THICKER INSULATION CHANGES ROOF DESIGNS

Designers should be designing roofs with enough space between the roof underlay and top plate for the thicker ceiling insulation now commonly used. Here are some options to avoid getting caught short.

By Tom Edhouse, Technical Advisor, BRANZ Advisory Helpline

The norm for ceiling insulation thickness has increased in recent years with the changes to the Building Code clause H1 *Energy efficiency* and some clients requesting designers to specify insulation above the minimum requirements. However, it seems designers have not taken into account the need to increase the available space between the top plate and the underside of roof underlay to accommodate this change.

In conventional truss and pitched roofs, the space available at the outside wall top plate to underlay is only about 100 mm, not enough when the ceiling insulant material may be 180 mm thick.

Allow 25 mm clearance for non-rigid underlay

In addition, a 25 mm clearance is required between the insulation and any non-rigid roof underlay. The 25 mm clearance is to prevent moisture wicking into the insulation if the underlay becames damp. Ensuring this gap is present becomes even more of an issue with the increase in ceiling insulation product thickness.

Where there is a rigid underlay specified, e.g. plywood or fibre cement (see E2/AS1 Table 23 – rigid sheathing) or a plywood substrate for a membrane roof, there is no requirement for the 25 mm clearance to be maintained.

Specify insulation, then design roof

For new buildings, the insulation type should be selected first, then the roof designed to suit it. The size of the framing members can then be specified to accommodate both the insulation thickness and the 25 mm clearance. This means the schedule method can be used to demonstrate compliance, which appears to be the preferred solution for simple housing.

Alternatively, the calculation method could be used. This is a way of reducing framing sizes without compromising the overall thermal efficiency of the design. Using this method, the designer can reduce the construction R-value required in the roof/ceiling by increasing the R-value of the thermal envelope in the walls and/or floors.

Different timber truss design needed

Figure 1 shows a worst case scenario of an existing framed roof detail for a low slope (12°) roof. With tiled metal or masonry roofs, the underlay is always installed to the underside of the tile battens, reducing the available space for insulation.

Figure 2 is a low slope skillion roof with metal tile cladding, showing

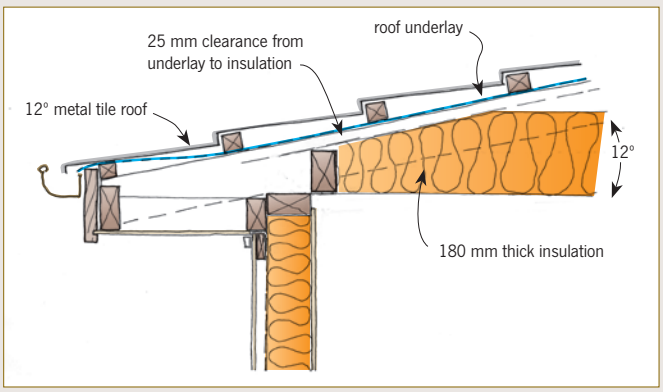

Figure 1: Typical existing detail worst case scenario – pitched metal tile roof at 12° in climate zone 3 needing 180 mm ± 5 mm thick insulation to give construction R-value of 3.3. Some trimming of insulation required to fit.

the minimum required dimensions of the rafters. Refer to E2/AS1 for recommended minimum roof cladding pitches.

Timber trusses manufactured specifically to accommodate the specified thickness of insulation and roof underlay separation are shown in Figures 3–5. By truncating the trusses at the wall plate, the top cord of the truss can be raised to accommodate a uniform depth of insulation over the whole ceiling.

Figure 3 is the worst case scenario of a metal tile clad at 12°. Figure 4 shows a 25° pitch metal roof or purlins, which is less affected due to the increased pitch and the underlay being on the purlins, but some adjustment in height is still required.

Figure 5 shows a 25° metal tile roof which is also less affected than the worst case scenario in Figure 3, but still shows the need for consideration of the insulation thickness and the required clearances.

This method will require an extra run of weatherboard or approximately 100 mm added to sheet cladding as the soffit and top cord is lifted. Alternatively, the soffit would need to be extended, but this is not always an option.

Retrofits

Retrofitting insulation to comply with current H1 requirements is usually not possible because of the size of framing members. The calculation method will need to be used to demonstrate compliance.

See page 24 for BRANZ Appraised insulation products and their thicknesses.

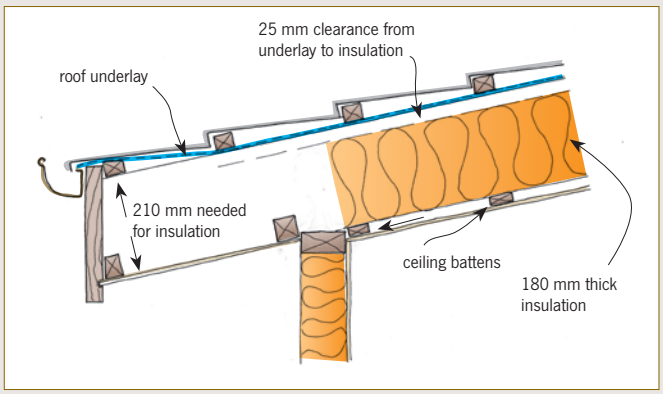

Figure 2: Low slope skillion metal tile roof at 12° in climate zone 3 needing insulation 180 mm ± 5 mm thick to give construction R-value of 3.3.

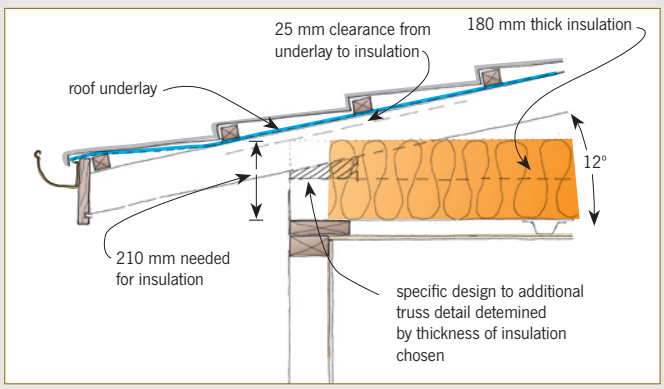

Figure 3: Alternative detail for worst case scenario of 12° metal tile roof. Suitable for climate zone 3.

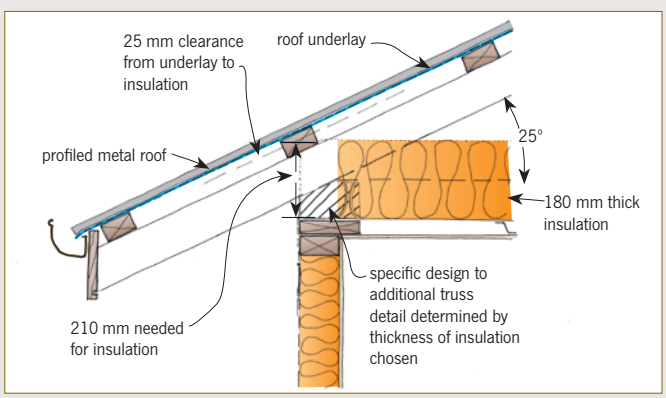

Figure 4: Alternative detail for 25° pitch roof with metal cladding. Suitable for climate zone 3.

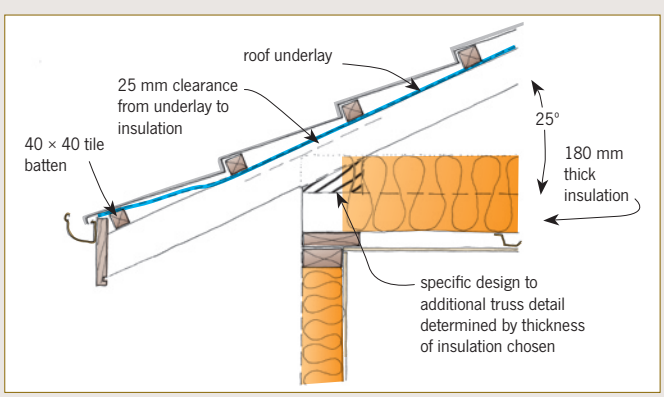

Figure 5: Alternative detail for 25° pitch metal tile roof. Suitable for climate zone 3.