FIRE SCIENCE AND

WHY IT MATTERS

UNDERWRITERS LABORATORIES FIRE SAFETY RESEARCH INSTITUTE (UL-FSRI) IS DEDICATED TO INCREASING FIREFIGHTER KNOWLEDGE TO REDUCE INJURIES AND DEATHS IN THE FIRE SERVICE AND THE COMMUNITY THEY SERVE.

NORTHVILLE TOWNSHIP FIRE DEPARTMENT

BE THE STANDARD

WHO WE ARE

Established in 1977, the Northville Township Fire Department has transformed from a volunteer fire department (1977) to a full-time (2000), to an advanced-life-support transport agency (2009).

The Mission, Vision and Values of the organization provide for the decision-making framework of the organization to make sure that the service delivery is consistent with community needs and expectations.

PROFESSIONALISM, PUBLIC OUTREACH, AND CONTINUOUS IMPROVEMENT.

- **Average of 3,350 incidents annually**
  Average of 9 incidents per day
- **27 operations staff**
  4 administrative staff
- **7 to 9 daily operations staff 24/7**
- **Full-time staffing with firefighter/paramedics consistent with like communities**
- **Cross trained firefighter/paramedics**

FIRE IS GETTING FASTER

Understanding fire science is critical to effectively deploying resources and managing outcomes. Scientists at NIST and UL have made tremendous strides in understanding fire behavior and its impact on tactics. Fires today burn hotter, faster than at any time in history.

This change is due to the increased use of plastics and synthetics for furniture and contents, the increased home size, the increase in open space within the home and the quality of construction materials and systems utilized.

Increased temperatures
Temperatures can increase from 250 degrees to 1,500 degrees fahrenheit in 10 seconds.

Increased heat release rate (HRR)
Flashover is 8x faster in modern homes than those built 50 years ago.

Lightweight construction
Lightweight construction elements are present in the majority of homes constructed after 1980. Since 2000, lightweight construction is used for floor systems, roof systems and even stairways. Nearly 60% of homes have been built since 1990.

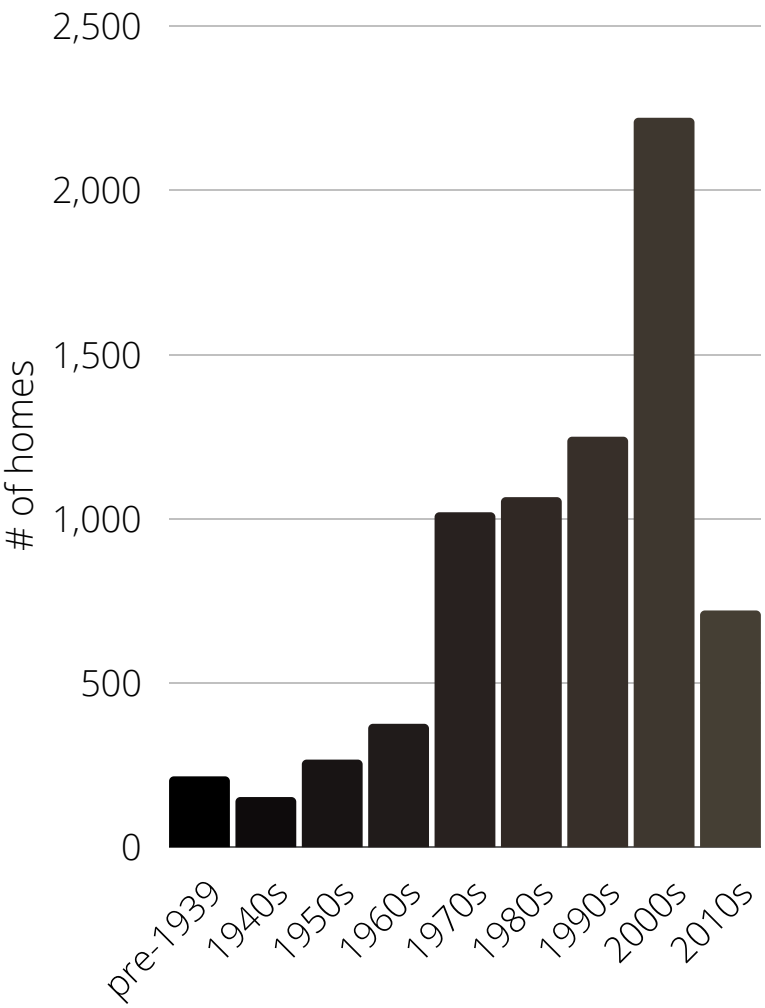
Increased collapse potential
Collapse potential of lightweight building construction.

Reduced time
The time for an occupant to escape a fire has been reduced from 17 minutes to less than 3 minutes. This increases the vulnerability of occupants and firefighters.

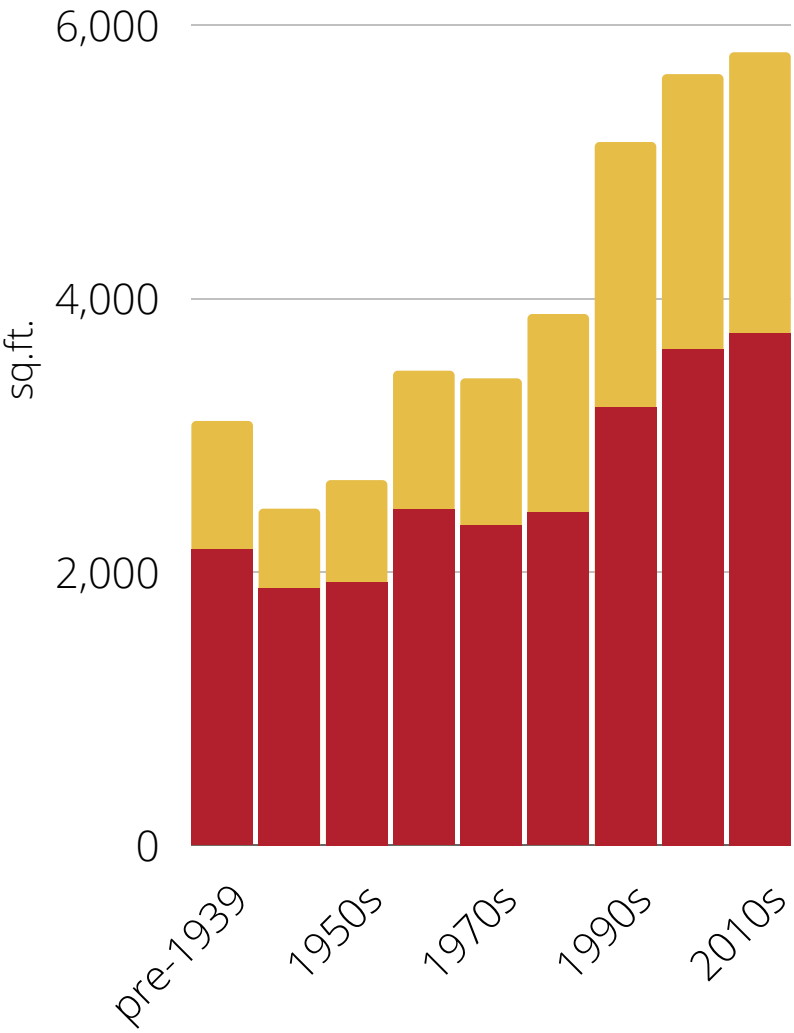
BIGGER HOMES, BIGGER FIRES.

Northville Township experienced a tremendous building boom in the early 2000s. More than 70% of all of the homes in Northville Township have been built since 1980. This is important from a firefighting standpoint, because of the inception of lightweight construction materials and methods. The increase in the use of lightweight materials and methods has allowed home sizes to grow substantially, with engineered truss systems, longer floor and ceiling spans and more space between structural supports.

Home Construction by Decade



Home Sizes by Decade

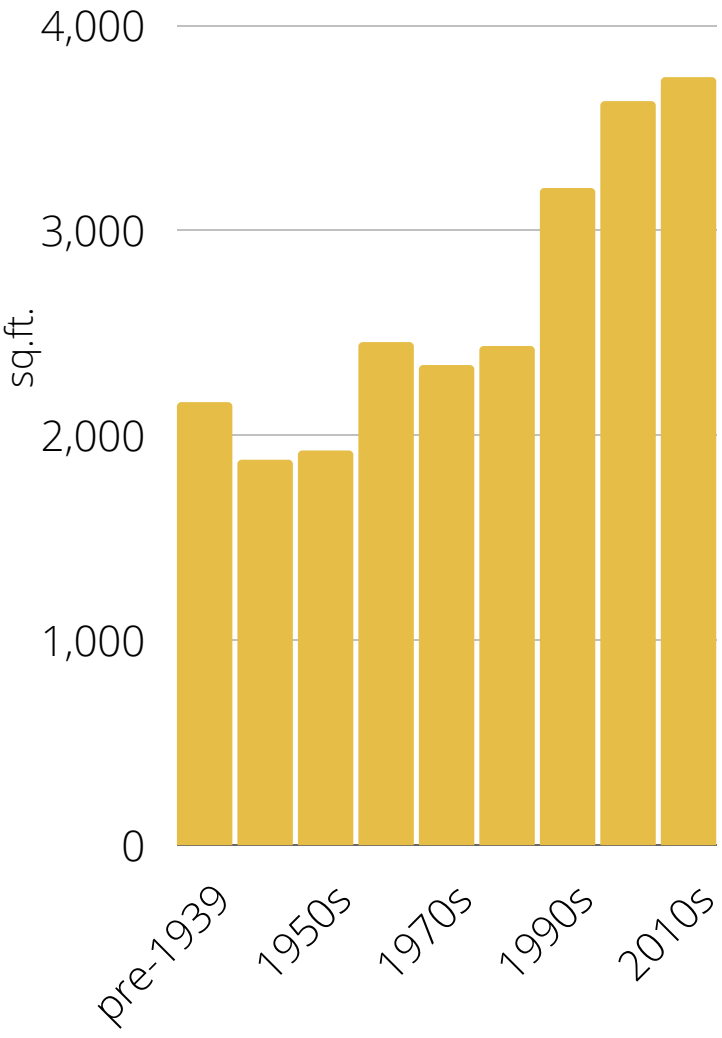


TRUST THE SCIENCE

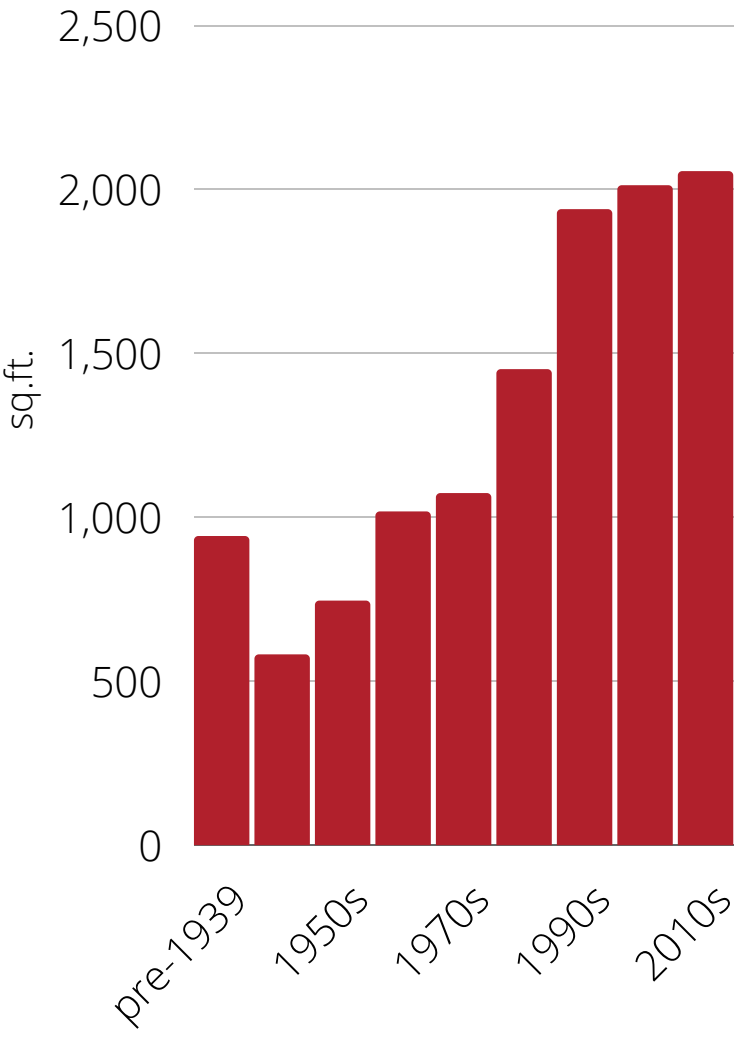
UL Firefighter Safety Research Institute (FSRI) advances fire research knowledge and develops cutting edge, practical fire service education aimed at helping firefighters stay safe while more effectively protecting people and property.

Locally, we commit to trusting the science. The science tells us that in our community we have unique hazards due to the prevalence of basements, the type of construction materials and methods, and the age of our homes increases risks to our residents and firefighters.

Floor Sizes by Decade



Basement Sizes by Decade



ON THE HOT SEAT

UL and NIST have studied and compared the impact of todays "modern" or synthetic furnishings on fire and more specifically on flashover. Furnishings in generations past were normally constructed of natural materials including wood, cotton, and wool. In the last 30-40 years synthetic materials have taken over and are present in all of our homes.

These synthetic materials such as polyester, polyurethane foam, polyolefin carpet, polyurethane padding, and engineered wood products such as MDF, release far more deadly smoke and chemicals than natural products. These products release more smoke and fuel leading to higher heat release rates and fires buring hotter, faster. These products cause flashover to occur almost 8x faster than natural furnishings.

Flashover is the transition phase in the development of a room fire in which fuel surfaces, exposed to thermal radiation from fire gases in excess of 1,100 degrees F, reach ignition almost simultaneously and fire spreads rapidly through the space. In short, flashover is the point where all contents in the room reach temperatures that cause them to release gases that simultaneously ignite.

TIME TO FLASHOVER

ROOM WITH SYNTHETIC FURNISHINGS

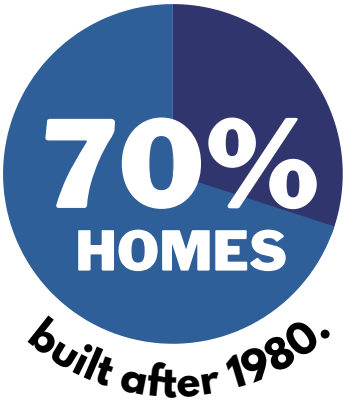
ROOM WITH NATURAL FURNISHINGS

LOCAL CHALLENGES

Average home is 3,000 sq.ft. with a 1,700 sq.ft. basement

Our average home sizes are over 3,000 square feet in size.

When you add the average 1,700 square foot basement, home square footage in Northville Township is over 4,700 on average.

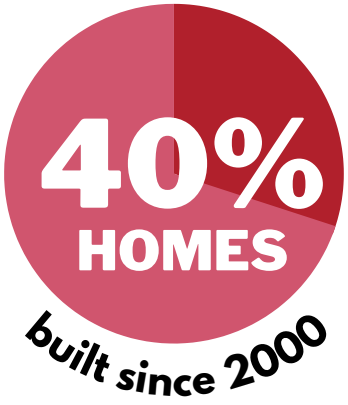


A vast majority of the Township has been built since 1980. This is important because homes sizes and home construction methods and materials have changed dramatically during that period.

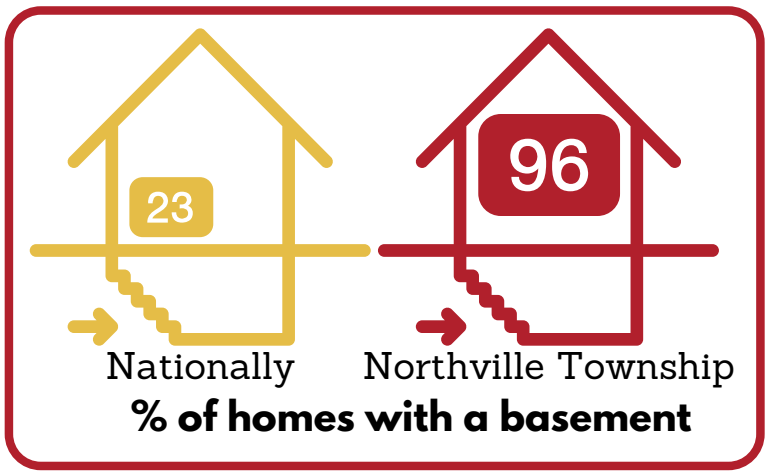
Over 70% of Northville Township homes were been built after 1980.

Move than 40% of the Township has been constructed since 2000.

The average size of homes and basements has increased exponentially during this period. This is due to the prevalence of lightweight construction materials and methods; and engineered products that increase size and span. Lightweight construction collapses much faster and more catastrophically than legacy construction.



LOCAL CHALLENGES

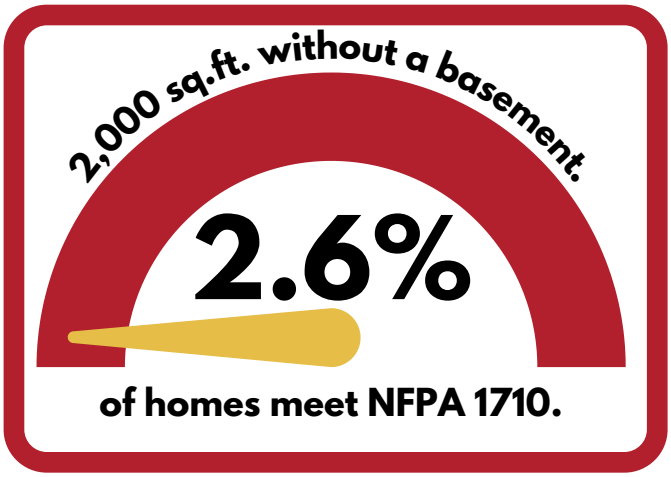


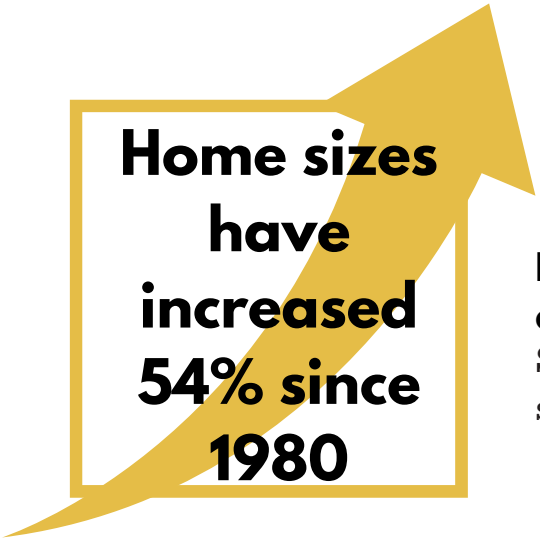
Nationally basements are constructed in approximately 23% of new homes.

In Northville Township approximately 96% of our homes and over 71% of our condos have basements (HUD, SEMCOG).

NFPA 1710 provides recommendations on the effective response force (ERF) based on fires involving homes that are 2,000 square feet without a basement.

In Northville Township approximately 189 homes or 2.6% of our homes meet that criteria.





Homes sizes have continued to grow for the last 4 decades.

Since 1980 Northville Township above grade home sizes have grown by almost 54%.

Topical Fire Report Series

June 2021 | Volume 21, Issue 3

At a Glance

Civilian Fire Fatalities in Residential Buildings (2017-2019)

Annually, from 2017 to 2019, an estimated

2,770

civilian fire fatalities

resulted from 1,900 fatal fires in residential buildings.

77%

From 2017 to 2019, civilian fire fatalities in residential buildings accounted for 77% of all estimated fire fatalities.

Thermal burns and smoke inhalation were the primary symptoms leading to death, accounting for 89% of all fatalities in residential building fires.

Bedrooms, at 50%, were the leading specific location where civilian fire fatalities occurred in residential buildings.

The time period from 11 p.m. to 7 a.m. accounted for 49% of civilian fire fatalities in residential buildings and 46% of fatal fires in residential buildings.

37%

At the time of their deaths, 37% of fire victims in residential buildings were trying to escape; an additional 31% were sleeping.

"Other unintentional, careless" actions (19%)

and

"smoking" (13%)

were the leading causes of fatal fires in residential buildings.

Males accounted for 58% of civilian fire fatalities in residential buildings; females accounted for 42% of civilian fire fatalities in residential buildings.

50 - 69

Adults aged 50 to 69 accounted for 36% of civilian fire fatalities in residential buildings.

The topical reports are designed to explore facets of the U.S. fire problem as depicted through data collected in the U.S. Fire Administration's National Fire Incident Reporting System. Each topical report briefly addresses the nature of the specific fire or fire-related topic, highlights important findings from the data, and may suggest other resources to consider for further information.

To read the full report, visit usfa.fema.gov.

FEMA

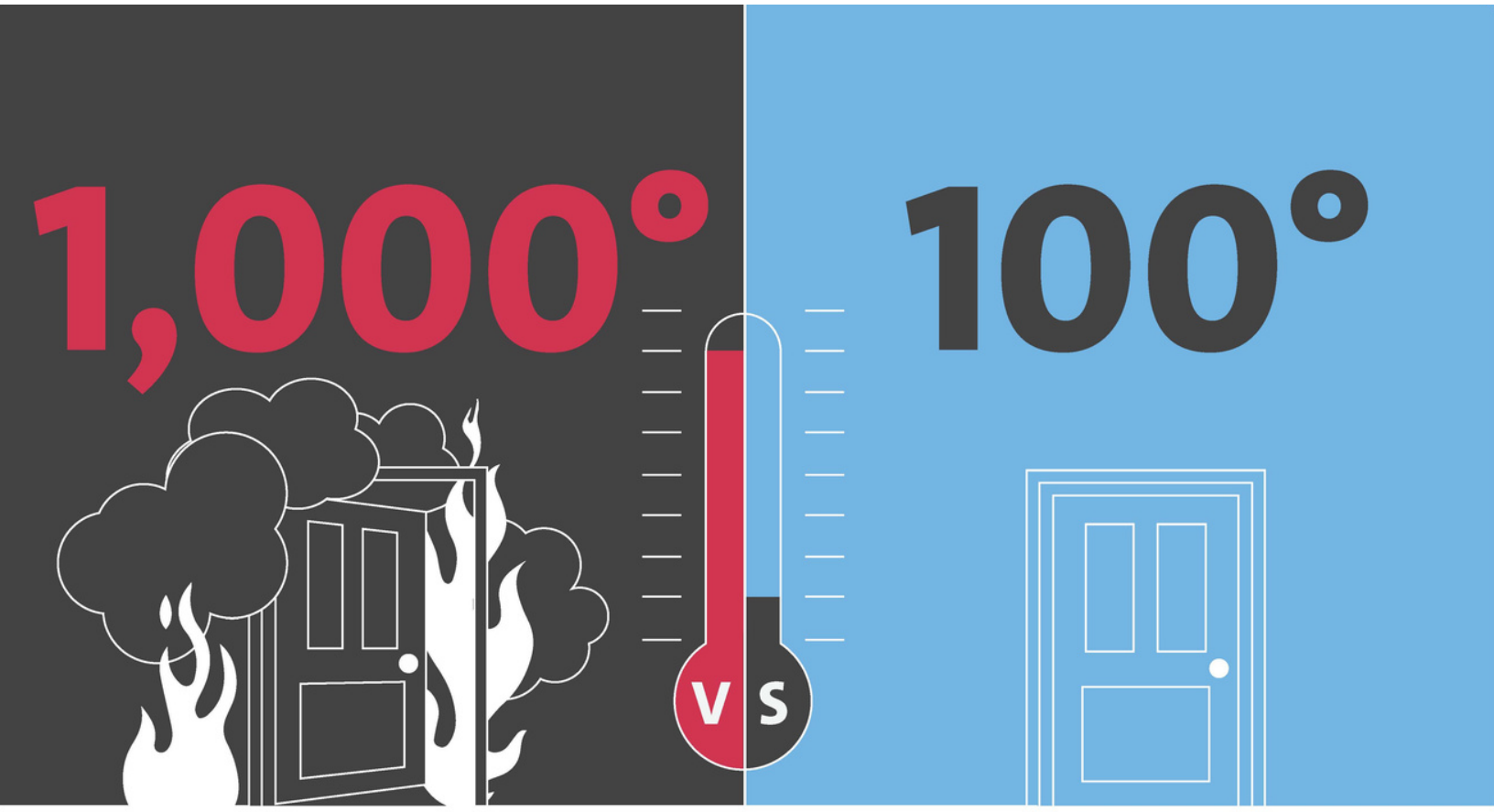
U.S. Fire Administration
Working for a fire-safe America

National Fire Data Center
16825 S. Seton Ave.
Emmitsburg, MD 21727
usfa.fema.gov

MAKE A 900 DEGREE DIFFERENCE

Research proves a closed door can mean the difference between 1,000 degrees and 100 degrees in the event of a fire. Fire is getting faster and closing a door helps to stop the spread of fire.

Even hollow-core doors can buy you additional time to escape or for help to arrival. This simple act can be the difference between saving your life or that of a loved one.



CLOSE BEFORE YOU DOZE

MAKE A 900 DEGREE DIFFERENCE

During a fire, a closed door can mean the difference between **1,000 degrees** and **100 degrees.**

One of these rooms is safer than the other.

CLOSE®

BEFORE YOU DOZE

Fire is getting faster. A closed door helps stop the spread of fire. Close before you doze, it could save your life.

BE THE STANDARD

CLOSE YOUR DOOR

It Could Save Your Life

Fire is getting faster, so if you can get out, get out. But if you can't, a closed door could make a life-saving difference.

Close the door and better your chances! A closed door could buy you time in a fire, and that's not all...

A closed door can hold back fire's heat. In tests, an open door room reached dangerous temperatures while a closed door room stayed under 100° F.

A fire needs oxygen to burn. Don't let it take yours! A closed door can keep more oxygen in the room – and away from the fire – so you can breathe better.

Closing the bedroom door at night could give you more time to react to if the smoke alarm sounds.

A closed door can help slow fire's spread and keep dangerous smoke away from you.

Because of the plastics in most modern furniture and household items, fire is more toxic and much faster than ever before.

A fire needs heat, fuel and oxygen to exist. Closing the door when exiting a burning structure can cut off the oxygen and stop the growth of fire.

CLOSE BEFORE YOU DOZE

IT'S TIME TO ADD "CLOSE YOUR DOOR" TO YOUR FIRE SAFETY CHECKLIST

You know how important it is to have working smoke alarms, escape plans, and a designated meeting place in case of a fire. But did you know that closing your doors in your home is also important for your safety? Closed doors can reduce fire growth, limit damage to your home, keep temperatures down, and can even save your life if you become trapped.

DID YOU KNOW?

Because of synthetic materials, furniture and construction, fire spreads faster than ever before.*

*NIST Technical Note 1455-1, February 2008

MAKE A 900 DEGREE DIFFERENCE - A closed door can mean reducing 1,000 degrees down to 100 degrees.

TAKE IT DOWN A NOTCH - During a fire, a closed door can keep carbon monoxide levels at 1,000 PPM versus 10,000 PPM if the door is left open.

TAKE A BREATHER - A fire needs oxygen to burn. A closed door keeps more oxygen in the room and away from the fire. When you exit a fire, make sure to close your door behind you to slow down its growth.

DOZE SAFELY - 50% of house fires happen between 11 p.m. and 7 a.m. Closing your doors before you hit the hay helps keep you safe.

Learn more at **closeyourdoor.org**

RESOURCES

VIDEO Home Furnishing Comparison

VIDEO The 900 Degree Difference

VIDEO Close Before You Doze

VIDEO See the Difference

USFA Smoke Alarm Position Paper

NTFD Smoke and CO Alarm Quick Reference Guide

NTFD Homeowner Resources