Structural fire protection, Compartment Wall Penetrations and Firestopping

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Structural fire protection, compartment
Wall/floor penetrations and firestopping

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- Structural Fire Protection
  - What is it for? How does it work?
  - How do I inspect it? (and how much?)
  - Where do I find more information?
  - Good and bad examples

- Penetrations through walls/floors
  - What are they? How are they protected?
  - How do I inspect it? (and how much?)
  - Where do I find more information?
  - Good and bad examples

- ASFP Guide to Passive Fire Protection for FRAs
  - What a fire risk assessor needs to do

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• Summary
PFP – what is it?

a. Structural frame (intumescent)
b. Structural frame (other sprays)
c. Structural frame (boards)
d. Fire/smoke control ductwork
e. Fire stopping – penetration seals
f. Fire/smoke control dampers
g. Fire doors and shutters
h. Fire resisting partitions
i. Fire resisting glazing (roof)
j. Fire resisting glazing (screens)
k. Fire resisting building hardware
l. Smoke control doors
m. Fire resisting glazed doors
n. Fire resisting glass doors

www.pfpf.org.uk
PFP – what is it?

a. **Structural frame (intumescent)**
b. **Structural frame (other sprays)**
c. **Structural frame (boards)**
d. **Fire/smoke control ductwork**
e. **Fire stopping – penetration seals**
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[www.pfpf.org.uk](http://www.pfpf.org.uk)
Structural Fire Protection

To maintain the stability of the structure during the period of the fire and ensure that it does not collapse
Structural steel loses about half its strength at about 500°C.
Non-reactive coatings

- Spray or troweled on
- Thick
- Inert
- Usually hidden
Non-reactive board/casings

- Mechanically fixed
- Thick (10-50mm)
- Usually hidden
Reactive coatings

- Spray or brushed
- Thin (1-4mm)
Where can I find more information?

- ASFP website
  [www.asfp.org.uk](http://www.asfp.org.uk)
- ASFP Yellow book
- Guidance on:
  - Structural fire engineering
  - How fire protection works
  - Testing & assessment processes
  - Product listings with thickness tables
  - 3rd party product certification.
ASFP Technical Guidance Documents relating to steelwork (current)

- TGD 2  Sprayed mineral wool (structural steel)
- TGD 8  Junctions between diff types of protection
- TGD 9  Beams with web openings (cellular beams)
- TGD 11 On site sprayed intumescent coatings
- TGD 14 Board systems
- TGD 15 Non-reactive sprayed coatings
- TGD 16 Off site sprayed intumescent coatings
How does a fire risk assessor inspect it?

• Only carry out checks while inspecting compartmentation and fire resisting construction serving escape routes:
  – Where protection is visible. Usually intumescent paint, look for lack of adhesion, corrosion, slumping, etc.
  – In concealed spaces e.g. board or spray protection. Look for damaged and missing fire protection as part of fire stopping checks (dealt with later)
• If all is well – record it. Basically look for damage.
• If not – you need to get the Responsible person to get a proper survey carried out and repairs made.
• You need to know enough to know something is wrong.
Good examples of Fire Protection to Steelwork
Structural fire protection & firestopping

Pioneering fire protection through innovation and professionalism
Getting it Wrong!
Unsuitable wet conditions
Can you spot the error? Extensive rusting
Corrosion and lack of adhesion  Damage
Sprayed protection plus a gypsum wallboard soffit on a steel beam in a hospital in Herefordshire.
Spray protection fallen from the flange of a steel beam
Structural Fire Protection

To maintain the stability of the structure during the period of the fire and ensure that it does not collapse.
Compartmentation

- Prevent spread of fire and smoke
- Subdivide buildings into manageable areas of risk
- Provide adequate Means of Escape
There is a need to maintain the structures integrity to ensure that no gaps of sufficient width open up to allow penetration of hot gases and flames.
Maintaining compartmentation

“10.2 If a fire separating element is to be effective, every joint or imperfection of fit, or opening to allow services to pass through the element, should be adequately protected by sealing or fire stopping so that the fire resistance of the element is not impaired.”
Structural fire protection & firestopping

Pipe closures used around plastic pipes in a blockwork wall

Pillows used to provide temporary multiple penetration for a horizontal cable tray penetration

Mortar poured onto permanent floor shutter

Coated batt used for a horizontal protection

Multi-cable firestop using mortar and preformed elastomeric seals

Pioneering fire protection through innovation and professionalism
Where can I find more information?

- ASFP website [www.asfp.org.uk](http://www.asfp.org.uk)
- ASFP Red book
- Guidance on:
  - How fire stopping works
  - Testing & assessment processes
  - Product listings with field of application
  - 3rd party product certification.
TGD 17

Technical Guidance Document 17: Code of practice for the installation and inspection of fire stopping systems in buildings

ASFP Technical Guidance Document - TGD 17

Code of practice for the installation and inspection of fire stopping systems in buildings:
Linear joint seals, penetration seals, small cavity barriers
How does a fire risk assessor inspect it? – 1

• Impossible/impractical/unnecessary to do it all
• But an audit should be carried out on:
  – Fire resisting walls and floors serving escape routes identifiable by:
    • Using information supplied under Regulation 38 or CDM Regulations (more on this later)
    • Your survey (more on this later)
  – Ends of corridors and adjacent to escape corridor walls
  – All compartment walls/floors depending on risk profile
How does a fire risk assessor inspect it? – 2

- Remove e.g. 1 or 2 suspended ceiling tiles adjacent to compartment walls and along each side of the escape corridors and inspect any penetrations seals
- Use of remote camera/video equipment facilitates this
- Check your Structural Fire Protection while you’re at it
- If all is well – record it.
- If not – you need to get the Responsible person to get a proper survey carried out and repairs made.
- You need to know enough to know something is wrong
Good examples of Penetration Seals
A typical penetration sealing system in a block wall.
A wall mounted collar around a pipe passing through a masonry wall
A compound seal through a concrete floor
Getting it Wrong!
Poorly installed floor sealing system (held up by the plastic pipes?)
Structural fire protection & firestopping

Pioneering fire protection through innovation and professionalism
Pipes (some lagged) through a coated batt installation.
Unsealed services through a gypsum wallboard partition in a block of flats in East London
An intumescent pipe collar installed on top of a ceiling in a sheltered housing building in Ireland
Intumescent pipe wrap installed around a plastic pipe in East London.
Cavity Barriers
A fabric cavity barrier system above a ceiling grid.
Cavity barrier systems for masonry walls
How does a fire risk assessor inspect cavity barriers?

- All large cavity barriers e.g. those in roof spaces
- All under floor voids serving escape routes
- All small cavity barriers where visible when checks are being made for other areas of PFP e.g. penetration seals at compartment walls/floors or on escape routes.
Getting it Wrong!
Structural fire protection & firestopping

Pioneering fire protection through innovation and professionalism
Inadequate protection around lagged pipes passing through a fabric cavity barrier in a Manchester hospital.
Air handling equipment
Fire rated ductwork systems
A fire damper cast into a concrete wall
How does a fire risk assessor inspect penetrations associated with air handling equipment?

- All Fire resisting walls and floors serving escape routes identifiable by:
  - Information supplied under Regulation 38 or CDM Regs (more on this later)
  - Your survey (more on this later)
- Ends of corridors and adjacent to escape corridor walls
- All compartment walls/floors depending on risk profile
TGD 18

Technical Guidance Document 18: Code of practice for the installation and inspection of fire resisting duct systems
Getting it Wrong!
A plastic extract system in residential flats in NW London.
A specific product for use with plastic extract ducts
An unsealed damper in a gypsum wallboard partition in a Manchester hospital.
A damper in a lightweight partition sealed with expanded polyurethane foam
ASFP has published a guide on what to look for when undertaking a Fire Risk Assessment of the Passive Fire Protection
• Introduces role of Fire Risk Assessor/Assessment
• Need to evaluate PFP associated with Means of escape according to risk
• NOT a full survey of compliance with statutory documents (ADs)
• ½ to 3 pages on each type of PFP
• Pictures of what to look for (good & bad)
• Annexes with further reading & links to third party organisations
• The all important Check List for each type of construction
• Supported by ASFP App ‘Fire Safety File’
What an assessor needs to do - 1

- Determine building layout
  - Modern Buildings
    - 2007 onwards – Regulation 38 of Building Regulations applies (Approved Document Appendix G) – Ask the RP for it!
    - 1994 to 1997 all information should be held under the Construction (Design and Management) Regulations – Ask for it!
    - If you can check the building against the CDM file/Reg 38 info and all is well – that is enough
  - Approved Document B (and national equivalents) provide statutory guidance for all PFP
  - Be aware that BS 9999, 9991, 7974 could have been used.
What an assessor needs to do - 2

• Older Buildings
  • Information required probably not be readily available
  • You will need to survey the premises (compartmentation audit)
  • You may have to decide what level of PFP is appropriate
    • HMO? Hotel? Offices? Hospital, Block of flats?
• Approved Document B (and national equivalents)
• Other relevant guidance documents
  • BS 9999, BS 9991 (flats), BS 7974
  • Fire safety in purpose-built blocks of flats
  • DCLG Risk Assessment Guides for different building types
  • Department of education BB 100 Design for fire safety in schools
  • HTM 05 – 01, 05 – 02A, , 05 – 02B, 05 – 03,
Summary

- Looked at Structural fire protection and penetration seals for services and air handling equipment
  - What they are, what they do and how they work
- Examples of good and bad practice
- How to assess them within the context of a Fire Risk Assessment
- Need to get information on building and where to get it
  - Regulation 38 or CDM Regulation information (new build)
  - From your own compartmentation audit of what is needed for primary means of escape (older buildings)
- Need to get professional surveyors in if problems found
- Get more information from ASFP website
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The Specialist Fire Contractors Perspective

A Case Study

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