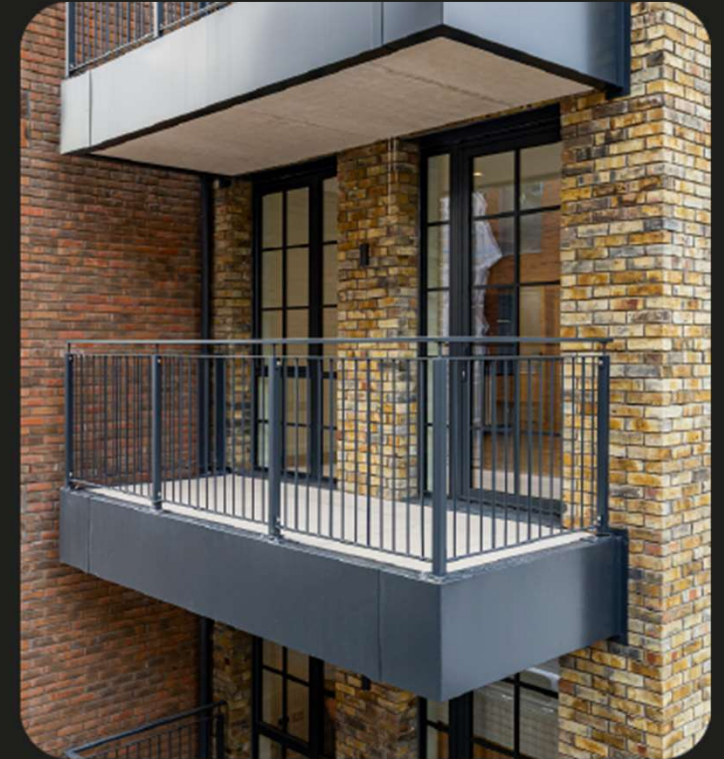


# Future-proof construction: specify the right materials & systems for balconies & terraces

Presented by

## Learning Outcomes, you will:

- Be able to select the most appropriate flooring system for your project
- Identify superior flooring products and systems
- An improved understanding of the UK building regulations relating to balconies and terraces
- Understand how to integrate planters and furniture into external flooring systems





Ryno

# Ryno

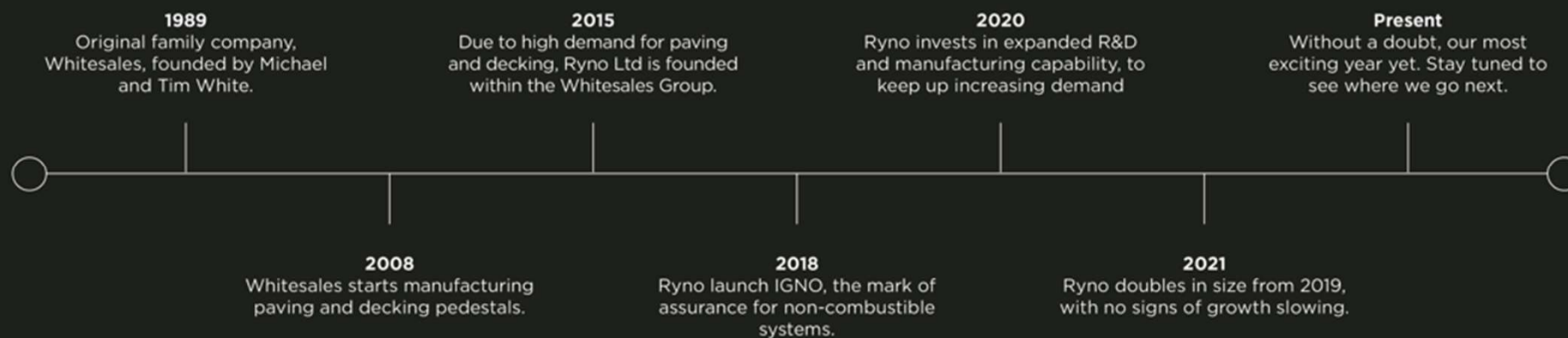
Design, manufacture and supply high-performance decking and paving systems for balconies and terraces across the globe.

Through years of experience in solving problems and constant innovation, Ryno has built up in-depth knowledge and understanding of the regulations that shape the design of modern terraces and balconies.



Presentation provided by Ryno Ltd

## Ryno years in the making





Igno



## Igno – Non-combustible Innovation

### What is it?

The Igno logo identifies non-combustible innovation that goes beyond compliance to build in protection. Any product sporting the logo meets a minimum fire classification of **A2-s1,d0**.

### What does it mean

To meet the Igno standards, any product must be rigorously tested in **UKAS** accredited labs to ensure the highest standard of testing and compliance is met.

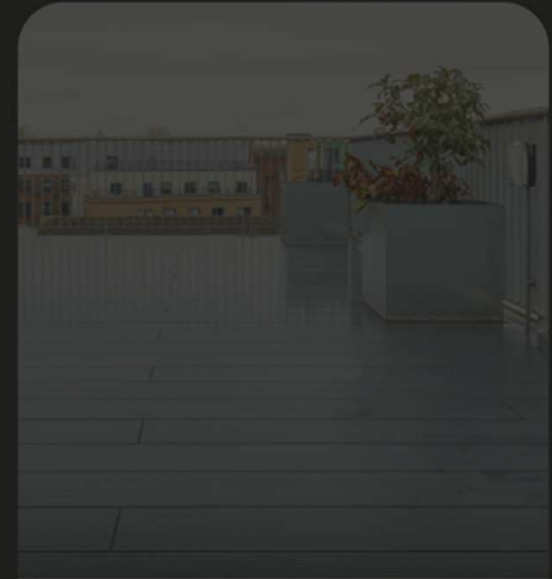




Balconies & terraces



Balconies



Terraces

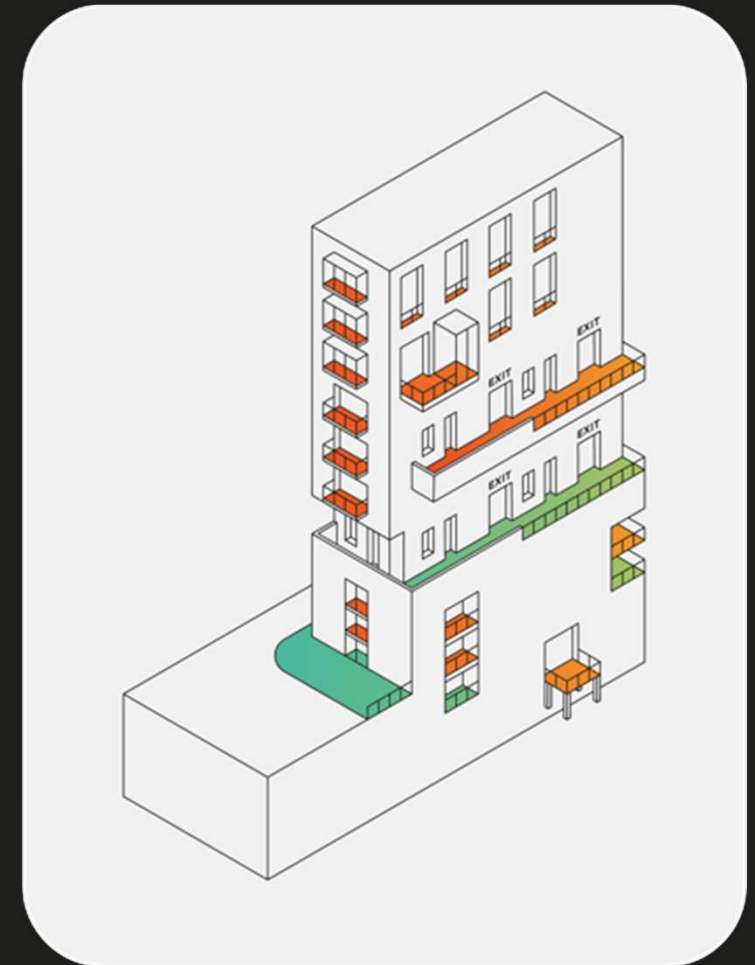
## What are terraces and balconies?

- Balconies form part of the external façade, while terraces typically form the function of the roof.
- Balconies can be protruding and recessed depending on their circumstances.
- As detailed - **BS 8579:2020**.

## How are they classified?

Balconies are classified per **BS EN 13501-1:2018**.

Terraces are classified per **BS EN 13501-5:2018**.



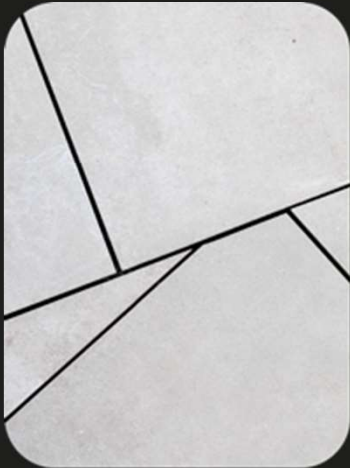
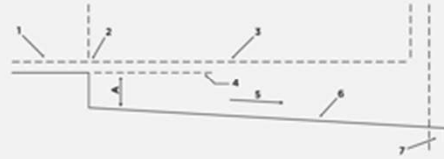


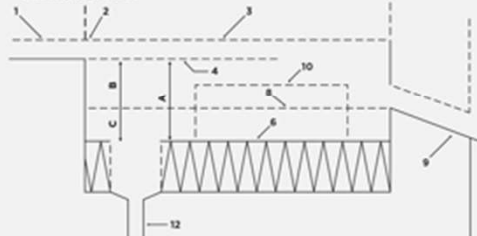
Figure 9 - Basic strategy for prevention of water ingress into a building



a) Balcony edge drained



a) Balcony edge drained



## Drainage Checks

To check if there is adequate drainage;

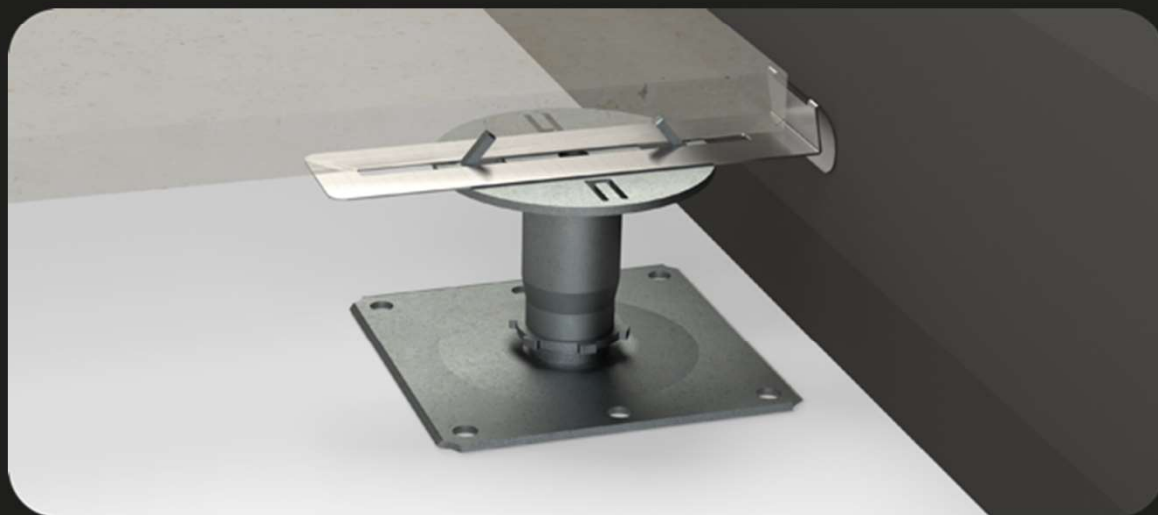
- ✓ Is there a 75mm gap between the waterproofing/drainage layer to the underside of the threshold?
- ✓ Are gaps between the pavers/planks maximum 8mm?
- ✓ Is there a perimeter gap of 10-12mm between the flooring and the edge (BS 8579:2020)?

## Edge details

Decking doesn't require extra edge details as it is 'fixed' in place.

Edge details on paving should be implemented at any abutment or upstand, including planters.

- Increasing the lifespan of the design
- Provides drainage gaps for the water to flow.
- Increases safety across the design by minimising movement



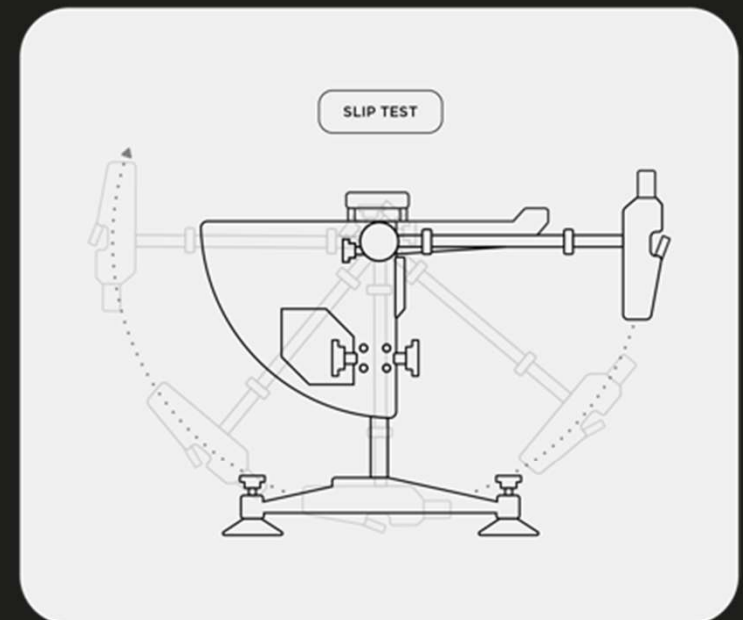


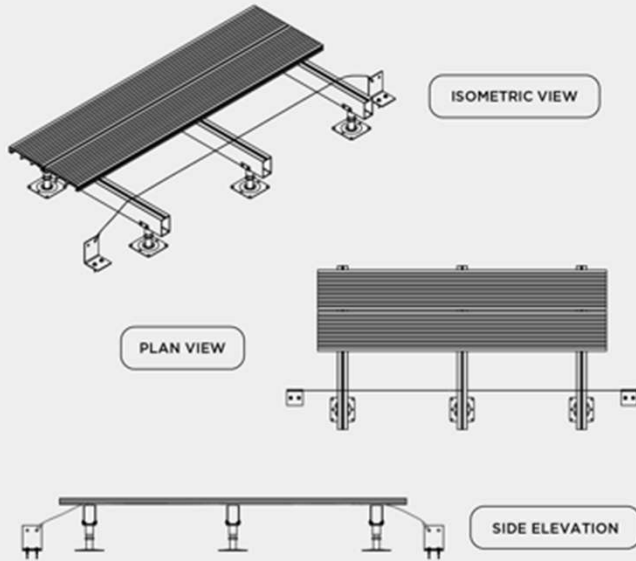
## Slip resistance

- Minimum slip resistance of 36PTV when tested to BS 7976 (all parts).
- 96 Slider (shod foot) & 55 Slider (unshod foot).
- BS 7976:2002 has been replaced with BS EN 16165:2021
- A higher level of slip resistance is required on a ramp than on the level to achieve the same degree of safety. The target PTV on a slope is calculated using a formula provided by UKSRG.



CLASSIFICATION	PTV RESULT
High Slip Potential	0 - 24
Moderate Slip Potential	25 - 35
Low Slip Potential	36 +





## Wind uplift

Wind uplift does not have a standard solution as each building experiences the effect of wind differently. It can also change throughout a building's lifetime depending on how the environment surrounding a building changes.

Tie-down points for furniture are required as per **BS 8579:2020**.

## How could it be overcome?

- Mechanical fixings.
- Increased dead load.

As long as it can counteract the uplift generated by the pressure difference created by the wind.

## Types of Paving Support

### Rail

- Provides lateral Support
- Allows for creative layouts
- Offers greater support in high traffic areas

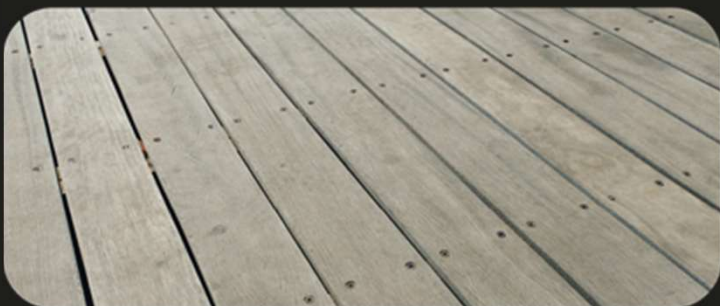


### Pedestal

- Cost-effective
- Allows for lower clearance heights
- Quick and easy installation







## Maintenance

Non-Combustible – Aluminium and Porcelain

- Does not retain moisture
- Does not rust
- Can be maintained with soapy water

Timber

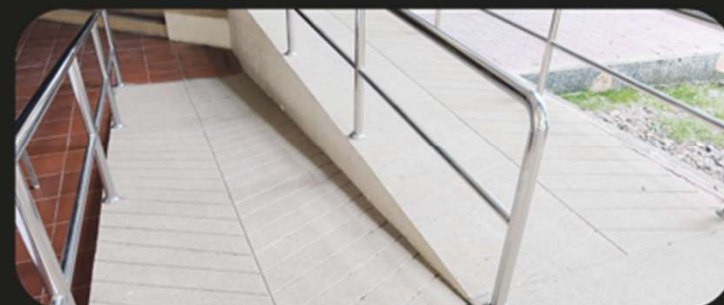
- Requires regular staining/oiling
- Rotten boards need replaced
- Warped boards need replaced

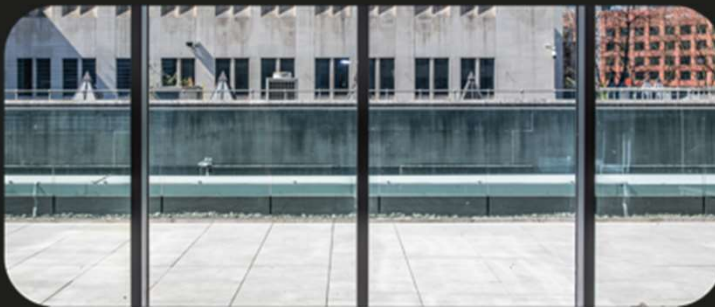


# Accessibility

Guidance on level thresholds, as a way of increasing accessibility, comes from **Approved Document M**.

Any remediation or refurbishment works focusing on accessibility must acknowledge the existing balustrade height to ensure that the finished flooring level sits **1100mm** below the top of the balustrade.



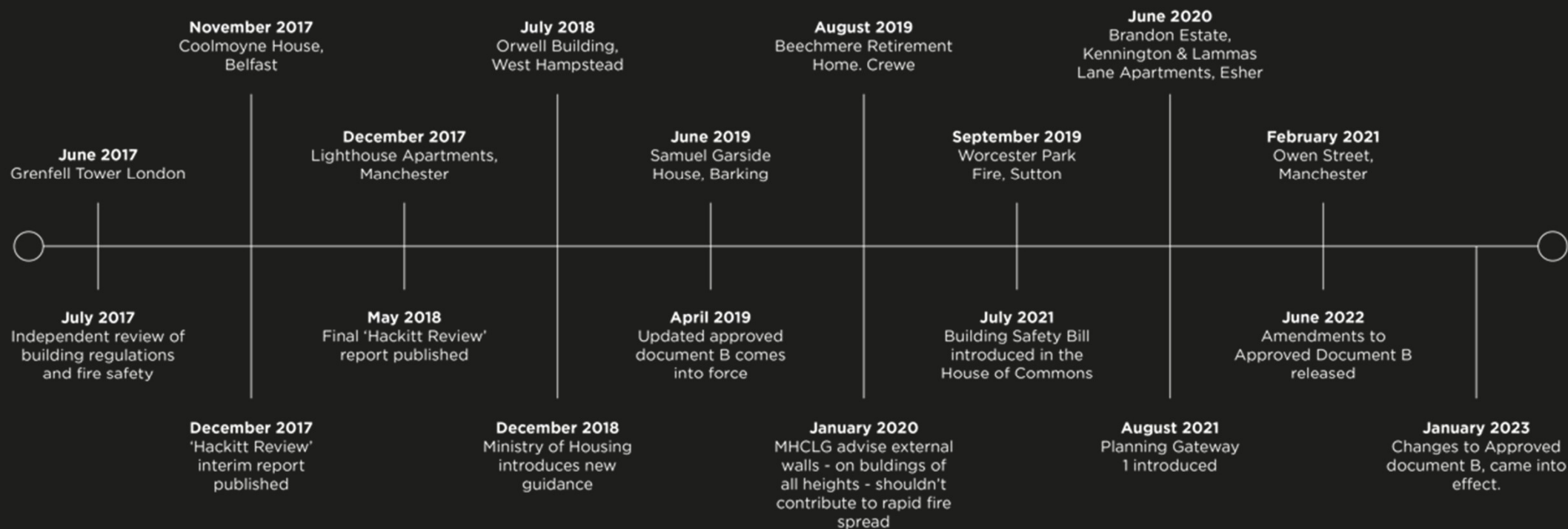


## Sustainability

- Aluminium is 100% recyclable and can be recycled an indefinite number of times.
- Approximately 75% of all aluminium ever produced is still in use today.
- Cut to length boards reduce waste
- Boards can be manufactured in the UK to reduce harmful emissions
- Porcelain is made with natural materials such as rocks and minerals and due to its make-up, it has the longest lifetime of any building finish material.

# Fire Timeline

## Landmark Incidents



## Regulation Changes



Balconies & terraces



Balconies



Terraces



# Fire Regulations

Under Regulation 7, balconies are classed as a specified attachment. On a Relevant Building, they are required to achieve a minimum fire classification of A2-s1,d0 in accordance with EN 13501-1:2018.

Amendments to Approved Document B where released in June 2022 and balconies on buildings for residential purposes over 11m are required to be of A2-s1,d0 - this comes into force in December 2022

We recommend that you review RIBA's fire safety information found at the link below:

[www.architecture.com/campaign/grenfell-tower](http://www.architecture.com/campaign/grenfell-tower)



## Requirement

### Requirement

#### External fire spread

- B4.** (1) The external walls of the building shall adequately resist the spread of fire over the walls and from one building to another, having regard to the height, use and position of the building.
- (2) The roof of the building shall adequately resist the spread of fire over the roof and from one building to another, having regard to the use and position of the building.

## Regulation

### Regulation 7 – Materials and workmanship

- (1) Building work shall be carried out—
- (a) with adequate and proper materials which—
    - (i) are appropriate for the circumstances in which they are used,
    - (ii) are adequately mixed or prepared, and
    - (iii) are applied, used or fixed so as adequately to perform the functions for which they are designed; and
  - (b) in a workmanlike manner.
- (2) Subject to paragraph (3), building work shall be carried out so that materials which become part of an external wall, or specified attachment, of a relevant building are of European Classification A2-s1, d0 or A1, classified in accordance with BS EN 13501-1:2007+A1:2009 entitled "Fire classification of construction products and building elements. Classification using test data from reaction to fire tests" (ISBN 978 0 580 59861 6) published by the British Standards Institution on 30th March 2007 and amended in November 2009.



### Regulation continued

- (3) Paragraph (2) does not apply to—
- (a) cavity trays when used between two leaves of masonry;
  - (b) any part of a roof (other than any part of a roof which falls within paragraph (4) of regulation 2(6)) if that part is connected to an external wall;
  - (c) door frames and doors;
  - (d) electrical installations;
  - (e) insulation and water proofing materials used below ground level;
  - (f) intumescent and fire stopping materials where the inclusion of the materials is necessary to meet the requirements of Part 8 of Schedule 1;
  - (g) membranes;
  - (h) seals, gaskets, fixings, sealants and backer rods;
  - (i) thermal break materials where the inclusion of the materials is necessary to meet the thermal bridging requirements of Part L of Schedule 1; or
  - (j) window frames and glass.
- (4) In this regulation—
- (a) a "relevant building" means a building with a storey (not including roof-top plant areas or any storey consisting exclusively of plant rooms) at least 18 metres above ground level and which—
    - (i) contains one or more dwellings;
    - (ii) contains an institution; or
    - (iii) contains a room for residential purposes (excluding any room in a hostel, hotel or boarding house) and
  - (b) "above ground level" in relation to a storey means above ground level when measured from the lowest ground level adjoining the outside of a building to the top of the floor surface of the storey.

# Fire Classification

A1 & A2: non - combustible materials  
B, C, D: little to substantial contribution  
E, F: high contribution

A1 or A2

The 'A' fire classification determines how much a material contributes to the behaviour of fire. A1 or A2-s1,d0 is non-combustible. Where 'A' is little flammability 'F' in contrast is highly flammable

S1: little or no smoke  
S2: quite a lot of smoke  
S3: heavy smoke

s1

'S' classification refers to the total smoke created within the 10 minutes of exposure to fire:

D0: no droplets  
D1: some droplets  
D2: quite a lot

d0

'D' directly relates to how many flaming droplets and particles are emitted within the first 10 minutes of fire exposure.

# Loadings

How to know your Balcony loadings are correct?

- Balconies fall under Category A in accordance with tables 6.1 and 6.2 of EN 1991-1-1:2002.
- As such, they are required to meet a standard design load of 2.5kN/m<sup>2</sup> and 2.0kN concentrated load.
- Deck boards can be supplied in a variety of spans, but all must comply with the required loadings.

Table 6.1 - Categories of use

Category	Specific Use	Example
A	Areas for domestic and residential activities	Rooms in residential buildings and houses, bedrooms and wards in hospitals, bedrooms in hotels and hostels, kitchens and toilets.
B	Office areas	
C	Areas where people may congregate (with the exception of areas defined under category A, B, and D <sup>1)</sup> )	<p>C1: Areas with tables, etc., e.g. areas in schools, cafés, restaurants, dining halls, reading rooms, receptions.</p> <p>C2: Areas with fixed seats, e.g. areas in churches, theatres or cinemas, conference rooms, lecture halls, assembly halls, waiting rooms, railway waiting rooms.</p> <p>C3: Areas without obstacles for moving people, e.g. areas in museums, exhibition rooms, etc. and access areas in public and administration buildings, hotels, hospitals, railway station forecourts.</p> <p>C4: Areas with possible physical activities, e.g. dance halls, gymnastic rooms, stages.</p> <p>C5: Areas susceptible to large crowds, e.g. in buildings for public events like concert halls, sports halls including stands, terraces and access areas and railway platforms.</p>
D	Shopping areas	<p>D1: Areas in general retail shops.</p> <p>D2: Areas in department stores.</p>

<sup>1)</sup> Attention is drawn to 6.3.1.3(2), in particular for C4 and C5. See EN 1990 when dynamic effects need to be considered. For Category E, see Table 6.3.

NOTE 1: Depending on their anticipated uses, areas likely to be categorised as C2, C3, C4 may be categorised as C5 by decision of the client and/or National annex.

NOTE 2: The National annex may provide sub-categories to A, B, C1 to C5, D1 and D2.

NOTE 3: See 6.3.2 for storage or industrial activity.

Table 6.2 - Imposed loads on floors, balconies and stairs in buildings

Categories of loaded areas	q <sub>s</sub> [kN/m <sup>2</sup> ]	Q <sub>k</sub> [kN]
Category A		
- Floors	1.5 to 2.0	2.0 to 3.0
- Stairs	2.0 to 4.0	2.0 to 4.0
- Balconies	2.5 to 4.0	2.0 to 3.0
Category B	2.0 to 3.0	1.5 to 4.5
Category C		
- C1	2.0 to 3.0	3.0 to 6.0
- C2	3.0 to 4.0	2.5 to 7.0 (4.0)
- C3	3.0 to 5.0	4.0 to 7.0
- C4	4.5 to 5.0	3.5 to 7.0
- C5	5.0 to 7.5	3.5 to 8.5
category D		
- D1	4.0 to 5.0	3.5 to 7.0 (4.0)
- D2	4.0 to 5.0	3.5 to 7.0

Reference: BS EN 1991-1-1:2002

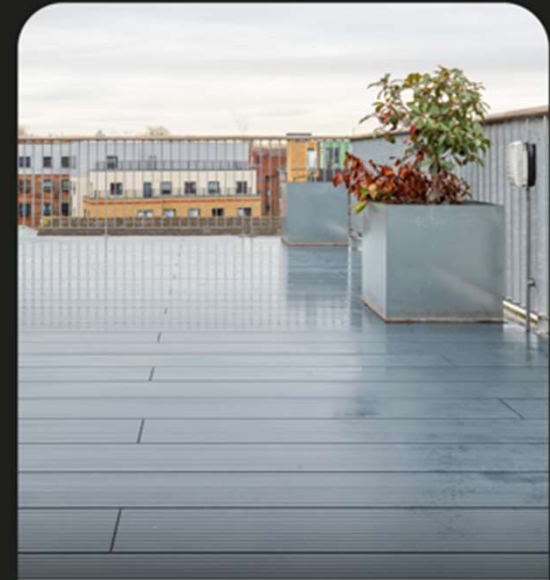




Balconies & terraces



Balconies



Terraces





## Paving support

Pedestals (self-levelling, fixed head, stackable).

- Provides singular support at the corners of the pavers.
- Utilise different head features to give adaptable support.

Rail systems (flexibility of design options).

- Gives better design flexibility.
- Offers increased support.

Fully bonded support systems.

- Allows intricate tile design.
- Can be integrated with free-draining areas.

## Fire – BS EN 13501-5:2018

Terraces and podiums should meet a minimum of BRoof(t4) fire classification in accordance with BS EN 13501-5:2018.

- Broof(t4) classifies the penetration of fire through the roof build-up.
- Products made from Euroclass E materials can be used if they meet BRoof testing requirements.

European Commission Decision of 6 September 2000 details products that comply with the BRoof classification without the need for testing.





Table 6.1 - Categories of use

Category	Specific Use	Example
A	Areas for domestic and residential activities	Rooms in residential buildings and houses; bedrooms and wards in hospitals; bedrooms in hotels and hostels; kitchens and toilets.
B	Office areas	
C	Areas where people may congregate (with the exception of areas defined under category A, B, and D <sup>1)</sup> )	<p>C1: Areas with tables, etc. e.g. areas in schools, cafes, restaurants, dining halls, reading rooms, receptions.</p> <p>C2: Areas with fixed seats, e.g. areas in churches, theatres or cinemas, conference rooms, lecture halls, assembly halls, waiting rooms, railway waiting rooms.</p> <p>C3: Areas without obstacles for moving people, e.g. areas in museums, exhibition rooms, etc. and access areas in public and administration buildings, hotels, hospitals, railway station forecourts.</p> <p>C4: Areas with possible physical activities, e.g. dance halls, gymnastic rooms, stages.</p> <p>C5: Areas susceptible to large crowds, e.g. in buildings for public events like concert halls, sports halls including stands, terraces and access areas and railway platforms.</p>
D	Shopping areas	<p>D1: Areas in general retail shops.</p> <p>D2: Areas in department stores.</p>

NOTE 1: Attention is drawn to 6.3.1.3(2), in particular for C4 and C5. See EN 1990 when dynamic effects need to be considered. For Category E, see Table 6.3.

NOTE 2: Depending on their anticipated uses, areas likely to be categorised as C2, C3, C4 may be categorised as C3 by decision of the client and/or National annex.

NOTE 3: The National annex may provide sub-categories to A, B, C1 to C5, D1 and D2.

NOTE 4: See 6.3.2 for storage or industrial activity.

Table 6.2 - Imposed loads on floors, balconies and stairs in buildings

Categories of loaded areas	$q_k$ [kN/m <sup>2</sup> ]	$Q_k$ [kN]
<b>Category A</b>		
- Floors	1.5 to 2.0	2.0 to 3.0
- Stairs	2.0 to 4.0	2.0 to 4.0
- Balconies	2.5 to 4.0	2.0 to 3.0
<b>Category B</b>	2.0 to 3.0	1.5 to 4.5
<b>Category C</b>		
- C1	2.0 to 3.0	3.0 to 4.0
- C2	3.0 to 4.0	2.5 to 7.0 (4.0)
- C3	3.0 to 5.0	4.0 to 7.0
- C4	4.5 to 5.0	3.5 to 7.0
- C5	5.0 to 7.5	3.5 to 8.5
<b>Category D</b>		
- D1	4.0 to 5.0	3.5 to 7.0 (4.0)
- D2	4.0 to 5.0	3.5 to 7.0

Reference: BS EN 1991-1-1:2002

## Structural calculations

These calculations should be done by looking at the intended purpose of the terrace and comparing these to BS EN 1991-1-1:2002 Actions on Structures (Table 6.1 and 6.2 Category of use).

- ✓ Is there heavy footfall?
- ✓ Are carts or transport going to regularly use it?

This can dictate the required support system as they have different capabilities.



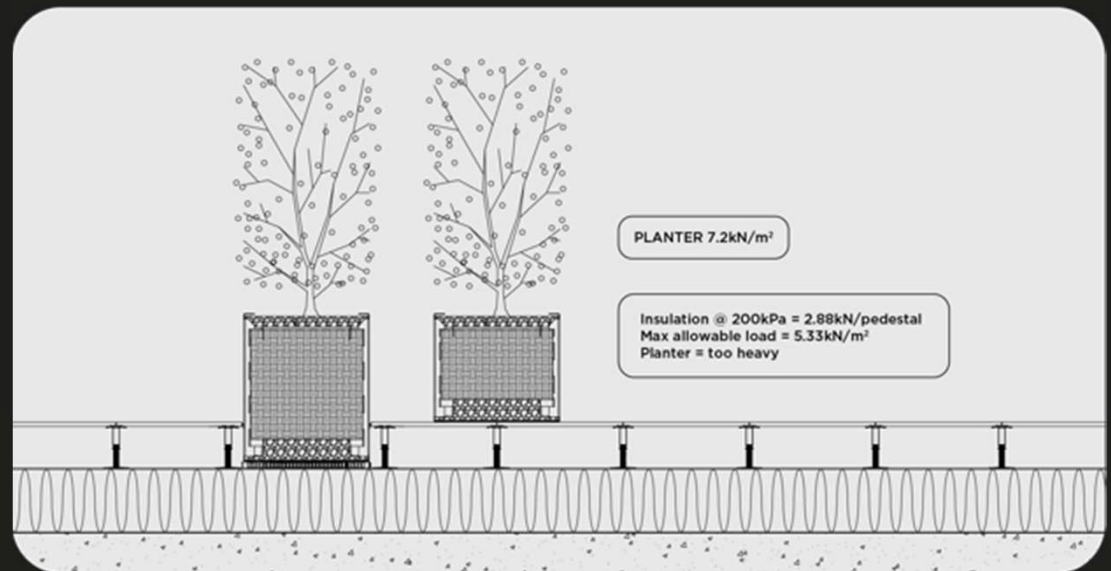
## Planters

Planters placed directly onto a pedestal supported system concentrate the load of the pedestal onto the insulation layer meaning:

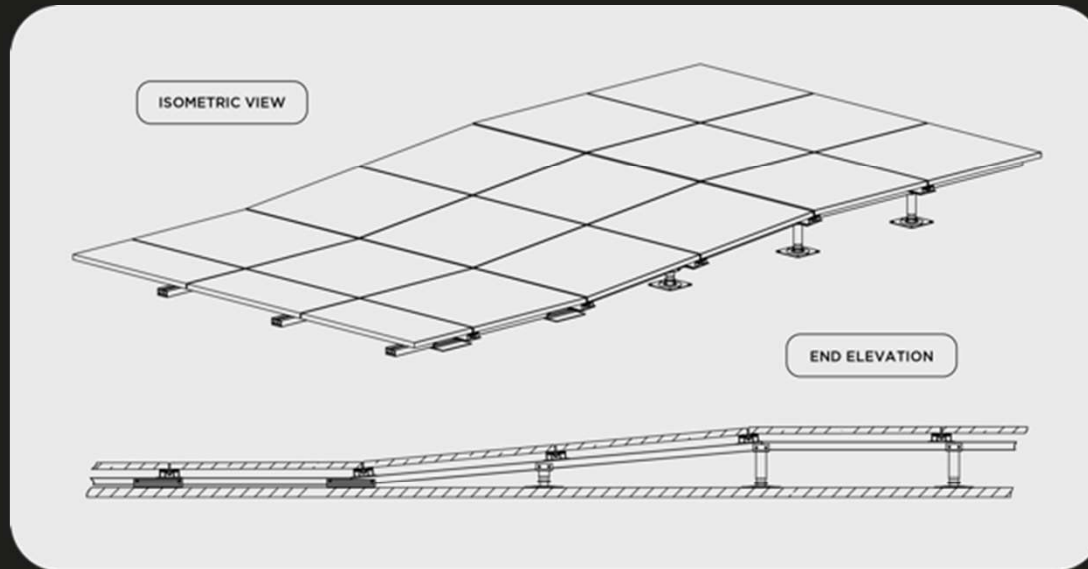
- Smaller allowable load.
- Decreased planter depth.
- Planters are being installed on the paving creating awkward cuts.

Planters integrated with a paving system, installed onto the same level as the insulation layer, will spread the load across the insulation layer meaning:

- Larger allowable planters.
- Larger soil depth for better plant cultivation.
- Seamless transition from paving to planter.







## Ramps

Ramps are often needed when there are changes to the FFL.

Approved Documents K and M give guidance on the design of ramps and steps and consideration for those with impaired or limited mobility:

- Increased PTV value required on ramps to reduce the risk of slipping.
- Pedestals alone are not a suitable support type to create a ramp.
- Rail systems are commonly used to provide the required support.
- Hand rails may need to be included

Thank you, for listening. Any questions?

## Contact Details

Name: Calvin Dalrymple

Email: [calvin.dalrymple@rynogroup.co.uk](mailto:calvin.dalrymple@rynogroup.co.uk)

Phone: +447469 037342

Head Office: Ryno Ltd, Castlepoint, Castle Way, Ellon, AB41 9RG

The Studio: 2 Sutton Ln, London EC1M 5PU