Presentation Description

The residential fire problem has changed over the last several decades. Although some aspects have improved, fires in newly constructed and furnished homes can become deadly in as little as a few minutes. This presentation will provide an overview of why residential fire sprinklers are so effective, and so necessary in today’s environment. New materials, design approaches, and applications will be highlighted to provide insight, awareness, and understanding of fire sprinkler systems. Learn how, and why, to incorporate this life saving technology into your cutting edge building designs.
Presenter Introduction - Eric Skare

Eric Skare, product manager, fire safety for Uponor, is a certified fire protection specialist (CFPS), has been a volunteer firefighter since 2002, and is a principal member of the National Fire Protection Association (NFPA) Technical Committee on Residential Sprinkler Systems. He is actively involved in various industry associations including chairing the Fire Sprinkler committee for the Plastic Pipe and Fittings Association (PPFA) and serving on the Residential Committee and Future Leadership Committee for the National Fire Sprinkler Association (NFSA).
Learning Objectives

• The fire problem – and the solution
• Fire sprinkler myths
• Emerging technologies
The Fire Problem
Flashover

- Flashover – the point where everything in the room suddenly and simultaneously ignites
- Approximately 1,100°F to 1,500°F
- Can occur in just a few minutes
Modern Furnishings

Comparison of Room Furnishings
Legacy Room  Modern Room
Underwriters Laboratories 02:00

Comparison of Room Furnishings
Legacy Room  Modern Room
Underwriters Laboratories 03:00

Comparison of Room Furnishings
Legacy Room  Modern Room
Underwriters Laboratories 03:40

Comparison of Room Furnishings
Legacy Room  Modern Room
Underwriters Laboratories 05:00

Comparison of Room Furnishings
Legacy Room  Modern Room
Underwriters Laboratories 10:00

Comparison of Room Furnishings
Legacy Room  Modern Room
Underwriters Laboratories

Modern Furnishings
Open Floorplans

- Large open spaces
- High, vaulted ceilings
- Fewer doors
- Nothing to contain heat, smoke and toxic gases
- Fires grow and spread rapidly
Lightweight Construction

- Cost effective
- Light and strong
- Quiet
- Poor performance when exposed to fire
- Structural failure in as little as 5 minutes
Myth #1: Smoke alarms are enough to keep me safe
Smoke alarms just aren’t enough anymore…
Occupants don’t have time to get out of the home…
Flashover and structural collapse can occur in as little as just a few minutes…

Fire sprinklers are the solution
Fire Sprinkler Overview
Sprinkler Basics

This threads into fitting

This holds back the water

This heats up and breaks when there is a fire

This heats up and melts

Water hits this

Water goes on the fire and removes the heat

EEBA 2016: Fire Sprinklers - The Ultimate Fire Fighters
Fire Sprinkler vs. Fire Hose
Myth #2: When one goes off they all go off

Myth #3: My house will get flooded if I burn the toast
Individually heat activated…
Will not activate by smoke…
10-15 gallons per minute vs 150 gallons per minute…
Fire damage, firefighter damage, or…

A fire sprinkler controlling the fire when it is small
Codes and standards

Sprinkler system installation requirements typically in accordance with NFPA (National Fire Protection Association) standards:

- NFPA 13
- NFPA 13R
- NFPA 13D — life safety

Model building codes require sprinklers
NFPA 13D

• Developed subcommittee in 1973
• Adopted in 1975
• Purpose is to prevent flashover
• Improve the chances for escape or evacuation
• One- and two-family dwellings, manufactured homes and townhomes
• Life-safety system
Standalone Sprinkler System

- Dedicated piping for fire sprinkler system
- Backflow prevention usually required
- Usually installed with CPVC pipe
Passive Purge Sprinkler System

- Single toilet fed by sprinkler piping
- Backflow prevention may be required
- Installed with PEX or CPVC pipe
Multipurpose Sprinkler System

- Cold-water fixtures fed from sprinkler piping
- Backflow prevention not needed
- Usually installed with PEX pipe
Multipurpose Sprinkler System

- Less piping in the home
- Non-stagnant system
- Backflow prevention not needed
- Homeowner “tests” their system every day!
Attic Insulation

- For cold regions: \( R_o = R_i \frac{(T_o - 40)}{(40-T_i)} \)
- For hot regions: \( R_o = R_i \frac{(T_o - 120)}{(120-T_i)} \)

Where

- \( T_i \) = indoor, conditioned living space
- \( T_o \) = outdoor, unconditioned attic space
- \( R_i \) = R-value of insulation between tubing and conditioned living space below
- \( R_o \) = R-value of insulation above tubing

![Figure 1: Preferred Installation Method](image1.png)

![Figure 2: Alternative Installation Method](image2.png)
Attic Insulation

- For cold regions: $R_o = \frac{R_i (T_o-40)}{(40-T_i)}$
- For hot regions: $R_o = \frac{R_i (T_o-120)}{(120-T_i)}$
Vapor Barriers – Recessed Sprinklers

All penetrations must be sealed

No issues with semi-recessed sprinklers
Vapor Barriers – Concealed Sprinklers

Insulator will want to seal around cup of flat concealed sprinkler head

Air must flow up through the sprinkler and out the top for correct operation
Vapor Barrier Solutions
AquaSAFE™ exposed listing

Approved to be installed and left exposed in:

- Dimensional lumber
- Engineered wood (LVL, Glulam)
- Wood I-joist
- Open-web wood joists (wood floor trusses)
"New" Technology

- Flexible PEX tubing
- Multipurpose – fire and plumbing combined
- Protecting exposed lightweight construction materials
- The forgotten system…hopefully
Summary – Learning Objectives

The fire problem – and solution

• Modern furnishings
• Open floor plans
• Modern (lightweight) construction

Fire sprinkler myths

• Smoke alarms are enough to keep me safe
• When one goes off they all go off
• My house will get flooded if I burn toast

Emerging technologies

• Multipurpose systems
• Flexible piping and system design
• Exposed applications
Thank you

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