

Eurostyle epic™ Roof and Wall Claddings: Alternative solutions for E2 External Moisture

- **Eurostyle epic™ Double Standing Seam**
- **Eurostyle epic™ Angle Seam**
- **Eurostyle epic™ Roll Seam**
- **Eurostyle epic™ Roll Cap**
- **Eurostyle epic™ Snap Lock**
- **Eurostyle epic™ Wall and Soffit Panel**

Executive Summary

This report presents arguments supporting the use of **Eurostyle epic™** profiles as roofing and vertically fixed wall cladding complying with the requirements of the Building Code regarding E2 External Moisture, for applications where the E2/AS1 risk score is not greater than 20.

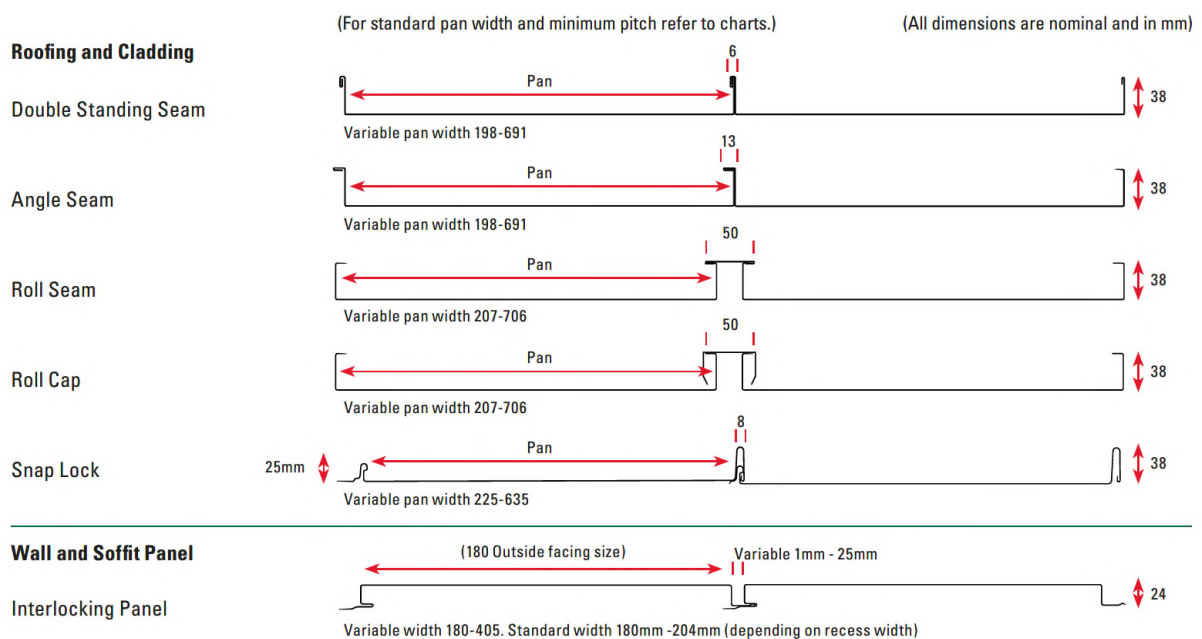
Background

The scope of Acceptable Solution E2/AS1 for trough profile roofing is limited to those with a minimum vertical rib height of 38 mm and pan width of 210 mm maximum and does not include the use of any trough profile as an acceptable solution for wall cladding.

Eurostyle epic™ roofing has a profile height of 38 mm, and a variable pan width which differs for each seam type. The standard pan width is 510 mm, 550 mm or 463 mm depending on the seam type.

Eurostyle epic™ Wall and Soffit Panel has a profile height of 24mm, and a trough pan 180mm wide. It is fixed with the ribs facing the wall.

All **Eurostyle epic™** profiles are fully supported and directly fixed on a plywood substrate.



This report examines how compliance with performance requirements of clause E2 External Moisture of the Building Code could be argued as an alternative solution for **Eurostyle epic™** roof and wall cladding.

The relevant Building Code requirement is cl E2.3.2:

E2.3.2 Roofs and exterior walls must prevent the penetration of water that could cause undue dampness, damage to building elements, or both.

For roofing, the acceptable solution E2/AS1 provides for trough profile roofing limited to those with a minimum vertical rib height of 38 mm and pan width of 210 mm maximum.

The acceptable solution E2/AS1 provides for metal cladding of corrugate or trapezoidal profiles to be used as wall cladding when fixed vertically (Risk Score 0- 6 Corrugated and symmetrical trapezoidal; Risk Score 7-20 Corrugated only). It also allows horizontal fixing

over a drained and ventilated cavity. It does not provide for vertical fixing on cavity. Vertical fixing on cavity is not provided for because the battens for fixing would compromise the ventilation and drainage of the cavity. However, using castellated battens (as an alternative solution) overcomes this and is widely accepted.

E2/AS1 does not provide for a trough profile to be used for wall cladding, either direct fixed or on a cavity.

Analysis

Roofing

The Acceptable Solution between trapezoidal profiles (which provide a flat area in contact at the point of fixing) and corrugated profiles, and trough profiles only with respect to roof pitch. The differentiation is driven by the crest height of the profile and the risk of the channels being overfilled with water in heavy rainfall, leading to possible entry through the side laps.

The profile depth for **Eurostyle epic™** is 38 mm for all seam types except Snap Lock. Although the seam on Snap Lock is aesthetically 38 mm, functionally as far as water is concerned it is effectively 25 mm and should be treated as though it was, for example, trapezoidal for the purpose of roof pitch and run.

For roofing installed on a roof the trough width does not materially affect the capacity of the roof to carry and discharge rainwater. The trough width does determine the number and spacing of fixing clips to resist wind loadings, but this is a B1 Structure matter, not an E2 External Moisture matter. The manufacturer's technical literature provides load/clip spacing information for various widths of panels.

Wall Cladding

The Acceptable Solution provides insight into the perceived risks associated with the profile type and differentiates risk on the basis of the profile. It differentiates between trapezoidal profiles (which provide a flat area in contact at the point of fixing) and corrugated profiles, and also between symmetrical and asymmetrical trapezoidal profiles.

This analysis compares **Eurostyle epic™ Wall and Soffit Panel** with the characteristics of corrugated and trapezoidal profiles with respect to the building physics behind these profiles installed vertically directly to the framing as wall cladding.

It considers

- comparative likelihood of ingress of external moisture
- mechanisms for drainage and ventilation
- the characteristics of underlay between the profile and timber framing

Ingress of moisture behind the cladding:

The **Eurostyle epic™ Wall and Soffit Panel** profile is no more likely to allow penetration of external moisture than a corrugated profile. Penetration can be considered under three scenarios:

Penetrations – such as windows etc. Flashing details etc are no more complex for **Eurostyle epic™ Wall and Soffit Panel** than they are for corrugated or trapezoidal profiles.

Profile sidelaps – this can be discounted as the channels do not run with any significant depth of water (unlike, potentially, a roofing application). The side lap is formed by the clip-lock connection between panels, where a formed metal tongue is fitted into a matching female part. The joint incorporates a capillary break that provides a drainage path down the lap joint for moisture. Should water pass across the capillary break it would track to the fixing flange, tending to drain down the face of the fixing flange rather than onto the wall underlay. In the unlikely event that external moisture did migrate to the underlay, the underlay characteristics are such that the framing is protected.

Fixings – wall claddings are typically fixed through the pan of the profile. **Eurostyle epic™ Wall and Soffit Panel** is fixed with screws through the flange extending from the female part of the clip-lock joint. There are no penetrations through the weather-exposed parts of the profile. In areas of very high wind speeds and where a wide pan width has been chosen, additional screw fixing using wafer TEK screws with an EPDM washer through the base of the channel provides additional integrity to the clip-lock connections between panels. In such cases those screws penetrate the weather-exposed part of the profile, but the risk of water penetration is mitigated by the EPDM washers. Pan support in the form of a batten running up the centre of the pan minimises pan deflection for panels greater than 200 mm wide. (The batten and cladding materials must be compatible to avoid corrosion).

There is no reason to believe **Eurostyle epic™ Wall and Soffit Panel** is any more likely to allow the ingress of external moisture than corrugate, which is allowed as an acceptable solution.

Mechanisms for drainage and ventilation

Ventilation and drainage generally are provided by the cavities formed by the **Eurostyle epic™ Wall and Soffit Panel** profile. The cross-sectional area of each void formed by the profile against underlay or RAB is approximately 4320 mm², compared with a void of 685mm² for a standard corrugated profile. So **Eurostyle epic™ Wall and Soffit Panel** provides drainage and ventilation well in excess of that provided by a standard corrugated profile.

Characteristics of the Cladding/Fixing interface

When a profile is direct fixed there is direct contact between the profile and the building underlay or RAB. The area of this contact is greater for a trapezoidal profile or a trough

profile than it is for a corrugate profile. For **Eurostyle epic™ Wall and Soffit Panel** the width of the fixing flange in contact with the fixing framing is typically about 30 mm, about the same as for a trapezoidal profile.

There is also direct contact between the underlay and the fixing framing. The issue is whether moisture is likely to migrate to and be retained within the underlay or RAB where the profile is fixed to the framing, and what the effect of that moisture would be.

Ideally, the underlay/RAB should:

a) have a high resistance to liquid water – to minimise passage of liquid water through the underlay, and

b) be highly permeable to water vapour – to facilitate the diffusion of water from the underlay over time, minimising moisture gain by the fixing framing timbers.

NZS2295 provides some insights into the appropriate characteristics of underlays. For direct fixing non-absorbent cladding on timber it specifies Type W2 (Heavy Kraft) or W4 (Absorbent Synthetic) underlay. It does not limit the “non-absorbent cladding” to any particular profile, and **Eurostyle epic™ Wall and Soffit Panel** would be classified as this.

The relevant requirements of NZS2295 for wall and roofing underlays are tabulated below:

Property	Wall Underlay	Roof Underlay
Water vapour resistance	7 MN s/g or less	Kraft: 7 MN s/g or less Synthetic: 0.5 MN s/g or less
Resistance to water penetration	20mm or greater	100mm or greater
Absorbency	100g/m2 or greater	150g/m2 or greater

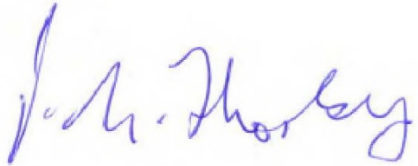
The parameters of underlays relevant to the management of external moisture are more critical for roofing underlay than for wall underlay, and the properties exceed the requirements for wall underlays. The use of a roofing underlay in the place of a wall underlay could provide an even more conservative option.

Conclusions

Eurostyle epic™ roofing can be expected to meet the performance requirements of E2 External Moisture as well as trough profile metal roofing as provided for in Acceptable Solution E2/AS1.

Eurostyle epic™ Wall and Soffit Panel direct fixed vertically can be expected to perform as well as standard corrugated profile as provided for in Acceptable Solution E2/AS1, with respect to ingress of external moisture and drainage and ventilation of the voids formed by the profile.

Absorbent synthetic wall underlay Type W4 or heavy kraft wall underlay Type W2 specified in NZS2295 allows the direct fixing of a non-absorbent cladding, such as **Eurostyle epic™ Wall and Soffit Panel**, on timber framing. A roofing underlay (Types R1, R2, R3, or R4) in the place of wall underlay would provide at least equivalent performance.



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