RICHMOND
INTERNATIONAL CODE COUNCIL 2018

*Welcome to the*

# 2018 Annual Conference Educational Sessions

**Session: Firestop - Let's Walk a Project and Look at Firestop Together**

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# Firestop: Let's walk a project and look at firestop together

Richmond ICC
Sharron Halpert
HLS Consulting
Education, Consultation and Inspection- Firestop

# Todays Topics

- Industry changes
- Cautionary Tales of Common Bad Firestop Installations
- Code Class-
- Some cool new products

# Where did Firestop Start?

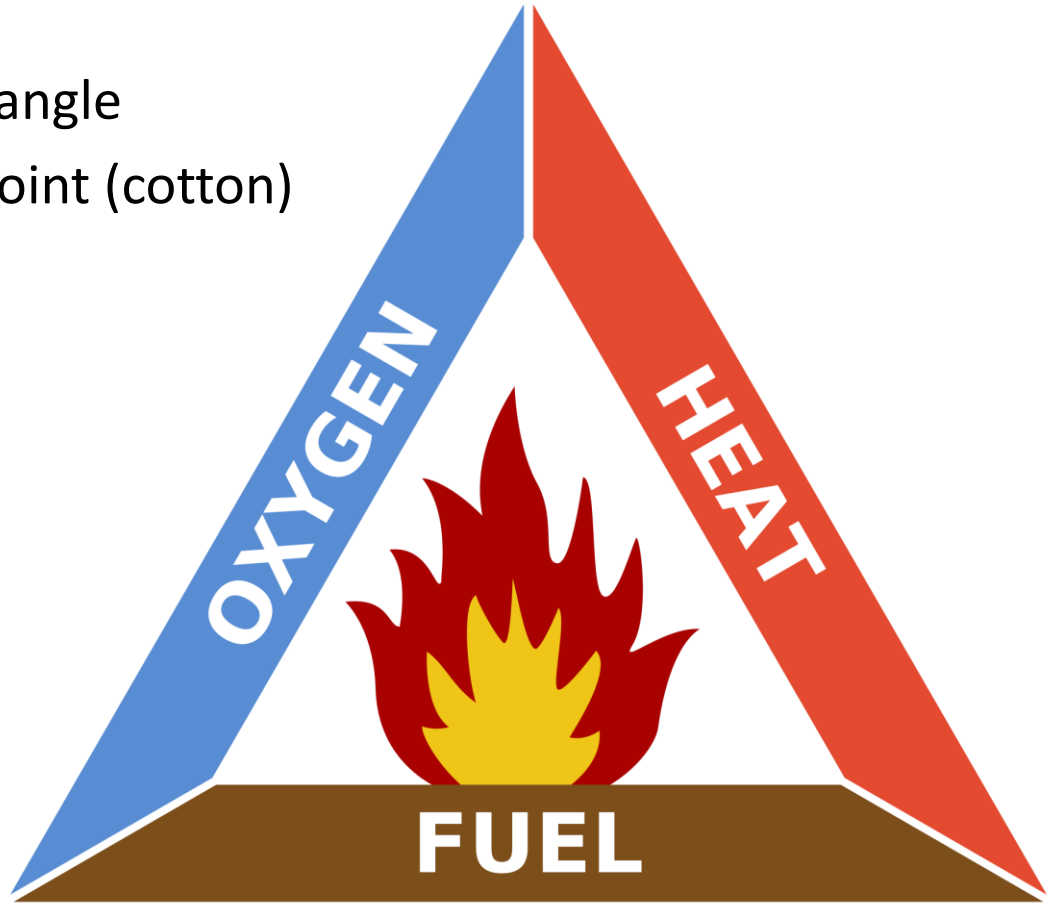
# March 22, 1975


- 30”wall
- Cable spreading rm
- 2x4 opening in cable
- Polyurethane foam RTV-102

- They were using B and C extinguishers on a type A fire- from 1:30-6pm-

# Vocabulary

- Fire Triangle
- Flash Point (cotton)



# Vocabulary

- Fire Triangle
- Flash Point (cotton)
- Intumescent
- Endothermic
- Type X
- Type C

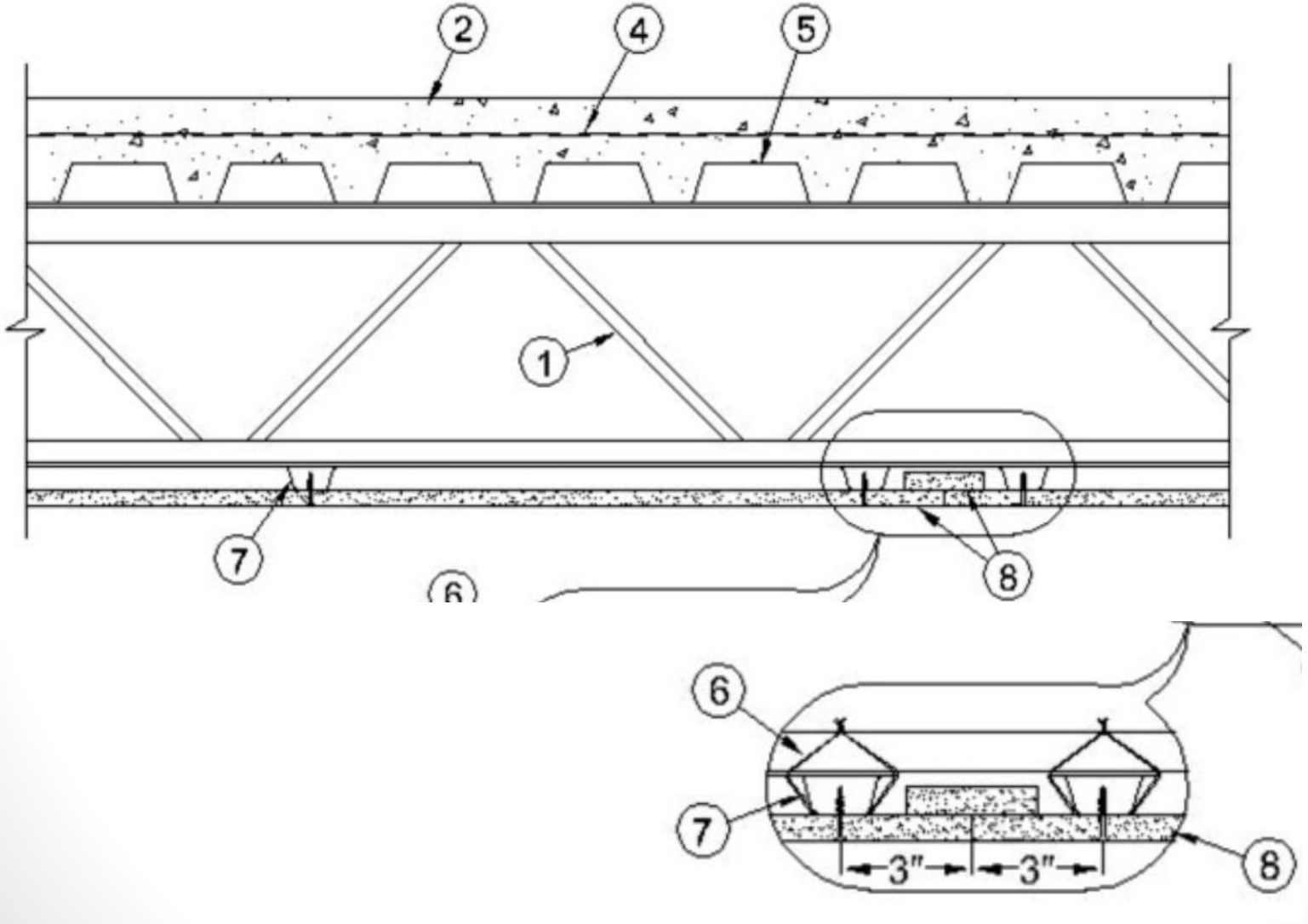
# ASTM E119
# ASTM E1966
# ASTM E814

Similarities and differences

# ASTM E119

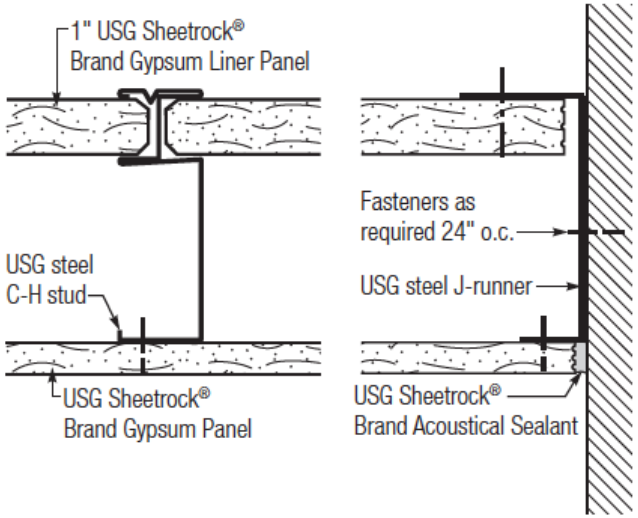
- Build the assemblies
- Allow to cure
- Burn assembly on furnace
- Subject to hose stream test
- F& T rating

# G572



# Rated Lids (USG)

**Ceiling Membrane of One-Hour Egress Corridors and Stair Soffits (see AER-09038)**




Refer to span table on page 22.

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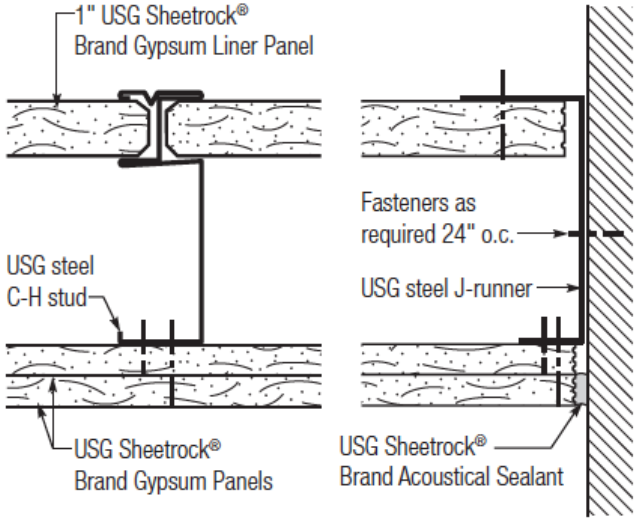



Refer to span table on page 22.

# ASTM E1966
# UL 2079

# ASTM E1966

- Build the assemblies
- Allow to cure
- Movement test
- Burn assembly on furnace
- Subject to hose stream test
- F& T rating

| Movement Type | Cycle Rates (cpm) | # of cycles |
|---|---|---|
| Type 1 Thermal | 1 | 500 |
| Type II WInd | 10 | 500 |
| Type III Seismic | 30 | 100 |
| Type IV Combined | 30 | 100 |
| | 10 | 400 |

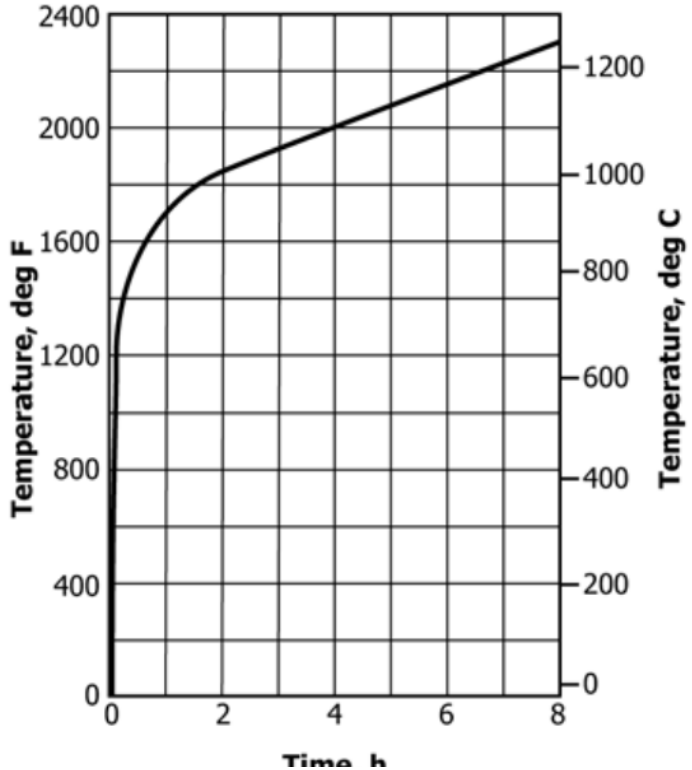
# Backing Material

# ASTM E814
# UL 1479

# ASTM E814

- Assembly created
  - Rigidly attached
- Cured
- Burned
- Hose Stream test
- F& T rating
- W & L rating

# Time Temperature Curve




| | |
|---|---|
| 1000°F (538°C) | at 5 min |
| 1300°F (704°C) | at 10 min |
| 1550°F (843°C) | at 30 min |
| 1700°F (927°C) | at 1 h |
| 1850°F (1010°C) | at 2 h |
| 2000°F (1093°C) | at 4 h |

# Firestop Submittal

- How to  find the right detail
- What the letters and numbers mean
- How to find the right information

# Penetrations
# ABC's and 123's of UL Systems

- KEY: the first letter/number is most important
- F-Floor
- W- Wall
- C- Combination

# Penetrations
# ABC's and 123's of UL Systems

- WL- Framed Gypsum Wall
- FC-  Floor Ceiling Assembly

- FA- Concrete floor  5" or less
- FB- Concrete floor over 5"
- WJ- Concrete or block wall 8" thick or less
- WK- Concrete or block wall over 8" thick
    - CAJ
    - CBJ

# Now Down to the Numbers

- 0xxx- blank
- 1xxx- metal pipes
- 2xxx- plastic pipes
- 3xxx- cables
- 4xxx- cable trays
- 5xxx- insulated pipe
- 6xxx- electrical busway
- 7xxx- mechanical
- 8xxx- combinations

# Review….

- WL
- FC
- CAJ

- 1000
- 4000
- 8000

# Submittal Package Review

- CAJ-1149
- CAJ-5301
- CAJ-3181
- WL-3320
- WJ-3060
- WL-3065
- WJ-1128
- WJ-5140
- WL-1297
- WJ-1202
- WL-1408
- WL-5257
- WJ-7109
- WJ-7112
- WL-7040
- WL-7059

# Does this project have

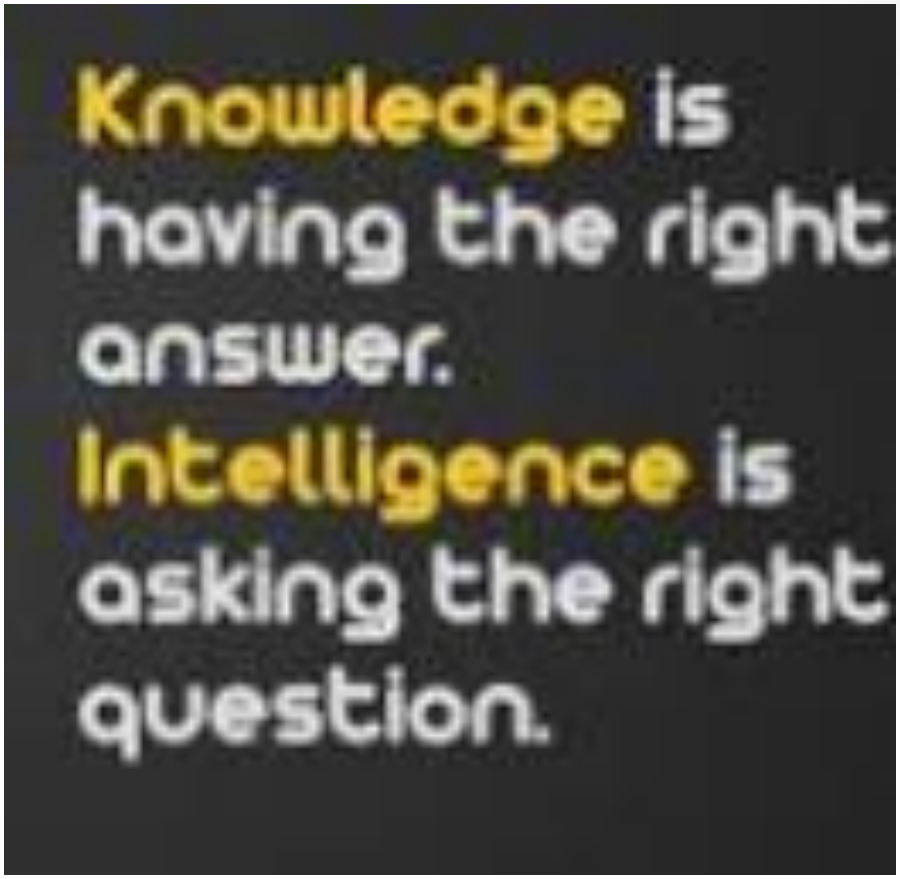
- Plastic pipes
- Cable trays
- Bus duct
- Las Vegas buffet

# Look at your submittals

- 5000 (3 details)
  - what type of insulation can be used (item 4)
- 7000 (4 details 5 pages)
  - WJ 7112 & WL 7059
    - Note #2
  - WL 7040 – WL 7109 – WJ 7112
    - Note 3
  - WL 7040
    - Item 4

  - Can you have an insulated duct that is 24x24?
  - Can you have a commercial kitchen exhaust duct

# BREAK




Reorganize your submittal package

# I’ve been Framed!- NOT

# 2000 & 5000

# Too close for comfort

# 14” Steel & sleeve on plastic

# Conduit bank

# CLIV

# Is that a cable tray?

# Dissimilar materials

- IBC 2015 714.4.3 Dissimilar Materials
- Noncombustible penetrating items shall not connect to combustible items beyond the point of firestopping unless it can be demonstrated that the fire resistance integrity of the horizontal assembly is maintained.

# Spiral Duct

# Sleeve stand off- insulated pipes

# Sleeve stand off- riser clamp

# Annular space

# Structural Beam

# Head of wall Joint

# Penetrations through horizontal assembly

# Rated to non rated wall

# Rated Joints
# ABC's and 123's of UL Systems

- F- Floor
- W- Wall
- FF
- FW
- WW
- HW
- BW

Static vs Dynamic

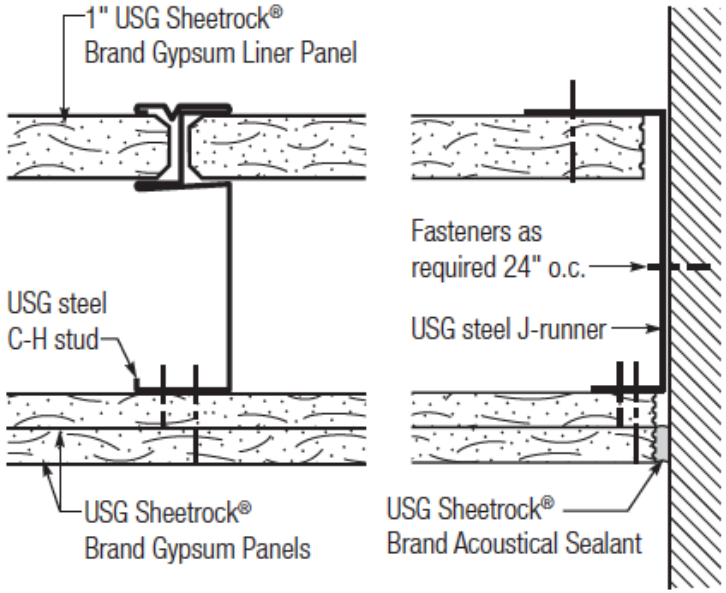
CG (corner guards)

# Penetrations
# ABC's and 123's of UL Systems

- 0000-0999 less than or equal to 2”
- 1000-1999 greater than 2” or up to 6”
- 2000-2999 greater than 6” or up to 12”
- 3000-3999 greater than 12” or up to 24”
- 4000-4999 greater than 24”

# Horiz Gyp Pens

**Ceiling Membrane of Two-Hour Egress Corridors and Stair Soffits (see AER-09038)**

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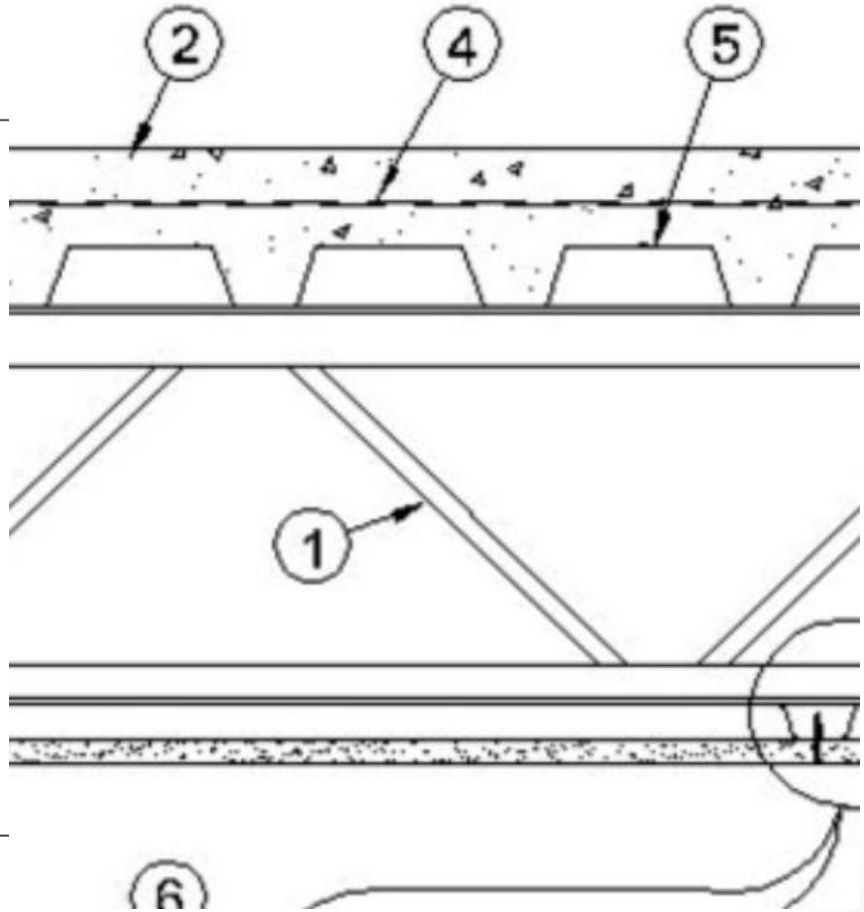


# Hollow Core Concrete

# What's the problem?

# XHEZ

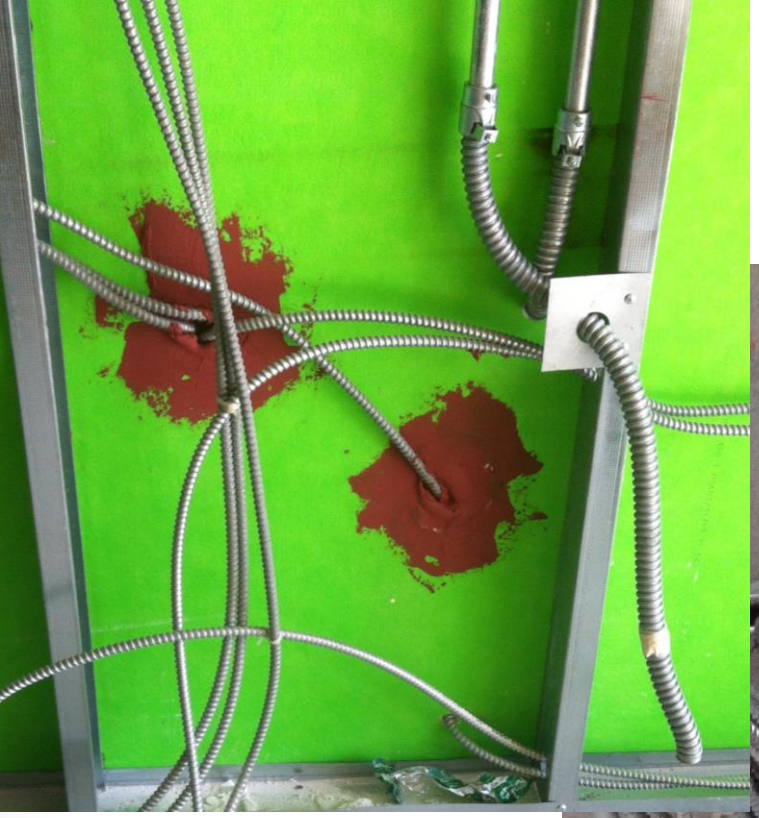
- Page 3 (4th paragraph)

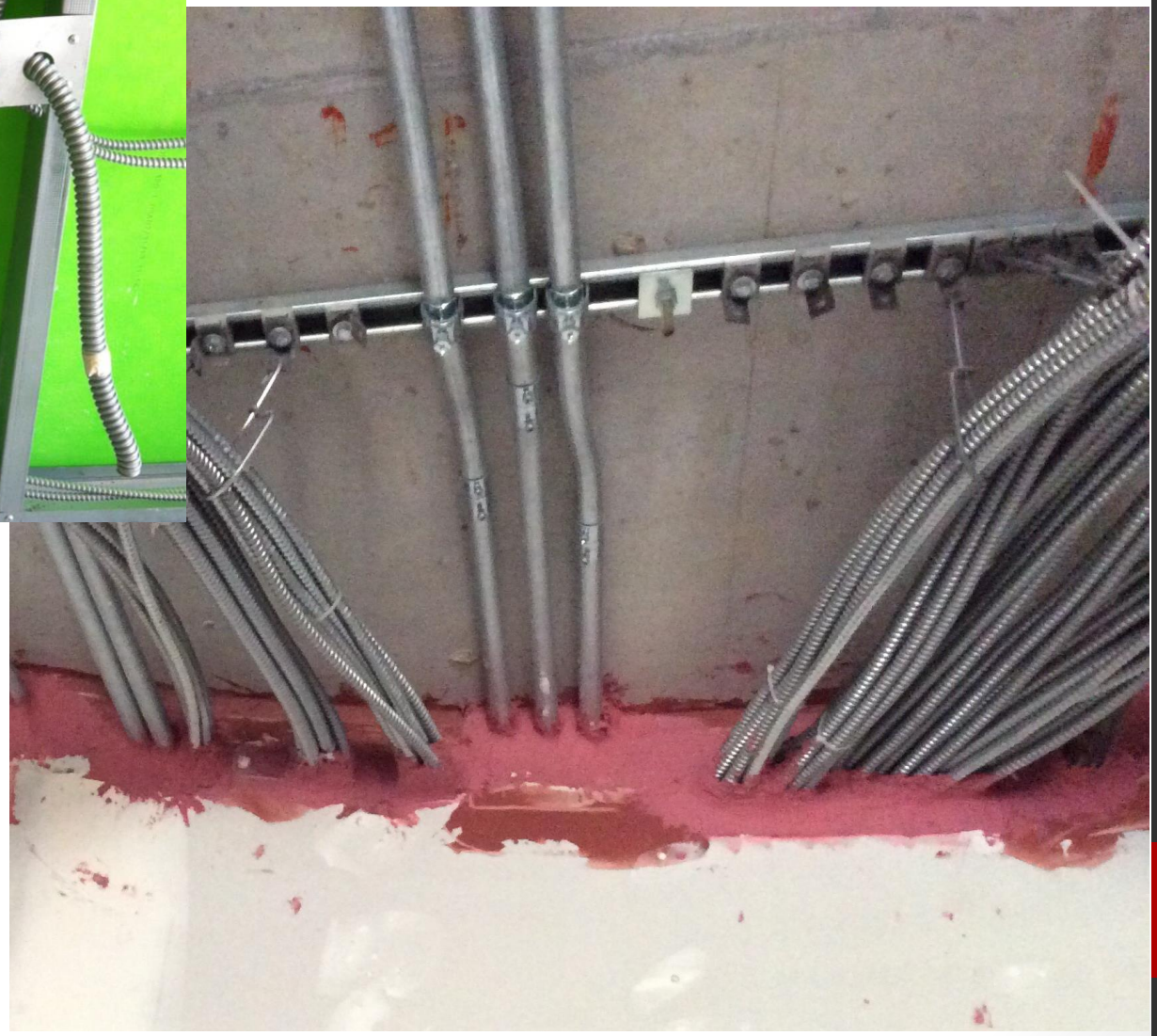
1. Thickness of floor matches requirements of the system
2. Max size of opening is 7” dia (7”x7”)
3. Cores  are filled with in 4” mineral wool, ceramic fiber, concrete, grout or mortar

# 1000

# What's wrong


- Sealant depth
- Annular Space
- Torn paper





# 2000

# Lubrizol Compatibility

# Innerduct- CAJ-2291

- Sleeve
  - 4” dia FLUSH (2)
- Annular Space
  - Min ¼” to periph and pen (3)
- Firestop material
  - 3” mineral wool (4.a)
  - ½” sealant (4.b)

# Angles On Ducts

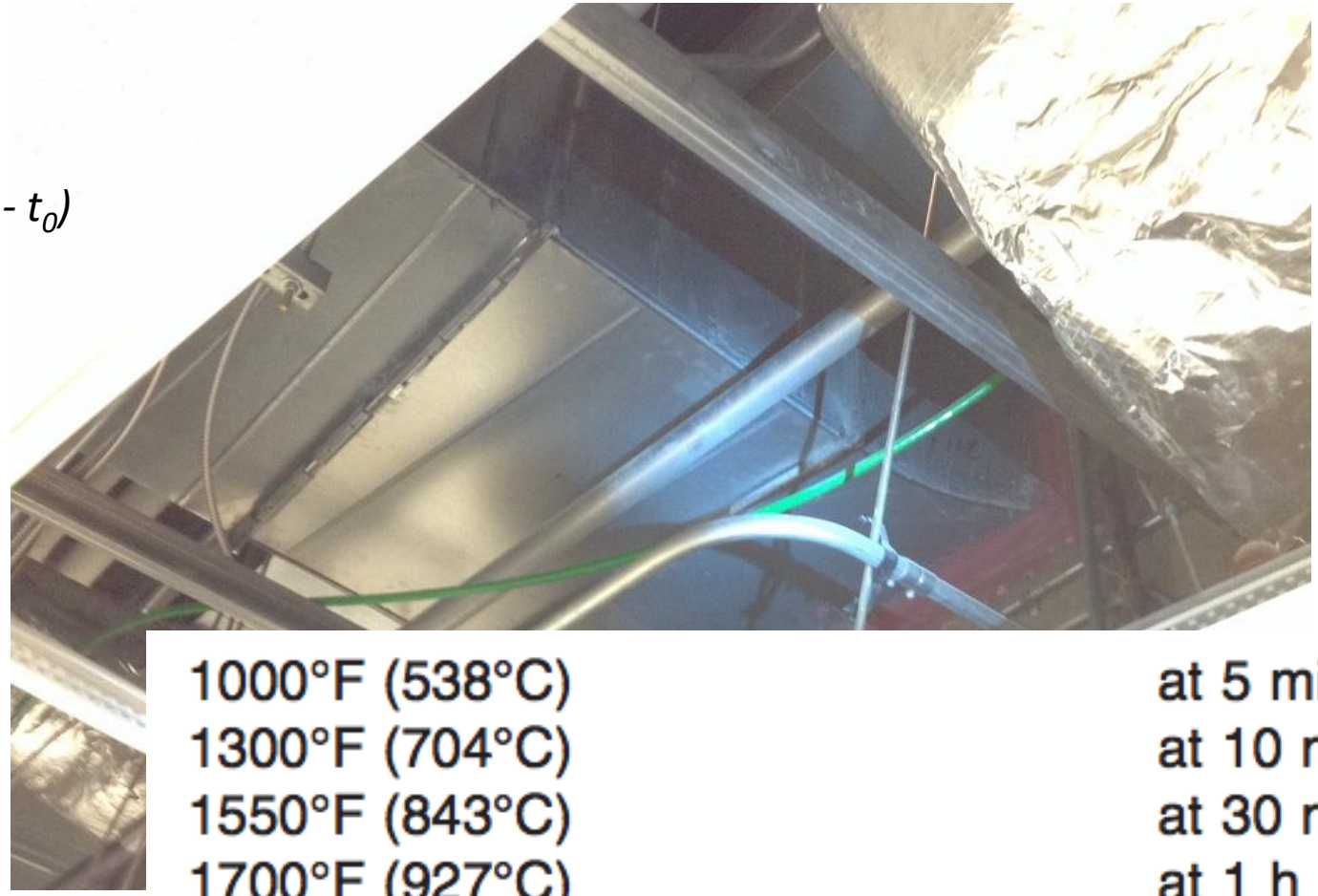
# Coefficient of Linear Thermal Expansion

- When an object is heated or cooled, its length changes by an amount proportional to the original length and the change in temperature. The linear thermal expansion of an object can be expressed as
- $dl = L_0 \alpha (t_1 - t_0)$ (1)
- *where*
- *dl = change in object length (m, inches)*
- $L_0$ *= initial length of object (m, inches)*
- $\alpha$ = *linear expansion coefficient (m/m°C, in/in°F)*
- $t_0$ *= initial temperature (°C, °F)*
- $t_1$ *= final temperature (°C, °F)*

http://www.engineeringtoolbox.com/linear-thermal-expansion-d_1379.html

# Angles on Ducts

48” Duct
70 degrees
1700
$dl = L_0 \alpha (t_1 - t_0)$
48.9389”



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# WL-7025

3.C **Steel Retaining Angles-** Minimum 16 ga galv steel angles sized to lap the steel duct a min of 2” and to lap the wall surface a min of 1”. Angles attached to steel duct on both sides of the wall with min No.10 by ½ in long steel sheet metal screws located a max of 1” from each end of the steel duct and spaced a max of 6” OC.

# WL-7169

- 4. Steel Reinforcement Angles – Min 2 by 2 by 0.070 in. (51 by 51 by 1.78 mm) steel angles attached to all four sides of duct on both sides of **wall 4 in. (102 mm) away from the surface** of the wall. The angles shall be attached to the duct with min 1/8 in. (3 mm) diam steel rivets or No. 8 (or larger) sheet metal screws spaced max 1 in. (25 mm) from each end of duct and spaced a max of 3 in. (76 mm) OC.

# Framing Ducts and Cable Trays


CLIV

# When do electrical boxes in rated walls require protection?

This is found in IBC 2015 514.3.2 exception 1

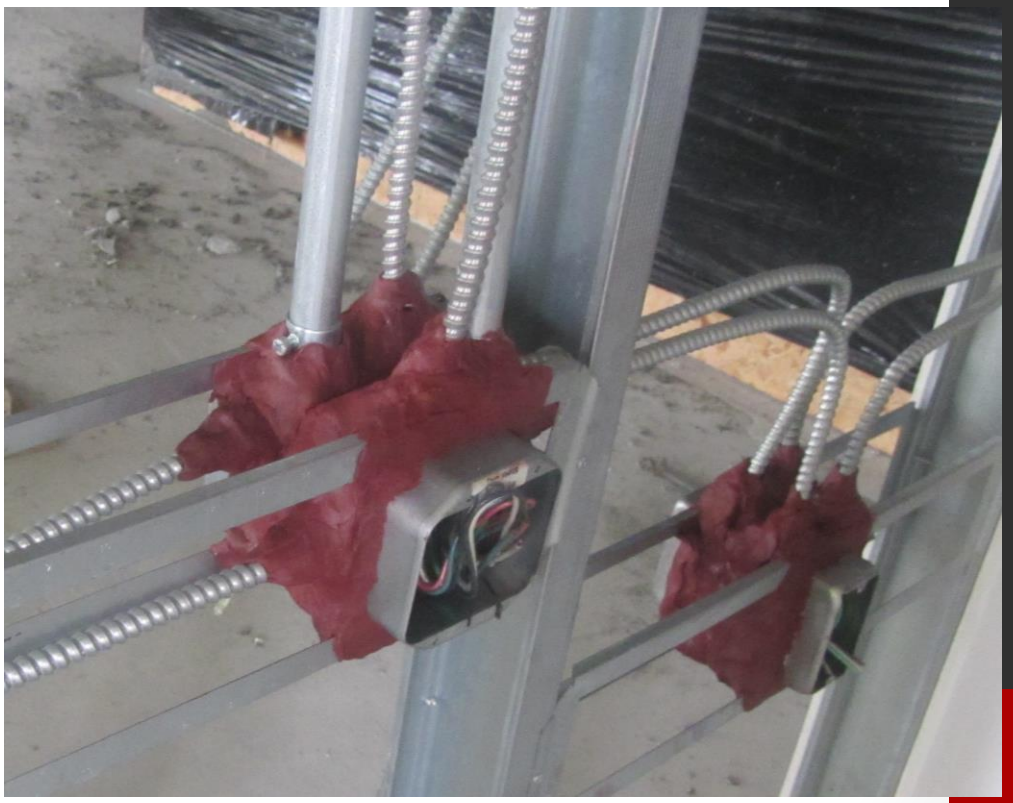
- **Steel electrical boxes** in maximum 2 hour rated walls
  - When the boxes are over 16 square inches.
  - When the boxes facing opposite sides of the wall are within 24 horizontal inches of each other and facing opposite sides of the wall.
  - When the boxes facing opposite sides of the wall are not separated by an individual non-communicating stud.
  - When boxes facing opposite sides of the wall do not have a horizontal separation between the boxes is less than the depth of the wall cavity.
  - When there are more than 100 sq in of opening in 100 sq ft of wall
  - When the annular space around the box exceeds 1/8”

# When do electrical boxes in rated walls require protection?

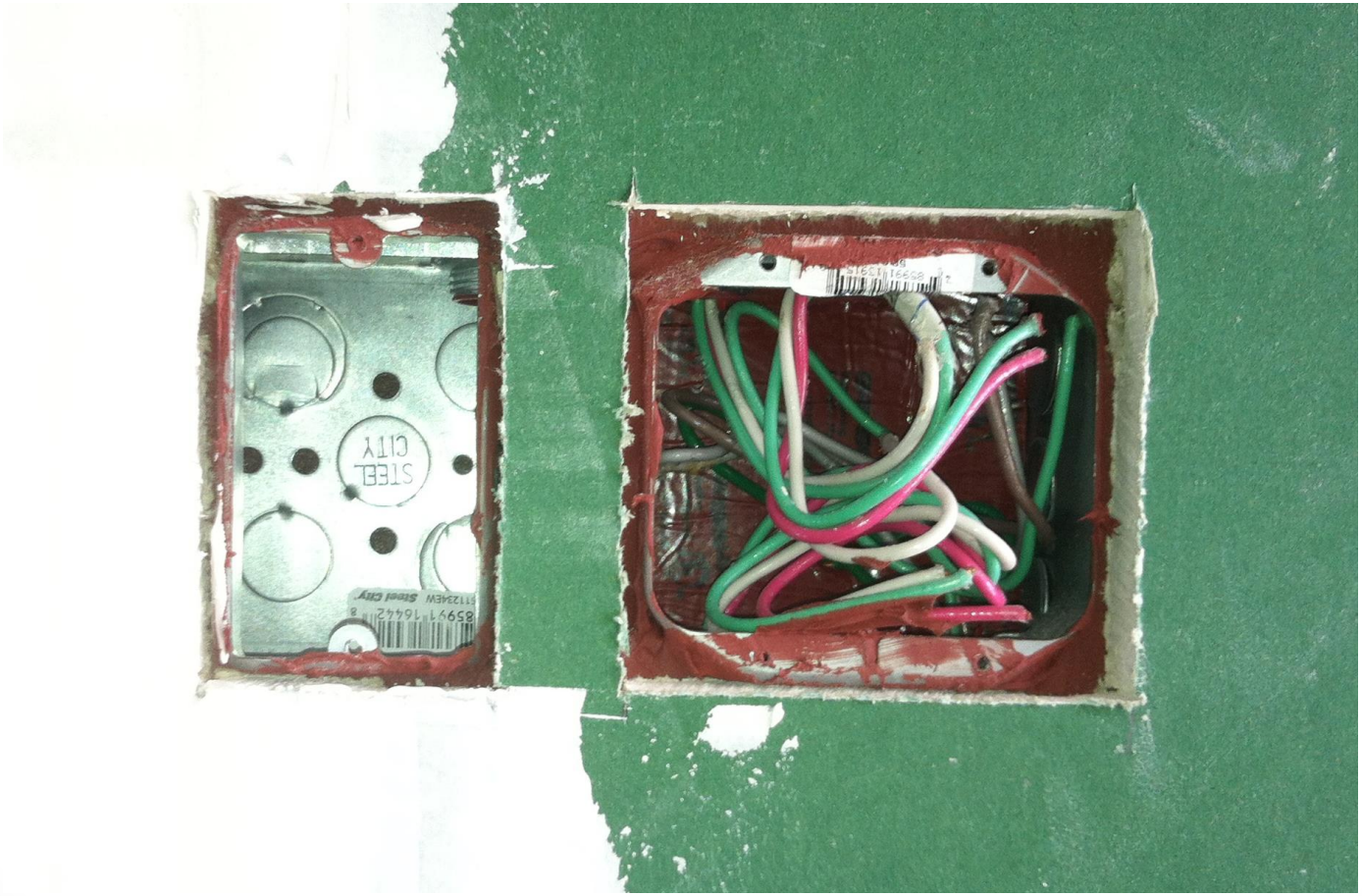
Any other electrical box that is listed for use in a rated assembly

- When the horizontal separation exceeds manufacturers recommendation
- When the annular space around the box exceeds 1/8”
- When the boxes are not separated by solid fire blocking (note there are no distances called out except that noted by the manufacturer)

# Electrical Outlets



# Electrical Outlets



# Electrical Outlets

- 24 Horizontal Inches
- 100 sq inches in 100 sq feet
- Boxes over 16 sq inches
- NEC gaps under 1/8”
- Back to back boxes
- Percent fill

# Low Voltage
# Cover Plates and CLIV

# Evaluating Electrical Box

- Wall Assembly (depth and type of insulation)
- Electrical Box ( material, size, percent fill, annular space)
- Spacing of boxes
- Protection required
- Type of cover plate

# Plastic Boxes

- Rated

# ASTM E84

This is NOT ASTM E814

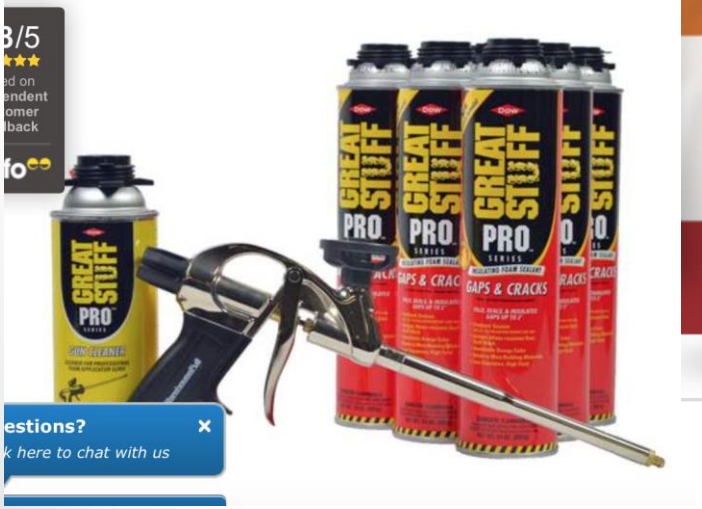
Standard Test Method for Surface Burning Characteristics of Building Materials

# Foam

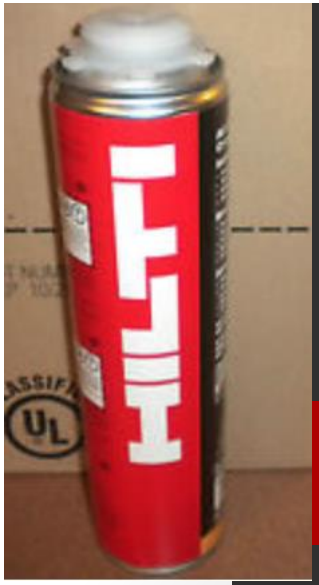




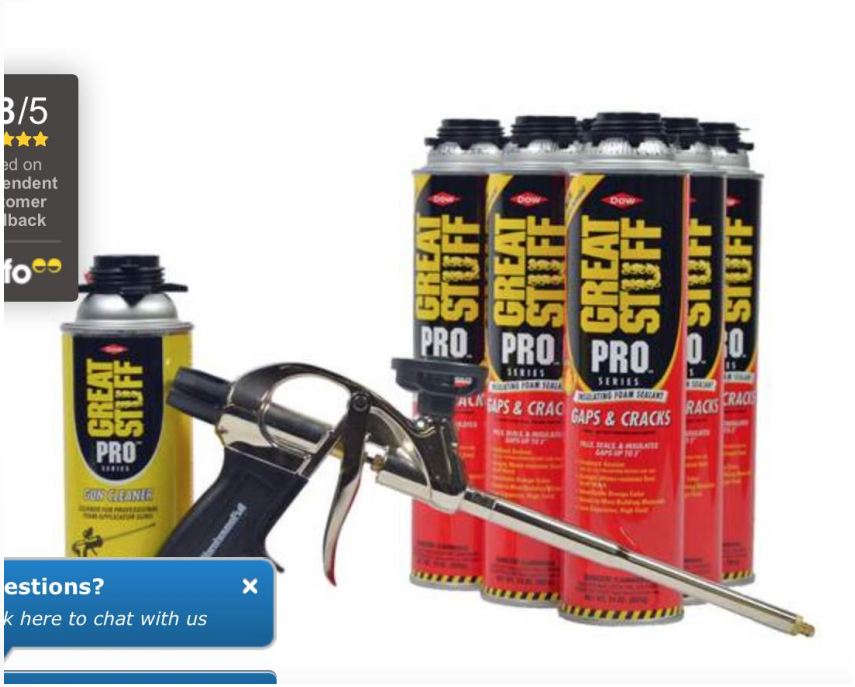
**FIREBLOCK**





# Great Stuff- (Pro)




- $2.94 for 12 oz (not PRO)
- $99 for case of 12 - 24 oz

# DAP Fireblock Foam


- $13.05

# Handi-Foam

- $13.95


**FIREBLOCK**

# ABESCO


- FC 3088
- WJ 1192
- WJ 1233
- WJ 1320
- WJ 3201
- WJ 3202
- WL 1390
- WL 1476
- WL 1482
- WL 3291
- WL 3397
- WL 3398

# WJ 1192

- What size penetration?
- What are the requirements for the sleeve?
- Can you use a cast in sleeve like a pipe?
- What materials will you need to firestop?

# Fire BLOCK vs Fire STOP




# Stair wells

- What comes first?

- Concrete shafts
- Block shafts
- Gypsum shafts

- Prohibited penetrations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# Joints

- Joint size
- Movement allowance
- Backing material
- Penetrations
- T ratings

# EOS- common problems


# EOS- common problems



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# EOS- common problems


# T Rating

- 714.4.1.2 Floor penetration fire stop system. Through penetration shall be protected by an approved through penetration fire stop system installed and tested in accordance with ASTM E814 or UL1479… the system shall have an F rating/T rating if not less than one hour but not less than the required rating of the floor.
- Exceptions:
  - 1 floor penetrations contained and located within the cavity of a wall above the floor or below the floor do not require a T rating
  - 2. floor penetration floor drains, tub drains or shower drains contained and located within the concealed space of a horizontal assembly do not require a T rating
  - 3. Floor penetration of a maximum four inches nominal penetrating directly into metal enclosed electrical power switchgear do not require a T rating

# Changes in the industry

- IBC 1705.17
- UL – membrane penetrations
- ASTM E3038
- Firestop TAPE!
- Terrorism Liability Protection

# IBC 1705.17

- ASTM E2174- Standard Practice for On-Site Inspection of Installed Firestops
- ASTM E2393- Standard Practice for On-Site Inspection of Installed Fire-Resistive Joint Systems and Perimeter Fire Barriers
- ASTM E3038- Standard Practice for Assessing and Qualifying Candidates as Inspectors of Firestop Systems and Fire-Resistive Joint Systems

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