FACADES AND FIRE

The Essential Elements

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LEARNING OBJECTIVES

- Reaction to fire versus fire resistance
- The requirement for full fire resistance
- Perimeter fire stopping
- Reaction to fire – flame spread

- **Fire Resistance versus Reaction to Fire**
- Reaction to Fire
- Reaction to fire tests tend to be small-scale test methods on materials, evaluating – ignitability, flame spread, heat release, smoke development and toxicity.
- Samples tend to be small in size (mm rather than m) and relate to the development stages of a fire.
- Fire Resistance
- These tests are generally used to determine the fire resistance of complete systems (eg. a wall, ceiling, floor structure, jet fan, fire damper, ducting etc). Specimens tend to be large in size (m rather than mm).
- They generally evaluate the duration of time that a complete structure will hold back a fire (eg. how long a fire will take before breaking into the adjacent room). Fire resistance tests integrity, and/or insulation and/or load bearing capacity (all measured in minutes)
- It relates to performance in a fully developed fire.

COURSE DESCRIPTION – PART 2

The Requirement for Full Fire Resistance

- Full fire resistance is mainly required were there is a specific need to:
  - protect the inside space from an external fire (eg. where adjacent buildings are close, or there is another defined and elevated risk)
  - protect the outside space from an internal fire (eg. if the adjacent external space forms an escape corridor)
- Most modern buildings don't need a façade with full fire resistance because buildings can be spaced apart sufficiently
- Fire resistance becomes more focussed on internal partitioning

Perimeter Firestopping

- This is an important fire resistance element that is required normally – preventing vertical flame spread
- It has historically been poorly provided and needs full integration with the wall

- **Reaction to Fire – Flame Spread**
- Flame spread on an exterior wall must be understood and controlled
- A wall doesn't have to have a full fire resistance performance to do that (although perimeter firestopping is likely to be a requirement)
- Both components and the full system should be evaluated (in that order)
- It is important to understand the performance of all parts of composite materials, eg. the core of a composite panel
- Appropriate test standards are proposed
- Performance criteria are proposed and should be developed for local application

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SPEAKER BIO

Andy Dean – Head of Façade Engineering – WSP ME

- Andy has over 25 years of experience in the field of building and construction, ranging from structural testing within the nuclear industry to fire testing. Having established the Dubai Cladding Technology Centre and Laboratory, and operated it for 10 years, he has particular knowledge of heavy structures testing and weathertightness testing of cladding, curtain walling and building envelope systems.
- He has carried out many consultancy projects as a third-party specialist in the field of building envelope technology.
- With long-standing association with the CIOB, Andy is an MCIOB, committee officer and a professional review mentor.
- He is a Fellow of the CIBSE Society of Facade Engineers and an active committee member and chair within the Middle East Chapter of the Glass and Glazing Federation (GGF).
- He continues to provide input into the UAE code and is a regular speaker at industry technical seminars.

REACTION TO FIRE VERSUS FIRE RESISTANCE

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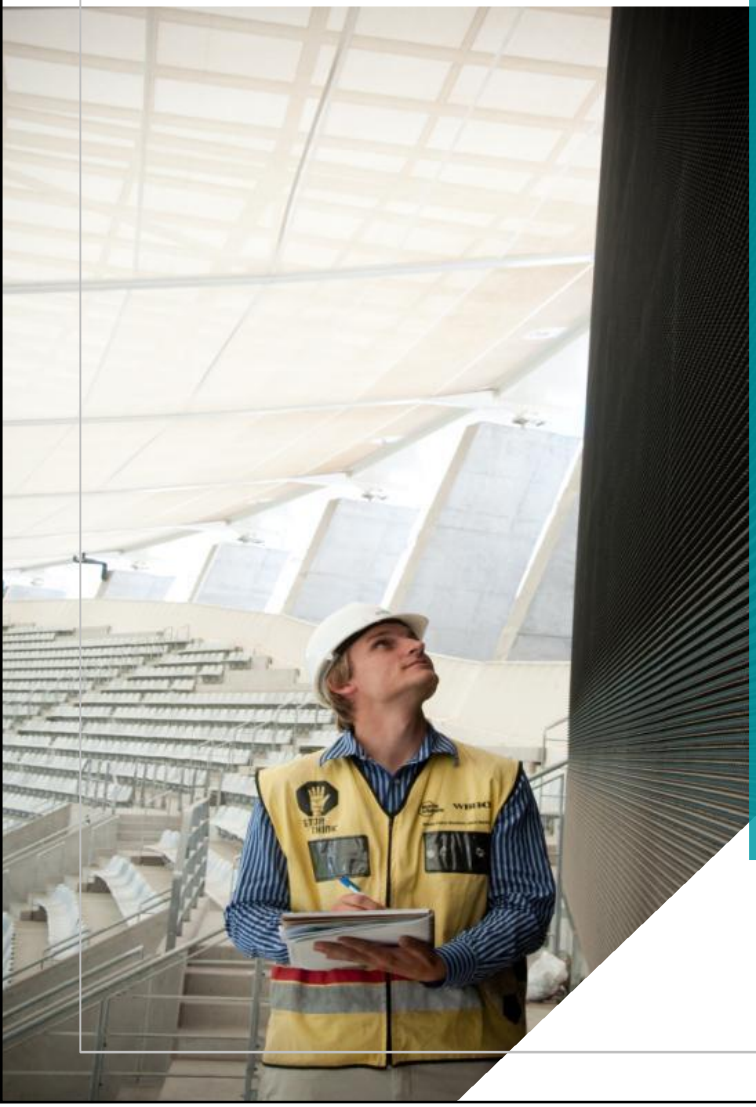
REACTION TO FIRE VERSUS FIRE RESISTANCE



REACTION TO FIRE

- Usually materials
- Fire development
- Various measurement formats
- Ignitability
- Surface spread of flame
- Smoke development
- Toxicity
- Combustibility

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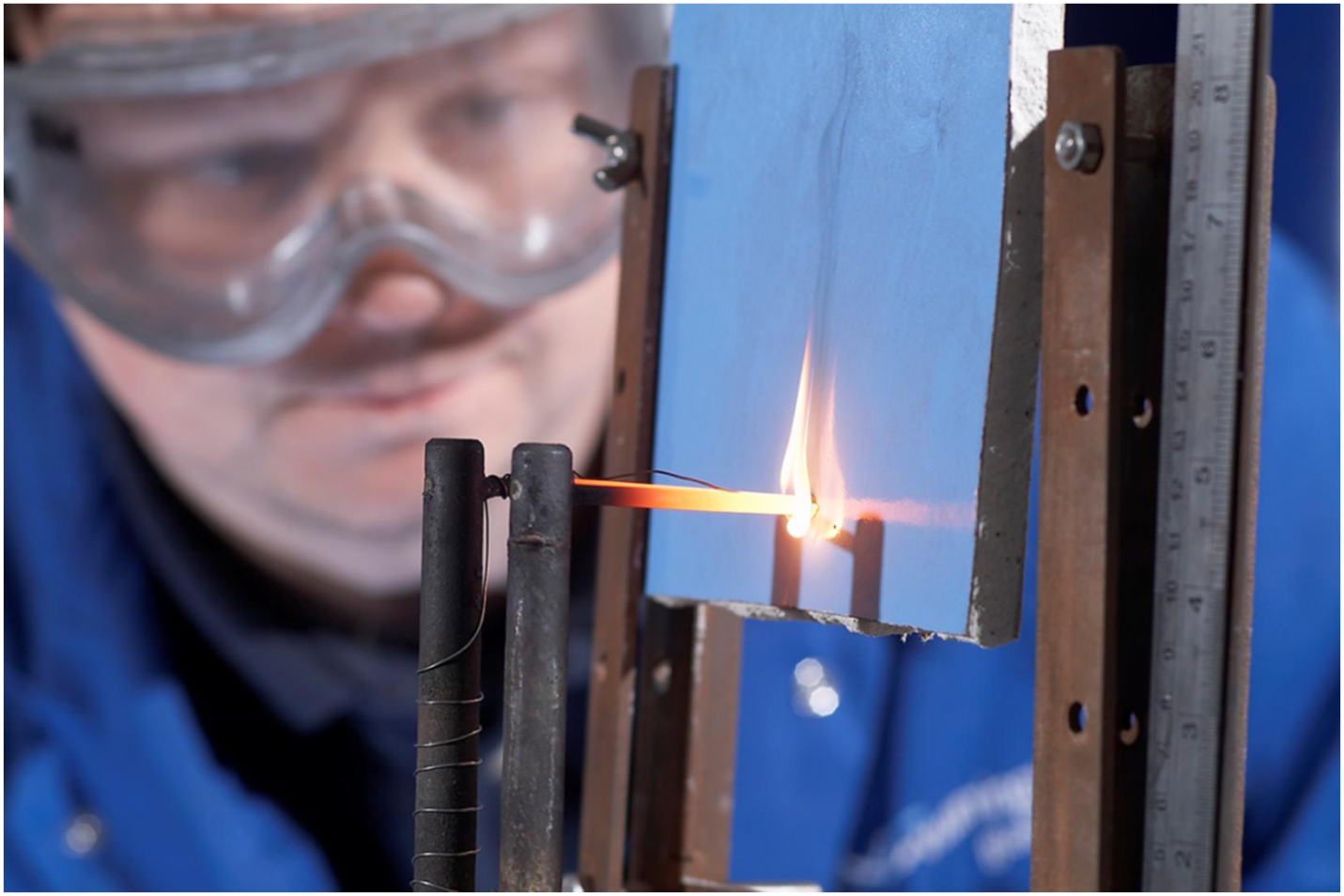
REACTION TO FIRE TESTING (1)



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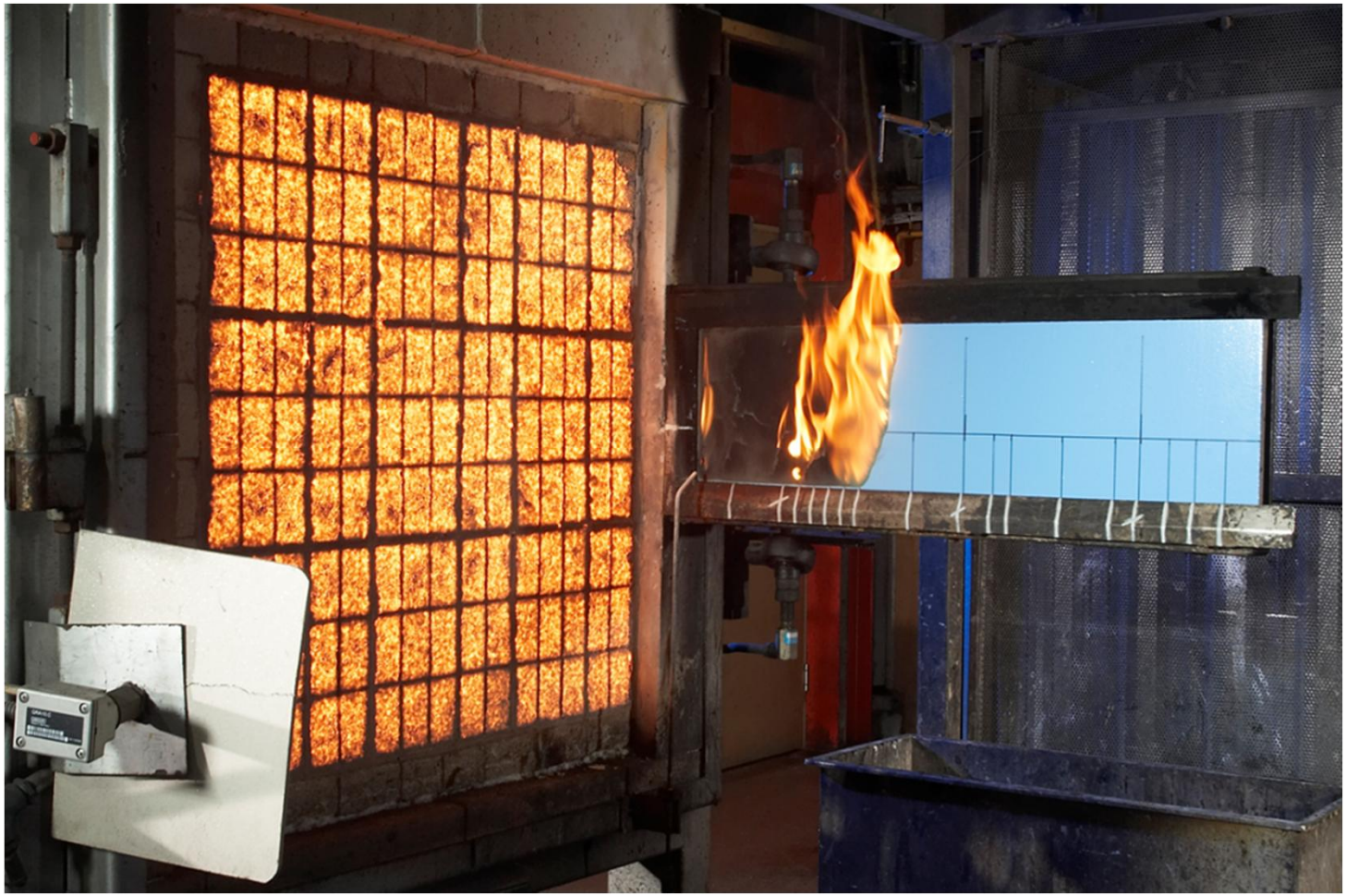
REACTION TO FIRE TESTING (2)



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REACTION TO FIRE TESTING (3)

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REACTION TO FIRE TESTING (4)

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REACTION TO FIRE TESTING (5)

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REACTION TO FIRE VERSUS FIRE RESISTANCE

FIRE RESISTANCE

- Usually systems
- Preventing a fully-developed fire from getting from one compartment into an adjacent one
- Compartmentation – internal fire spread
- Walls, doors, windows, floors, ceilings, penetration seals
- Measured in time (temperature, integrity, structural)

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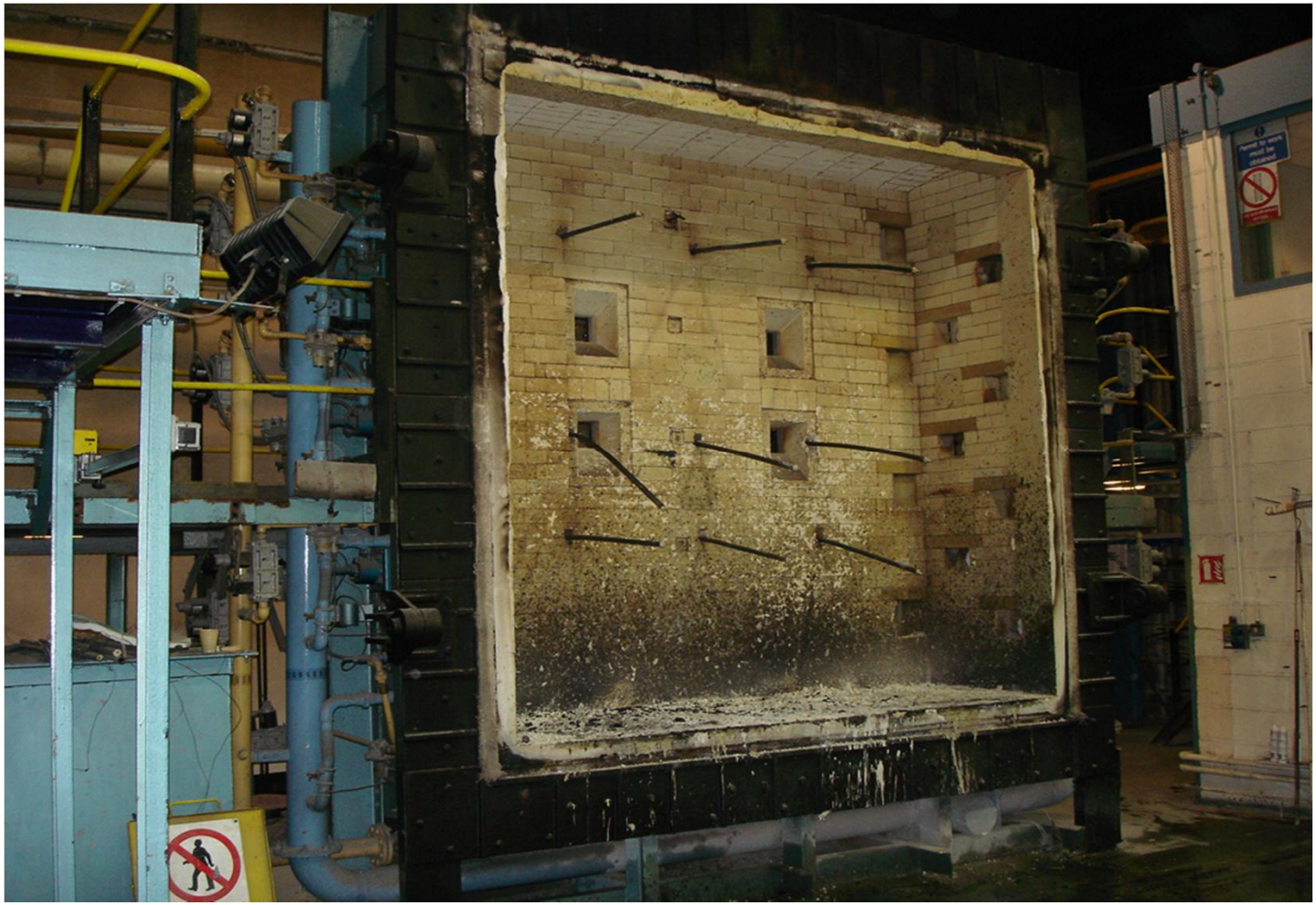
FIRE RESISTANCE TESTING (1)



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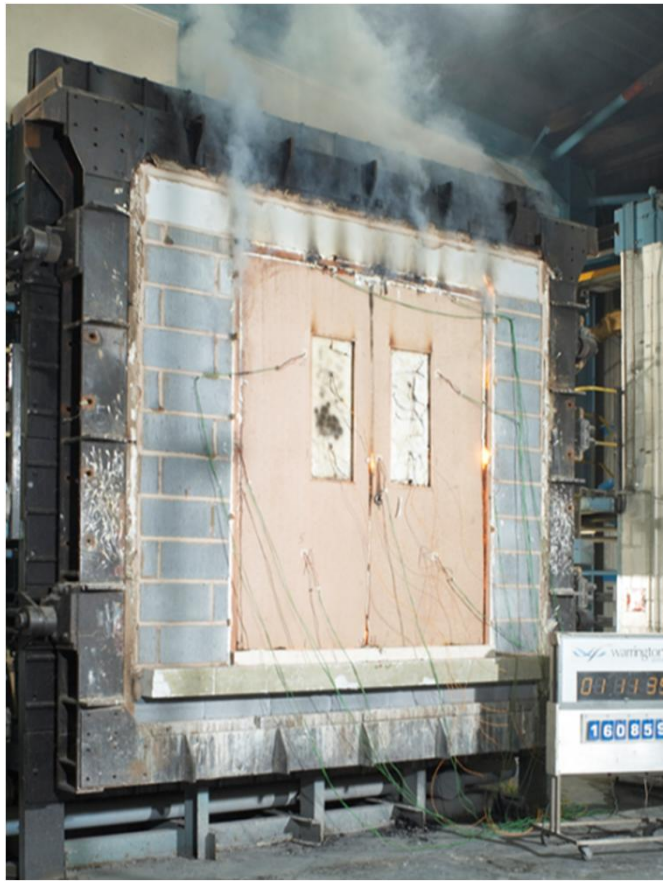
FIRE RESISTANCE TESTING (2)



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FIRE RESISTANCE TESTING (3)

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FIRE RESISTANCE TESTING (4)

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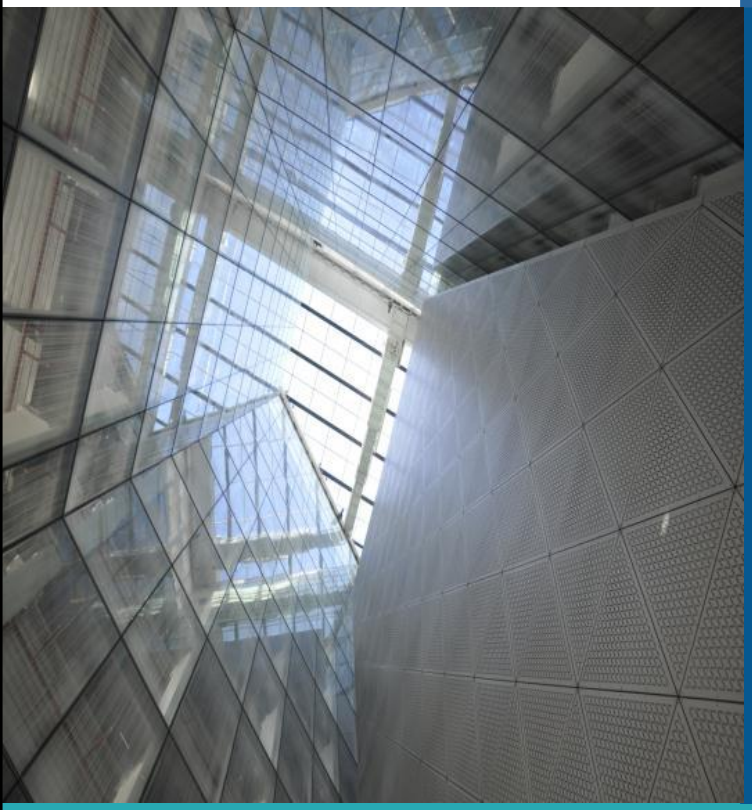

THE REQUIREMENT FOR FULL FIRE RESISTANCE IN FACADES

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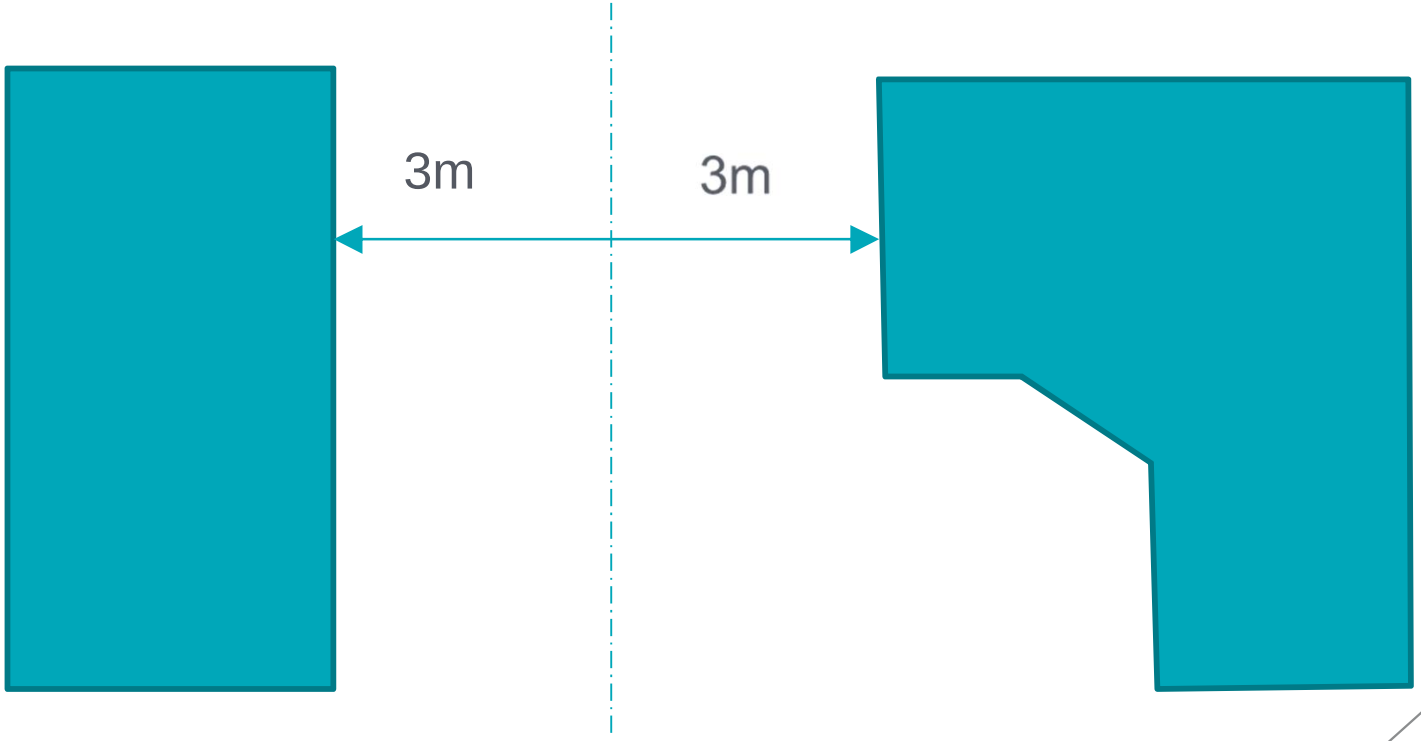
THE REQUIREMENT FOR FULL FIRE RESISTANCE - FACADES

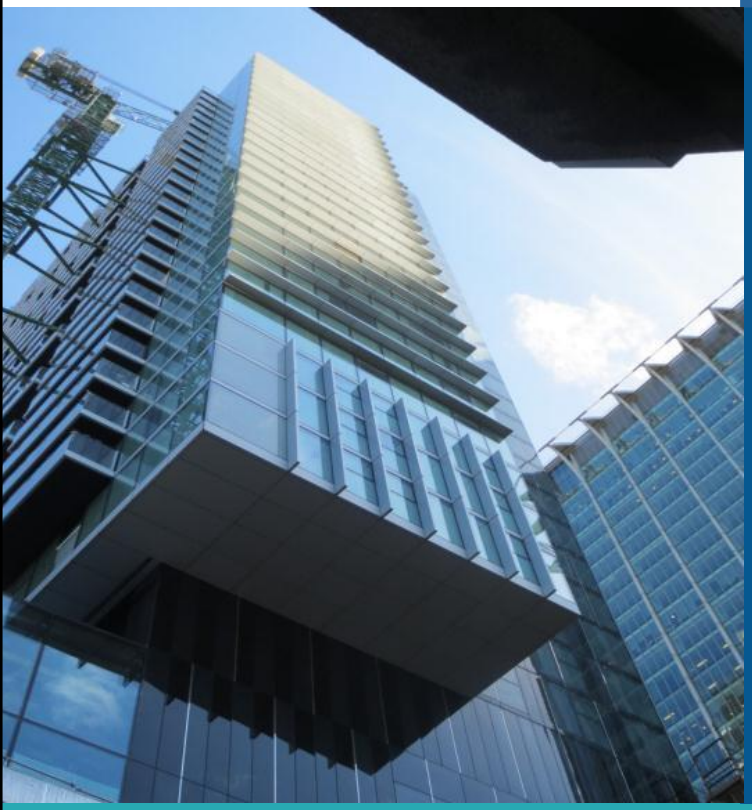
- Preventing flame spread out of, or into, a building
- Protecting an essential space



- More frequently an internal requirement (internal partitions)

CODE REQUIREMENTS – Regional Examples

- UAE Fire and Life Safety Code
- Qatar Civil Defence Fire Safety Standards
- NFPA 5000
- Should be tested and certified
- ASTM E119
- BS 476
- EN 1364 Part 3



PERIMETER FIRESTOPPING

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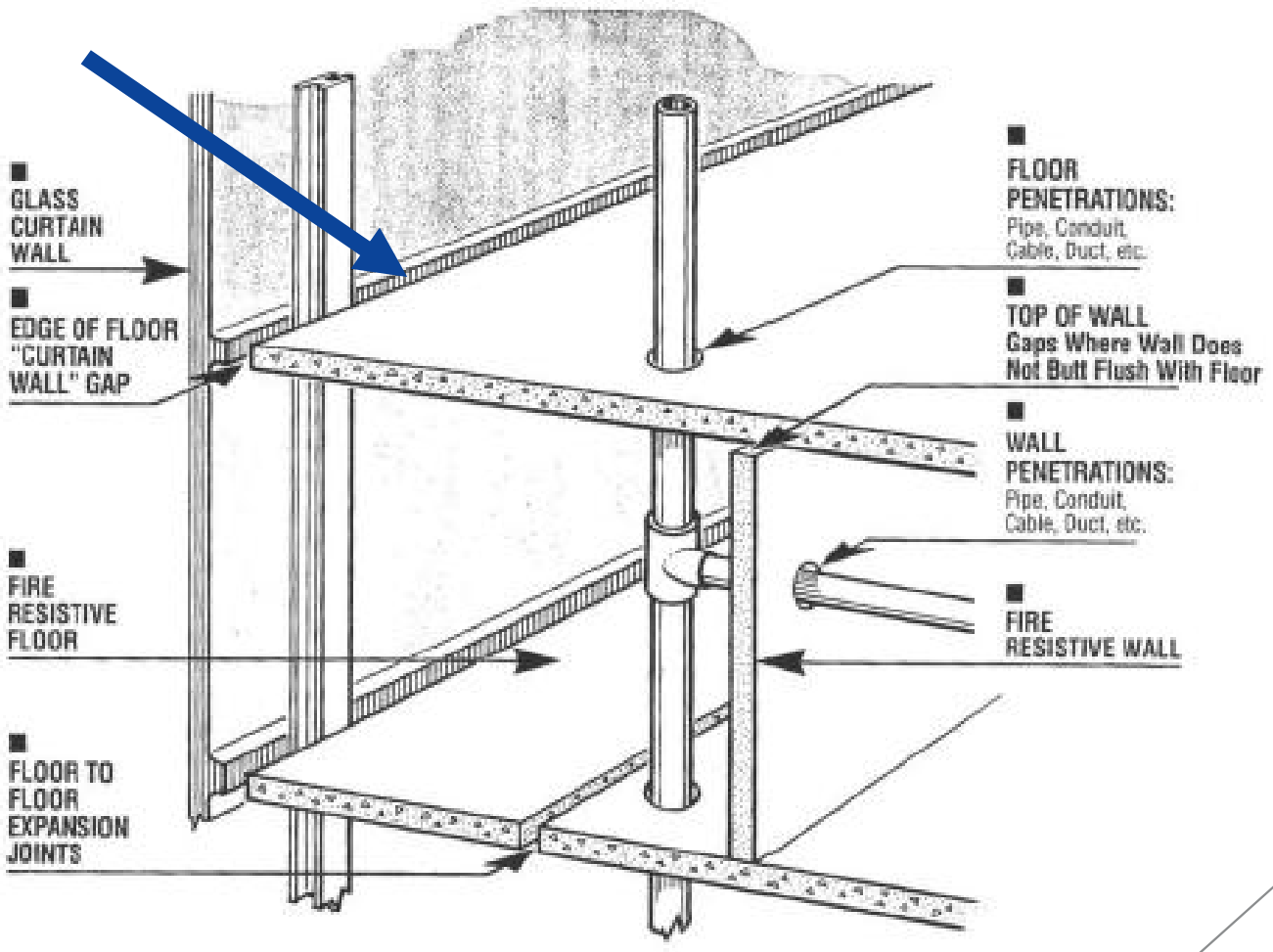
PERIMETER FIRESTOPPING

- The joint between the slab edge and the façade.



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PERIMETER FIRESTOPPING

- Purpose – to prevent vertical fire spread through this joint

- Requirement – to maintain internal fire spread performance rating up to the façade

CODE REQUIREMENTS – Regional Examples

- UAE Fire and Life Safety Code
- Qatar Civil Defence Fire Safety Standards
- NFPA 5000
- Should be tested and certified
- ASTM E2307
- EN 1364 Part 3 (full) or Part 4 (part configuration)

REACTION TO FIRE AND FACADES

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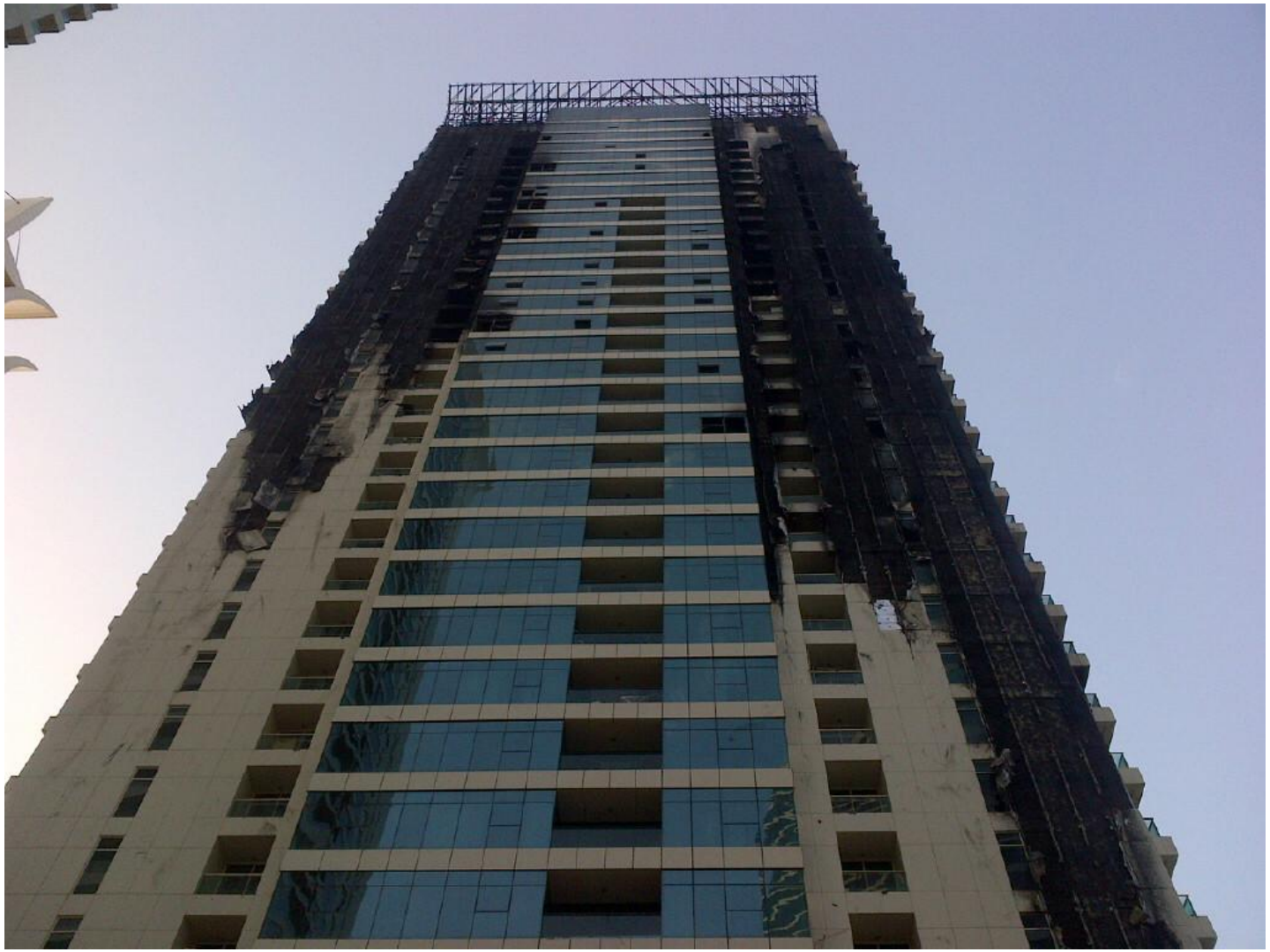
DUBAI 2012



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REACTION TO FIRE - FACADES

- **Non-combustible?**
  - Unrealistic
  - Components only
- **Ignitability?**
  - Probably
- **Spread of flame?**
  - Definitely

SPREAD OF FLAME – COMPONENTS

- **Component examples**
  - insulation
  - sealants
  - coatings
  - panels (aluminium composite panelling – ACP)

- **Components require small scale tests**
  - BS 476 part 7, ASTM E84, EN 13501-1

SPREAD OF FLAME – THE SYSTEM

- **System**
  - full scale test
  - BS 8414, NFPA 285, ISO 13785, several others

- **Demo of fire rated versus non-fire rated system videos**

BS 8414

- **Fire rated system after 15 minutes**

Source:
Exova
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BS 8414

- **Non-fire rated system after 15 minutes**

Source:
Exova
Warringtonfire

SPREAD OF FLAME – THE SYSTEM

- **System**
  - full scale test
  - BS 8414, NFPA 285, ISO 13785, several others

- **Demo of fire rated versus non-fire rated system videos**

- **Performance criteria proposed in LPS 1582**

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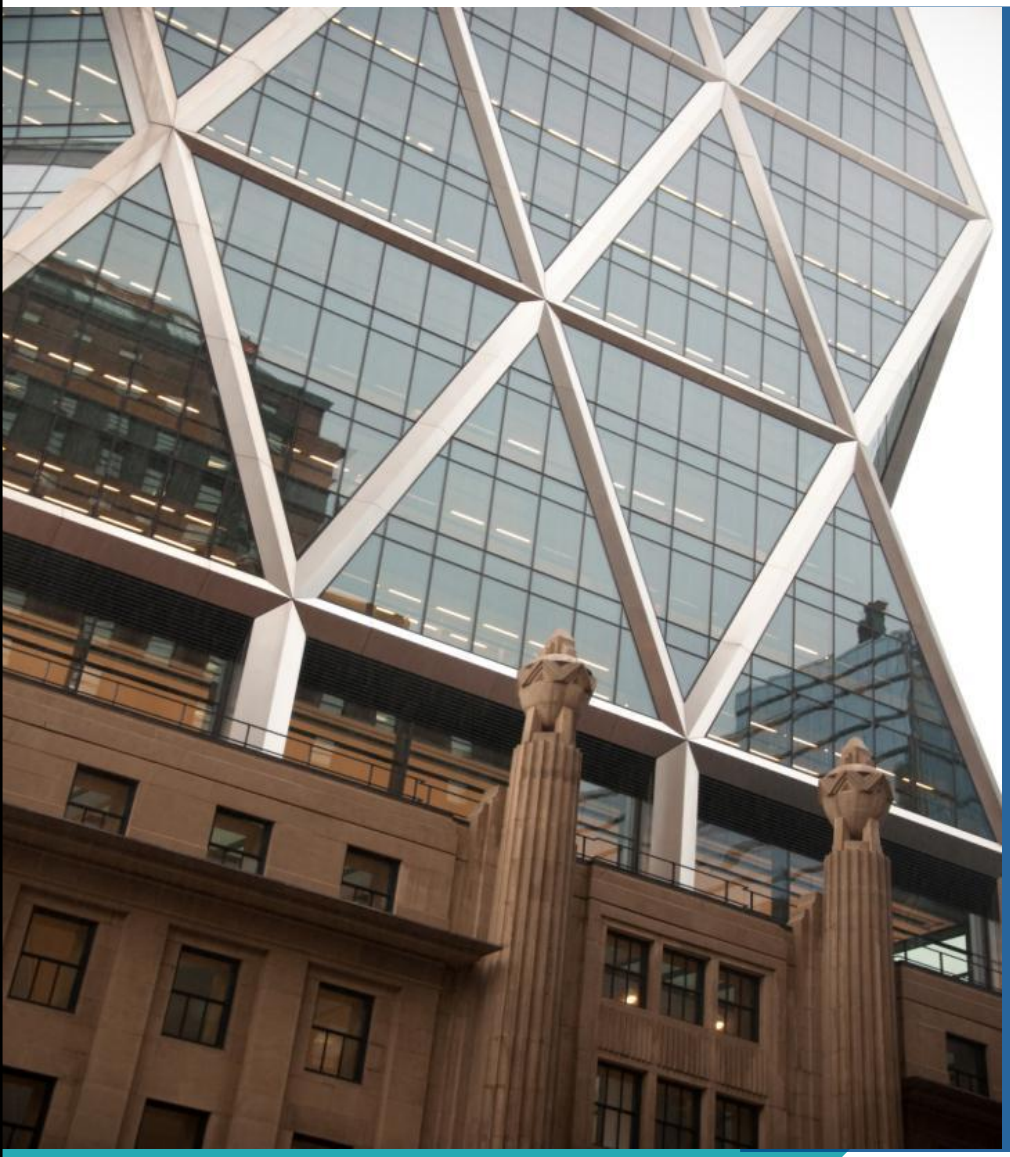
LEARNING OBJECTIVES - SUMMARY

- Fire resistance versus reaction to fire – context
- The requirement for fire resistance – uncommon
- Perimeter firestopping – integral with the façade
- Reaction to fire – flame spread – locally relevant



THANK YOU