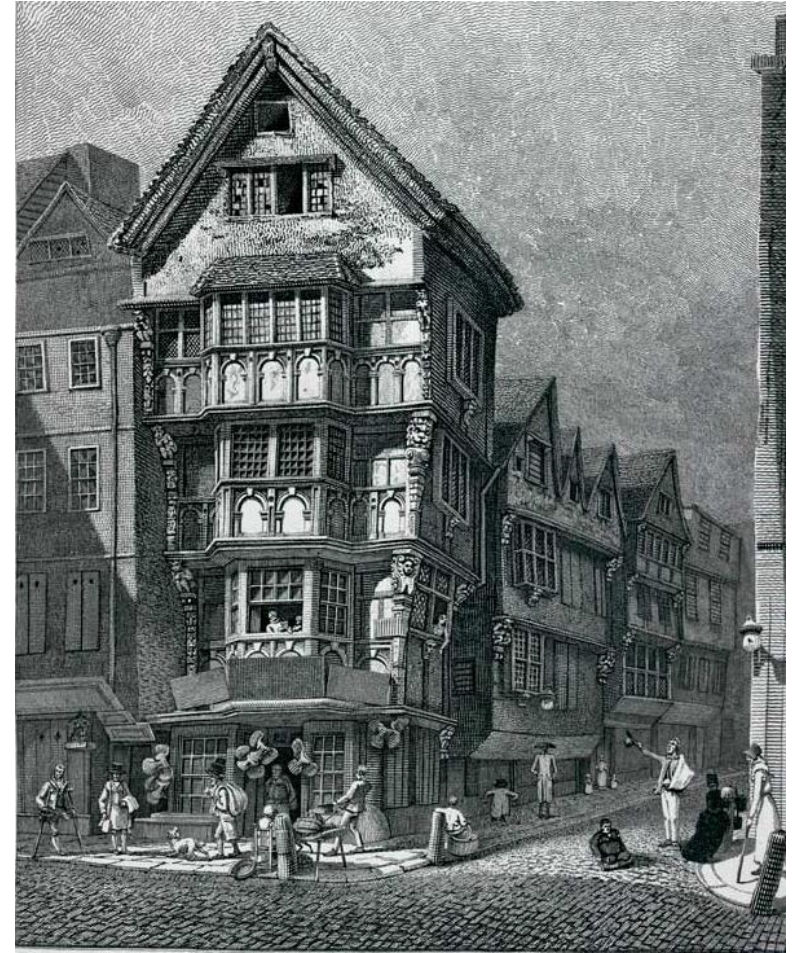


# Facades and Spandrel Panels

## Deconstructing the Myths





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Adrian is a Member of the Energy Institute a Member of the Institute of Fire Engineers and Chartered Fire Engineer. Adrian up until recently supported Dubai Civil Defence as a Fire Service technical/policy advisor in respect of Operational Intervention, Fire Engineering design, Training, Crisis and Strategic Risk assessment and Management, Companies Approvals and forensic fire investigation.

Adrian's role also included having responsibility for the review and approval of Engineering designs and fire strategies for complex and High Rise building projects, market access for equipment, products and systems for DCD listing and the issue of NOCs. Adrian, during his time with Dubai Civil Defence coupled with his background as a Fire Engineer, firefighter and Fire investigator has become the leading expert in the Middle East in respect of the fire performance of Façade/cladding system design and materials and recently authored the Chapter on the performance requirements for the approval of facade and cladding systems with the UAE Fire and life Safety Code.

Before arriving in Dubai, Adrian spent 38 years with the UK Fire and Rescue Service the last 4 of which as the Director of the Fire Engineering, Building Design and Fire Investigation courses at the UK National Fire Service College. Also, as a PRINCE 2 practitioner, Adrian was seconded to the Office of the Deputy Prime Minister as a project manager responsible for the implementation of National Critical Infrastructure Projects of the UK Fire and Rescue Services. An additional function also during this time was to assist in the creation and implementation of new UK Fire Safety Legislation including the Licensing Act 2005, The Regulatory Reform (Fire Safety Order) as well as the development of UKFRS Efficiency and Effectiveness initiatives as well as implementing the change management required to realise such process reviews. Adrian, as an agile team player, has vast experience in Military, Police and Fire Service operations and Incident Command systems, Business continuity and service degradation management planning, secure telecommunications as well as Command and Control technology.

Adrian, as a Chartered Fire Engineer provides nearly 40 Years of essential, objective based fire engineering, focused regulatory compliance, commercial/business development and client management, efficient project management and effective leadership experience, and also possesses a rare but significant ability in design concept foresight. project risk mapping and management which often adds support for the delivery and actualisation of client expectations.

Adrian previously worked for UK and Global Multi-Discipline and Boutique Fire Engineering Consultancies, this experience included the establishment of one of the first Royal Oman Police Fire Engineering Consultancies in Oman. During his time as a Consultant Adrian has been responsible for the creation, delivery, commissioning and management of challenging Building and infrastructure Projects and Strategies, including Heathrow Airport, Qatar Gold line, Hospital projects in the UK, Georgia, Oman and Ireland, above and below ground Railway projects, large assembly buildings, Sports Stadia, challenging Ultra rise Residential and commercial developments, as well as the development of critical infrastructure projects for the UK Ministry of Justice and German Embassy and Chancery in Muscat. Adrian has also provided risk assessment and fire engineering services for numerous Global Hotel projects including JW Marriot, Holiday Inn, Crowne Plaza and smaller boutique Hotels.

Adrian is a forensic fire investigator with the International Association of Arson Investigators and was responsible for the creation, development and implementation of the first Arson Task Force for the UK. Adrian sits on the editorial board with the British Standards Institute committee - FH14 for British standards 9999, 9991 and 7974. Most recently Adrian was involved in the reissue of the UAE Fire and Life Safety Code of Practise 2018 and co-authored the Sections dealing with Facades, Fire Stopping, Facilities for Fire Service intervention, and Materials and systems testing.

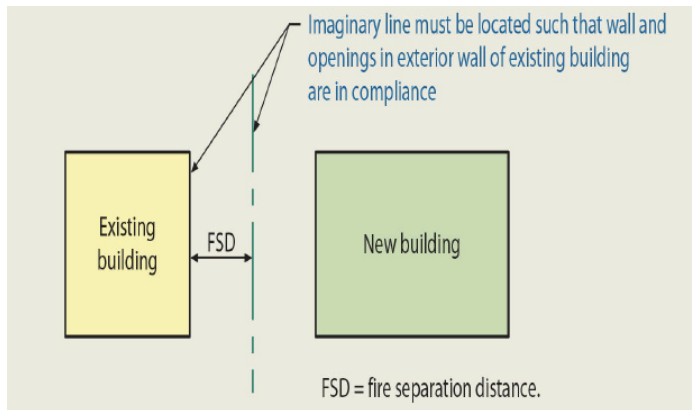
Adrian, although also being able to play the Scottish highland bagpipes, is a passionate public speaker and has delivered presentations, including witness testimony to all levels of Government in the UK and State Departments in the, USA, Columbia, Greece, Oman and UAE, including UK/USA Criminal Courts.





# Vertical Fire Spread – First Principles

- External Radiated Fire Spread
- Fire spread across flammable/ Combustible external rainscreens
- Fire development within façade/external leaf cavities ( Not Compartment!)
- Internal Floor to Floor Fire transmission at floor/wall interfaces (perimeter edge)
- External Floor to floor fire transmission



# External Floor to floor fire transmission

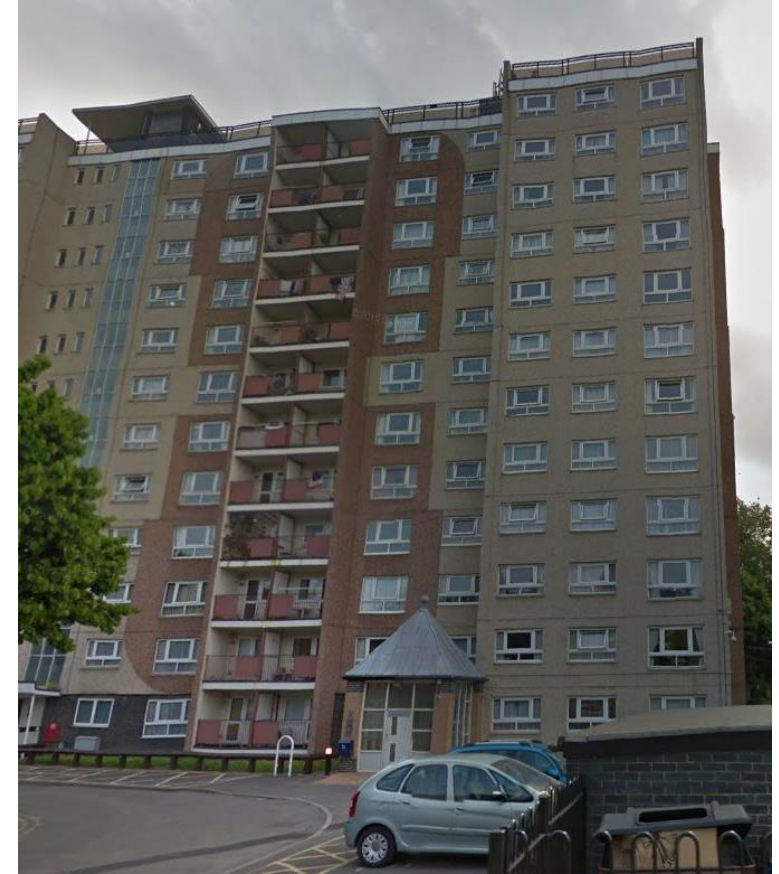
Two separate requirements which have been merged into one solution !!

1. Separation of vertical openings
2. Perimeter edge protection at interfaces – Curtain Walls

# External Floor to floor fire transmission

## 1. Separation of vertical openings

Achieved by the provision of Fire Resistance Construction  
– irrespective of the external leaf material !!



**Why do we need Fire Resistant separation between vertical openings?**

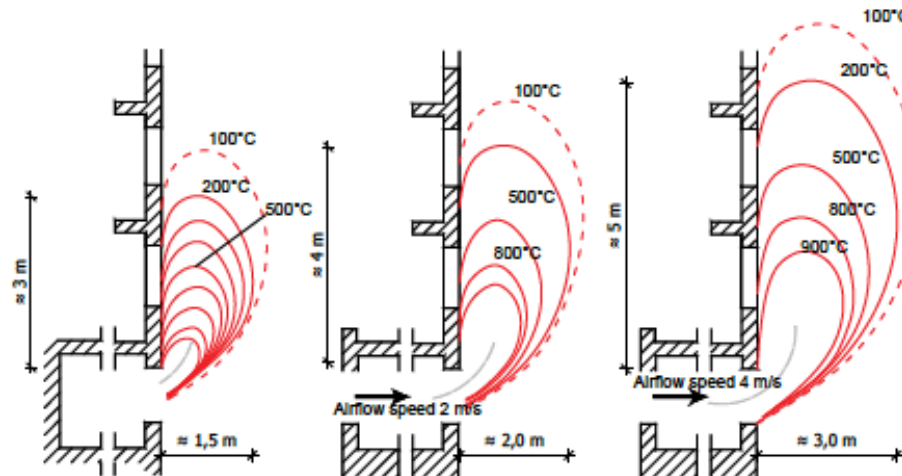
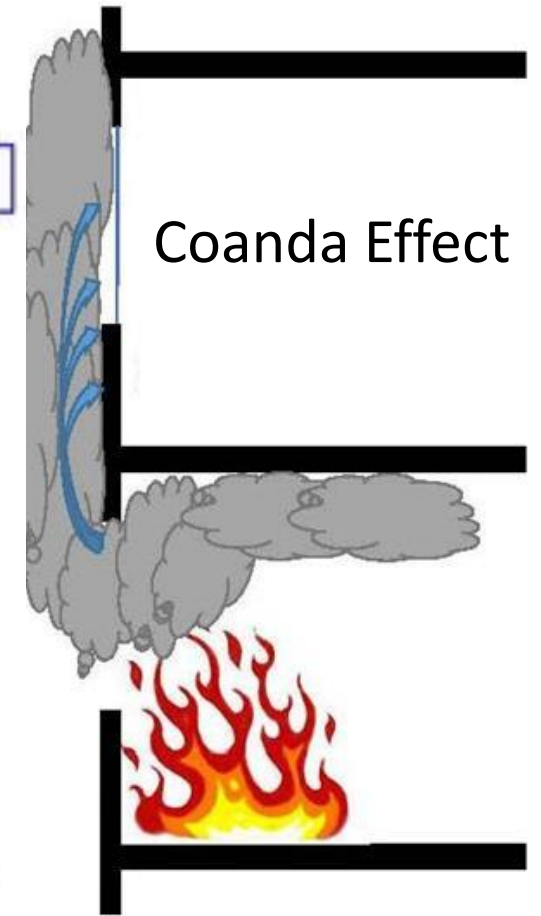
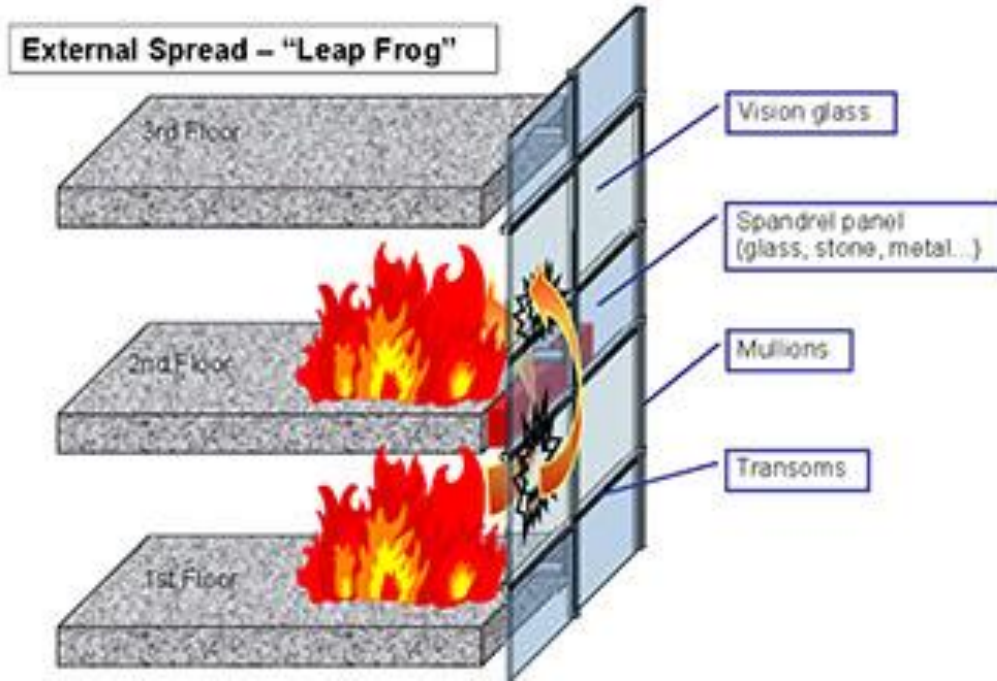
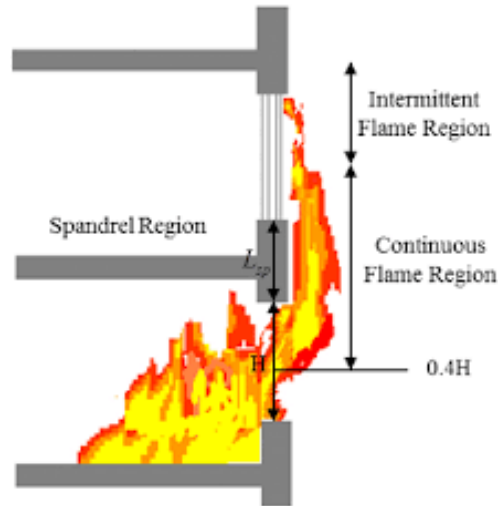
What is the objective?







# Why do we need Fire Resistant separation between vertical openings?



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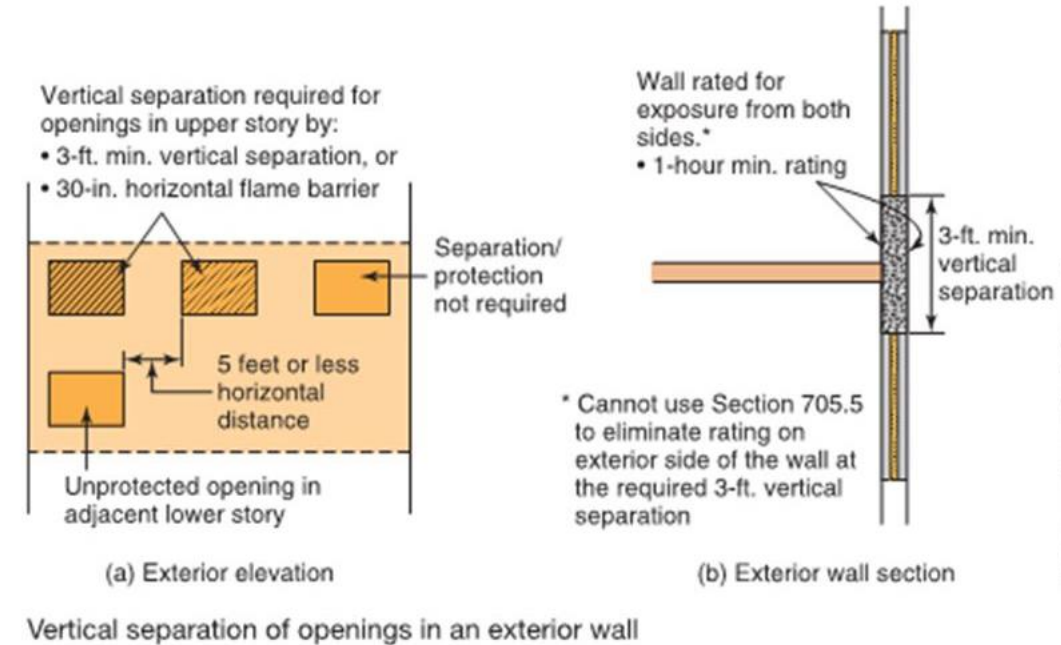
# What are the requirement 'Code' requirements?

# What are the requirement 'Code' requirements?

## Vertical Separation of Openings ( IBC,NFPA 5000, UAE)

Openings in **exterior walls** in adjacent stories shall be separated vertically to protect against fire spread on the exterior of the buildings where the **openings are within 1524 mm of each other horizontally** and the opening in the lower story is **not a protected opening** with a fire protection rating of not less than 90 minutes.

Openings shall be separated vertically at **least 914 mm** by spandrel girders (Panels), **exterior walls or other similar assemblies** that have a fire-resistance rating of at least 1 hour or by flame barriers that extend horizontally at **least 762 mm** beyond the exterior wall. Flame barriers shall have a fire-resistance rating of not less than 1 hour.





# What are the requirement 'Code' requirements?

## Vertical Separation of Openings

Exceptions:

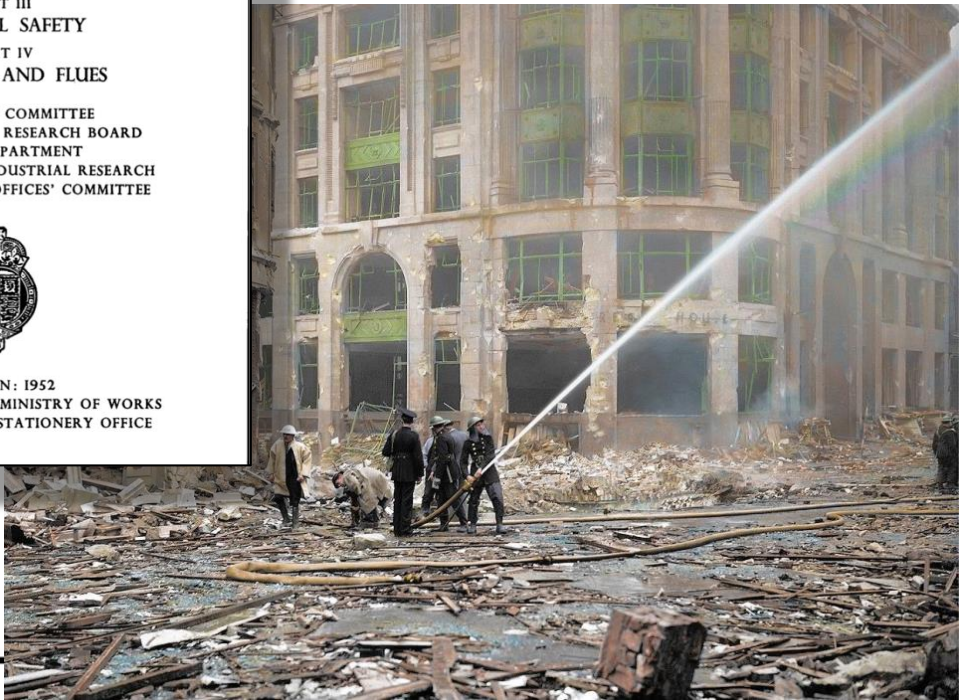
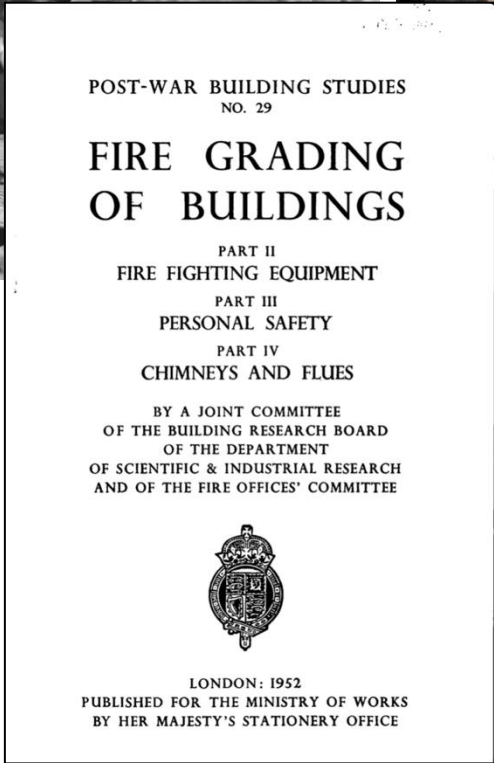
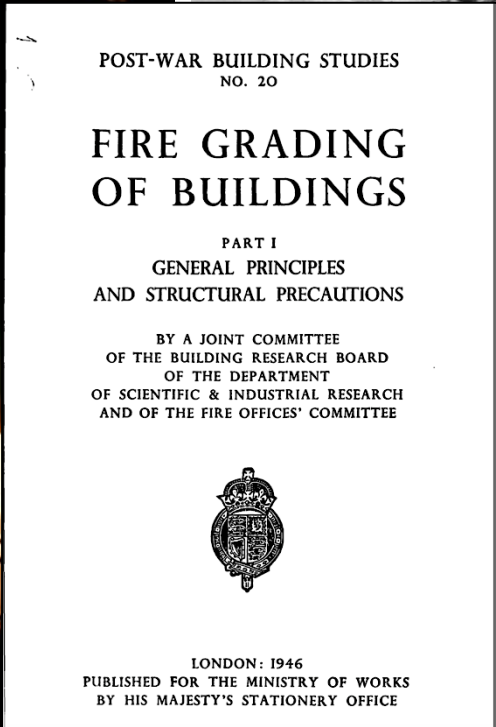
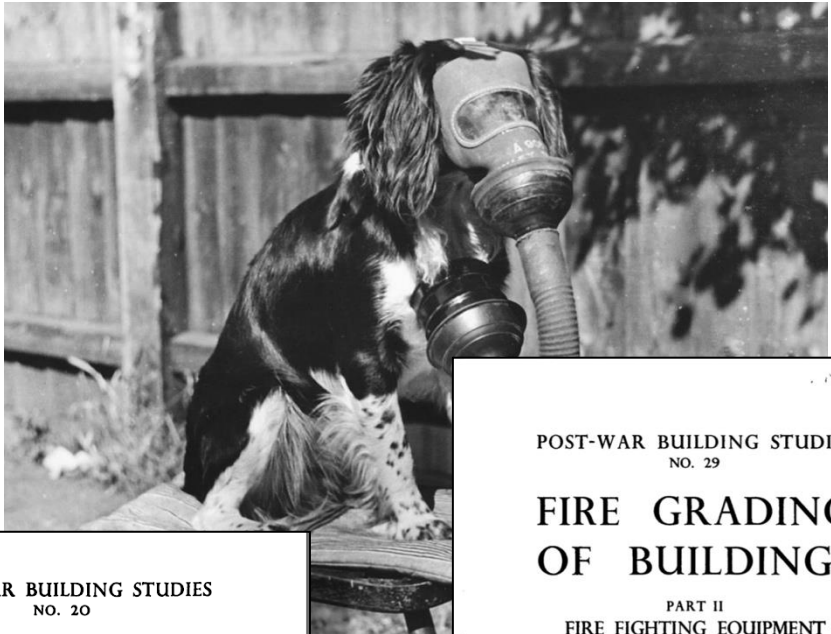
1. This provision shall not apply to buildings that are 3 stories or less above grade plane.
2. This provision shall not apply to buildings equipped throughout with an automatic sprinkler system.  
(Note: This exemption is not valid in UAE FLS 2018)
3. This provision shall not apply to open parking garages.

**These exemptions refer to the requirement of a 915mm Fire resistant Spandrel panel only !**

It is often misunderstood that should a project meet any of the exemptions, especially Exception 2, then designing and installing a perimeter fire barrier system is not required, or that installing safing only in the interior joint structure will suffice.

This is not true. A full perimeter fire barrier system must always be incorporated when a fire-resistance-rated floor intersects with a non-fire rated exterior wall.

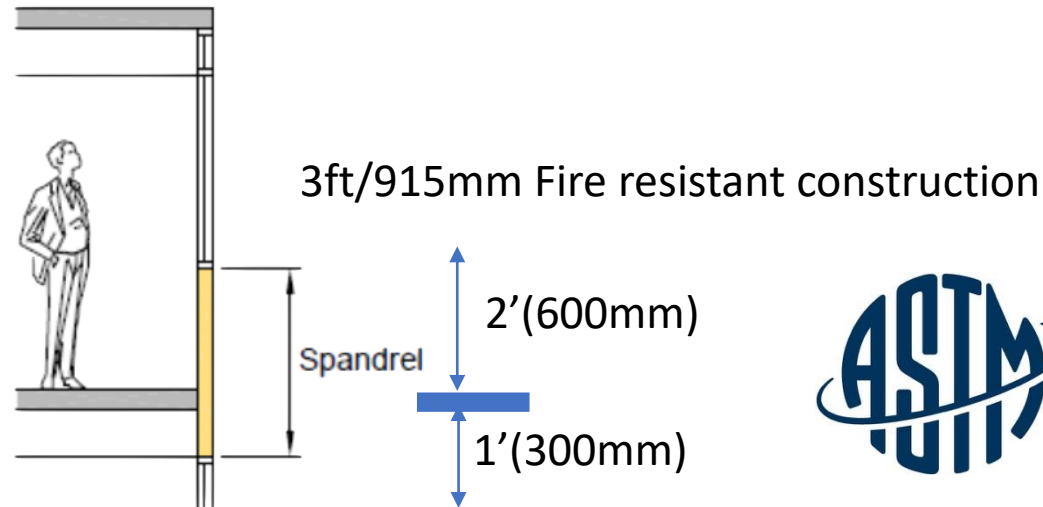
Particularly where the external leaf is a glazed curtain wall.





### *Openings situated Vertically Above One Another in Buildings of Fully Protected Construction*

212. If the storeys of a building are separated at all points from one another by fire resisting construction of a sufficient grade to resist a complete burn-out, there still remains risk of spread of fire between storeys via windows. If on account of exposure from other buildings it is necessary to protect these windows, an adequate degree of protection against the risk of spread from storey to storey is assured, but where such protection is not required considerable risk is entailed. A large proportion of window openings markedly accentuates the risk and adds to difficulties of fire fighting. With average amounts of window openings we felt that it would be onerous to demand protection in all cases. A reasonable degree of protection could be obtained by providing at least 3 ft. of construction (of which at least 2 ft. should be above floor level) of the same grade of fire resistance as the walls, between the lintel of the lower window and sill of the one above. This would, in addition, provide the pitching for firemen's ladders and for emergency rescue.



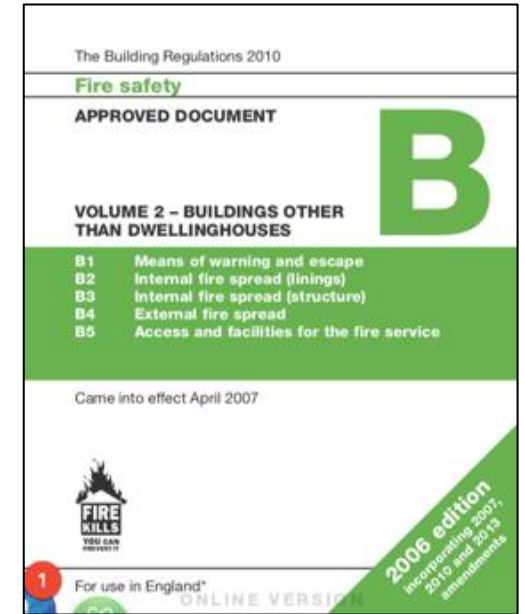
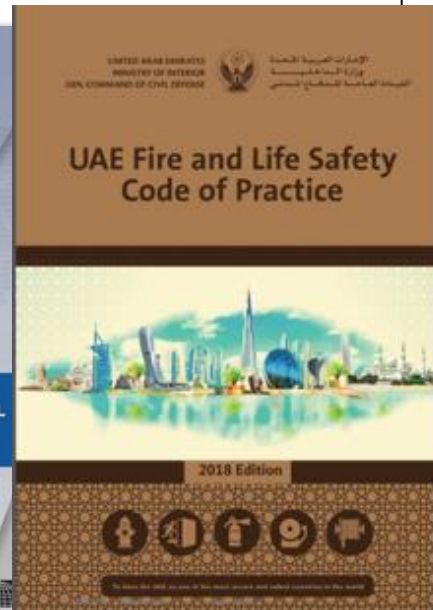
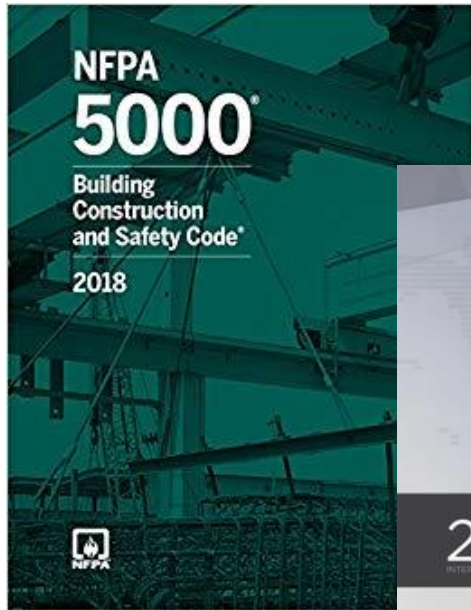
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This recommendation was replicated across the world,  
and to this day the requirement exists in virtually all Building Codes,

except .....

**The United Kingdom !!!!**



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**So why is that ? What happened**

JOINT FIRE RESEARCH ORGANISATION OF GREAT BRITAIN  
Fire Prevention note 9

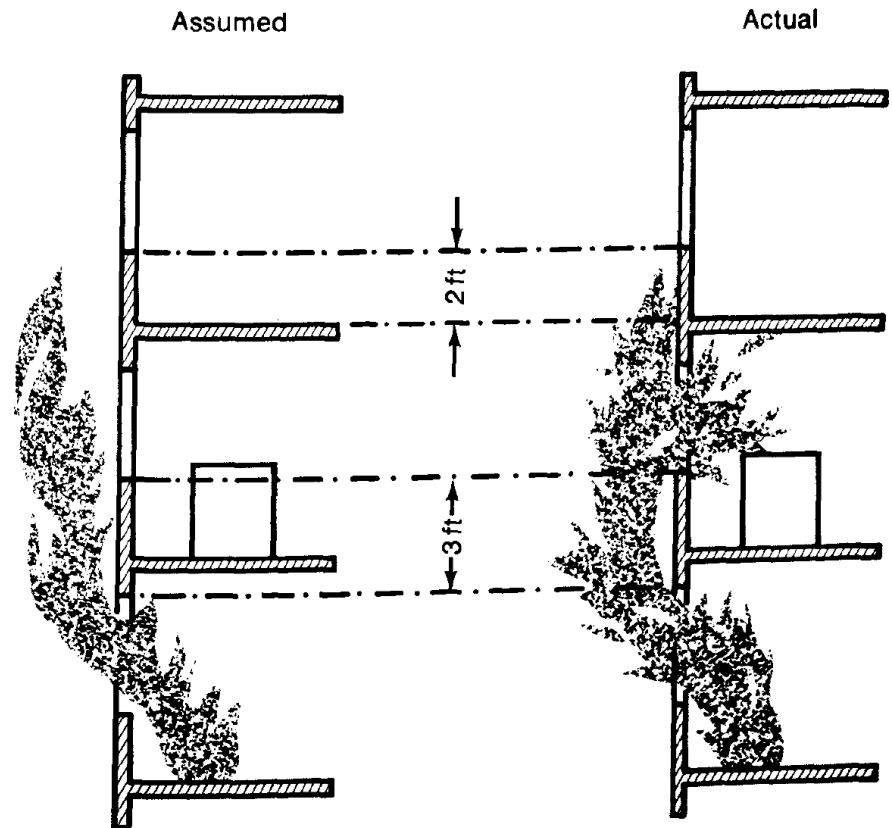


Figure 33. Assumed and actual shape of flames projecting from windows with vertical separation of openings.

**Does a 'Spandrel' provided as part of a Perimeter Edge Protection system not achieve the same function?**

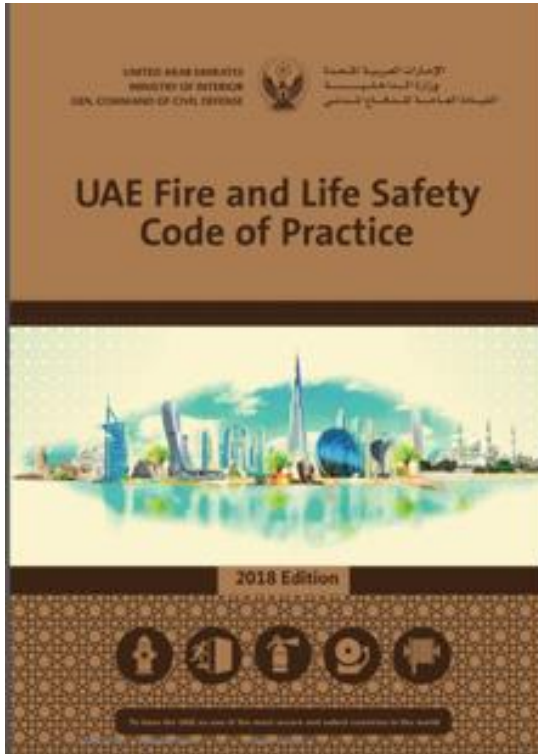


**Tested to ASTM E2307**



# UAE Fire and Life Safety Code 2018 – Chapter 4

## 4.5.9. Openings on the exterior walls



- 4.5.9.1.** Openings on exterior walls in adjacent stories shall be separated vertically to protect against fire spread on the exterior of the buildings where the openings are within 1524 mm of each other horizontally. Such openings shall be separated vertically not less than 914 mm by spandrel girders, exterior walls or other similar assemblies that have a fire-resistance rating of not less than 1 hour, rated for exposure to fire from both sides, or by flame barriers that extend horizontally not less than 762 mm beyond the exterior wall. Flame barriers shall have a fire resistance rating of not less than 1 hour.
- 4.5.9.2.** Where a Spandrel Panel is used to satisfy the requirement in **Section 4.5.9.1.**, it shall be ensured that the materials used and spandrel panel as system provides a minimum of 60 minutes fire resistance from BOTH sides of the panel. All transoms and Mullions must be protected in this respect.

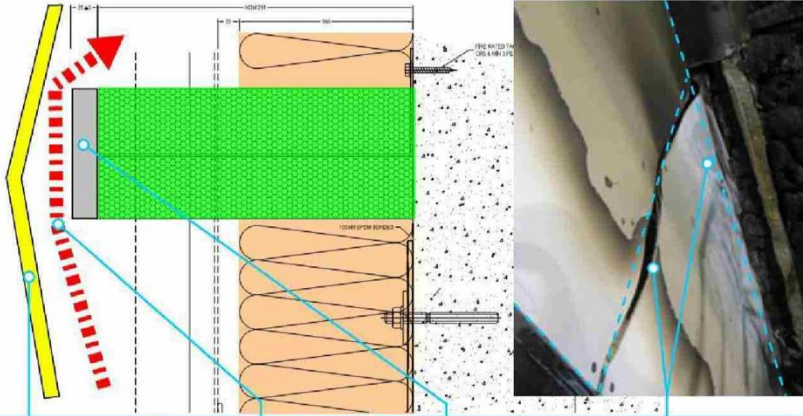
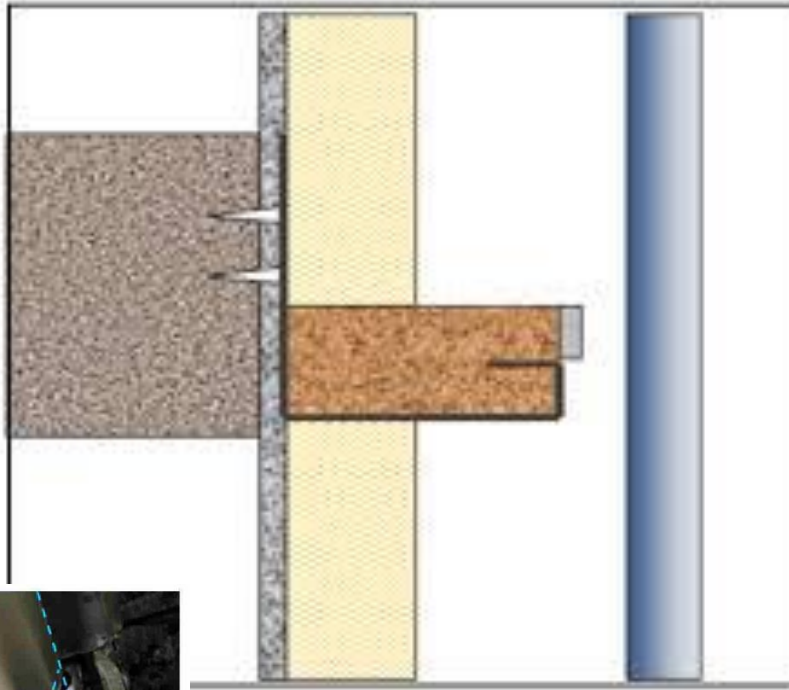
# Questions

Thank you









Rainscreen cladding panel distorts due to exposure to heat and/or failure of fixings

Route around intumescent layer becomes available

Expanded intumescent layer

Distortion of panels with PE core outwards due to exposure to heat and flames (DCLG test 5)

### **1.Cavity barrier –**

A barrier, used to close or separate a concealed space, the purpose of which is to restrict the spread of smoke/fire and to be fire resisting in itself.

2.The ultimate question being - when do cavity closers need to have fire resistance?



5.1 This test method provides for the following measurements and evaluations:

5.1.1 Movement capacity of the perimeter fire barrier.

5.1.2 Loadbearing capacity of the perimeter joint protection is optional.

5.1.3 Ability of the perimeter fire barrier to resist the passage of flames and hot gases.

5.1.4 Transmission of heat through the perimeter fire barrier

**5.2 This test method does not provide the following:**

5.2.1 Evaluation of the degree to which the perimeter fire barrier contributes to the fire hazard by generation of smoke, toxic gases, or other products of combustion,

5.2.2 Measurement of the degree of control or limitation of the passage of smoke or products of combustion through the perimeter fire barrier,

NOTE 1: This test method does not measure the quantity of smoke or hot gases through the floor assembly, the wall assembly, or the perimeter joint protection.

5.2.3 Measurement of flame spread over the surface of the perimeter fire barrier,

NOTE 2: The information in 5.2.1 through 5.2.3 are determined by other suitable fire test methods. For example, Test Method E84 is used to determine 5.2.3

5.2.8 A measurement of the capability of the test specimen to resist:

5.2.8.1 Flame propagation over the exterior faces of the test specimen,

5.2.8.2 Spread of flame within the combustible core component of the exterior wall assembly from one story to the next,

NOTE 3: Some exterior wall assemblies are made from sandwich panels, which use EPS foam or other similar materials that are combustible.

5.2.8.3 Spread of flame over the interior surface (room side) of the test specimen from one story to the next, and

NOTE 4: While it is a failure to have fire on the interior surface of the observation room, this test method does not provide a measurement of that flame spread.

5.2.8.4 Lateral spread of flame from the compartment of fire origin to adjacent spaces.

NOTE 5: The exterior wall assembly, floor assembly, and perimeter joint protection are individual components. The capabilities of individual components are not part of this specific test method's Conditions of Compliance.

5.3 In this test method, the test specimens are subjected to one or more specific test conditions. When different test conditions are substituted or the end-use conditions are changed, it is not always possible by, or from, this test method to predict changes to the characteristics measured.

5.4 This test method is not intended to be used as the only test method in the selection of a perimeter fire barrier. It is not intended as a specification for all attributes required by a perimeter fire barrier, or any of its individual components, in order for a perimeter fire barrier to be used in a particular application.