Balcony Drainage
Summary Document 1.0

Leaky balconies and drainage:
What you need to know to avoid a drainage problem on your balconies.

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Balcony drainage: The answers you need.

What is the 'leaky homes crisis'?

The leaky homes crisis in New Zealand was estimated in 2009 to have incurred costs of approximately $11.3 billion and is still ongoing. This construction and legal crisis affected timber framed buildings built from 1994 – 2004 which suffered from issues with their weather-tightness and drainage.

Some blame for the crisis has been placed with building control as code compliance certificates were issued for buildings later found to have waterproofing issues.

What were the consequences of the leaky homes crisis?

The 16-storey Victopia apartment block in Auckland represents New Zealand's largest leaky building litigation, costing $40 million to fix.

A lawyer representing the case argued that the waterproof membrane on the concrete balconies had deteriorated and failed to properly bond ceasing to repel water.

Problems also arose due to an incompatibility between the waterproofing membrane and tile adhesive which meant the tiles became lose, lifted and some had cracks. Grouting also became dislodged as a result of moisture becoming trapped between the adhesive and membrane.

What are the challenges with draining concrete balconies like those at Victopia?

Traditional concrete balconies with upstands can trap water and form a pond, causing issues like those at Victopia. According to NHBC regulations adequate drainage provisions must be considered at an early stage and integrated into the balcony design.

Concrete balconies also need to be waterproofed using a membrane in a similar way to a flat roof. Due to balconies placement directly above internal rooms careful consideration of waterproofing must be made to prevent water leaking inside the apartment as it did in New Zealand. Therefore, the interfacing between the balustrade and waterproofing must be carefully managed to prevent this issue.

A further challenge with waterproofing concrete balconies is that the membrane used is often combustible. Combustible materials are prohibited on building exteriors over 18 metres under the combustible cladding ban making the building non-compliant.

In order to meet NHBC requirements concrete balconies must also be thick enough to allow for a 150mm splashback, adding substantial weight and thickness to the balcony slab.

What do the building regulations say about balcony drainage?

Any water collecting on a balcony deck, either from rainfall or from watering container plants, should be addressed in the design of the balcony to ensure it doesn't drip onto the balcony below.

With this in mind, drainage of balconies is covered by Building Regulations and industry guidance. Approved Document H3 of the Building Regulations requires adequate provision for rainwater to be carried from the roof of the building but does not state whether balconies are considered part of 'the roof'.

What are the NHBC requirements for balcony drainage?

According to the NHBC "Pitched Roof" guidance, section 7.2.22 states drainage should be provided on balconies where the area is 6m2 or over. However, the guidance also states that consideration should be given to providing drainage to smaller balconies.

NHBC guidance documents contain section 7.1 which is entitled 'Flat roofs and balconies'. This guidance is a bit more specific than the Approved Document, as it uses the word balcony in several places, but it is still open to different interpretations.

In clauses such as 7.1D8, the guidance makes a distinction of 'balconies functioning as roofs'. By inference, balconies not functioning as roofs do not have the same requirements, but this is not clearly stated.

Clause 7.1

D9 states that 'balconies shall have adequate rainwater disposal to a suitable outfall'. It does not go into detail of what constitutes a suitable outfall. It then speaks of the 'cumulative effect of water discharging from multiple balconies in vertical alignment'. This clearly indicates that NHBC expect that in some cases water will be discharged into the open, not into a RWP.

The guidance also contains a comment that 'Open slatted balcony decking should drain away from the dwelling'. This is open to interpretation.

Appendix 7.1

D focuses on balcony drainage and shows 3 typical sections. However, these are all concrete balconies with upstands which could trap water and form a pond, which is not relevant for metal balconies. None of the sections address how metal balconies should be drained. An NHBC publication in February 2010 explains that the drawings show concrete as 'these are potentially more difficult to meet with the principles, rather than freestanding balcony structures (typically constructed from steel)'. This infers that requirements for metal balconies are less onerous as there is less risk of water penetration, but no detail is given.

Section 7.2

D15 says 'Roofs greater than 6m2 in area should be provided with rainwater gutters and downpipes'. It does not mention balconies.

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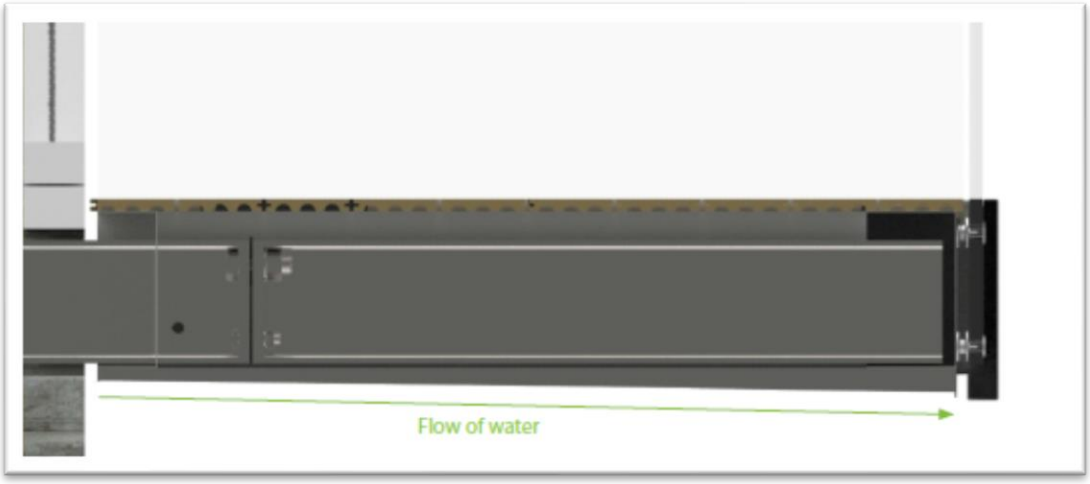
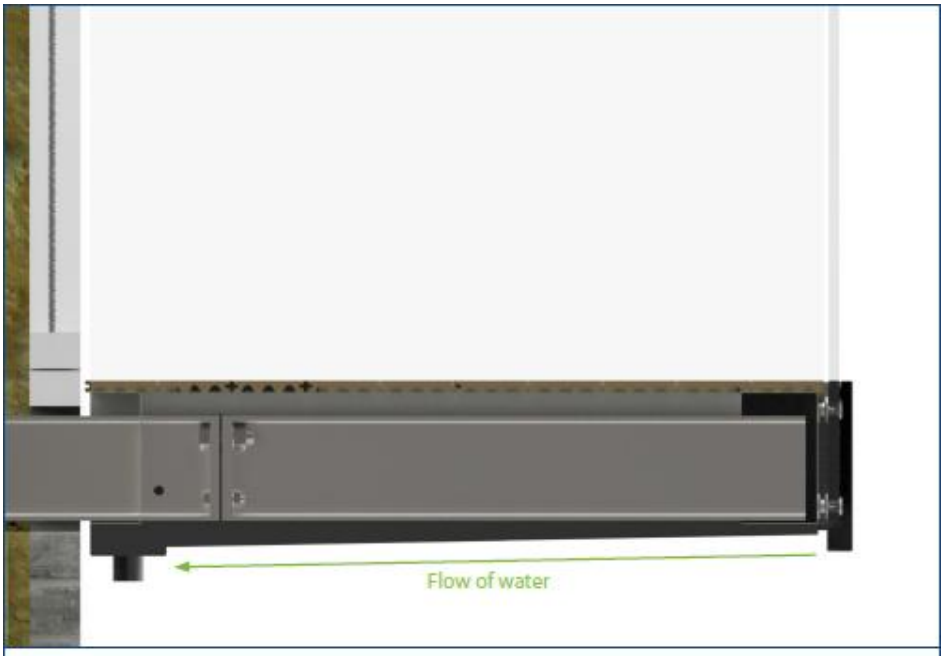
What are the alternative methods of balcony drainage?

Controlled drainage



Balcony soffits have a gradient, usually sloped to the front of the balcony, so that rainwater will flow towards the front of the balcony, where it can freely drain. This effectively channels the water away from the building façade without the need for pipes.

Piped or positive drainage



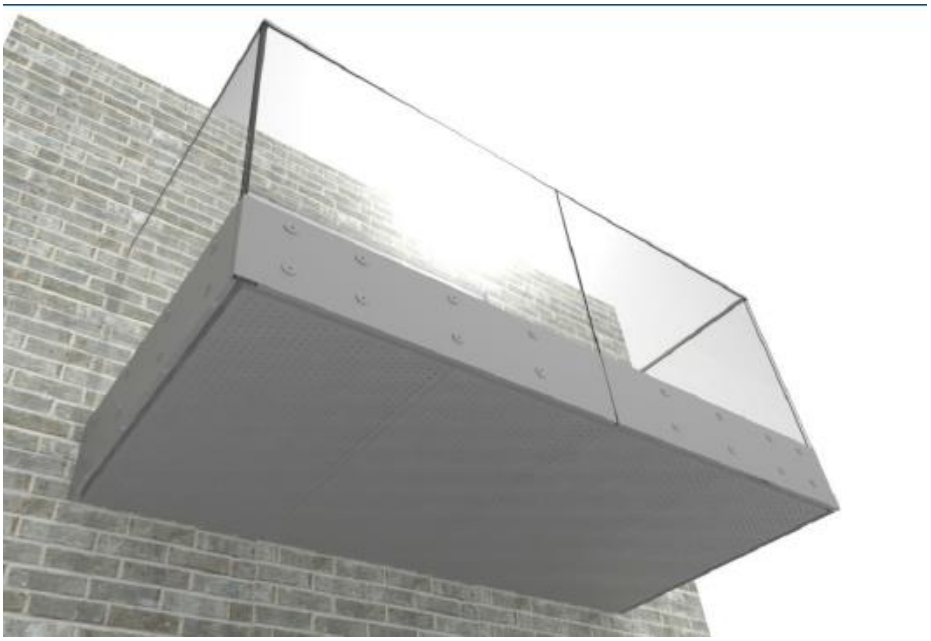
Example of a positive drained balcony. The outlet is shown here without a RWP (rain water pipe).

Water is directed towards the back of the balcony into rainwater pipes running down the building façade.

The NHBC 'Pitched Roof' guidance is often interpreted as requiring positive or piped drainage on balconies over 6sqm. However, when using frameless structural glass, even with driving rain at the 'stated 26 degree angle' the majority of the balconies in a stack are sheltered by those above and the glass balustrade.

Most of the rain therefore hits the glass and runs down to the drip edge at the bottom. As a result, it is not very noticeable what effect a positively draining actually has.

Drained through or free draining



Water is either drained through the gaps between the decking, without any form of water management. Or, are free draining balconies using soffits with perforations. The use of perforated soffits offers balconies a neater aesthetic appearance than not using soffits as it hides the balcony supports and their connections.

What are the main factors to consider when deciding on a method of balcony drainage?

Cost

Free draining balconies are the lowest in cost. The addition of a drip tray typically adds around 10%. Incorporating positive drainage to a Rainwater Pipe (RWP) typically adds a further 25% and makes the construction significantly more complex.

Appearance

Free draining balconies tend to look quite industrial, as the structure and decking are usually visible when looking up at the building. The addition of a soffit/drip tray greatly enhances the appearance. The addition of a RWP is typically a visual detriment, unless it can be incorporated within the façade, which adds complexity. Also, balconies draining to a RWP need to be significantly deeper to accommodate the pipework, which makes them look more chunky.

Safety

With free draining balconies, there is a risk of hot liquids being spilt on a balcony and falling through gaps onto residents below. A drip tray reduces this risk by draining water to the edge of the balcony. A RWP eliminates the risk altogether.

Facade Staining

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Every situation will be different, but with free draining balconies, there is an increased risk that water will track along the support arms and run down the façade, giving a greater likelihood of staining. Positive drainage is likely to reduce this risk.

Frequently asked questions (drainage FAQ's)

1. Does decking affect balcony drainage?
    a. Yes, grooved decking boards are commonly used as a surface. Experience has shown that the majority of rainwater falling on the decking will run along the grooves and drip off the end of the board. It is, therefore, better to run decking parallel with the building line, otherwise there can be a substantial amount of water dripping off adjacent to the façade, increasing the risk of staining or water penetration.

2. What soffit options are there?
    a. PPC aluminium sheet: This is the most popular option for balcony soffits. Usually, the fixings are concealed, and the soffit is broken up into panels 400mm wide with neat butt joints, although this can vary.
    b. Open soffit: This is a cost saving option which is not as neat in appearance and is only suitable for free draining balconies. With open soffits, the balcony structure can be left as mill finish, or powder coated in a darker colour to make it less noticeable.
    c. Decking soffit: Some clients choose to clad the underside of the balcony with decking to match the top surface. This would normally be in a free draining situation where water falls between the deck boards.

3. Are soffits only used for drainage?
    a. No, soffits provide aesthetic benefits as well as reducing the risk of fire spread on balconies.
    b. Soffits can help to reduce the risk of the spread of balcony fires as they not only limit embers falling from one balcony to another, but also act as a barrier to fire travelling up the exterior of a building.
    c. The aesthetic appeal of soffits is that they conceal the fixings and underside of decking when seeing the balconies below. Soffits provide a sleek finish to balconies while providing practical benefits.

Want to know more?

For more information on reducing fire risk and the benefits of using soffits for fire safety, we recommend that you read the Sapphire Fire White Paper: Recommendations regarding fire safety on balconies in high rise residential blocks. This can be obtained via: www.sapphire.eu.com/fire

We also present our Fire CPD covering the use and benefits of soffits to architects, developers, and contractors, etc. If you would like to find out about attending one or arranging one at your offices visit https://sapphire.eu.com/resources/balcony-fire-cpd/

If you would like further technical detail or to enquire about drainage on a project you can contact us on 0344 880 0553 or email sales@sapphire.eu.com

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