

CWCT

New CWCT Technical Notes

Fire

Alan Keiller and David Metcalfe

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CWCT Technical Notes – Fire

Agenda

▶ Welcome,

▶ Purpose of today's webinar,

▶ New TN's webinar,

▶ Questions.

TN114	Fire performance of facades - Use of combustible material (26 pp)
TN113	Fire performance of facades - Introduction (23 pp)

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Introduction

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CWCT Technical Notes – Fire

Outline

▶ 113: *Fire performance of facades – Introduction*

▶ 114: *Fire performance of facades – Use of combustible material.*

▶ For each Note we will touch on

- ▶ The scope
- ▶ A few of the key takeaways
- ▶ Annexes

▶ Further TNs are in preparation,

- ▶ 115: *Fire performance of facades – Application to curtain walls*
- ▶ 116: *Fire performance of facades – Application to built-up walls*

▶ These Notes replace TN98, *Fire performance of facades - Guide to the requirements of UK Building Regulations*

▶ Good engagement with the Building Safety Regulator and Scottish Building Standards Division.

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### Target audience

- ▶ Those who design and construct facades in the UK,
- ▶ Also provide useful information for building designers and fire engineers on fire-related requirements for facades.

Technical Note TN113

Fire performance of facades – Introduction

1. This Technical Note is one of a series on the fire performance of facades, and updates previous guidance contained in CWCT 7000 which is withdrawn. This series covers:

- ▶ TN113, Fire performance of facades – Introduction
- ▶ TN114, Fire performance of facades – Use of combustible materials
- ▶ TN115, Fire performance of facades – Application to curtain walling
- ▶ TN116, Fire performance of facades – Application to built-up walls

2. The series of Technical Notes is intended to provide those who design and construct facades in the UK with an introduction to the regulations and associated guidance relating to the ability and how the regulations can be used in the design and construction of facades. They also provide useful information for building designers and fire engineers on fire-related requirements for facades.

3. This Technical Note provides an introduction to the building regulations relating to fire in England and the associated regulatory guidance in Approved Document B. Requirements in other countries of the UK may differ and any differences are described in Annex D.

4. Building regulations require buildings to be designed and constructed to limit the spread of fire:

- ▶ within the building,
- ▶ over the external walls of the building,
- ▶ from one building to another.

5. This also requires provision for warning and escape in case of fire.

6. Identifying these requirements will affect the design of the facade. This Technical Note provides an introduction to these requirements. Note, satisfying these requirements may affect appearance and may need to be resolved prior to planning permission.

7. Definitions

8. Fire resistance (fire rating)

9. Fire resistance is the ability of a building component or system to satisfy performance criteria for a stated period when exposed to a standard fire. In the case of a facade the performance criteria is to:

- ▶ maintain integrity (I),
- ▶ maintain the ability of a separating element to prevent the passage of flame and hot gases,
- ▶ maintain (E) – ability of a separating element to restrict the transfer of heat.

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CWCT Technical Notes – Fire

### TN113 – Fire performance of facades – Introduction

- ▶ Contents;
  - ▶ Introduction,
  - ▶ Definitions,
  - ▶ Regulations and guidance;
    - ▶ Regulatory framework,
    - ▶ Building regulation requirements;
      - ▶ Content of regulations and guidance applicable in England,
  - ▶ Summary
  - ▶ Annexes;
    - ▶ Testing for reaction to fire,
    - ▶ Requirements for Wales, Northern Ireland and Scotland.

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### TN113 – Fire performance of facades – Introduction

- ▶ Definitions;
  - ▶ Fire resistance,
  - ▶ Reaction to fire
    - ▶ Require testing,
    - ▶ European classification system now used,
    - ▶ Classification based BS 476 no longer recognised from March 2025 for reaction to fire and September 2029 for fire resistance
- ▶ Relevant building;
  - ▶ Definition varies according to country and context,
- ▶ Higher risk building,
- ▶ External walls,
- ▶ Specified attachments.

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### TN113 – Fire performance of facades – Introduction

- ▶ Regulation and guidance;
  - ▶ Building Regulations give **minimum** requirements **to ensure life safety**;
    - ▶ Generally in functional terms,
    - ▶ Approved Documents provide practical guidance that would normally satisfy the functional requirements (Approved document B for fire),
    - ▶ Regulation 7(2) is prescriptive and does not allow alternatives,
  - ▶ However;
    - ▶ ‘following the guidance in ADB may not be sufficient to achieve an adequate level of performance for a given facade in a fire for certain building situations. It is incumbent on the building designer to ensure that the guidance given in ADB is relevant to their building and what additional measures (if any) are required to ensure the façade achieves the required performance standard’
  - ▶ Additional considerations:
    - ▶ Property protection.

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TN113 – Fire performance of facades – Introduction

▶ Regulation and guidance;

▶ Geographical extent,

▶ Approved document B covers England

▶ Wales has its own Approved document B

▶ Northern Ireland has Technical Booklets (E for fire)

▶ Following the English Approved document B will satisfy requirements for construction of facades in Wales and Northern Ireland

▶ Scotland has its own regulations and guidance documents (Technical Handbooks) which differ in structure and content but will give similar results in most, **but not all**, cases.

▶ TN113 refers to requirements in England and describes differences in other countries in Annex B.

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TN113 – Fire performance of facades – Introduction

▶ Building regulation requirements;

▶ B1 Means of warning and escape,

▶ Fire resisting façade to protect fire escape,

▶ Smoke vents,

▶ Fire doors,

▶ B2 Internal fire spread (linings);

▶ Reaction to fire of lining materials,

▶ B3 Internal fire spread (structure);

▶ Fire resistance of loadbearing facades,

▶ Interfaces with compartment walls /floors,

▶ Cavity barriers,

▶ B4 External fire spread;

▶ Requirement for fire resisting façade to limit fire spread between buildings,

▶ Limits on reaction to fire of external surfaces,

▶ Limits on combustibility of materials,

▶ Cavity barriers,

▶ Testing in accordance with BS 8414,

▶ B5 Access and facilities for the fire service;

▶ Risk of falling materials in fire.

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TN113 – Fire performance of facades – Introduction

▶ Summary

▶ Design of the façade is affected by decisions about the design of the building,

▶ A fire strategy needs to be developed by the building designer/fire engineer,

▶ Requirements need to be communicated to the façade designer,

▶ These might exceed the recommendations of ADB,

▶ Requirements include

▶ Requirements for façade to be fire resisting,

▶ Identification of compartment walls/floors to allow design of interfaces,

▶ Limitations on reaction to fire of materials that exceed limits in ADB,

▶ Provisions relating to escape routes that affect the façade,

▶ Minimum recommendations of Approved document should be met:

▶ Cavity barriers,

▶ Limits on reaction to fire of materials.

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TN113 – Fire performance of facades – Introduction

▶ Annex A reaction to fire

▶ Classification A1 to F based on small scale laboratory tests

▶ Some tests carried out on sample that represents way material is to be used,

▶ Classification depends how material is used,

▶ Eg thickness of paint coating

▶ Claims of performance should be supported by a classification report giving field of application.

Fire testing of Reynobond PE

Date	Type	Test fully completed?	Classification
2005	Cassette	✗	E
2005	Rivet	✓	B
2011	Cassette	✗	E
2011	Rivet	✓	B
2014	Cassette	✗	E
2014	Rivet	✓	C
2015	Cassette	✗	E
2015	Rivet	✓	C

Source: CSTB

BS EN 13501-1

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TN114 – Fire performance of facades – Use of combustible material

Extensive guidance in relation to regulation 7(2) available in the CWCT/SFE guide,

Update published last year,

Live document.

Window Cladding

Society of Facade Engineering

The Building (Amendment) Regulations 2019

The Building etc. (Amendment) (England) Regulations 2022

Regulation 7(2), Regulation 7(3) and Requirement B4

Technical guidance for interpretation in relation to the external walls and specified attachments of Relevant Buildings in England

Issue 3, July 2023

<https://www.cwct.co.uk/pages/cwct-sfe-fire-guidance>

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TN114 – Fire performance of facades – Use of combustible material

Structure

Regulations

ADB requirements

Summary of requirements

Flow charts

External surfaces

Materials and products

Balconies

Reaction to fire testing

Annex

Other countries of the UK

Flow charts (Scotland)

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TN114 – Fire performance of facades – Use of combustible material

Overarching requirement (ADB clause 10.4/12.4)

*In relation to buildings of any height or use, consideration should be given to the choice of materials (including their extent and arrangement) used for the external wall, or attachments to the wall (e.g. balconies, etc.), to reduce the risk of fire spread over the wall.*

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TN114 – Fire performance of facades – Use of combustible material

Summary of minimum recommendations

Residential

Non residential

Buildings where at least part used for residential purposes

Height of top floor (18m or more above ground) (relevant buildings)

Yes

All materials A2-s1, d0 or better (other than permitted exceptions Reg 7(2), Reg 7(3))

Also applies to specified attachments

Notes: Additional considerations (ADE1) of 10.3.2

External surfaces A2-s1, d0 or better (ADE1) of 10.3.2

No

Height of top floor (18m or more above ground)

Yes

Insulation products, fire materials etc. A2-s1, d0 or better (ADE1) of 10.3.2

External surfaces A2-s1, d0 or better (ADE1) of 10.3.2

Stakes to be composed of A2-s1, d0 materials (other than specified exceptions) or to have a surface achieving R60

30 component of A2-s1, d0 materials and any materials of Class B-s1, d0 or worse to be interrupted by a 300mm wide strip of A2-s1, d0 material at compartment boundaries (ADE1) of 10.3.2

No

Building height greater than 18m above ground

Yes

External surfaces A2-s1, d0 or better (ADE1) of 10.3.2

No

Wall within line of boundary

Yes

External surfaces B-s1, d2 or better (ADE1) of 10.3.2

No

No specific recommendations (ADE1) of 10.3.2

Figure 1 – flow chart for buildings where at least part used for residential purposes in England

See section on 'Materials and products' for details of this height

See section on 'External surfaces' for details of this height

Exemptions apply (see section on External surfaces)

Exemptions for certain masonry cavity walls. See paragraph 5.1

Note: In all cases 'relevant metal composite material' is prohibited by regulation 7(1A)

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TN114 – Fire performance of facades – Use of combustible material

▶ External surfaces

▶ What is an external surface?

▶ Where do the recommendations apply?

The diagrams show three roof types: a double pitch roof, a mansard type roof, and a flat or mansard roof. Each diagram labels the highest point of roof slope, lowest point of roof slope, height of building, and mean ground level. The mansard type roof diagram also includes the top level of gutters and a note: 'Use height as in 1, whichever is greater'.

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TN114 – Fire performance of facades – Use of combustible material

▶ External surfaces

▶ What is an external surface?

A photograph showing a close-up of a window frame, highlighting the external surface of the glass and the frame material.

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TN114 – Fire performance of facades – Use of combustible material

▶ Where do the recommendations for external surfaces apply?

▶ Any problems applying them to all materials?

▶ Considered impractical to apply recommendations to all parts of the external surface,

A 3D cutaway diagram of a window frame, showing the internal structure and the external surface. The diagram is credited to Window Architects.

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TN114 – Fire performance of facades – Use of combustible material

▶ Where do the recommendations for external surfaces apply?

▶ Any problems applying them to all materials?

▶ Considered impractical to apply recommendations to all parts of the external surface,

▶ What about regulation 7(2) exemptions?

▶ What about other buildings?

A 3D cutaway diagram of a window frame, showing the internal structure and the external surface. The diagram is credited to Window Architects.

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TN114 – Fire performance of facades – Use of combustible material

▶ In conclusion, recommendations for external surfaces principally apply to:

▶ Opaque areas generally,

▶ Rainscreen panels,

▶ Spandrel/infill panels,

▶ External render systems,

▶ Precast panels,

▶ Etc,

▶ Balcony balustrades\*,

▶ Attachments such as shading devices\*

▶ Surfaces considered exempt from the recommendations for external surfaces:

▶ Window/curtain wall framing members,

▶ Vision glazing in windows/curtain walls,

▶ Sealants/gaskets.

▶ Consideration must be given to the potential risk of fire spread over these materials.

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TN114 – Fire performance of facades – Use of combustible material

▶ Materials and products

▶ Different definition of height!

▶ Recommendations clear, except for the definition of a 'filler material',

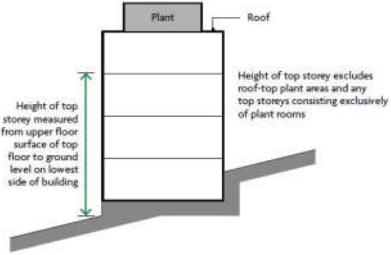
▶ Laminated glass?

▶ Considered exempt in vision glazing

▶ Spandrel glazing/balcony balustrades not exempt,

▶ Conflicts with safety,

▶ Use justified by fire risk assessment.



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TN114 – Fire performance of facades – Use of combustible material

▶ Balconies

▶ New guidance for buildings with a 'residential' purpose, with a storey 11m in height,

▶ Two options given.

▶ Reaction to fire testing

▶ Details of reaction to fire testing given in TN113,

▶ Important that products are tested in a way that is representative of their end use,

▶ Care required where asymmetrical products are used.

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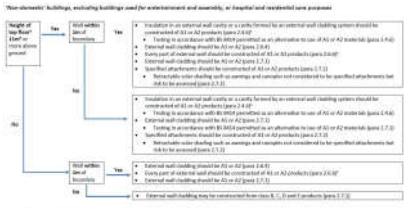
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TN114 – Fire performance of facades – Use of combustible material

▶ Annex

▶ Recommendations in other countries of the UK,

▶ Guidance in Scotland is very different, however the end result is similar.



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### Future Fire Technical Notes

- ▶ *TN115 – Fire performance of facades – Application to curtain walls,*
- ▶ Curtain wall fire stops,
- ▶ Proposing a hierarchical approach to this:
  - ▶ Direct field of application
  - ▶ Extended field of application
  - ▶ Fire engineering assessment,
- ▶ <https://www.cibsejournal.com/technical/fire-and-facades-key-guidance/>

Dimensions in millimetres

Wall furnace

© BSI

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### Future Fire Technical Notes

- ▶ *TN116 – Fire performance of facades – Application to built-up walls,*
- ▶ Unresolved issues
  - ▶ How can cavity barriers be tested when rainscreen fails before the end of the test?
  - ▶ Is the spread of cold smoke prior to activation of open state cavity barriers an issue?
  - ▶ Acceptability of testing in accordance with BS 8414.

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### Questions?

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