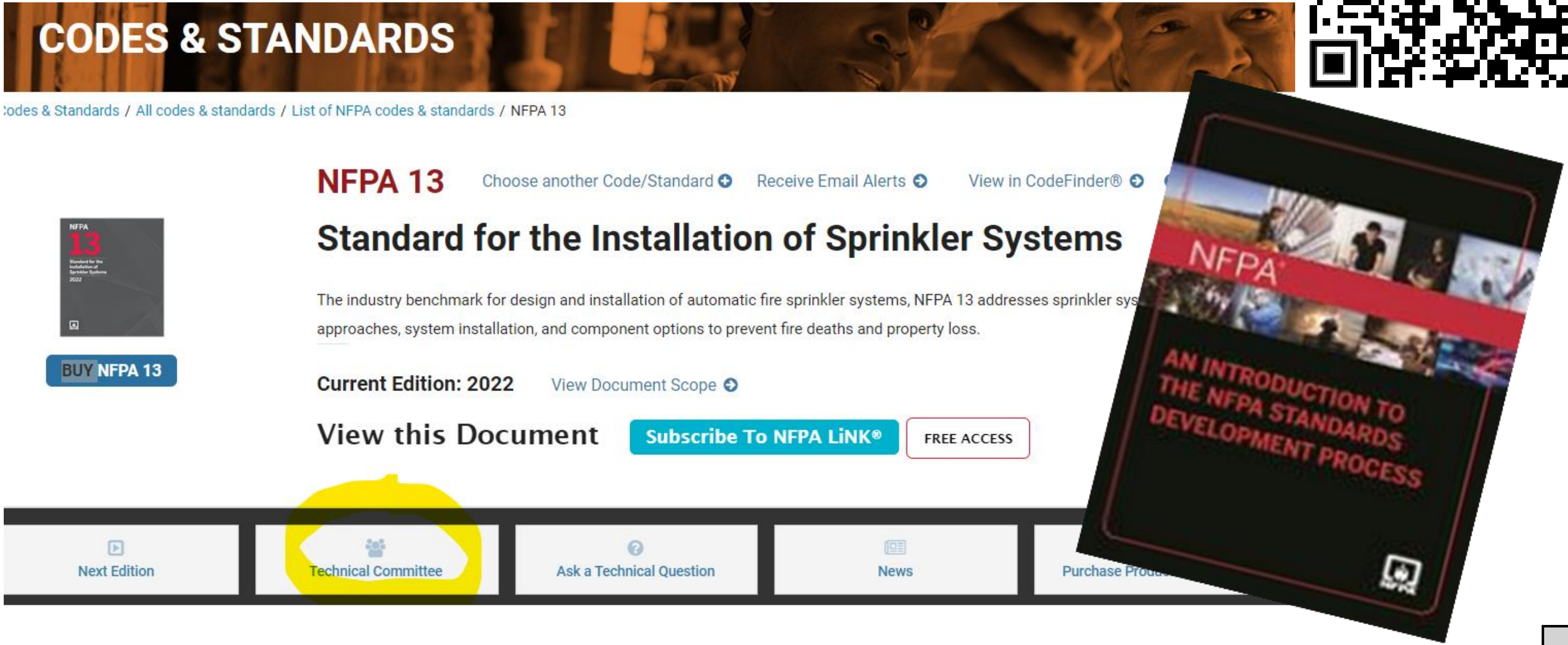


- NFPA 420: Standard on Fire Protection of Cannabis Growing & Processing Facilities
- NFPA 715: Standard for the Installation of Fuel Gases Detection and Warning Equipment
- NFPA 915: Standard for Remote Inspections
- NFPA 1321: Standard for Fire Investigation Units

Ask a Technical Question



Take a seat at the table!



New Resources

Fire Protection Handbook

- Wildland Fires and the Wildland/Urban Interface
- The Interconnected All-Hazards Fire Department
- Smart Infrastructure and Fire Protection
- Facilitating Occupant Movement During Emergencies
- Additive Flame Retardants
- Solid and Liquid Oxidizers
- Organic Peroxides
- Photovoltaic Systems
- Energy Storage Systems
- Fuel Gases Detection
- Cannabis Processing Facilities
- Active Shooter/Hostile Event Operations
- Modular Construction
- The NFPA Fire & Life Safety Ecosystem™

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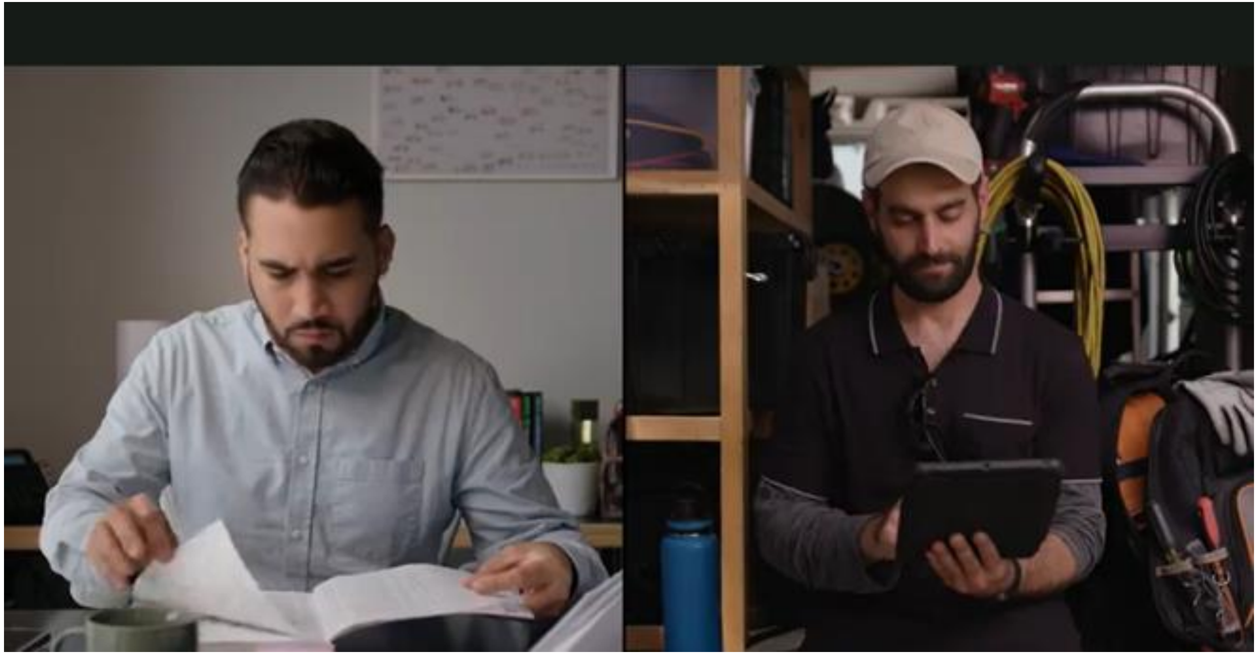


NFPA LiNK™

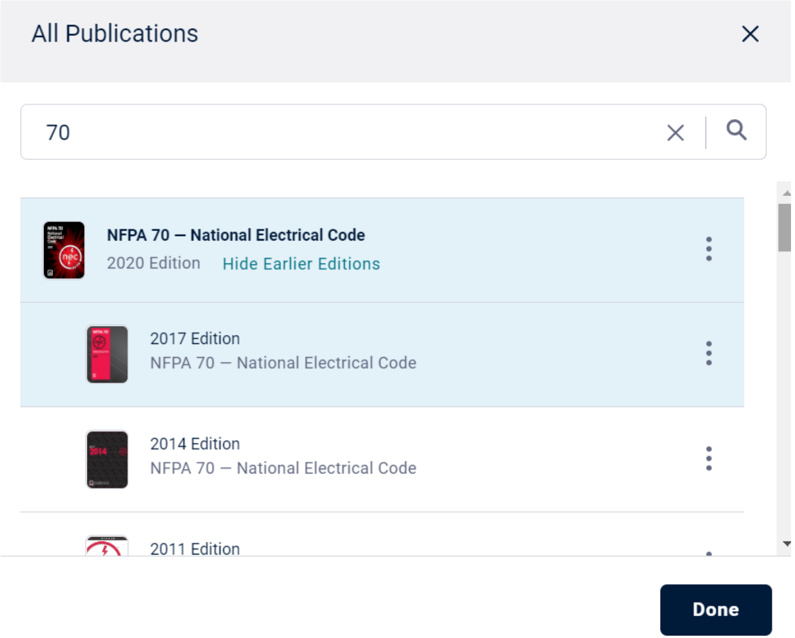
www.link.nfpa.org

New on YouTube!

Past Editions

Additional Content
Legacy Editions

- Over 1400 publications now available
  - Current edition of every NFPA publication
  - 4 prior editions of every NFPA publication
  - 42 Spanish publications
- New cyclical releases being published as they are issued
- Explanatory commentary and visual aids continuously added



Free Trial

Risk-Free 14-Day Trial

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- *No obligation, hassle-free*
- *No auto-renewal*
- *Free for two weeks*

ACTIVATE YOUR FREE TRIAL

Individual

Affordable plans billed monthly or annually

- *Digital Access to NFPA Codes and Standards*
- *Expert Commentary & Visual Aids*
- *Situational Navigation*
- *Custom Collections*
- *Personal Notations*
- *Bookmarking*
- *Sharing*

SUBSCRIBE NOW

Team

Pricing varies with various billing options

- *All Individual Plan Features*
- *User Management*
- *Team Collaboration*
- *Team Notes & Sharing*
- *Team options available for up to 5 or 10 users*

SUBSCRIBE NOW

Enterprise

Pricing varies with various billing options

- *All Individual Plan Features*
- *User Management*
- *Enterprise Collaboration*
- *Enterprise Team Notes & Sharing*
- *11 or More Users*

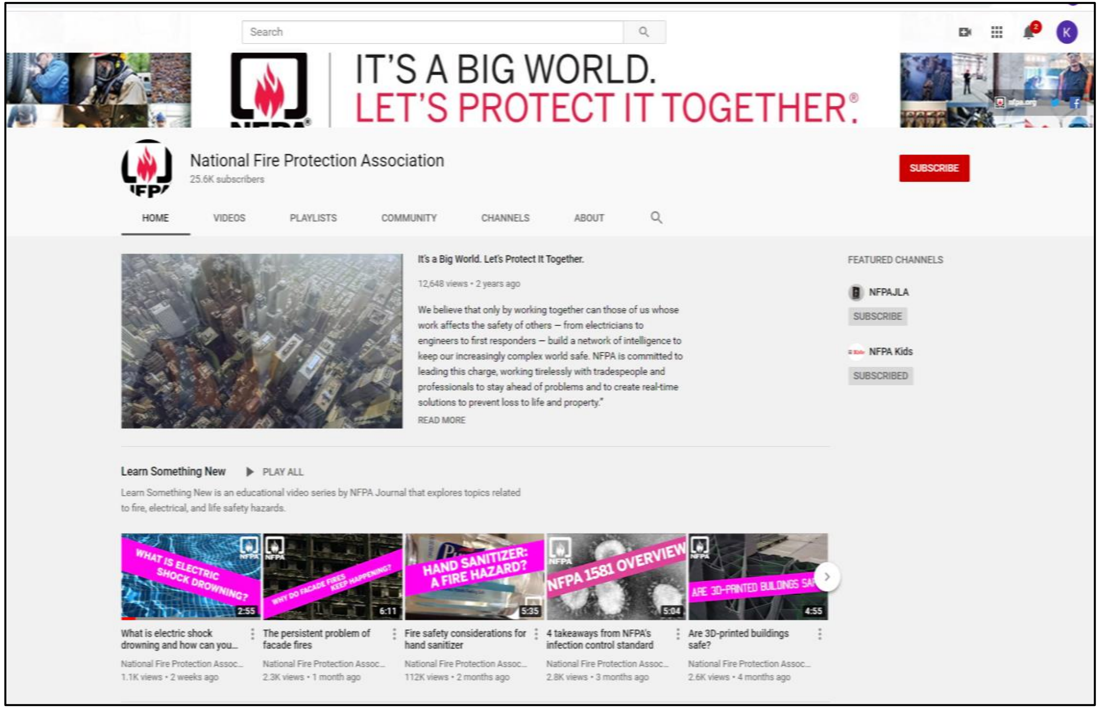
GET A QUOTE

How to Get Involved!

Conference & Expo | June 17-19
Technical Meeting | June 20-21

 |

Learn something new!



New Journal 2.0: Quarterly Print

Dispatches Emerging Issues

NFPA SEEKS INPUT ON POTENTIAL CANNABIS STANDARD

With 35 states now permitting cannabis in some form, including 14 that have moved to fully legalize the plant and its related products for adult use, the NFPA Standards Council is asking the public to weigh in on the merits of developing a new standard to help local officials regulate the industry. A call went out in January asking interested stakeholders to provide comment on whether such a standard is needed and what information it could include. Comments are being accepted through March 31 at nfpa.org/cannabisfiresafety.

While it's too early to know if the project will go forward, the council said in its request that such a document could include minimum safety requirements for cannabis facilities related to growing, processing, extracting, and testing. It could also set training and skill requirements for workers in these facilities, as well as for professionals responsible for inspecting, testing, and maintaining the equipment. Information on marijuana growing, processing, and extraction facilities was added to the 2018 edition of NFPA 1, *Fire Code*.

NFPA Journal has closely tracked the burgeoning cannabis industry and has published several articles, podcasts, and videos detailing the related safety hazards as well as efforts in Colorado and elsewhere to develop regulations and procedures. Those materials and others can be found at nfpa.org/cannabis.

EVs on the assemly line at Tesla. The number of electric vehicles on the road is expected to increase sharply over the next decade, raising an assortment of safety concerns.

ANTICIPATING A BOOM, NFPA PLANS TO EXPAND TRAINING AND PREPAREDNESS FOR ELECTRIC VEHICLES

The issue isn't whether electric vehicle (EV) use will grow in the US—it's how much and how fast it will grow, and whether the safety community will be ready for it.

That's the assessment of many experts, who believe there could be more than 18 million EVs in the US by 2030—a staggering jump from the estimated one million on the road now. Along with those predictions have come concerns over whether the safety community is prepared for the boom.

In October, NFPA announced a three-year project in partnership with the US Department of Energy to bolster training and help communities prepare for the safe adoption of widespread EV use. As part of the project, NFPA will expand its already extensive online training modules for EV safety to include programs targeted at charging station installers, code officials, utilities, manufacturers/dealerships, fleet owners, garages/maintenance facilities, insurance companies, and vehicle owners. Updates will also be made to NFPA's existing alternative-fuel vehicle safety training programs for law enforcement and tow and salvage operators. This is in addition to the free online training NFPA has provided for first responders on alternative-fuel vehicles for nearly a decade.

As part of the new training effort, NFPA will also assist DOE in conducting 30 community preparedness assessment workshops across the US, events that will be designed to help local officials implement safe practices and partnerships in anticipation of widespread EV adoption. The project is expected to be completed by October 2023.

For more information about NFPA's electric and alternative fuel vehicles safety training programs, visit nfpa.org/Training-and-Events/By-topic/Alternative-Fuel-Vehicle-Safety-Training.

GETTY IMAGES

14 | NFPA JOURNAL · SPRING 2021

Dispatches Ecosystem

A SURVEY OF RECENT EVENTS USING THE NFPA FIRE & LIFE SAFETY ECOSYSTEM™
NFPA.ORG/ECOSYSTEM

GOVERNMENT RESPONSIBILITY

COVID-BROKE
911 systems across the US are 'at a breaking point' financially after receiving next to zero COVID-19-related aid since the pandemic began in April, according to multiple reports.
ECOSYSTEM FAIL

INVESTMENT IN SAFETY

SPARE RIBS SPARED
In 2012, fire sprinklers were installed at Hutchins BBQ in McKinney, Texas. In January, a local fire investigator ruled that the sprinklers saved the restaurant from being destroyed by a fire this past New Year's Eve.
ECOSYSTEM SUCCESS

PREPAREDNESS AND EMERGENCY RESPONSE

COVID-WISE
The state fire marshal in North Carolina has launched a first-responder COVID-19 registry to provide real-time data for state leaders to understand how the virus is affecting first responders and what resources are needed to keep them safe.
ECOSYSTEM SUCCESS

SKILLED WORKFORCE

SYSTEM FAILURE
Three contractors have been charged with negligent homicide for allegedly installing a heating system incorrectly at a New Hampshire couple's home. The couple and their pets were found dead from carbon monoxide poisoning in 2019.
ECOSYSTEM FAIL

DEVELOPMENT AND USE OF CURRENT CODES

GIMPY GEAR
According to *PV Magazine*, fires involving photovoltaic arrays have increased five-fold in Australia, due largely to government rules mandating the use of equipment that has been found to "easily degrade and malfunction."
ECOSYSTEM FAIL

GOVERNMENT RESPONSIBILITY
SKILLED WORKFORCE

COVID-DESPERATE
Citing a shortage of nurses, in November the governor of North Dakota announced that the state would allow health care workers who had tested positive for COVID to continue to treat patients.
ECOSYSTEM FAIL

NFPA.ORG/JOURNAL · NFPA JOURNAL | 15

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Latest Podcast

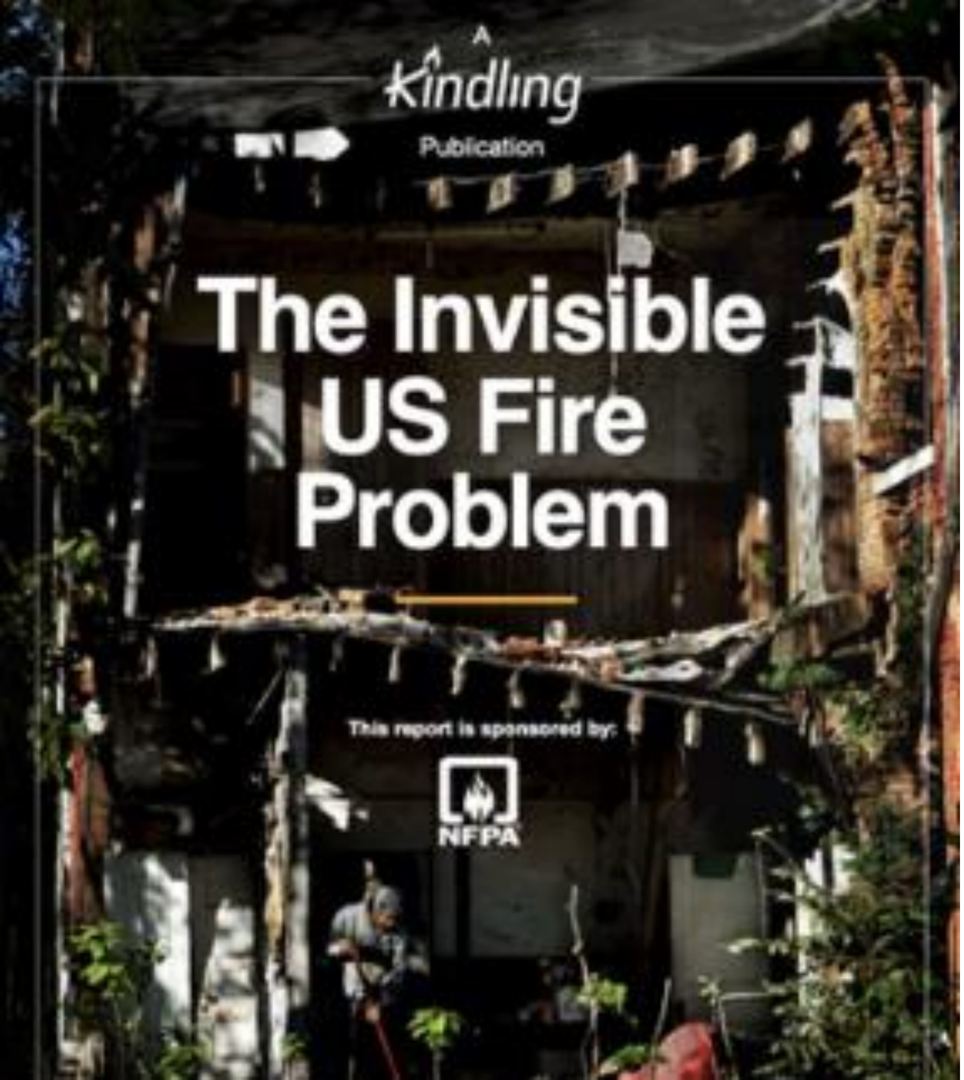
Danger: Construction

The first in a new series of NFPA webinars will tackle the issue of fires in buildings under construction

NFPA Today - Blogs

NFPA 610 - Guide for Emergency and Safety Operations at Motorsports Venues,

Ready to Roll for the 2023 US Rally Racing Season



NFPA JOURNAL
The online magazine of the National Fire Protection Association

NFPA-Sponsored report published by Kindling

MORE HOMELESS, MORE FIRES

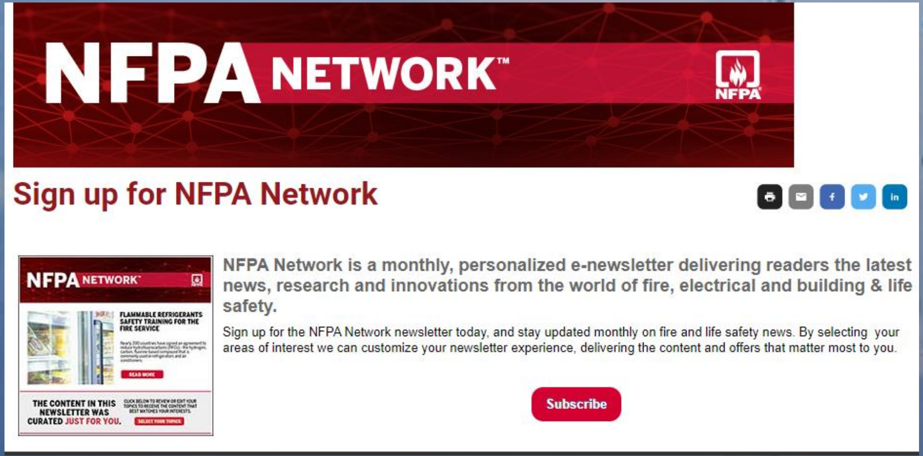
From 2016 to 2020 (the last year data was available), the estimated population of homeless people in the US grew from roughly **550,000** to more than **580,000**, an increase of about **5.5 percent**.

The share of people experiencing homelessness who live "unsheltered" has also increased significantly in recent years. In 2016, **32.1 percent** of the US homeless population lived unsheltered; in 2020, that share had risen to **38.9 percent**.

Globally, an estimated **150 million** people are homeless today, compared to about **100 million** in 2005—a **50 percent** increase in the past 17 years.

Sources: The National Alliance to End Homelessness, United Nations

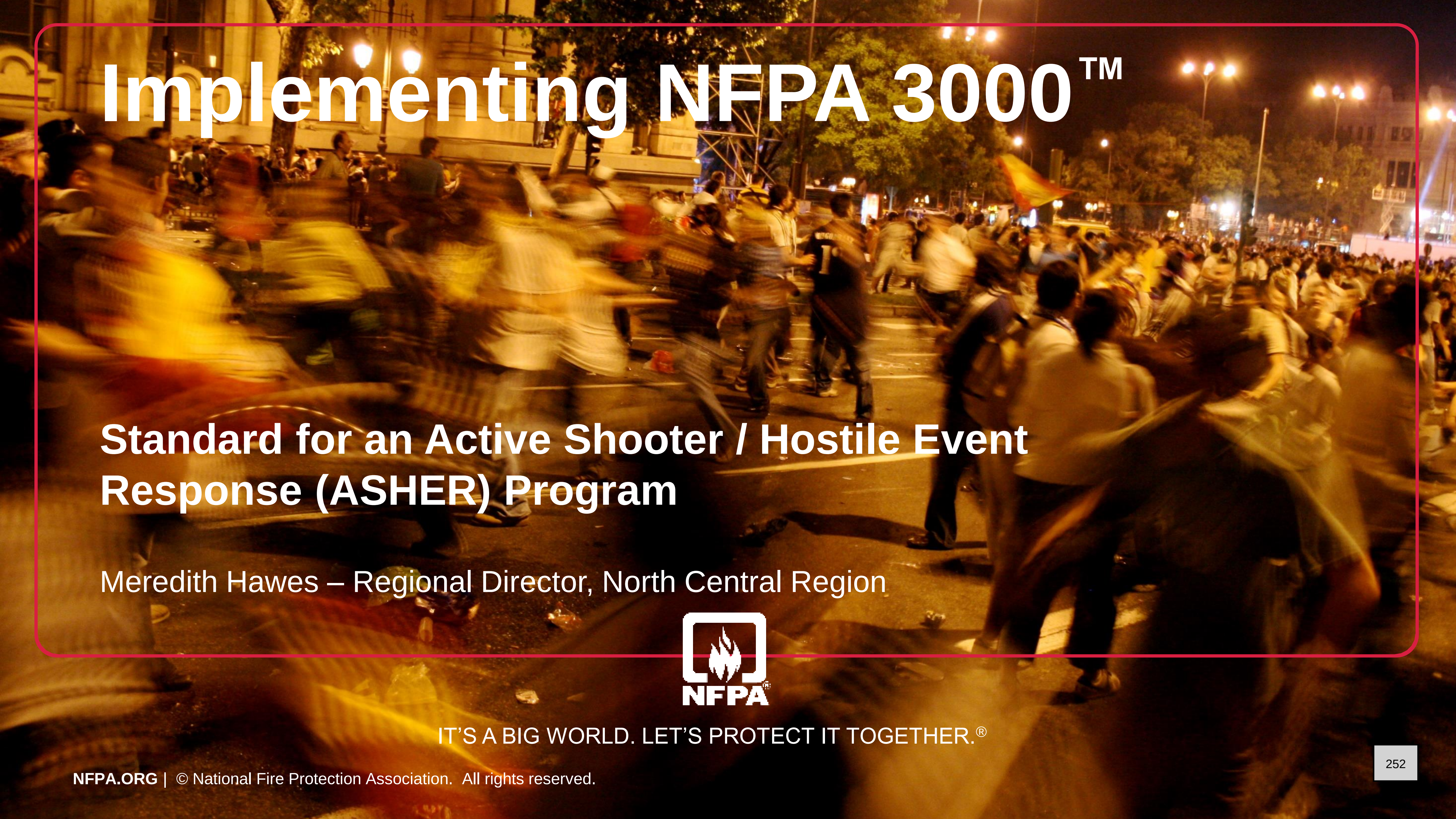
Network Newsletter



SCAN ME

Thanks!

Meredith Hawes
mhawes@nfpa.org
617-984-7237



Implementing NFPA 3000™

Standard for an Active Shooter / Hostile Event Response (ASHER) Program

Meredith Hawes – Regional Director, North Central Region

NFPA

IT'S A BIG WORLD. LET'S PROTECT IT TOGETHER.®

Agenda:

- Incident data
- How NFPA became involved
- 4 Main concepts of the NFPA 3000 Standard
- Resources and training

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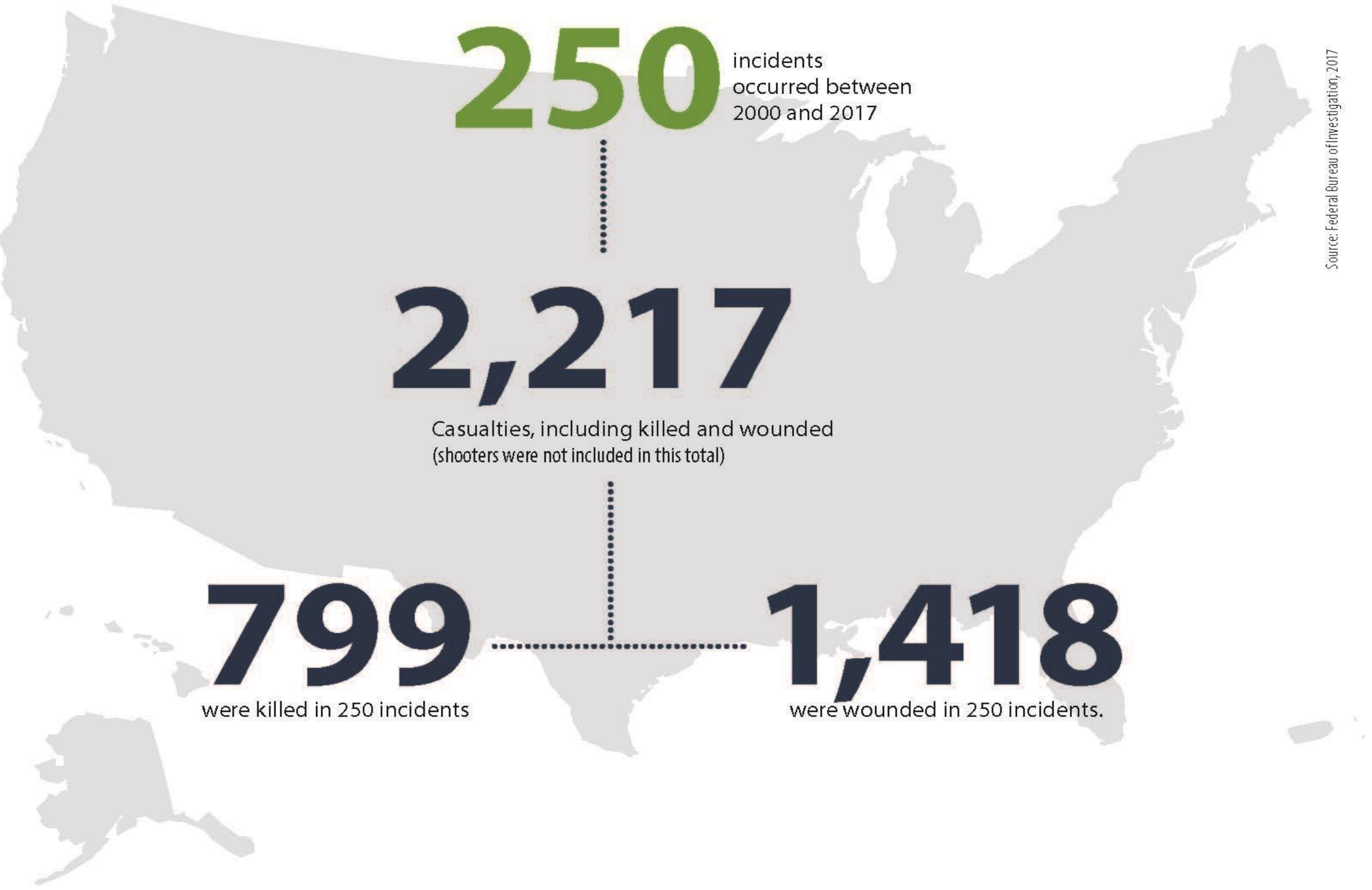
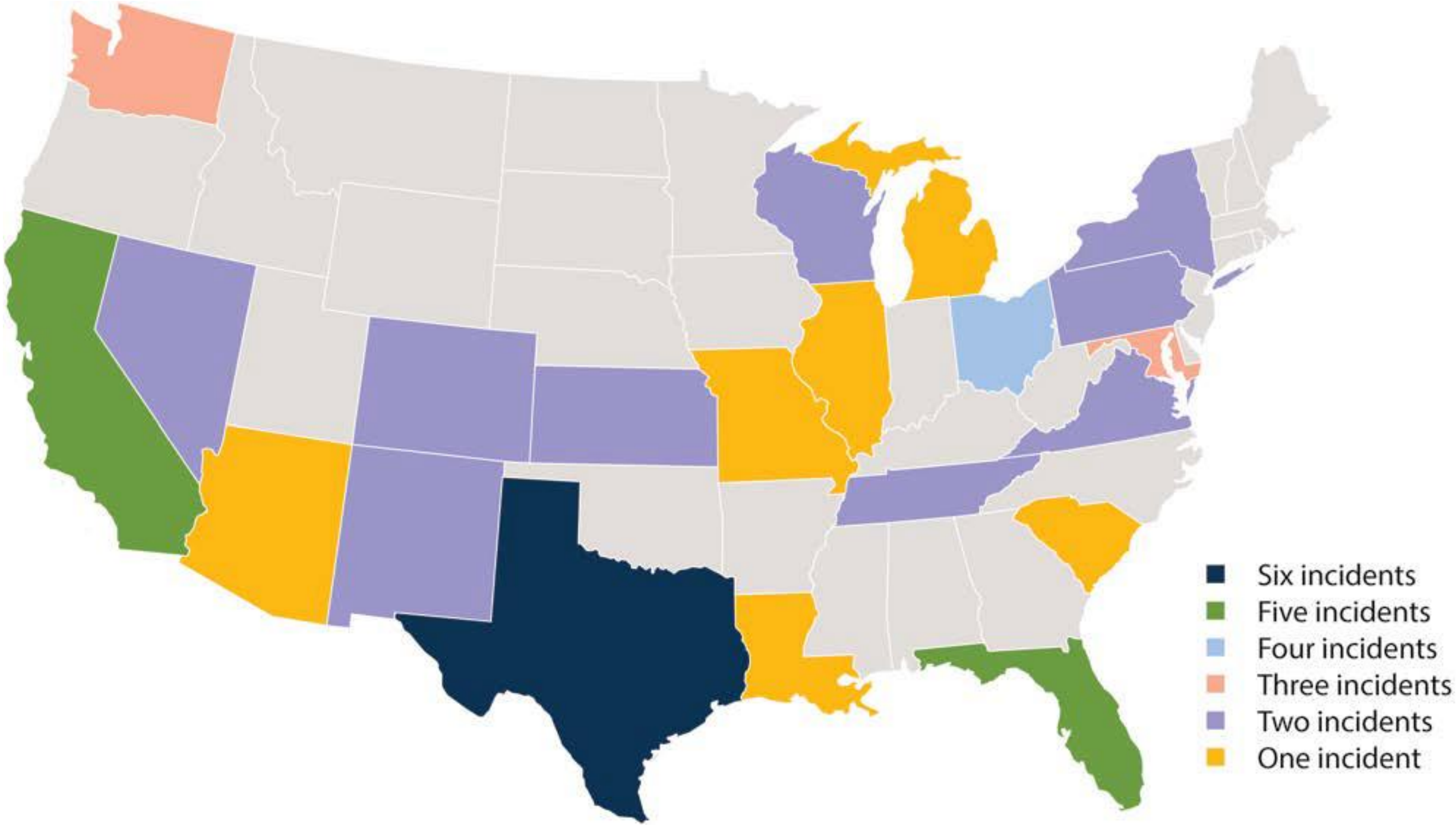
Active Shooter Incidents: 2000-2017



Active Shooter Incidents: 2016 & 2017



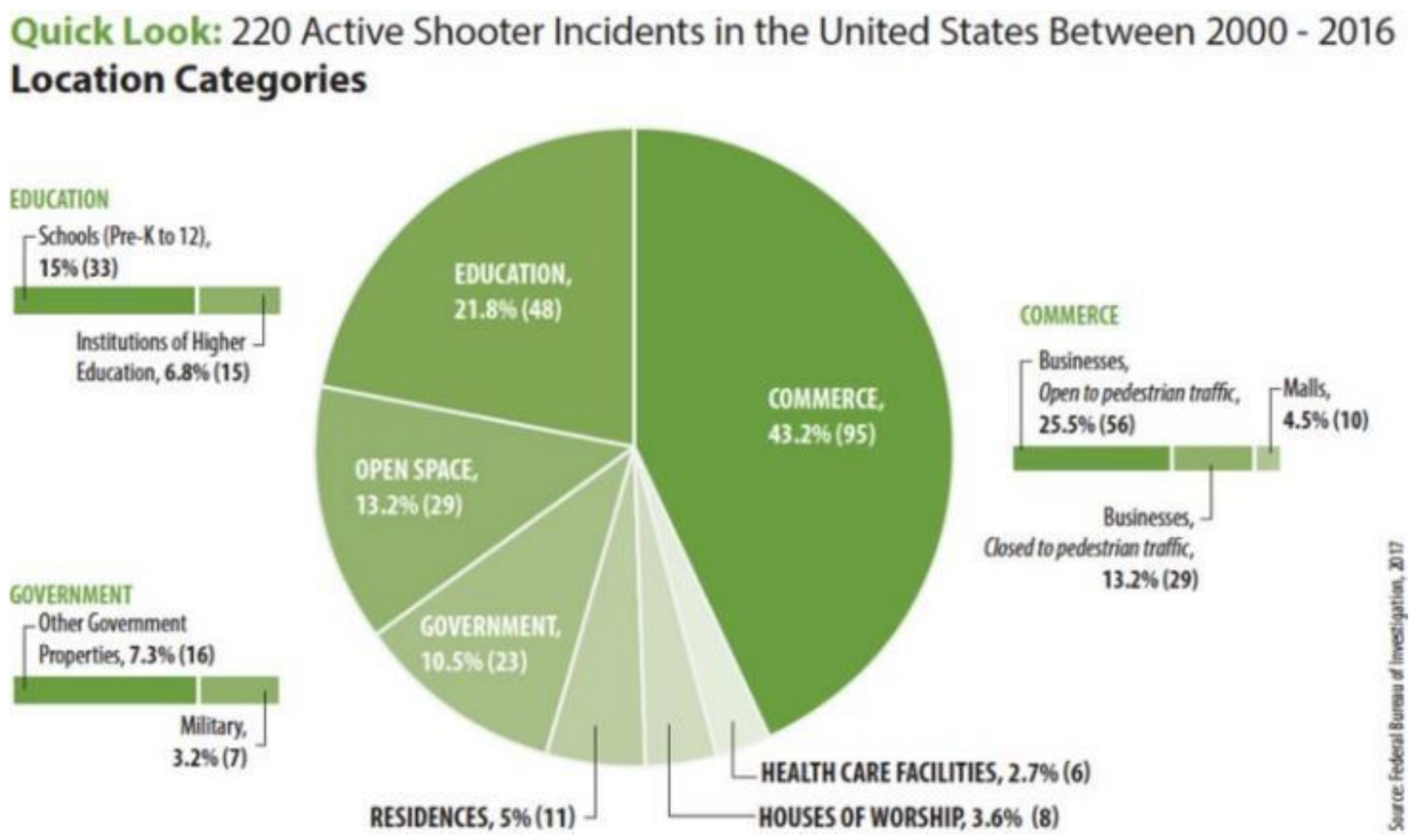
51 Incidents in **21** States

943 Casualties

221 Killed

722 Wounded

Incident Location Categories



Incident Statistics

Active Shooter Incidents 2017–2021

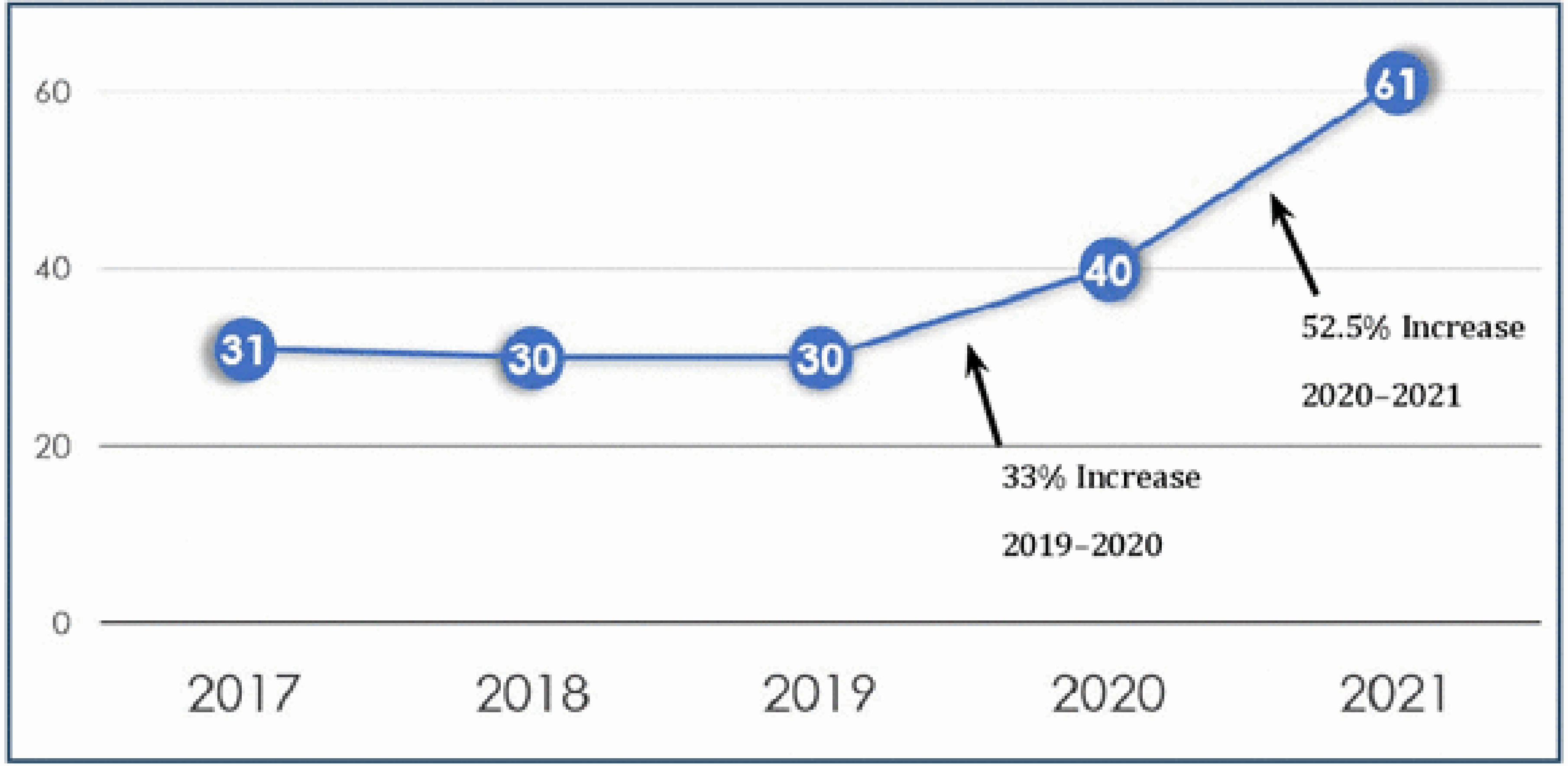


Figure 1

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By the Numbers, a Comparison of 2020 vs. 2021 Statistics

2020		2021
40 in 19 states	Total Incidents	61 in 30 states*
164 38 killed 126 wounded	Casualties (Excluding Shooters)	243 103 killed 140 wounded
1	Law Enforcement Officers Killed	2
11	Law Enforcement Officers Wounded	5
5	Met "Mass Killing" Definition	12
8	Incidents Where Law Enforcement Engaged Shooters	17
42 35 male 3 female 4 unspecified	Shooters / Gender	61 60 male 1 female
1	Shooters Wore Body Armor	2
7	Shooters Committed Suicide	11
4	Shooters Killed by Law Enforcement	14
2	Shooters Killed by Citizen	4
24 5 at large	Shooters Apprehended by Law Enforcement	30** 1 at large

= Decreased metrics
= Increased metrics

* Two incidents occurred in two states
**One shooter was killed in a vehicle crash and does not fit into any other shooter-resolution categories

Figure 2

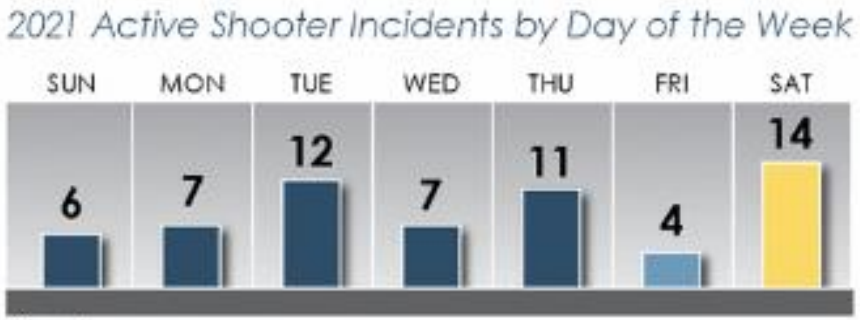


Figure 4

Summary

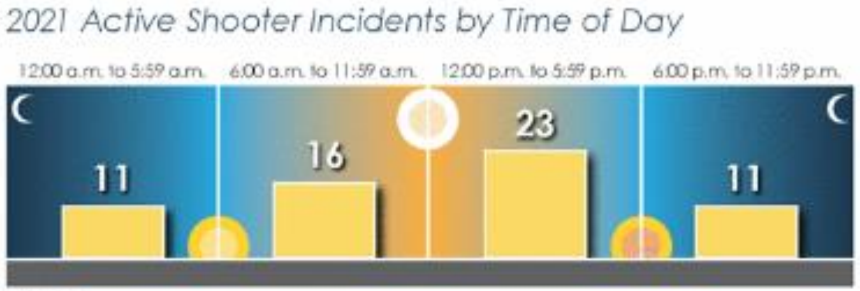
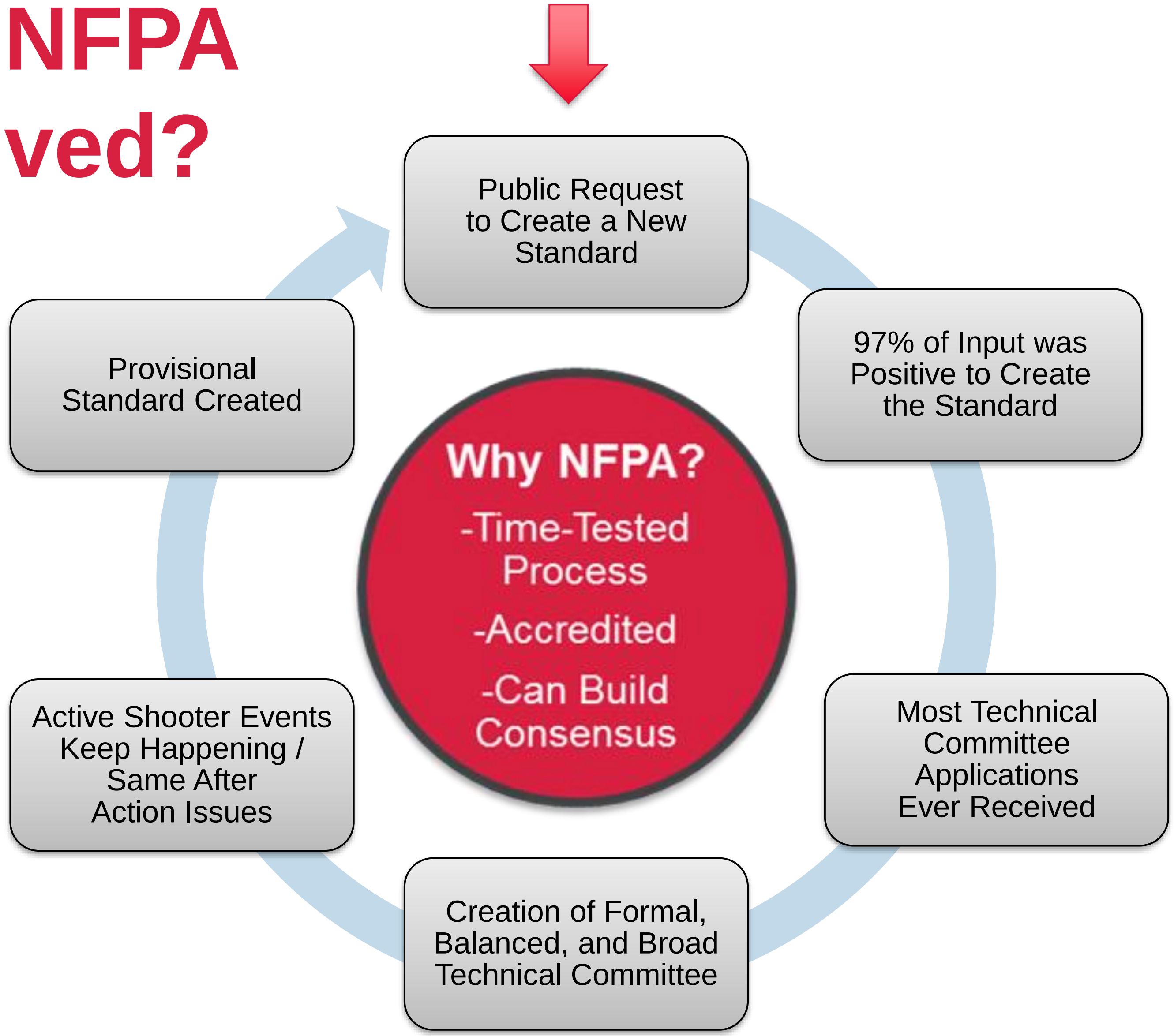
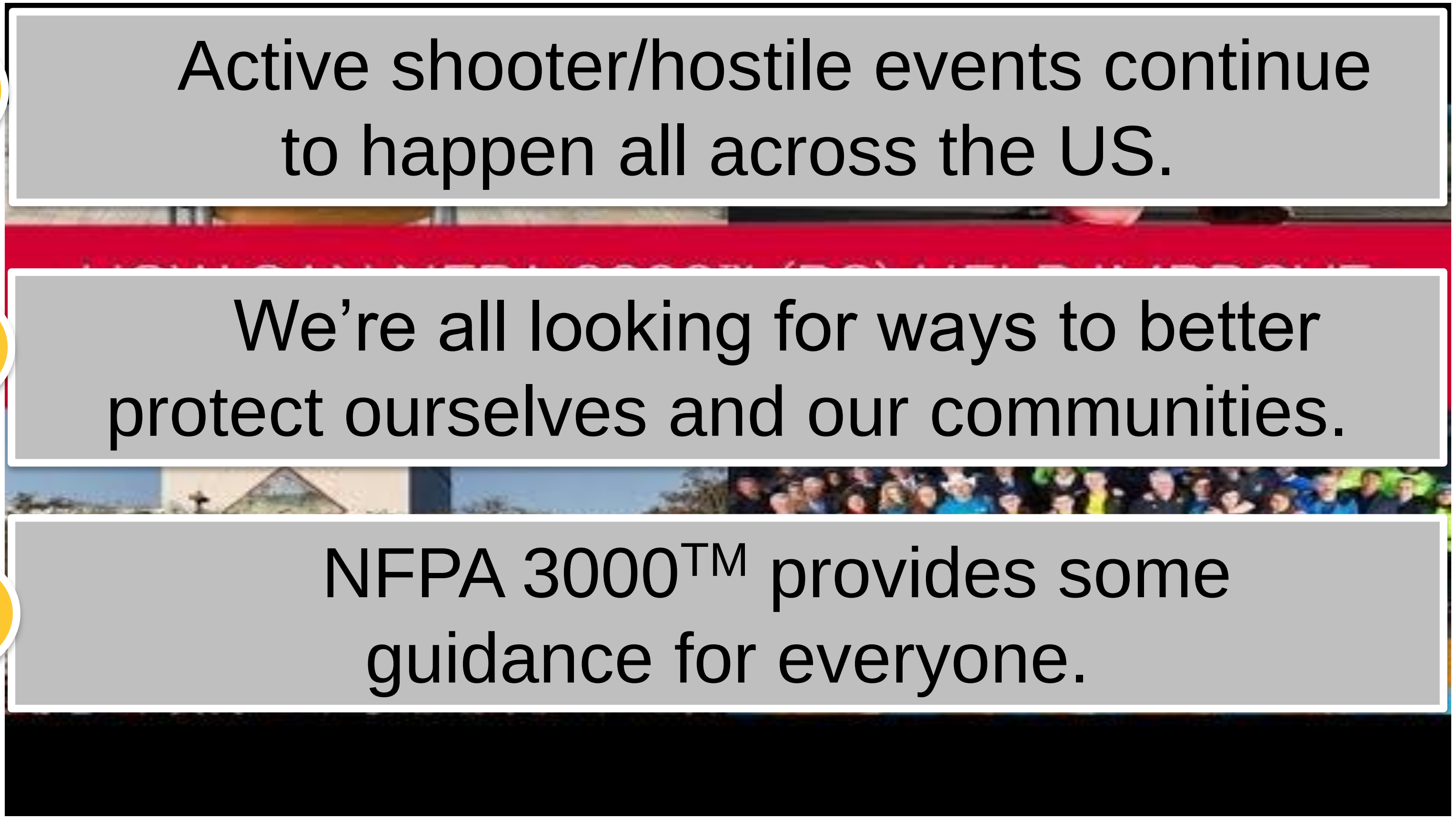


Figure 5

How Did NFPA Get Involved?



Need for Guidance Leads to New Standard



Active shooter/hostile events continue to happen all across the US.

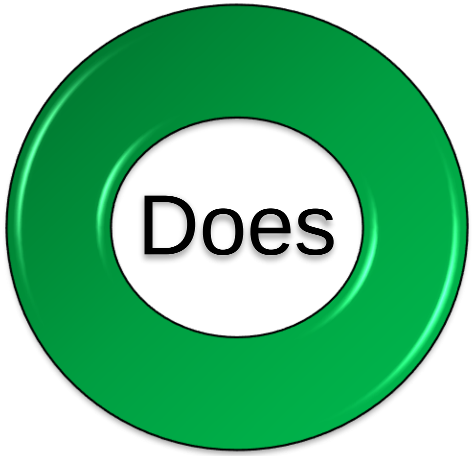
We're all looking for ways to better protect ourselves and our communities.

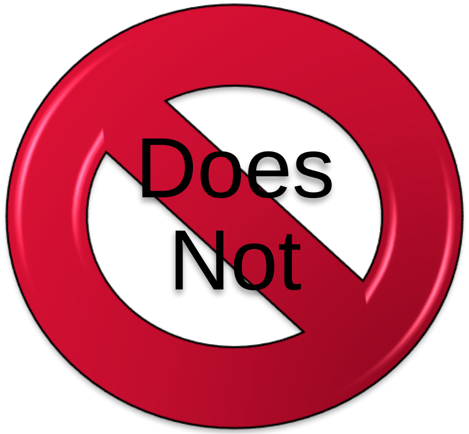
NFPA 3000™ provides some guidance for everyone.

NFPA 3000: A Resource for Everyone

- Community Leaders
- Emergency Management
- Public
- Healthcare Officials
- Non-Governmental Partners
- First Responders
- Facility Managers

What Does NFPA 3000™ (PS) Do?





Does:

- Provide resources for community leaders
- Offer tools to help **plan** for, **respond** to, and **recover** from these events

Does Not:

- List prevention tips
- Detail local tactics

 |

Four Main Concepts

Whole Community

Unified Command

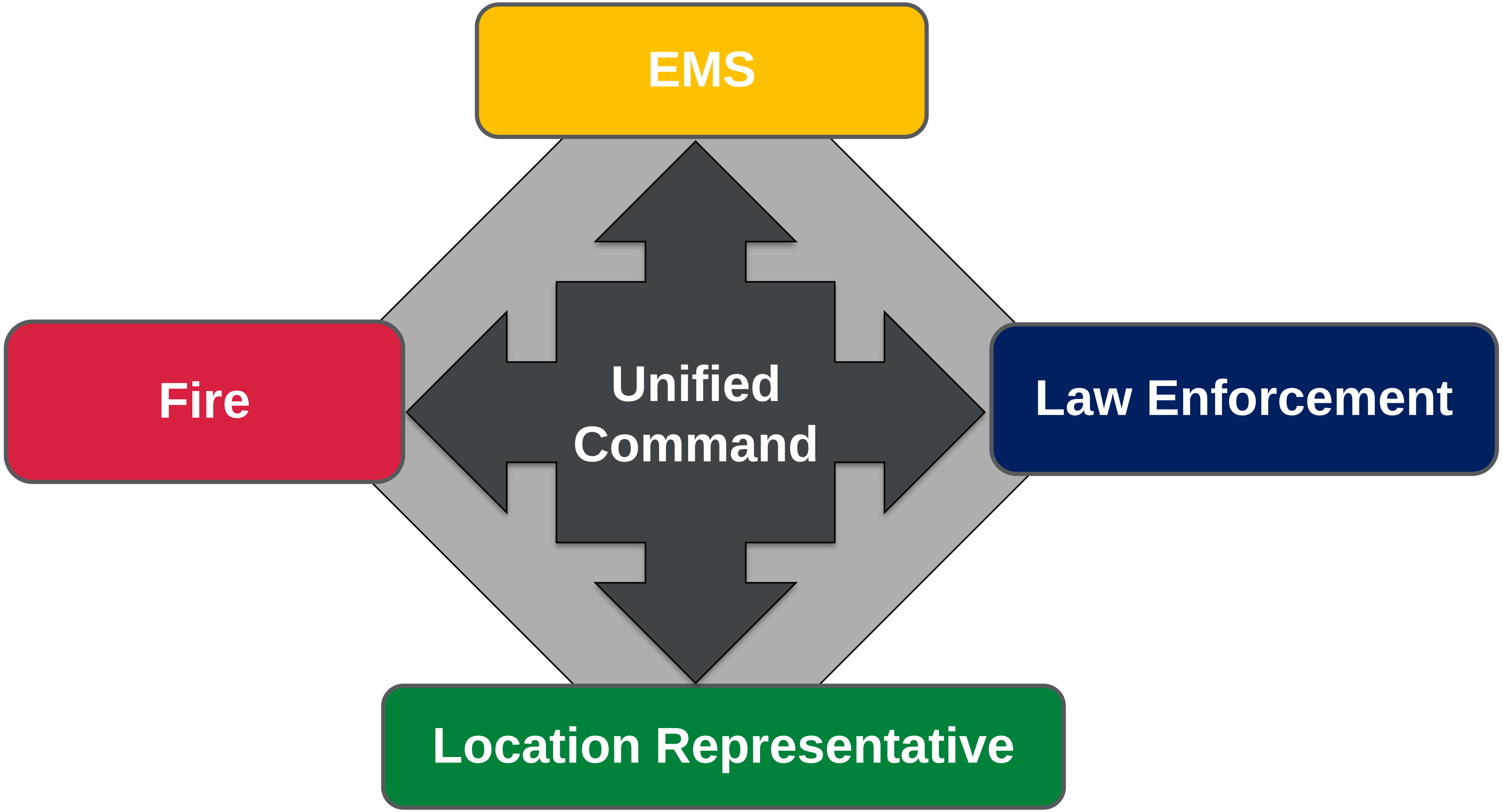
NFPA 3000

Integrated Response

Planned Recovery

Concept 1: Whole Community

Concept 2: Unified Command



Concept 3: Integrated Response

Law En… …mpetencies

- Knowle… …s and competencies
- Federa… …equirements
- Threat-… …e

How do you achieve an integrated response?

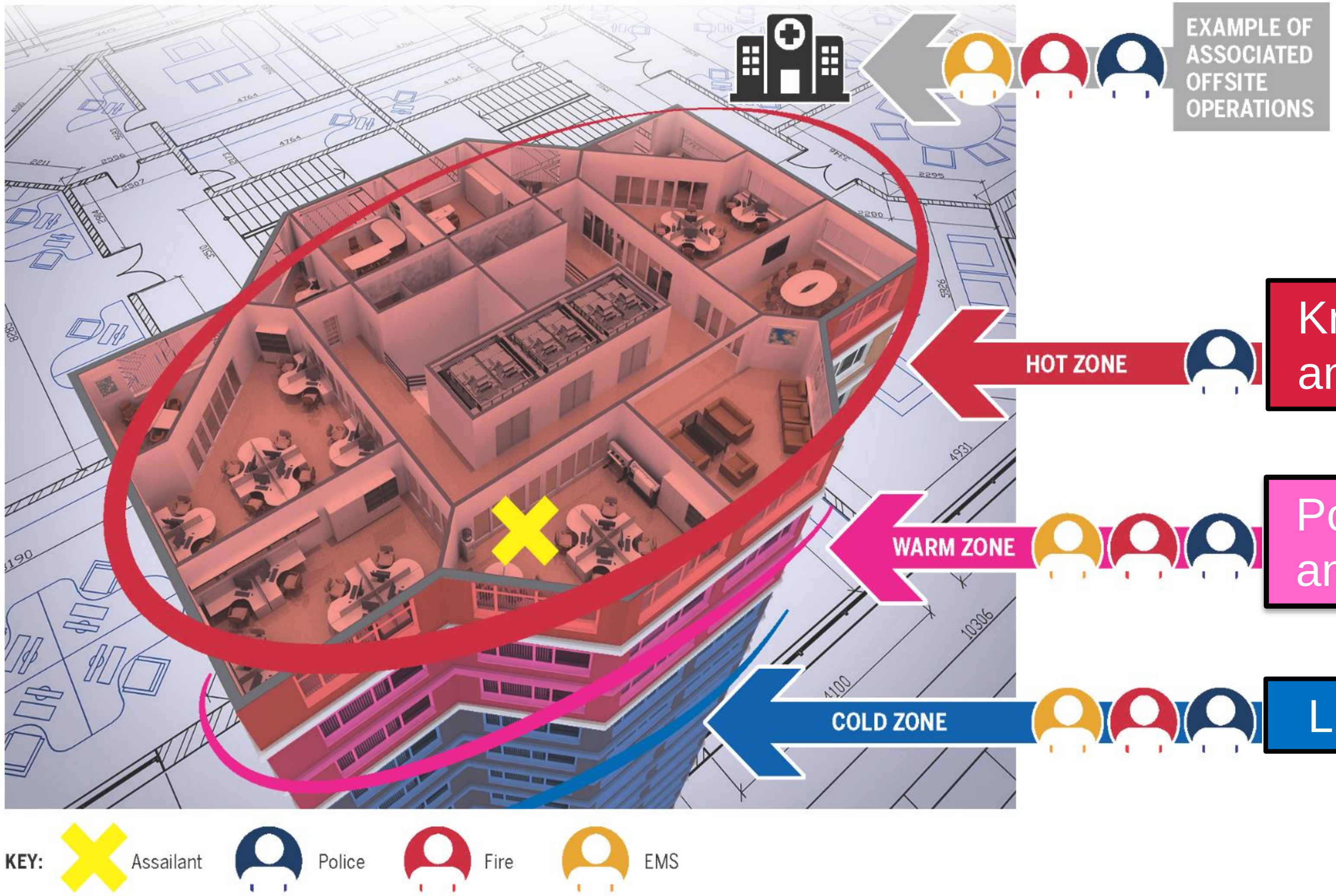
Fire/EMS Competencies

Shared knowledge + Competencies

… law e… …rs

- Competencies (shooter, vehicle, IED, fire)

Incident Response Zones



Known hazard or direct and immediate life threat

Potential for a hazard or an indirect threat to life

Little or no threat

 |

Why Integrated Response Matters

Personal Protective Equipment Requirements

Law Enforcement (All Zones)

- Ballistic vest
- Identifiable garment
- Means of communication

Fire/EMS (Warm and Hot Zones)

- Ballistic vest
- Identifiable garment
- Means of communication

Concept 4: Planned Recovery

As soon as an incident begins

Today

Recovery starts TODAY

After an incident is over

24 hours after an incident is over

Planning for Recovery

 |

NFPA 3000™ (PS) Roadmap

PLAN

Chapter 4
ASHER Program Development Process

Chapter 5
Risk Assessment

Chapter 6
Planning/Coordination

Chapter 7
Resource Management

Chapter 8
Incident Management

Chapter 9
Facility Preparedness

Chapter 10
Financial Management

RESPOND

Chapter 8
Incident Management

Chapter 11
Communications Center Support

Chapter 12
Competencies for Law Enforcement Officers

Chapter 13
Competencies for Fire and EMS Responders

Chapter 14
Personal Protective Equipment

Chapter 15
Training

Chapter 16
Public Education

Chapter 17
Public Information

RECOVER

Chapter 18
Continuity of Operation

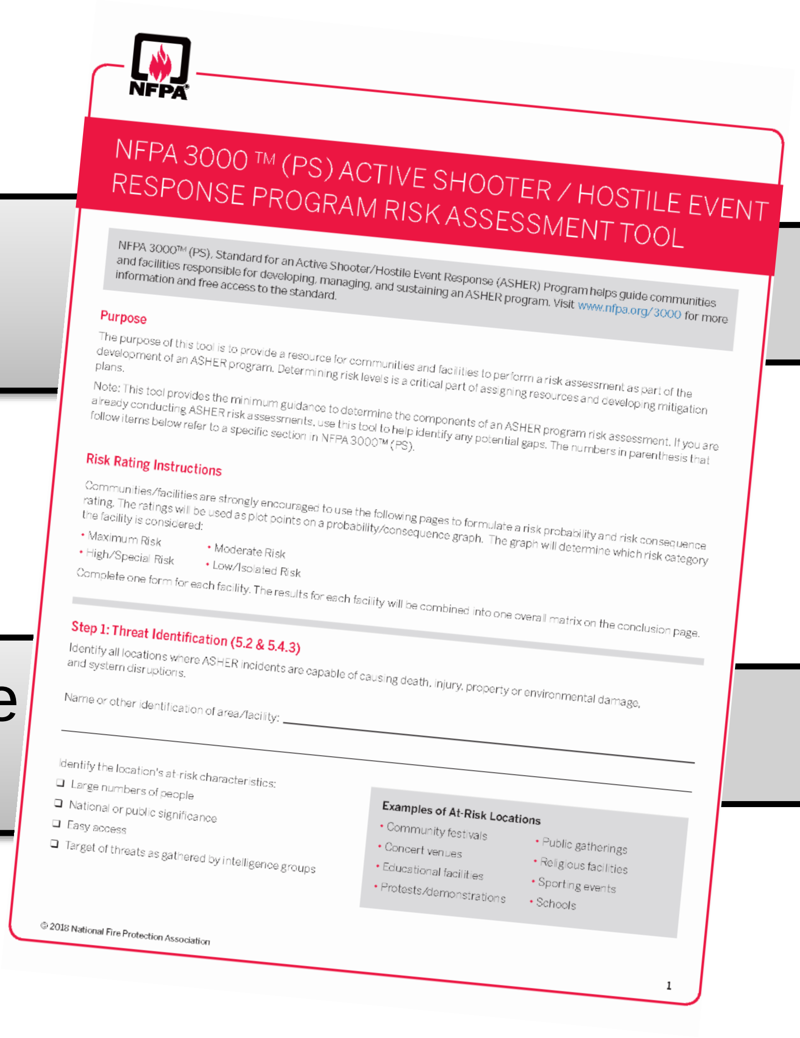
Chapter 19
Hospital Preparedness and Response for Out-of-Hospital ASHER Incidents

Chapter 20
Recovery

Risk Assessment

Facility Assessment

Community-Wide Assessment


NFPA

NFPA 3000 TM (PS) ACTIVE SHOOTER / HOSTILE EVENT RESPONSE PROGRAM RISK ASSESSMENT TOOL

NFPA 3000™ (PS), Standard for an Active Shooter/Hostile Event Response (ASHER) Program helps guide communities and facilities responsible for developing, managing, and sustaining an ASHER program. Visit www.nfpa.org/3000 for more information and free access to the standard.

Purpose

The purpose of this tool is to provide a resource for communities and facilities to perform a risk assessment as part of the development of an ASHER program. Determining risk levels is a critical part of assigning resources and developing mitigation plans.

Note: This tool provides the minimum guidance to determine the components of an ASHER program risk assessment. If you are already conducting ASHER risk assessments, use this tool to help identify any potential gaps. The numbers in parenthesis that follow items below refer to a specific section in NFPA 3000™ (PS).

Risk Rating Instructions

Communities/facilities are strongly encouraged to use the following pages to formulate a risk probability and risk consequence rating. The ratings will be used as plot points on a probability/consequence graph. The graph will determine which risk category the facility is considered:

- Maximum Risk
- High/Special Risk
- Moderate Risk
- Low/Isolated Risk

Complete one form for each facility. The results for each facility will be combined into one overall matrix on the conclusion page.

Step 1: Threat Identification (5.2 & 5.4.3)

Identify all locations where ASHER incidents are capable of causing death, injury, property or environmental damage, and system disruptions.

Name or other identification of area/facility: ____________

Identify the location's at-risk characteristics:

- ❑ Large numbers of people
- ❑ National or public significance
- ❑ Easy access
- ❑ Target of threats as gathered by intelligence groups

Examples of At-Risk Locations

- Community festivals
- Concert venues
- Educational facilities
- Protests/demonstrations
- Public gatherings
- Religious facilities
- Sporting events
- Schools

© 2018 National Fire Protection Association

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Everyone is informed and working on the same page:

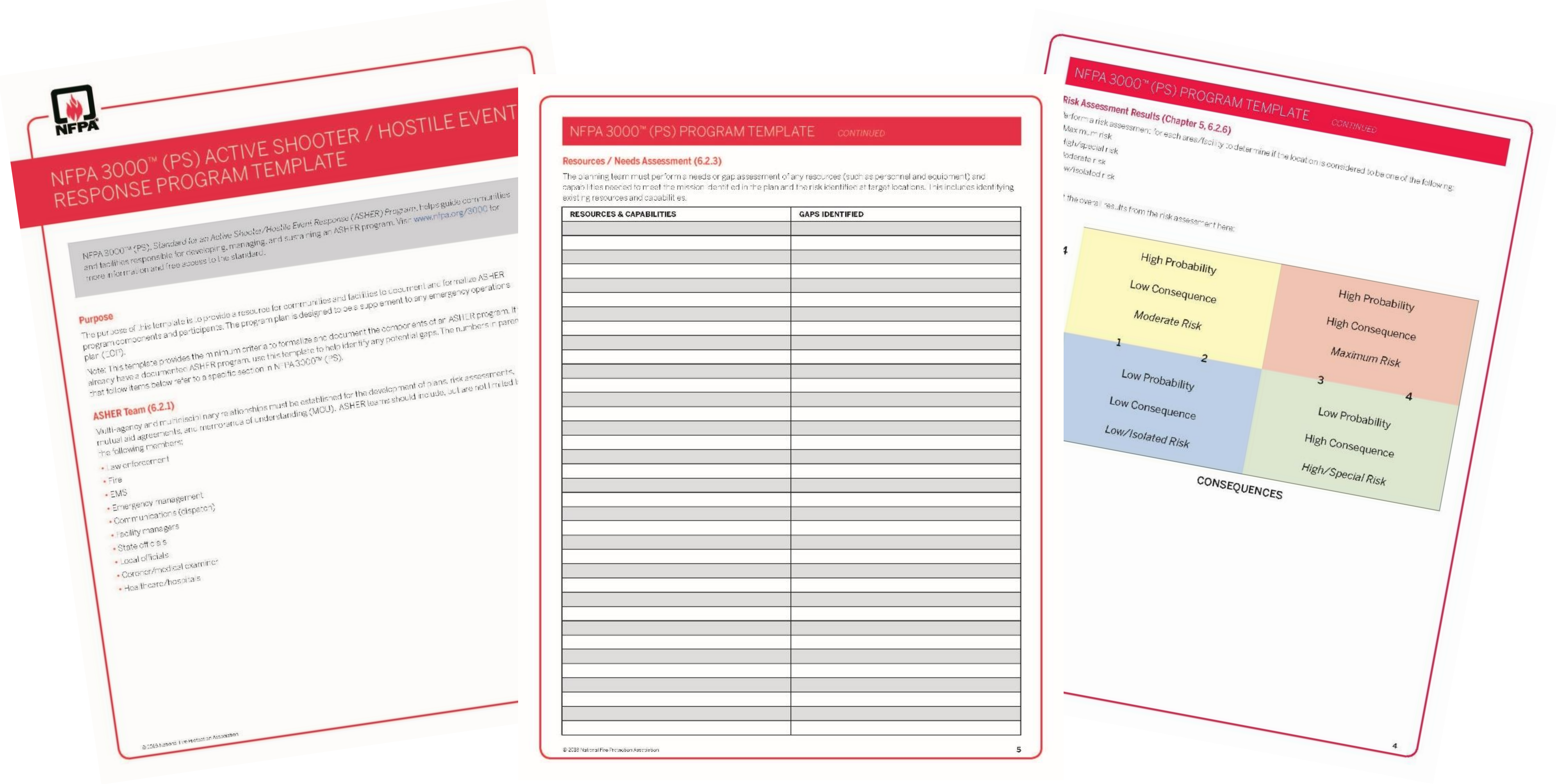
- AHJ
- Facilities
- Community Members

 |

Risk Assessment

 |

ASHER Program



Facility Readiness

Identify fac
character

Create an
emergenc
action pla

How Does this Affect Door Security & Safety?

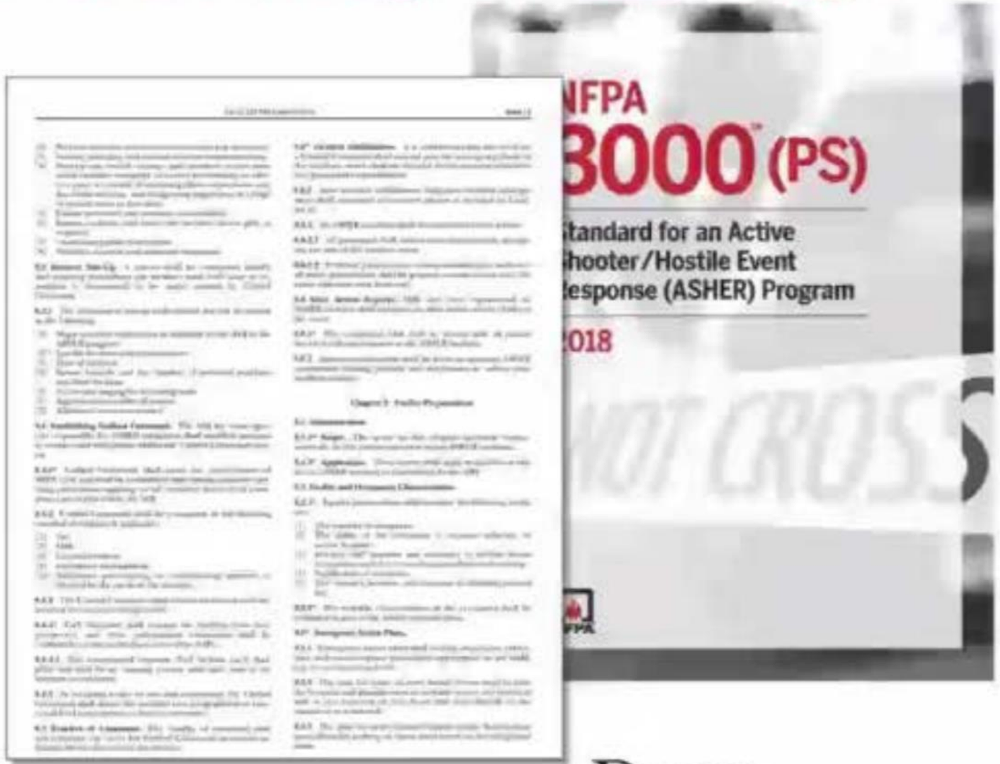
Chapter 9 Facility Preparedness

Evacuation

Relocation

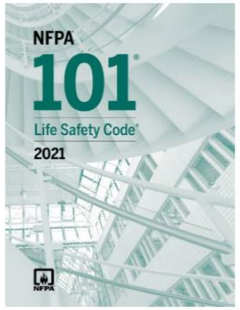
Secure-in-place

Comply with requirements of NFPA 101®



Door Security & Safety Foundation

NFPA 101, *LIFE SAFETY CODE:* A KEY ELEMENT OF SCHOOL SAFETY AND SECURITY



Used or applied by every state in the US, the *Life Safety Code* provisions require that virtually all types of buildings are designed and built so that people can safely escape in the event of a fire or other emergency. Visit nfpa.org/101 for more information and free access.

Option One

The hardware for the first option is sometimes called an interconnected latch or lock, and is similar to what you might see in a hotel room. This type of locking mechanism can be used for newly installed doors. It can also be retrofitted on existing doors.

Option Two

The second option enables existing school classroom doors to be retrofitted with secondary hardware, which might include items such as a thumb turn lock. For existing classroom doors only, this option can be used in lieu of single operation hardware, which combines a latch and lock together.

This is one example of the second door locking option; it's called a dead bolt lock with a thumb turn:

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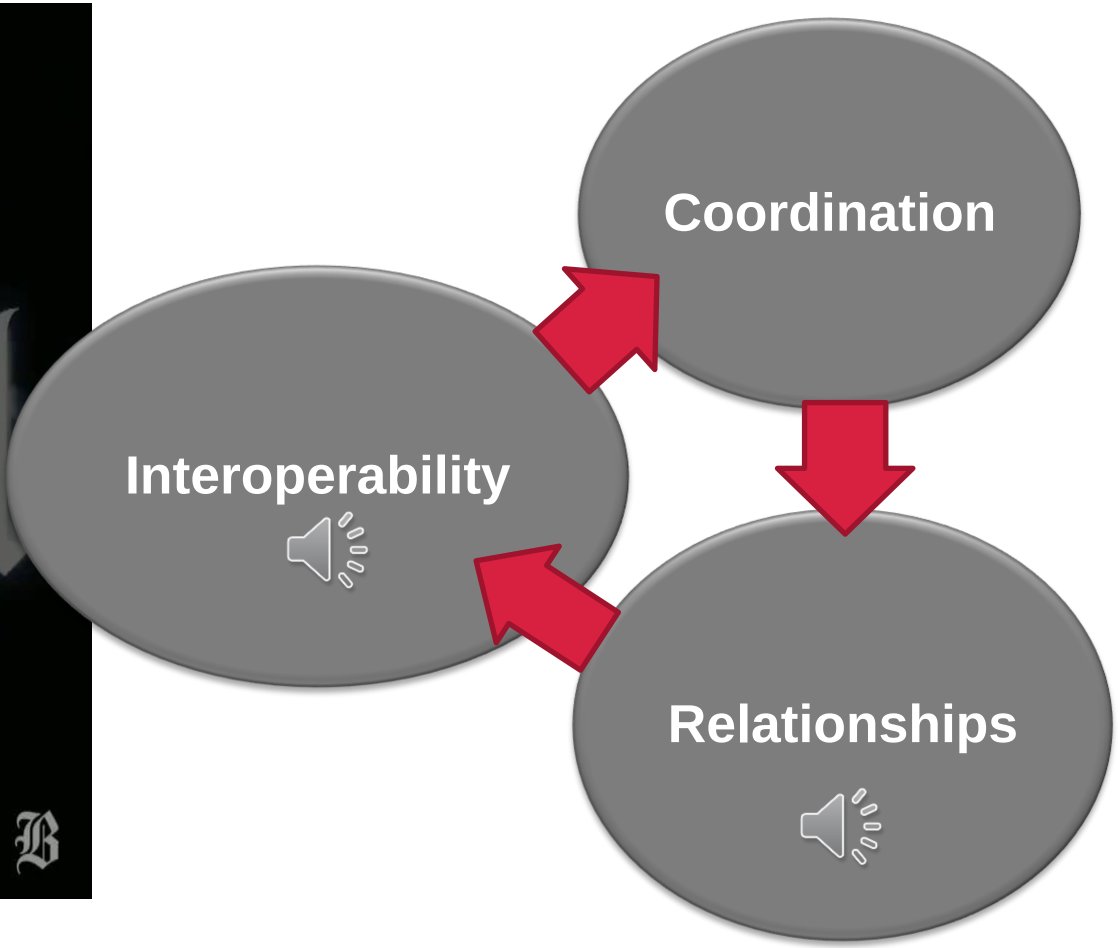
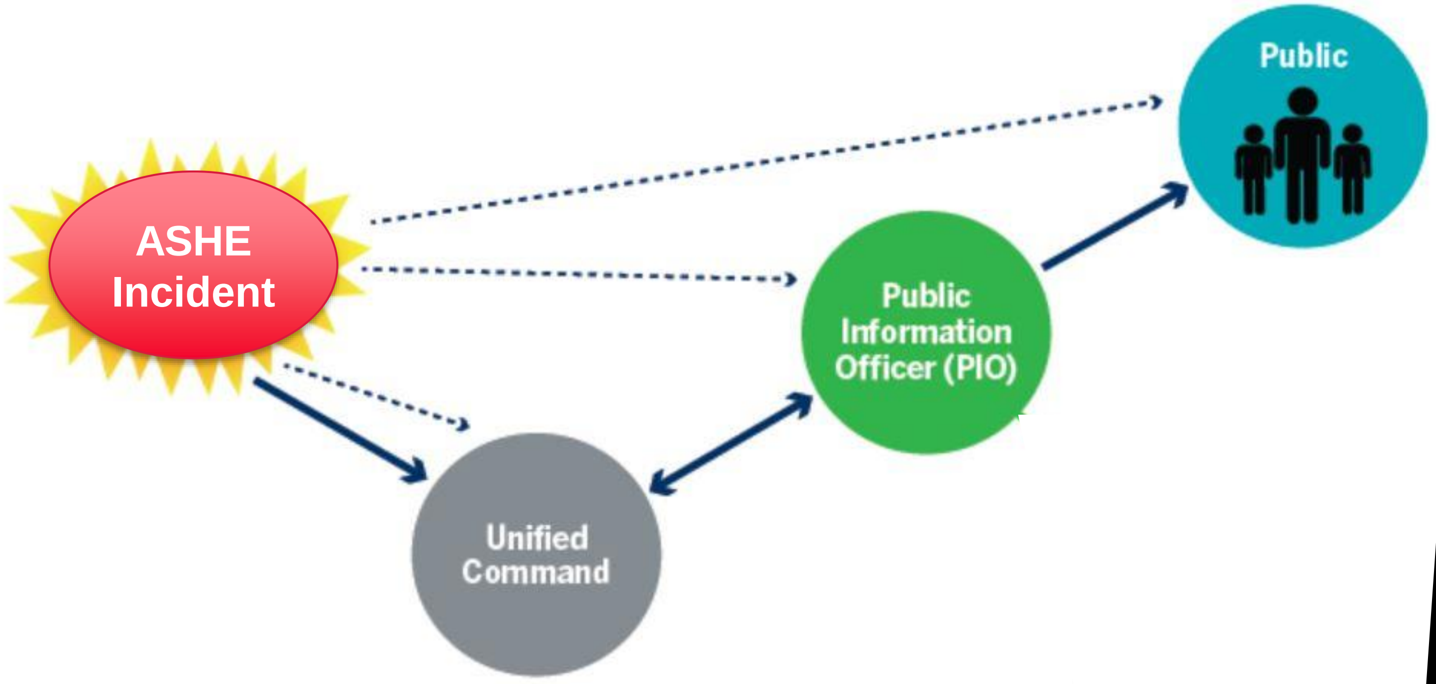
Communications Center Support



Warning, Notification, & Crisis Communications



KEY:
- Direct lines of communication (responders, facility, and dispatch)
- Indirect lines of communication (victims, witnesses, and associated parties)

Visit www.nfpa.org/3000news for more information.

Receiving Hospitals

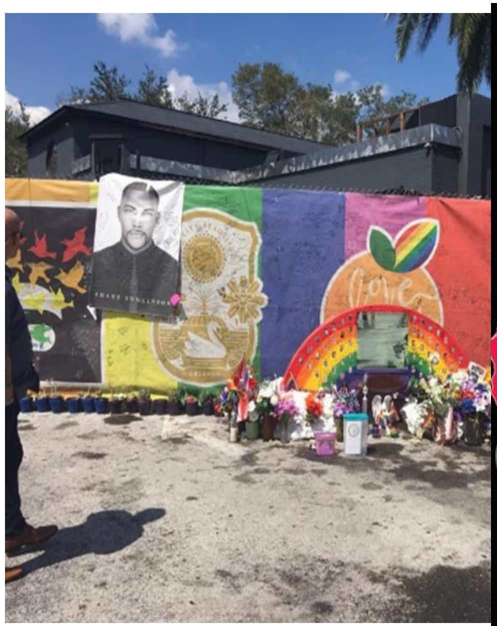
Communications

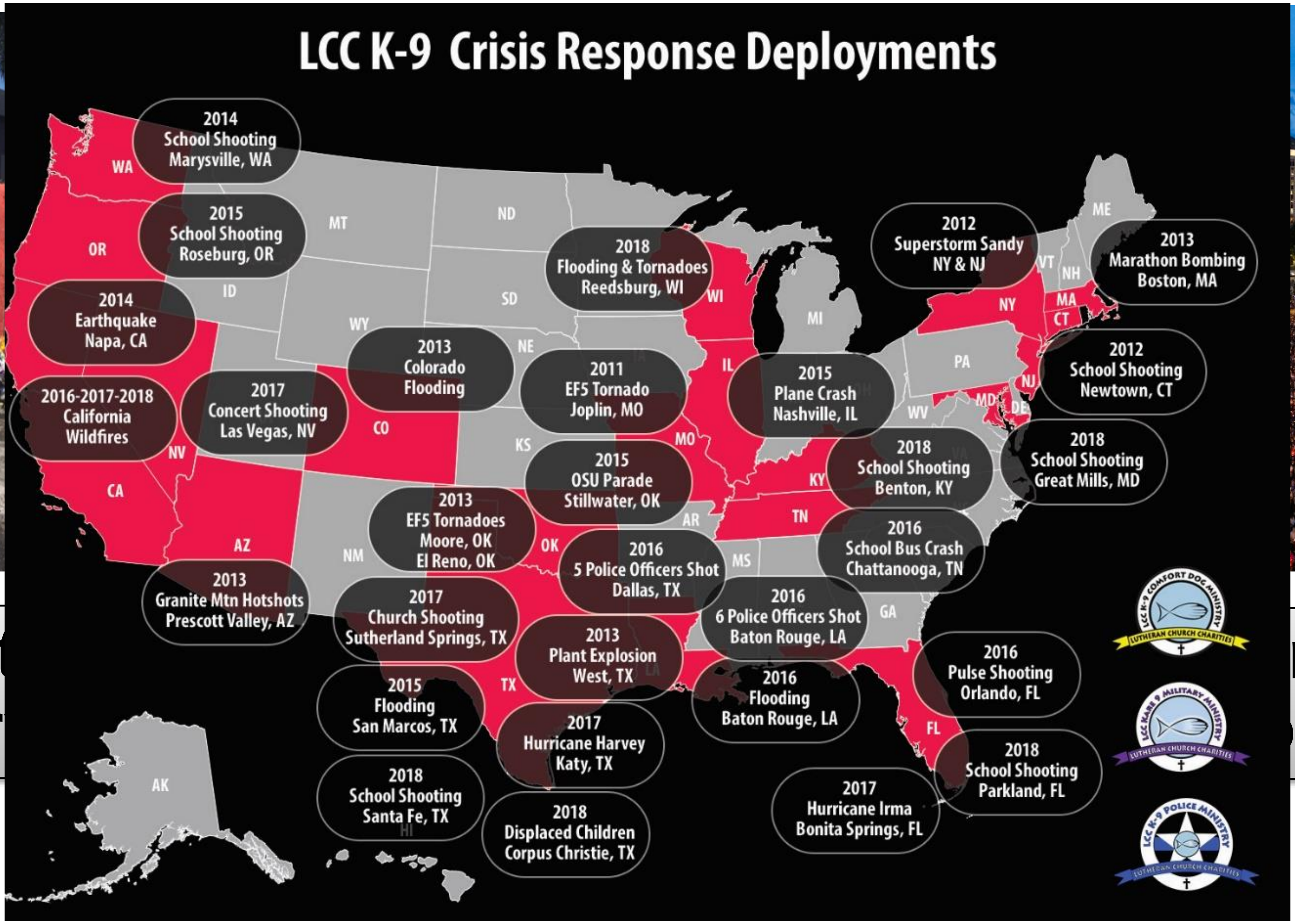
Victim Identification

Facility Security

Recovery Integration

Phases of Recovery





OneOrlando Fund

Immediat
Recover

nued
very

Phases of Recovery

Call to Action: Plan, Prepare & Implement

STEP 1

Learn more about NFPA 3000™ (PS) and how to get involved in the standards development process.

STEP 2

Identify and implement the components that are relevant in your community.

STEP 3

Visit **nfpa.org/3000news** to access resources, information, and knowledge.

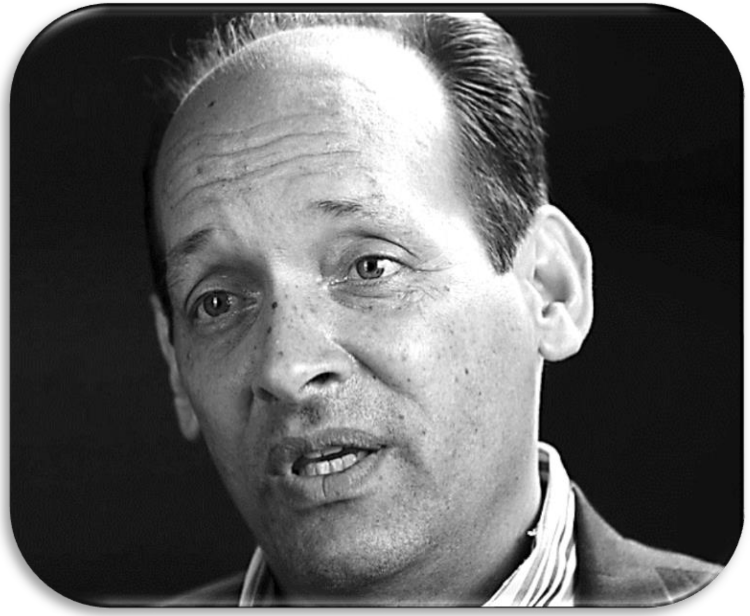
NFPA 3000™ (PS) PLAN

NFPA 3000™ (PS) RECOVER

NFPA 3000™ (PS) RESPOND

PLAN RESPOND RECOVER
ACTIVE SHOOTER/ HOSTILE EVENT RESPONSE PROGRAM SPECIALIST
NFPA 3000™ (PS)

STORY DRIVEN | REAL LIFE CASE STUDIES | EXPERT INSIGHTS | VALUABLE TOOLS



Thank you. Questions?

NFPA®

IT'S A BIG WORLD.
LET'S PROTECT IT TOGETHER.™

Visit **nfpa.org/3000news** to learn more.

File Attachments for Item:

EC-6 Updated Clean Agent Protection (Southwest Ohio Fire Safety Council)

All certifications (1 hour)

Ohio | Department of Commerce

Mike DeWine, Governor
Jon Husted, Lt. Governor

Sheryl Maxfield, Director

Board of Building Standards

Application for Continuing Education Course Approval

Provider Information:

Name: WHAT'S NEW IN NFPA 72 & OTHER THINGS YOU NEED TO KNOW

Organization: SOUTHWEST OHIO FIRE SAFETY COUNCIL

Address: 8320 MCEWEN RD. CENTERVILLE, OHIO 45458

E-mail: WILLIAM.SUTTER@WASHINGTONTWP.ORG Telephone: 937-433-3083

Website: SWOFSC.ORG

Conference Sponsor (if applicable) SWOBC & MVBOC Conference Email: WILLIAM.SUTTER@WASHINGTONTWP.ORG

Check here if Course Renewal:________ Prior course number ___________________ *(i.e. BBS2018-429)*

Renewals will only be granted for identical content and certifications, within the current code cycle.

Attach a copy of prior course approval letter for confirmation. No further information is required.

New Course Information:

Course title: UPDATED CLEAN AGENT PROTECTION

Course instructor: MICHAEL McSWEENEY – ROTAREX

Course description: NEW CLEAN AGENTS – REPLACING FM-200 & NOVEC 1230
HANDOUTS & LECTURE

QUESTION & ANSWERS

Instructional hours per session: 1 Number of Sessions: 1

Course Date(s) and Location: 11/09/2023 WASHINGTON TWP. TRAINING CENTER – CENTERVILLE, OHIO

Special Content:

Code Administration: [X]

Existing Buildings: [X]

Electrical Instruction: [X]

Plumbing Instruction: [ ]

Conference Course: __________

Conference Name: __________

Conference location: __________

Course to be offered online? [ ] **On Demand** [X] **Webinar** [ ]

Course Website: NONE TO SPEAK OF AT THIS TIME

Detail online course participation confirmation method *(i.e. test, quizlets, participant activity confirmation)*:

Course applicable for the following certifications

Residential Certifications Only: [ ] Commercial Certifications: [X]

Administrative Course, All Certifications: [X]

Application materials included:

[X] Course Outline or Course Learning Objectives

[X] Presentation Materials/Slides (not required for roundtable courses)

[ ] Assessment Materials (for online courses)

[X] Presenter Bio

Please submit application and materials in .pdf format to: michael.lane@com.ohio.gov or BBS@com.ohio.gov

"UPDATE TO CLEAN AGENT SYSTEMS"

Presenter: Michael McSweeney

Employer: ROTAREX S.A.

BIO:

Below is a bio you can use:
Michael is a seasoned professional in the fire suppression market with over 20 years of experience. He has worked for manufacturers and Installers with several high-profile clients and is an expert in designing and implementing fire suppression systems that meet the unique needs of each client. Michael is passionate about ensuring the safety of people and property, and he is committed to providing the highest level of service to his clients.

Outline:

-Fire Triangle

- FM200 & NOVEC 1230 being Phased out

_ What's next and what are it's limitations

ROTAREX
VALVES - FITTINGS - REGULATORS

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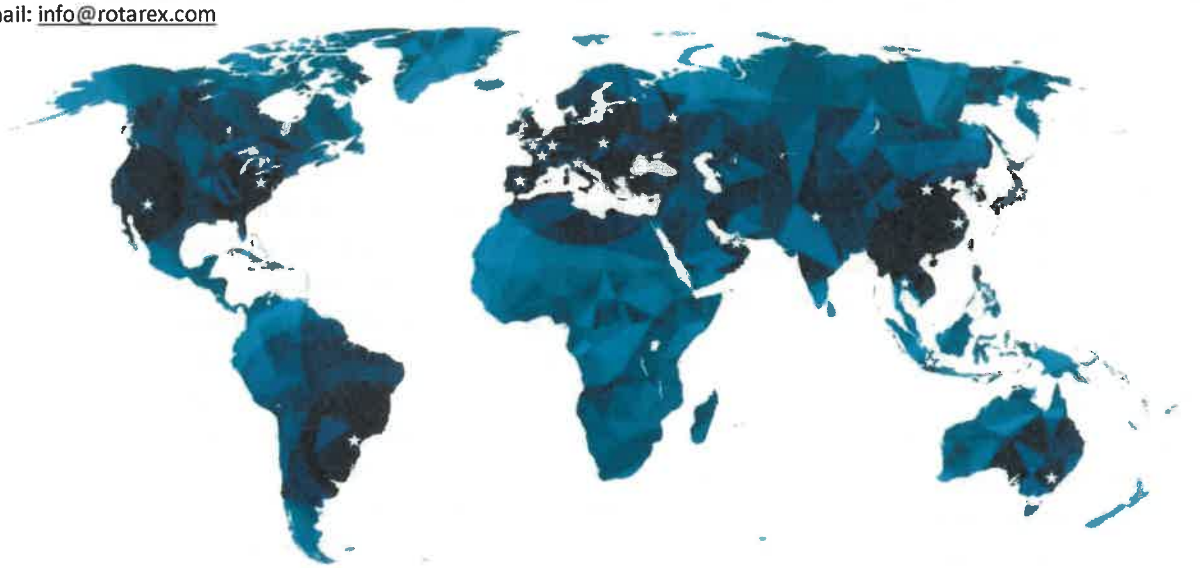

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FireDETEC® Sensor Tubing Tests

Description of the tests realized on red and black tubing as part of the FM & UL approval tests for certifying entire FireDETEC pre-engineered systems.

Leakage Rate

The FireDETEC® Sensor Tubing passed the FM Approvals *One Year Leakage Test*. Six FireDETEC® indirect systems were filled with HFC 227ea and pressurized to the nominal working pressure, 240 psi (16.5 bar). Samples were weighed initially and then placed in a secure storage area for a period of one year. None of the systems leaked in excess of the allowed 0.25% of charge weigh over the period of test. Discharge tests were then performed successfully, and post-discharge inspection revealed not a single sign of the tube deterioration.

Aging Test

FM Approvals and UL 2166 *Air-Oven Aging Test* was performed with one 2 ft. (0.6 m) sample of FireDETEC® Sensor Tubing. The tube was subjected to air-oven aging at a temperature of 212°F (100°C) for 180 days. Following the test, the sample exhibited no signs of any cracking temperature. A hydrostatic test was then performed on the tubing: the sample was pressurized to six time the nominal operating pressure, 900 psi (62.1 bar), for a period of one minute. No signs of damage were observed.

30-Day Extreme Temperature Leakage Test

According to FM Approvals *30-Day Extreme Temperature Leakage Test*, twelve FireDETEC® indirect systems were filled with HFC 227ea and pressurized to the nominal working pressure, 240 psi (16.5 bar). Six samples of these systems were conditioned to the maximum operating temperature, 130°F (54°C), for a period of 30 days, while six other sample were conditioned to the minimum operating temperature, 32°F (0°C), for the same period. All samples were weighed before and after the test period. None of the assemblies leaked in excess of the allowed 0.021% of charge weight over this time. Discharge tests were then performed successfully, and post-discharge inspection revealed no signs of deterioration.

Corrosion – Salt Spray

Two pressurized systems and separate components were subjected to a 240 hour, 20 percent salt fog corrosion test per ASTM B117, *Standard for Salt Spray Testing*. Components, including the FireDETEC® Sensor Tubing, were then examined to verify they exhibited no corrosion, galvanic action, loss of legibility of markings, or separation of protective coatings that would impair future functionality. Every sample passed the test. Furthermore, Discharge tests were performed on each system successfully.

ROTAREX Quality Control

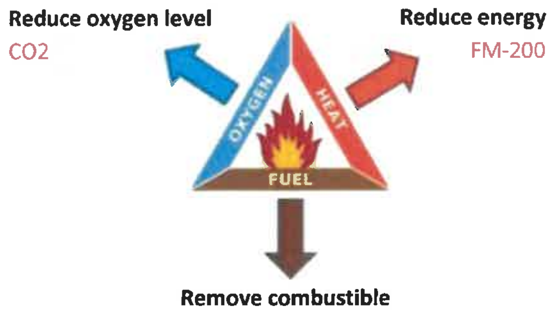
Applying 90 years expertise, ROTAREX prodı are manufactured with the highest qua standards to ensure consistent relia performance even in the most severe conditic The entire FireDETEC range is designed ; produced in Europe to meet the most string requirements in terms of quality.

For the FireDETEC® Sensor Tube, Rotarex focus all the steps of the supply chain. This level rigour is a key point for such a high value-adı product.

FireDETEC is a trademark of the CEODEUX Extinguisher Valves Technology S.A., part of the group ROTAREX S.A.

Extinguishing Agents Used for Electrical Enclosures

The extinguishing agent's choice acts on the way a fire is extinguished.



The FireDETEC fire detection system for electrical enclosures can be offered with two agents:

- **CO2:**

Carbon dioxide is a **naturally occurring chemical compound** and extinguishes fires by **displacing oxygen**, or taking it away. The carbon dioxide is also very cold as it comes out of the extinguisher, so it cools down the fuel as well.

Advantages	Disadvantages
· Non-conductive: **ideal agent for electronic equipment** · No residues: no post-fire clean up → **Time and money savings** · Liquid under pressure: **Storage space gain** · **Excellent environment profile**: 0% ODP · **Low cost**	· Toxic: **human evacuation** when used in large quantities NB: Object Protection does not mean total flooding of the shop floor: not used in large quantities

- **FM-200:**

An alternative extinguishing agent used in FireDetec systems for electrical enclosures is FM-200.

It is a **colorless, non-toxic gas** (Heptafluoropropane), which acts on the **heat of the fire triangle.** It can stop ordinary combustible, electrical, and flammable liquid fires before they cause significant damage.

Advantages	Disadvantages
· Less extinguishing agent needed · **Effective fire suppression agent** : Reach extinguishing levels in 10 seconds · **Excellent environment profile**: 0% ODP · **Non-toxic** for human	· **Fog** during discharge · Machine must be fully **enclosed** · **High cost**

Approvals and References for the FireDETEC Technology

Approvals & Certifications for FireDETEC system

FM APPROVED

UL

LPCB

Applicable Standards

NFPA MEMBER

VdS

References for Electrical Enclosures

	Client	Country
Siemens	SIEMENS	France
ABB	ABB	Switzerland
Toshiba	TOSHIBA	Thailand
Samsung Heavy Industries	SAMSUNG	Korea
Nestle	Nestlé	Singapore
Vodafone	vodafone	India
LG Display	LG	Korea
New Delhi Airport	DELHI	India
Boiron	BOIRON	France
Statoil	Statoil	Norway
Airbus	AIRBUS	Europe

Background Information

Fire risk Assessment

Electrical cabinets are not the most expensive equipment in the factories, but, they do have a **strategic role,** since they enable to control the electricity distribution in the whole facility. So, operators must have to integrate them in their risk management strategy.

When it comes to fire, statistics are clear: **13% of fires in non-home structures are due to electrical distribution and components**, according to the estimation of NFPA from 2007 to 2011. Among all fire occurrences, these **electrical fires accounted for 21% of associated direct property damage**.

Reported Fires in non-home structures in US (1)	
Average Number of fire / year	10,150
Average property damage / year	$ 498,000,000
Average property damage / fire	$ 49,064

(1) NFPA's "Electrical Fires" Report – from 2007 to 2011 – April 2013

With the new tools of plant management, many electrical cabinets have a **Maximum Supportable Downtime** near from zero. Identifying these pieces of equipment and those presenting higher risks of fire is important: **strategic and critical cabinets, which could disrupt the activity, must be protected**. Should a fire occur, this protection would permit to maintain the business activity at its best.

Do you have a bottle-neck analytical grid?

Actually, the equipment might be completely destroyed, and the business activity interrupted for several weeks due to **replacement time,** if it is not secured from fire. This leads to potential late orders and **loss of clients**, and thus significant **financial loss**. Indeed, the probability of fire spreading around surrounding equipment is high. So, it is not only the electrical cabinet that caught fire, but **all surrounding equipment that can be damaged or even completely destroyed.**

Furthermore, many official parties recommend that electrical equipment should be **provided with suitable protection**. For instance, the **European Union** voted the **DIRECTIVE 2006/95/EC** on the harmonization of the laws of Member States relating to electrical equipment designed for use within certain voltage limits between 50 and 1 000 V for alternating current and between 75 and 1 500 V for direct current, stating that technical measures shall be taken in order to ensure safety.
According to the **NFPA** and the **National Electrical Code 2014**, that **approved automatic suppression systems shall be fitted** where sources of power (storage batteries, generator sets, uninterruptible power supplies) are located.

Fire Causes

The major risks in manufacturing machinery have different causes:

- **Short-circuits, overloading or overheating of components**
- **Faulty electrical connections**
- **Electrical malfunction**
- **Electrical surges**
- **Formation of intermittent arcs**
- **Life time of electrical wires**
- **Incorrect installation**
- **Faulty equipment**

When a fire occurs, even if manual fire extinction is always possible, **human beings are not always on side and aware of the proper action**, compared to an automatic fire detection system. Portable extinguishers are not enough efficient once smoke and flames are too much present, and fire is spreading to other equipment.
Plus, who would really like to approach equipment where fire and smoke are present? ☺

CONTENTS

How FireDETEC works?

Principle

Rotarex FireDETEC systems use a continuous linear **thermal sensor tube** that reliably detects **in a 360° environment** and actuates release of the extinguishing agent. It is **more flexible**, **space efficient** and **cost effective** versus alternative mechanical or electronic systems. Indeed, the revolutionary pneumatic design secures individual high-risk areas like electrical and mechanical equipment that were previously not practical to protect.

- Installation closer to the source

Because the sensor tubing is flexible, it can easily be installed directly inside electrical enclosures – directly among circuitry. This installation enables early fire detection.

- Instant Suppression

The sudden tube depressurization actuates the special valve and floods the enclosed area with extinguishing agent. The fire is quickly suppressed just moments after.

Functioning

Indirect High Pressure (IHP) or **Indirect Low Pressure** (ILP) cylinder valves are operated with the FireDETEC thermal sensor tubing and release the agent through a separated discharge line. The FireDETEC sensor tubing is connected to the valve on the low-pressure side of the cylinder valve and installed in the fire hazard area.

The **FireDETEC sensor tubing** is **resistant to oil, dust and chemicals vapor**. At 110°C, the pressure in the FireDETEC sensor tubing releases suddenly. The sudden release of pressure activates the cylinder valve and floods the protected area with extinguishing agent.
This **unique** type of fire detection and suppression has many benefits, since it adapts to the machine: it is totally **flexible** and thus easy to install. So, it enables to **reduce installation costs.**

A **manual release device** can be installed at the end of the FireDETEC sensor tubing for a supplemental manual system activation. In case of fire, by simply pulling the yellow safety device and pushing the red handle, the FireDETEC system activates. A **solenoid actuator** can also be installed in order to connect an additional detection system, which enables the actuation via electronic sensor or control room.

Additionally, a **pressure switch** enables secondary electronic operations such as sounding an alarm when the system actuates, and informing the central alarm system.

DIMES (Digital Measuring System) is the **only permanent electronic contents control** for CO2. It is a capacitive measuring method for determining the gas mass in CO2 storage tanks. It represents a real benefit to industrial buildings and factories, reducing **maintenance costs**, since it eliminates the need to periodically dismount and weigh cylinders to verify fill levels.

Moreover, DIMES technology is **easy to install** (integrated in the valve body), and offers **easy read-out**. It has a **long distance data transmission**.

All the advantages of DIMES technology enable the FireDETEC system to work with CNC machines, without losing time in maintenance, and thus have a **normal business activity**.

Applications for Electrical Equipment

- Electrical Cabinets
- Computer installations
- Electronic Equipment
- Control Boxes
- Battery recharging stations
- Inversion panels
- Relay switches
- Control centers
- Main switch boxes
- Cable rooms
- Cable ducts
- Emergency supply panels
- Transformers
- High voltage equipment

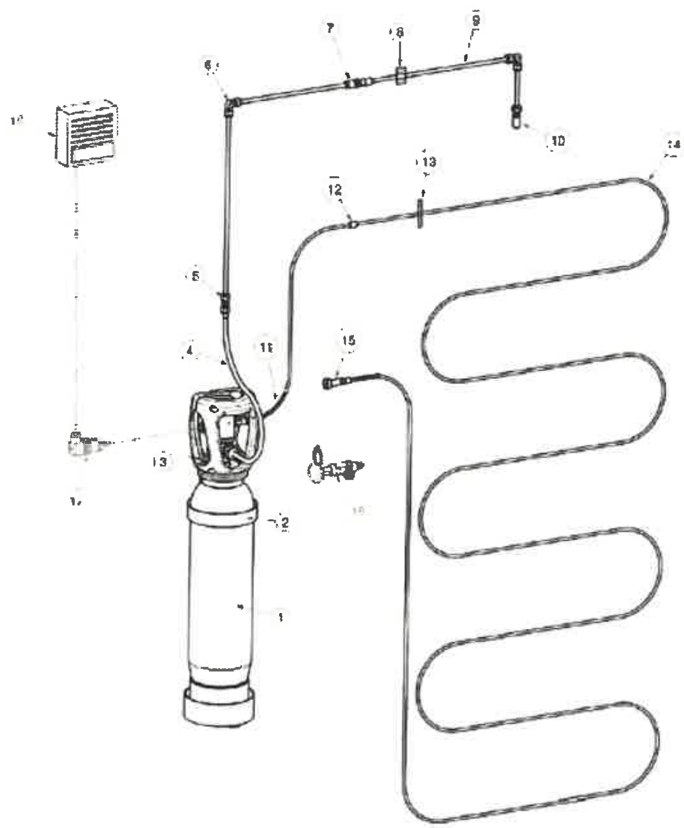
Electrical Cabinets

The most common of application of the FireDETEC system is in electrical cabinets. The thermal sensor tube is routed on each component and rapidly reacts when temperature rises and approaches 110°C.

Once installed, **the FireDETEC tube will not disrupt the functioning of the electrical cabinet**, as it can be considered as another cable. For safety purpose, a **label** installed on the tube prevents from cutting it.

Several electrical cabinets can be protected with the same system.
Directional valve enables to only discharge the agent in the cabinet where fire has been detected by the FireDETEC tube.

	CO2 system components
1	IHP Cylinder / Valve assembly
2	Cylinder bracket
3	Gasket
4	Rubber hose
5	Tube fitting - straight
6	Tube fitting - elbow
7	Cross panel-fitting
8	Pipe bracket (0.8 Ø)
9	Stainless steel tubing (1m)
10	Nozzle
11	Protection Spring top
12	Cross panel-fitting
13	Binding ties
14	FireDETEC Tube (10m)
15	End of Line Adapter
16	Manual Release Device
17	Pressure switch
18	Alarm Box



FireDETEC IHP system

ROTAREX
FIRETEC

CE UL FM APPROVED

COMPLETE SYSTEMS FOR ELECTRICAL CABINETS

FIREDETEC
COMPACT FIRE SUPPRESSION SYSTEMS

MARKET AND PRODUCT INFORMATION

Instruction manual

FireDETEC® Direct low pressure (DLP) fire suppression system for utilizing 3M™ NOVEC™ 1230 fire protection fluid

B0700 EN

(Additional languages available online at www.rotarexfiretec.com)

1 Safety

Read the instruction manual carefully before use.

The product described in this instruction manual is intended exclusively for properly trained specialists (either by the manufacturer or by an authorized person) with experience in installation and maintenance and specifically with the product described herein.

1.1 General understanding of safety

The product has been safely constructed and poses no danger if it is operated in a technically correct manner. Nevertheless, there are risks due to non-intended use that can be avoided by obeying the instructions in this instruction manual.

The non-compliance with the instruction manual can lead to accidents or personal injury, for which CEODEUX Extinguisher Valves Technology S.A. or Rotarex North America, Inc. disclaim any and all liabilities.

Obey all instructions and warnings in this instruction manual when assembling, installing and operating this product.

1.2 Distributor obligations

The distributor of the product described herein must ensure the following:

- All warnings, instructions and product labels for end-users are in the responsibility of the distributor
- Check whether the product has a Pi marking and the declaration of conformity is provided
- Protection from unauthorized access
- Compliance with European and national regulations
- Awareness and comprehension of the product specifications of all affected personnel
- Avoidance of non-intended use
- When the product is installed, all warnings, instructions and product labels for the end-users are in the responsibility of the operator

1.3 Symbols used and their meanings

The warnings are scaled according to the severity of the respective hazard using warning symbols and signal words. You can identify warnings by their color coding or by their upper and lower separator lines.

The following warnings are used within the text:

⚠ DANGER	Indicates a hazardous situation which, if not avoided, will result in death or serious injury.
⚠ WARNING	Indicates a hazardous situation which, if not avoided, could result in death or serious injury.
⚠ CAUTION	Indicates a hazardous situation which, if not avoided, may result in minor or moderate injury.
NOTICE	Indicates useful tips and recommendations as well as information for efficient and trouble-free operation.

2 Intended use

The FireDETEC® Direct low pressure (DLP) fire suppression system is a pre-engineered system designed for the extinguishing agent 3M™ Novec™ 1230 fire protection fluid. 3M™ Novec™ 1230 fire protection fluid is effective on:

- Class A fires - surface fires of celluloid materials (wood, paper, cloth – anything that leaves an ash residue after combustion)
- Class B fires - fires of flammable liquids and gases
- Class C fires - fires that involve energized electrical equipment

The FireDETEC® Direct low pressure (DLP) fire suppression system must be designed and installed in accordance with the requirements outlined in this instruction manual and in accordance with the requirements of LPCB (LPS 1666).

Product repairs must only be performed by the manufacturer or with prior written consent of the manufacturer using only original spare parts.

The product is intended for EU countries and the United States of America. Without prior written permission from CEODEUX Extinguisher Valves Technology S.A. or Rotarex North America, Inc. the product may not be used in any other country.

2.1 Non-intended use

⚠ WARNING Danger due to non-intended use or faulty operation.
The non-intended or faulty use of the FireDETEC® Direct low pressure (DLP) fire suppression system poses a risk to the operator, the users, and to third parties which may lead to death or severe physical injury.

- The FireDETEC® Direct low pressure (DLP) fire suppression system must only be used for the intended use specified in chapter 2
- Retrofits and modifications are prohibited
- All guarantees/warranties are void in the event of non-intended use
- According to NFPA 2001, latest edition and LPCB (LPS 1666) the FireDETEC® Direct low pressure (DLP) fire suppression must not be used on fires involving the following materials:
  - Self-oxidizing chemicals of rapid oxidizing chemicals (examples: cellulose nitrate and gunpowder)
  - Reactive metal compounds (examples: sodium, potassium, barium, magnesium, lithium titanium, zirconium, uranium and plutonium)
  - Metal hydrides (examples: sodium hydride and lithium aluminum hydride)
  - Chemicals capable of undergoing auto-thermal decomposition (examples: organic peroxides and hydrazine)

3 Functional description

The FireDETEC® Direct low pressure (DLP) fire suppression system is a pre-engineered system designed for the extinguishing agent 3M™ Novec™ 1230 fire protection fluid.

NOTICE The FireDETEC® Direct low pressure (DLP) fire suppression system is abbreviated as "DLP System" and the extinguishing agent 3M™ Novec™ 1230 fire protection fluid as "Novec™ 1230" in the following chapters of this instruction manual.

The DLP System is a fire suppression system for suppressing fires in hazards where an electrically non-conductive medium is required and where cleaning of other extinguishing agents is a problem. The DLP System can only be used with the extinguishing agent Novec™ 1230.

The DLP System is used to protect hazards that are enclosed. An enclosed hazard area will provide a means to contain the Novec™ 1230. By containing the Novec™ 1230 in the enclosure, when discharged it will establish and maintain an effective extinguishing agent concentration. Some typical hazards that can be protected with an DLP System include small unoccupied defined volume enclosures such as

- electrical switchgear cabinets
- server racking and similar
- installations from small local flaming fire sources

The DLP system uses a single method for detection and delivery of the extinguishing agent to the activation point. The DLP System uses a FireDETEC® sensor tube, a thermally sensitive tube as an automatic detection line. The FireDETEC® sensor tube is pressurized with dry nitrogen when it is put into service. The FireDETEC® sensor tube is installed in the hazard area as a continuous linear detector that will rupture from flame impingement or when the temperature reaches the release point. The the extinguishing agent is discharged from the FireDETEC® sensor tube. For the DLP System therefore no additional pipework is required. The DLP System is developed for use in total flooding applications, where the hazard area is not normally occupied.

The DLP valve is nickel plated brass equipped with a pressure gauge to monitor the DLP System pressure, a ball valve that is the interface between the FireDETEC® sensor tube, the DLP pressure cylinder, and a pressure relief device. The ball valve must be in the OFF position and secured with the safety clip and tamper seal whenever the DLP pressure cylinder is being transported or is not in service.

The extinguishing agent Novec™ 1230 is stored in DLP pressure cylinders made of steel, that are located in a safe and accessible location.

Additional accessories are used to provide alarms, ventilation control, door closures, or other auxiliary shutdown functions.

The DLP System combines an environmentally safe extinguishing agent and specially developed components for a fast discharge. The resulting rapid fire suppression reduces property damage to the lowest possible extent.

The DLP System is a simple pre-engineered system that operates within a predetermined set of design parameters with limitations that are pre-established by testing. DLP Systems are tested and approved by LPCB. The DLP System does not require the designer to perform any hydraulic flow calculations.

The DLP System is available in two sizes:

- Model DOT and CE marked, charged with 3 lb (1,36 kg) of Novec™ 1230

3.1 Illustration

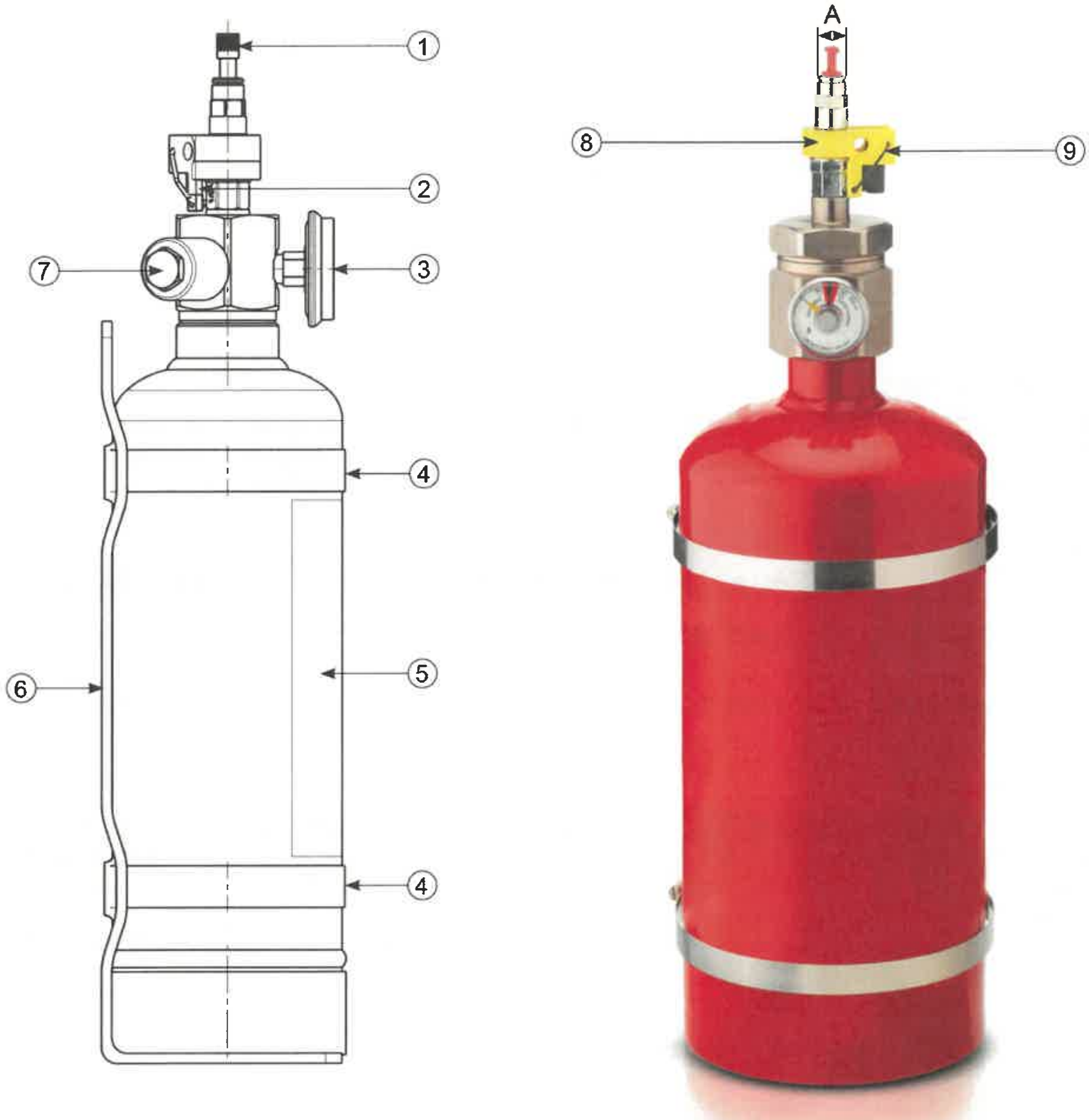


Figure 3.1.1 Figure 3.1.1 DLP pressure cylinder with DLP valve, mounting brackets and clamps

Legend			
①	Sealing plug	⑥	Cylinder mounting bracket
②	Ball valve	⑦	Burst disc
③	Pressure gauge	⑧	Safety clip
④	Clamp	⑨	Tamper seal
⑤	Label	A	Outlet connection

NOTICE The circled numbers ① to ⑨ in the following chapters refer to figure 3.1.1.

3.2 Marking

All DLP Systems have the following marking:

B0XXXXXXX	Article number
	Logo of the manufacturer
YY/WW	Year/week of production
XXXX	The last 4 digits of the batch number (WA)
XX,X kg	Tare weight
LPCB	Approval symbol and approving organization

Individual and additional marking is also possible.

3.3 Variants

3.3.1 DLP pressure cylinder

DLP pressure cylinder article number	DOT Spec	CE EN 3-8	Diameter		Height		Volume		Extinguish-ing agent filling		Working pressure		Test pressure		Used in DLP System article number
			inch	cm	inch	cm	IN³	l	lb.	kg	psi	bar	psi	bar	
028800077	DOT-4BA	X	3,465	8,8	10,669	27,1	75	1,23	3	1,36	360	24,8	720	50	B07004516, B07004524
028800078	DOT-4BA	X	5,236	13,3	11,339	28,8	174	2,87	7	3,18	360	24,8	720	50	B07004517, B07004525

3.3.2 DLP Systems

DLP System article number	Extinguishing agent filling		Burst pressure		Working pressure		Outlet connection (A) valve B07000117	Weight approximately
	lb.	kg	psi	bar	psi	bar		
B07004516	3	1,36	480	33,09	240	16,5	6 mm	2 kg
B07004517	7	3,18	600	41,36	240	16,5	6 mm	4 kg
B07004524	3	1,36	480	33,09	240	16,5	6 mm	2 kg
B07004525	7	3,18	600	41,36	240	16,5	6 mm	4 kg

4 Approvals

Article number	LPCB
B07004516	---
B07004517	---
B07004524	X
B07004525	X

5 Technical properties

5.1 DLP Systems

Valve	B07000117
Pressure relief device	600 psi
Working pressure	Refer to chapter 3.3.2
Extinguishing agent	3M™ Novec™ 1230 fire protection fluid abbreviated as "Novec™ 1230"
Gas for pressurizing the extinguishing agent and the FireDETEC® sensor tube	Nitrogen (N_2)
Inlet connection (C) DLP valve	1" 14 UNS
Outlet connection (A) DLP valve	Refer to chapter 3.3.2
Dip tube thread (G) DLP valve	5/8" 24 UNEF
Pressure gauge connector	1/8" NPT
Torque of the safety screw	18 +1/-0 Nm
Filling connection (D) DLP valve	Equal to outlet connection (A), refer to chapter 3.3.2
Sealing plug outlet connection (A) DLP valve	Equal to outlet connection (A), refer to chapter 3.3.2
FireDETEC® sensor tube connection port	Ø 6 mm
Pressure in the FireDETEC® sensor tube	16 bar
Orifice diameter	4 mm
Normal operating temperature	-4 °F to +131 °F (-20 °C to +55 °C)
Leak test with helium	5 x 10^{-6} mbar l/s
Materials • Valve body, adapter, screws, piston, seal holder, nuts, spindles • Seat gaskets, shock absorber • Primary gaskets • Other O-rings • Burst disc • Springs • Primary seals (membrane) • Screw-in connections • Test valve • Pressure gauge • Secondary seals	 • Brass, nickel plated • PA 6.6 (PCTFE) • EPDM; NBR • EPDM; NBR • Nickel • Stainless steel • Special polymer • Brass with NBR seals • Brass, nickel plated • Brass, nickel plated • NBR, hybrid seal metal nitrile
Weight	Depending on variant

5.2 DLP pressure cylinder

Test pressure	Refer to chapter 3.3.1
Diameter DLP pressure cylinder	Refer to chapter 3.3.1
Height DLP pressure cylinder	Refer to chapter 3.3.1
Volume DLP pressure cylinder	Refer to chapter 3.3.1
Materials • DLP pressure cylinder	 • Steel

5.3 Storage temperature DLP System

DLP pressure cylinders are steel pressure vessels designed to hold the Novec™ 1230 under pressure until it is discharged. All DLP pressure cylinders are suitable for use at storage temperatures of -4 °F to +131 °F (-20 °C to +55 °C). Each DLP pressure cylinder is manufactured in strict accordance with DOT and CE regulations and undergoes extensive pressure and leak testing before shipment to the field.

5.3.1 Temperature and pressure relationship

DLP Systems are designed to operate between -4 °F to +131 °F (-20 °C to +55 °C). The following table shows the internal DLP pressure cylinder pressure as indicated on the pressure gauge. The temperature pressure relationship is based on a maximum fill density of 75 pounds of extinguishing agent per cubic foot at +70 °F (+21 °C) and a charging pressure of 240 psi / 16,5 bar.

Temperature		Pressure	
° F	° C	psi	KPA
30,1	-1,1	205,0	1413,4
40,7	4,8	215,0	1482,4
50,7	10,4	220,0	1516,8
60,9	16,1	226,6	1562,1
69,7	20,9	239,1	1648,3
80,8	27,1	242,2	1669,8
90,2	32,3	260,9	1799,1
100,2	37,9	268,8	1853,0
110,1	43,4	270,3	1863,7
120,3	49,1	280,0	1930,5
130,4	54,7	290,0	1999,5

5.4 Novec™ 1230

3M™ Novec™ 1230 fire protection fluid is a registered trademark of 3M. Novec™ 1230 is a next-generation halon replacement, designed to alleviate concerns for human safety, performance, and the environment. Novec™ 1230 has key features which define sustainable clean agent protection:

- Zero ozone depletion potential
- A global warming potential of one
- Five-day atmospheric lifetime
- A large margin of safety for occupied spaces

Novec™ 1230 is based on a proprietary chemical from 3M called a fluoroketone. The full chemical name for this compound is dodecafluoro-2-methylpentan-3-one. Its ASHRAE nomenclature, the way it is designated in the NFPA 2001 and ISO 14529 clean agent standards, is FK-5-1-12.

Novec™ 1230 is applied as a gas, but is liquid at room temperature. It is electrically non-conducting in both the liquid and gaseous state.

Novec™ 1230 has been tested and verified to be safe for use in occupied spaces when used as specified in the U.S. EPA Significant and New Alternative Policy (SNAP) rules. Tests have proven that exposure to Novec™ 1230 is safe and effective in suppressing fires at low concentrations; all of which are well below the EPA's maximum exposure levels. Novec™ 1230 is approved for use in occupied areas up to 10,5% concentration by volume with a mandated egress time of 5 minutes or less.

5.4.1 Extinguishing mechanism

In order to understand how Novec™ 1230 suppresses a fire, it is important to review the principal aspects of fire chemistry. Four components (fuel, oxygen, heat, and the combustion chain reaction) are often referred to as the "fire tetrahedron".

All four of these factors are required in the correct combination for a fire to ignite and sustain burning. The fire tetrahedron shows that a fire can be extinguished by breaking one or more links between these components or by changing the balance between them.

1. By interrupting the combustion chain reaction.
2. By containing or eliminating the source of fuel.
3. By cutting off or diluting the source of oxygen.
4. By removing sufficient heat from the fire.

Novec™ 1230, like other halocarbon halon alternatives, extinguishes a fire simply by removing heat from the fire. Upon discharge, Novec™ 1230 creates a gaseous mixture with air. This extinguishing agent/air mixture has a heat capacity much larger than that of air alone. A higher heat capacity means that this gas mixture will absorb more energy (heat) for each degree of temperature change it experiences.

At a proper system design concentration, the extinguishing agent/air mixture absorbs sufficient heat to upset the balance of the fire tetrahedron. The amount of heat the fire loses to the surroundings is increased by the presence of the extinguishing agent. This causes the combustion zone to cool to the point that the fire extinguishes.

Novec™ 1230 has the highest heat capacity among all of the commercially available halon alternatives. This results in Novec™ 1230 having the lowest extinguishing concentrations for a given fuel.

5.4.2 Physical properties of Novec™ 1230

NOTICE All properties tested at a room temperature of +25 °C (+77 °F) unless otherwise noted.

Chemical name	Pentafluoroethyl Ketone (C6F12O)
Molecular weight (g/mol)	316,04 g/mol
Boiling point at 1 atm	+49,2 °C (+120,6 °F)
Freezing point	-108,0 °C (-162,4 °F)
Critical temperature	+168,7 °C (+335,6 °F)
Critical pressure	18,65 bar (270,44 psi)
Critical volume	494,5 cc/mol (0,0251 ft^3lbm)
Critical density	639,1 kg/m^3 (39,91 lbm/ft^3)
Specific heat, liquid	1,103 kJ/kg °C (0,2634 BTU/lb. °F)
Specific heat, vapor at 1 atm	0,891 kJ/kg °C (0,2127 BTU/lb. °F)
Heat of vaporization (kJ/kg °C) at boiling point	37,8
Thermal conductivity (W/m °C) of liquid	0,034
Viscosity, liquid	0,39 centistokes
Global warming potential	1
NOAEL (VOL %)	10
LOAEL (VOL %)	> 10,0
Ozone depletion potential	0
US EPA SNAP approval	Accepted
Estimated atmospheric lifetime	0,014 years
4 hours acute inhalation	LC50 > 100,000 ppm

5.4.3 Exposure to Novec™ 1230

Novec™ 1230 is both low in acute toxicity and is a highly-efficient clean extinguishing agent, so that it puts out fires long before the extinguishing agent reaches concentrations that could harm humans. In fact, because its design concentration is much lower than its No Observable Adverse Effects Level (NOAEL).

Extinguishing agent	Novec™ 1230
Design concentration	4,2 - 5,9 %
NOAEL	10 %
Safety margin	69 - 138 %

5.4.4 Spaces not normally occupied

Most DLP Systems will be used to provide protection for hazards and compartments that are too small or too remote to be occupied. DLP Systems can be designed for concentrations exceeding the LOAEL if the space is not normally occupied or that personnel in the hazard area can escape within 30 seconds.

⚠ CAUTION We do not recommend DLP Systems to be used in any normally occupied spaces where the design concentration required is above 10,0 %.

5.4.5 Toxicity

Novec™ 1230 has been extensively tested and is approved for use in fire suppression systems around the world.
The LC50 toxicity rating for Novec™ 1230 is greater than 100,000 ppm. When one considers that most DLP Systems are designed for concentrations providing less than 59,000 ppm it is evident that Novec™ 1230 is safe to use.

Properties	Novec™ 1230
4 hours acute inhalation	Practically non-toxic (LC50 > 100,000 ppm)
Cardiac sensitization	Not a sensitizer (NOAEL = 100,000 ppm)
Acute dermal toxicity	Low toxicity (LD50 > 2000 mg/kg)
Ames assay	Negative
Primary skin irritation	Non irritating
Primary eye irritation	Minimally irritating

Properties	Novec™ 1230
Acute oral toxicity	Low toxicity (LD50 > 2000 mg/kg)
Skin sensitization	Not a skin sensitizer
28 days inhalation study	NOAEL of study 4,000 ppm
Chromosomal aberration	Negative

Although Novec™ 1230 has been shown that it is safe to use, there can be some health effects caused by its combustion. Hydrogen fluoride (HF) vapor can be produced in fires as a breakdown product of Novec™ 1230 and other fluorocarbon extinguishing agents and in the combustion of flouropolymers. The significant toxicological effects of Hydrogen fluoride (HF) exposure occur at the site of contact. As such one must know what to expect when dealing with this toxic vapor. The following table shows the health problems caused by exposure to Hydrogen fluoride (HF) vapors.

Exposure time	Hydrogen fluoride (ppm)	Reaction
2 minutes	< 50	Slight eye and nasal irritation
	50 - 100	Mild eye and upper respiratory tract irritation
	100 - 200	Moderate eye and upper respiratory tract irritation; slight skin irritation
	> 200	Moderate irritation of all body surfaces; increasing concentration may be escape impairing
5 minutes	< 50	Mild eye and nasal irritation
	50 - 100	Increasing eye and nasal irritation; slight skin irritation
	100 - 200	Moderate irritation of skin, eyes and respiratory tract
	> 200	Definite irritation of tissue surfaces; will cause escape impairing at increasing concentrations
10 minutes	< 50	Definite eye, skin and upper respiratory tract irritation
	50 - 100	Moderate irritation of all body surfaces; increasing concentration may be escape impairing
	100 - 200	Moderate irritation of all body surfaces; escape impairing effects likely
	> 200	Escape impairing effects will occur; increasing concentrations can be lethal without medical intervention

5.4.6 Chilling and visibility

Novec™ 1230 discharging from the FireDETEC® sensor tube will have a chilling effect on objects and can cause frostbite burns to the skin. The liquid phase vaporizes rapidly when mixed with air. Discharging the extinguishing agent into an area with a humid atmosphere may cause a reduction in visibility due to condensation of water vapor normally present in the hazard area.

5.4.7 Pressure

The normal working pressure of an DLP System is 240 psi at +70 °F (16,5 bar at +21 °C). This is accomplished by super pressurizing the DLP System with a charge of nitrogen added to the Novec™ 1230. All DLP pressure cylinders are pressurized vessels. Care must be observed when handling, filling and transporting storage DLP pressure cylinders. The anti-recoil devices must be in place whenever the charged DLP pressure cylinder is moved.

To increase the available pressure above the vapor pressure of Novec™ 1230 nitrogen is added to the DLP pressure cylinder after the transfer of the Novec™ 1230 is complete. This process is referred to as super pressurization. Super pressurization is applied to the DLP pressure cylinder for any of the following reasons:

- To increase the total pressure available for flow from the DLP pressure cylinder through the FireDETEC® sensor tube
- To provide a "pressure pad" for the liquid in order to keep the liquid compressed in the liquid phase during flow through the FireDETEC® sensor tube
- To stabilize the DLP pressure cylinder over a wide temperature range or to maintain significant storage pressures at low temperatures

7 Design of the DLP System

The pre-engineered DLP Systems are balanced flow configurations that are simple to design and easy to install. The pre-engineered DLP System minimizes the engineering effort required to design an effective fire suppression system. As long as the length of the FireDETEC® sensor tube and volume limitations are adhered to, computerized flow calculations are not required.

7.1 Hazard evaluation

This section of the instruction manual will detail the steps necessary to design an DLP System within the limitations established by LPCB (LPS 1666). The design of the DLP System must be verified by following the steps outlined in this instruction manual prior to installing any DLP System. When evaluating hazards one must record the following properties:

- Ambient temperature
- Minimum and maximum temperature

⚠ CAUTION	If the specified limitations are not obeyed, the DLP System may not supply the required quantity of extinguishing agent which may result in a fire not being suppressed.
NOTICE	The pre-engineered DLP Systems have been tested and all limitations have been pre-established.

7.2 Safety recommendations

The following are safety recommendations as outlined in NFPA 2001. The designer must be aware of the occupancy of the hazard(s) being protected in order to complete their evaluation of the project and make adjustments or recommendations as necessary.

7.2.1 Spaces not normally occupied

Protected spaces that are considered to be not normally occupied (e.g. flammable liquids storage room, cabinets, some machinery spaces, etc.) can be designed for concentrations above the LOAEL concentration. If there is a potential for personnel to be exposed, measures must be taken to limit exposure.

⚠ CAUTION	We do not recommend DLP Systems to be used in any normally occupied spaces where the required design concentration is above 10 %.

7.3 Determine the enclosure vent area

Make sure that all openings are within the limitations defined in chapter 8.4.1.

⚠ CAUTION	Only one DLP pressure cylinder may be used to protect a hazard.

7.4 Locate the DLP pressure cylinder

Determine the location of the DLP pressure cylinder. Make sure that it is capable of being properly mounted and in a safe accessible location free from high traffic areas and damp or wet locations.

Storage DLP pressure cylinders and accessories must be located and arranged so that inspection, testing, recharging, and other maintenance activities are facilitated and interruption of protection is held to a minimum.

7.4.1 Storage DLP pressure cylinder sizing

For DLP Systems, all DLP pressure cylinders supplying the same manifold outlet for distribution of Novec™ 1230 must be interchangeable and of one select size and charge.

7.5 Determine the location and placement of the FireDETEC® sensor tube

Determine the location of the FireDETEC® sensor tube. Make sure, that it is not subject to damage but located to detect a fire.

8 Limitations

8.1 General

The pre-engineered DLP System minimizes the amount of engineering required when evaluating a design for a specific application. As long as the FireDETEC® sensor tube is installed within the limits prescribed in this instruction manual, no calculations are required for pressure drop, flow rates, or discharge time.

8.2 Temperature

DLP Systems are designed to be stored and operated between -4 °F to +131 °F (-20 °C to +55 °C).

⚠ WARNING DLP pressure cylinder and valve assemblies must be handled, installed and serviced in accordance with the instructions contained in this instruction manual and The Compressed Gas Association (CGA) pamphlets C-1, C-6 and P-1.

CGA pamphlets are available from the CGA, 4221 Walney Road, Chantilly, VA 20151-2923. Failure to follow these instruction can cause DLP pressure cylinders to violently discharge; resulting in injury, death and/or property destruction.

8.3 Working pressure

The normal working pressure of an DLP System is 240 psi (16,5 bar) at +70 °F (+21,1 °C).

8.4 FireDETEC® sensor tube and volume limitations according to LPCB (LPS 1666)

The placement of the FireDETEC® sensor tube is important because it is heat sensitive, it must be placed above the hazard area being protected. In small enclosures it must be at ceiling level.

The numbers published in the table below are approved by LPCB for the DLP System to work properly.

Extinguishing agent filling	FireDETEC® sensor tube				Volume limitations enclosure	
	Maximum length		Maximum height above hazard			
lb.	ft.	m	inch	mm	ft³	m³
3	32,8	10	6,29	160	48,02	1,36
7	32,8	10	6,29	160	70,63	2,00

8.4.1 Maximum free vent area

- Low level vent area = 50 mm x 125 mm (1,96 inch x 4,92 inch)
- High level vent area = 100 mm x 125 mm (3,93 inch x 4,92 inch)

8.5 Ventilation shutdown

Provisions must be made to shut off ventilation systems when the DLP System is actuated and discharging.

18 Appendix

18.1 Material safety data sheet 3M™ NOVEC™ 1230 fire protection fluid

Material Safety Data Sheet

3M™ NOVEC™ 1230 Fire Protection Fluid

Document Group: 16-3425-2 Version Number: 28.02 Issue Date: 11/02/15 Supercedes Date: 07/23/15

SECTION 1: IDENTIFICATION OF PRODUCT AND COMPANY

Product identifier:	3M™ Novec™ 1230 Fire Protection Fluid
Product identification numbers:	98-0212-3203-2, 98-0212-3217-2, 98-0212-3414-5
Recommended use and restrictions on use:	Streaming and flooding fire protection
Manufacturer:	3M
Division:	Electronics Materials Solutions Division
Address:	3M Center, St. Paul, MN 55144-1000, USA
Telephone:	1-888-3M HELPS (1-888-364-3577)
Emergency phone:	**1-800-364-3577 or (651) 737-6501 (24 hours)**

SECTION 2: HAZARD IDENTIFICATION

Hazard classification: Not classified as hazardous according to OSHA Hazard Communication Standard, 29 CFR 1910.1200.

Label elements:

- **Signal word:** Not applicable.
- **Symbols:** Not applicable.
- **Pictograms:** Not applicable.

Hazards not otherwise classified: None.

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

Component:	1,1,1,2,2,4,5,5,5-Nonafluoro-4-(trifluoromethyl)-3-pentanone
CAS number:	756-13-8
% by WT:	> 99.5

SECTION 4: FIRST AID MEASURES

Description of first aid measures:

- **Inhalation:** Remove person to fresh air. If you are concerned, get medical advice.
- **Skin contact:** Wash with soap and water. If signs/symptoms develop, get medical attention.
- **Eye contact:** Flush with large amounts of water. Remove contact lenses if easy to do. Continue rinsing. If signs/symptoms persist, get medical attention.
- **If swallowed:** Rinse mouth. If you feel unwell, get medical attention.

Most important symptoms and effects, both acute and delayed: See section 11.1. Information on toxicological effects.

Indication of any immediate medical attention and special treatment required: Not applicable.

SECTION 5: FIRE-FIGHTING MEASURES

Suitable extinguishing media:

Product is a fire extinguishing agent. Material will not burn.
Use a fire fighting agent suitable for the surrounding fire.

Special hazards arising from the substance or mixture:

Exposure to extreme heat can give rise to thermal decomposition.

Hazardous Decomposition or By-Products

Substance	Condition
Carbon monoxide	During combustion
Carbon dioxide	During combustion
Toxic vapor/Gas	During combustion

Special protective actions for fire-fighters:

When fire fighting conditions are severe and total thermal decomposition of the product is possible, wear full protective clothing, including helmet, self-contained, positive pressure or pressure demand breathing apparatus, bunker coat and pants, bands around arms, waist and legs, face mask, and protective covering for exposed areas of the head.

SECTION 6: ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures:

Evacuate area. Ventilate the area with fresh air. For large spill, or spills in confined spaces, provide mechanical ventilation to disperse or exhaust vapors, in accordance with good industrial hygiene practice. Refer to other sections of this MSDS for information regarding physical and health hazards, respiratory protection, ventilation, and personal protective equipment.

Environmental precautions:

Avoid release to the environment. For larger spills, cover drains and build dikes to prevent entry into sewer systems or bodies of water.

Methods and material for containment and clean-up:

Contain spill. Working from around the edges of the spill inward, cover with bentonite, vermiculite, or commercially available inorganic absorbent material. Mix in sufficient absorbent until it appears dry. Remember, adding an absorbent material does not remove a physical, health, or environmental hazard. Collect as much of the spilled material as possible. Place in a closed container approved for transportation by appropriate authorities. Seal the container. Dispose of collected material as soon as possible.

SECTION 7: HANDLING AND STORAGE

Precautions for safe handling:

Contents may be under pressure, open carefully.
Do not breathe thermal decomposition products.
For industrial or professional use only.
Do not use in a confined area with minimal air exchange.
Do not eat, drink or smoke when using this product.
Wash thoroughly after handling.
Avoid release to the environment.

Conditions for safe storage including any incompatibilities:

Protect from sunlight.
Store in a well-ventilated-place.
Store at temperatures not exceeding 38 °C/100 °F.
Store away from strong bases.
Store away from other materials.
Store away from amines.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters:

- **Occupational exposure limits:** If a component is disclosed in section 3 but does not appear in the table below, an occupational exposure limit is not available for the component.
- **Ingredient:** 1,1,1,2,2,4,5,5,5-Nonafluoro-4-(trifluoromethyl)-3- pentanone
- **CAS number:** 756-13-8
- **% by WT:** > 99.5
- **Agency:** Manufacturer determined
- **Limit type:** TWA: 150ppm (1940 mg/m^3)
- **Additional comments:** ACGIH: American Conference of Governmental Industrial Hygienists
  AIHA: American Industrial Hygiene Association
  CMRG: Chemical Manufacturer's Recommended Guidelines
  OSHA: United States Department of Labor - Occupational Safety and Health Administration
  TWA: Time-Weighted-Average
  STEL: Short Term Exposure Limit
  CEIL: Ceiling

Exposure controls:

- **Engineering controls:** Provide appropriate local exhaust when product is heated.
  For those situations where the material might be exposed to extreme overheating due to misuse or equipment failure, use with appropriate local exhaust ventilation sufficient to maintain levels of thermal decomposition products below their exposure guidelines.
  Use general dilution ventilation and/or local exhaust ventilation to control airborne exposures to below relevant Exposure Limits and/or control dust/ fume/gas/mist/ vapors/spray.
  If ventilation is not adequate, use respiratory protection equipment.

- **Personal protective equipment (PPE):**
  - **Eye/face protection:** Eye protection not required.
  - **Skin/hand protection:** No protective gloves required.
  - **Respiratory protection:** Use a positive pressure supplied-air respirator if there is a potential for over exposure from an uncontrolled release, exposure levels are not known, or under any other circumstances where air-purifying respirators may not provide adequate protection. If thermal degradation products are expected, use a full facepiece supplied-air respirator.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties:

General physical form	Liquid
Specific physical form	Liquid
Odor, color, grade	Clear colorless liquid with low odor
Odor threshold	No data available
pH	Not applicable
Melting point	-108 °C
Boiling point	49 °C [at 760 mmHg]
Flash point	No flash point
Evaporation rate	> 1 [Ref Std: BUOAC=1]
Flammability (solid, gas)	Not applicable
Flammable limits (LEL)	None detected
Flammable limits (UEL)	None detected

Vapor pressure	40.4 kPA [at 25 °C]
Vapor density	11.6 [Ref Std: AIR=1]
Specific gravity	1.6 [at 68 °F] [Ref Std: WATER=1]
Solubility in water	Nil
Solubility non-water	No data available
Partition coefficient: n-octanol/water	No data available
Auto ignition temperature	Not applicable
Decomposition temperature	No data available
Viscosity	0.6 centipoise [at 25 °C]
Volatile organic compounds	1600 g/l [Test Method: calculated SCAQMD rule 443.1]
Percent volatile	100%
VOC less H20 & exempt solvents	1600 g/l [Test Method: calculated SCAQMD rule 443.1]

SECTION 10: STABILITY AND REACTIVITY

Reactivity: This material may be reactive with certain agents under certain conditions - see the remaining headings in this section.

Chemical stability: Stable

Possibility of hazardous reactions: Hazardous polymerization will not occur.

Conditions to avoid: Light

Incompatible materials: Strong bases - Amines - Alcohols

Hazardous decomposition products:

Substance: Hydrogen Fluoride
Condition: At Elevated Temperatures - extreme conditions of heat

Refer to section 5.2 for hazardous decomposition products during combustion.
If the product is exposed to extreme condition of heat from misuse or equipment failure, toxic decomposition products that include hydrogen fluoride and perfluoroisobutylene can occur.
Extreme heat arising from situations such as misuse or equipment failure can generate hydrogen fluoride as a decomposition product.

SECTION 11: TOXICOLOGICAL INFORMATION

The information below may not be consistent with the material classification in section 2 if specific ingredient classifications are mandated by a competent authority.
In addition, toxicological data on ingredients may not be reflected in the material classification and/or the signs and symptoms of exposure, because an ingredient may be present below the threshold for labelling, an ingredient may not be available for exposure, or the data may not be relevant to the material as a whole.

Information on toxicological effects

Signs and symptoms of exposure:

Based on test data and/or information on the components, this material may produce the following health effects:

- **Inhalation:** No known health effects.
- **Skin contact:** Contact with the skin during product use is not expected to result in significant irritation.
- **Eye contact:** Contact with the eyes during product use is not expected to result in significant irritation.
- **Ingestion:** May be harmful if swallowed.
- **Toxicological data:** If a component is disclosed in section 3 but does not appear in a tab[illegible] below, either no data are available for that endpoint or the data are n[illegible] sufficient for classification.

Jack Menke

From: MCSWEENEY Michael <McSweeney.Michael@Rotarex.com>
Sent: Tuesday, October 3, 2023 4:32 PM
To: Jack Menke
Subject: Re: 11/02/2023 Class

Jack,
To confirm, the training will be focused on electrical cabinet protection.

Sent from my iPhone

On Oct 3, 2023, at 2:23 PM, Jack Menke <JMenke@a1ssi.com> wrote:

Thanks, JM

<a1logo-horizontalbottom-01_55e4dbf3-bed4-4eac-a1df-22f45f2e993d.jpg> **Jack Menke**
Systems Contract Sales
e: JMenke@a1ssi.com w: www.a1ssi.com f: 937.859.0651 p: 937.859.6198 x204 c: 937.603.4415
2383 Northpointe Drive, Miamisburg, OH 45342

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From: MCSWEENEY Michael <McSweeney.Michael@Rotarex.com>
Sent: Tuesday, October 3, 2023 3:07 PM
To: Jack Menke <JMenke@a1ssi.com>
Subject: Re: 11/02/2023 Class

Sorry Jack. I will get it to you by tomorrow.

Sent from my iPhone

On Oct 3, 2023, at 1:15 PM, Jack Menke <JMenke@a1ssi.com> wrote:

Michael. I still need your handouts for the class on 11/2/2023. Also, the State of Ohio wants a paragraph or so Bio on you and your Systems experience. Need no later than Thursday afternoon. Thanks Jack

Jack Menke, SET
Senior Fire Alarm Designer
NICET Level IV – Fire Alarm

BBS Certified # 3198
937-603-4415

<a1logo-horizontalbottom-01_55e4dbf3-bed4-4eac-a1df-22f45f2e993d.jpg>

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