build right

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EIFS claddings

Exterior insulation and finish systems (EIFS) are multi-layered exterior wall systems that are used on both commercial buildings and homes. They can provide superior energy efficiency and more design flexibility than other cladding products.

EIFS claddings consist of polystyrene boards, planks, sheets or panels fixed to framing and to which a reinforced plaster coating system is applied. EIFS claddings were first developed in Europe after World War Two to over-clad existing masonry buildings and improve their thermal and weather-resistance performance. The technology was picked up in the US in 1969 where it was adapted as a cladding applied over solid sheathing to framing. By 1994, 35% of new American houses were clad with EIFS.

In New Zealand EIFS was first used in the early 1980s, mostly on residential buildings, and adapted by using 40 mm thick polystyrene rather than the 25 mm used in the US. This allowed it to span traditional timber framing without rigid sheathing. Currently about 15% of our houses in New Zealand are clad with EIFS.

Most EIFS cladding systems in New Zealand are proprietary systems installed directly over timber framing. However, EIFS can be readily installed over masonry structures or with a drained cavity (the latter is expected to be required for most installations once the revised E2/AS1 comes into force).

EIFS can provide a durable and weathertight cladding system, but is not tolerant of poor design, construction or maintenance. In all cases, the proprietor's information regarding specification and installation requirements for each element must be referred to.

Why use EIFS?

Having insulation on the outside wall can provide many structural and thermal efficiency benefits, such as:

- reducing thermal stress in the structure
- greatly reducing thermal bridging effects, particularly when used with steel framing
- enhancing the performance of a wall's thermal mass if installed over concrete or concrete masonry construction
- avoiding the potential loss of performance with poorly installed wall insulation.

But it also offers many other benefits in relation to design and installation. For instance, a range of textures and colours are available and it's easy to create varied shapes and decorative features. The applicators are accredited by the system manufacturer and know what options are available.

A lightweight (4.5–18 kg/m^2 depending on the system) monolithic appearance can be achieved with a lower risk of cracking compared with other monolithic claddings because the fixings can move within the polystyrene. As a consequence it can be fixed directly over just about anything — timber framing, sheathing or solid construction (including many existing sound claddings). Thermal performance can be adjusted by varying the polystyrene thickness, which can be a plus when retrofitting over existing claddings. Plus the cladding components are rot-resistant.

Cladding system components

All components making up the cladding system must come from a single system proprietor. Variations can occur between different systems, but the basic EIFS components are:

- building wrap or building paper
- polystyrene or timber cavity battens
- expanded or extruded polystyrene insulation boards/sheets
- proprietor's recommended fixings and washers or adhesive fixing method
- expanded or extruded polystyrene decorative features
- uPVC trims around windows, along the bottoms of walls and at external corners

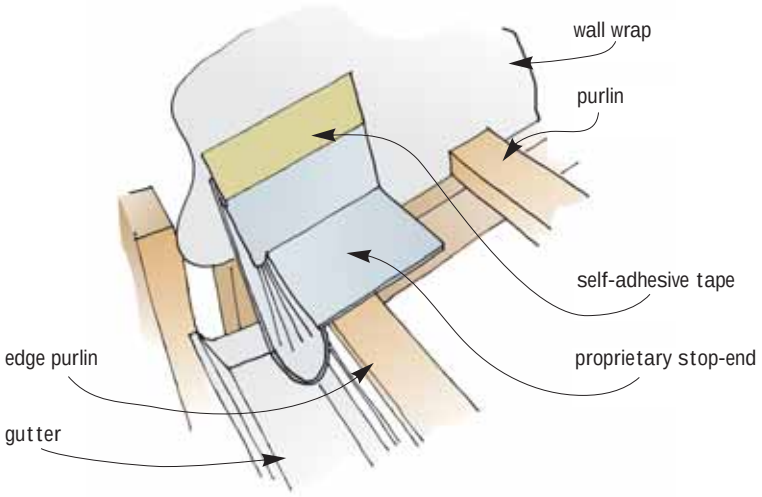

Figure 1: Proprietary uPVC stop-end designed for use with EIFS cladding.

- cement-based or polymer-based (acrylic) reinforced base coat
- alkali-resistant fibreglass reinforcing mesh embedded into the wet base coat
- texture finish and/or waterproof system
- glaze coat.

Depending on the thickness and grade of polystyrene used and the presence of a cavity, additional insulation may be required to meet the requirements of Clause H1 *Energy efficiency* for the building location. (See pages 22–23 for how a cavity affects insulation values.)

Design and detail

The majority of EIFS claddings in the future will probably be constructed over a drained cavity to manage any water infiltration. As in any construction, the cavity is there solely as a back-up and it is still important to design and construct to prevent water getting into the drainage cavity. (This is the premise that the revised E2/AS1 is based on.) To achieve this, EIFS should be designed around good practice.

Always include movement-control joints as recommended by the system manufacturer. Keep the cladding clear of the finished ground level and any deck surfaces, and make sure raw polystyrene edges are protected (usually by uPVC trims).

Figure 2: If gaps between the polystyrene boards are filled with the base coat they create a thermal bridge. Cracks may also appear along the line of the joint because of differential expansion in the base coat when temperatures rise.

Good flashing practice

Parapet and balcony walls should have sloped, flashed tops. If there is a junction between a low wall and a full-height wall then include a saddle flashing. If a barrier or balcony wall has handrails, fix them to the side not the top.

Where the end of the flashing is within the wall area (as shown in Figure 1), install kick-outs to apron flashings. (If using uPVC, make sure it drains to PVC or copper as the run-off from PVC will corrode zinc coated metal.) All windows should have head flashings and sill tray flashings.

Where installed over a cavity, drainage is needed at the base of the wall, at horizontal movement-control joints and across the heads of windows and door openings.

Construction

To achieve quality during construction:

- straighten framing before applying the polystyrene
- ensure polystyrene is installed with all joints supported and finished level
- close-butt polystyrene sheets at joints (Figure 2 shows poor installation)
- install all saddle and back flashings
- don't substitute materials or finishes from other manufacturers
- ensure all junctions are effectively sealed when installing uPVC or other rigid window flashings
- complete parapet and cap flashings as soon as practicable to prevent water entry behind the cladding
- remove all oxidisation (yellowing) from the polystyrene before plastering
- ensure the reinforcing mesh is fully embedded in the first base-coat
- only apply plaster when weather conditions are within the recommended range
- protect adjacent elements and completed surfaces when applying plaster and finish-coats
- use trained applicators.