Stramit®

CONCEALED FIXED DECKING

DESIGN GUIDE

CONCEALED FIXED DECKING

This guide outlines the merits of concealed fixed decking against through-fixed for commercial and industrial applications.

Benefits of the new concealed fixed roofing, ***Stramit Speed Deck Ultra®*** *concealed fixed decking, now include economy as well as superior performance, low maintenance and aesthetic appeal.*

Important note

The information contained within this brochure is as far as possible accurate at the date of publication, however, before application in a particular situation, Stramit Building Products recommends that you obtain qualified expert advice confirming the suitability of product(s) and information in question for the application proposed. While Stramit accepts its legal obligations, be aware however that to the extent permitted by law, Stramit disclaims all liability (including liability for negligence) for all loss and damage resulting from the use of the information provided in this brochure.

Design considerations

The major factors in designing commercial roofing are:

- ***Economy***
- ***Performance***
- ***Maintenance***
- ***Aesthetics***

Concealed fixed decking has traditionally been preferred on large commercial and industrial projects for its superior performance in long-run, low-pitch roof installations.

Compared with pierced fixed roofing, new ***Stramit Speed Deck Ultra***® concealed fixed decking generally delivers higher water carrying capacity, a lower roof pitch, greater durability, better tolerance of thermal expansion and contraction, as well as security from intrusion.

Stramit's new generation concealed fixed deck system ***Stramit Speed Deck Ultra***® *has considerably improved both the performance and economy of concealed fixed decking.*

The aesthetic appeal of an uninterrupted visual surface and the distinctive shadow line of a narrower rib profile are major reasons for the preference shown by architects and designers for concealed fixed decking.

However, in commercial building design, economy is often an overriding consideration. In the past, this has limited the use of concealed fixed decks because the cost/benefit analysis has favoured the pierced-fixed roofing option. With ***Stramit Speed Deck Ultra***® concealed fixed decking this is generally no longer the case.

Economy

The economy of concealed fixed decking was considerably improved in 1995 with the launch by Stramit of the high performance deck system, ***Stramit Speed Deck Ultra***® concealed fixed decking. By transferring the performance increases of the new generation decking to the building structure, significant savings in structural components can be generated.

When savings in purlins and labour are included, the cost differential between the concealed fixed and pierced fixed options is typically reduced to less than 0.5% of the total cost of a typical commercial office or warehouse complex[1].

On very large roof expanses, where the minimum slope of 1° can be used to provide extra savings on roofing and end walls, the cost difference is negligible.

Further savings are generated by the wide sheet cover, including material savings from the reduction in sheet overlaps and labour savings from the fact there are fewer sheets to be fixed.

More detailed information on the cost comparison of through-fixed and concealed-fixed applications can be found in Stramit's Roof System Selection Guide.

Performance

Higher performance is now a major reason for the specification of concealed fixed decks.

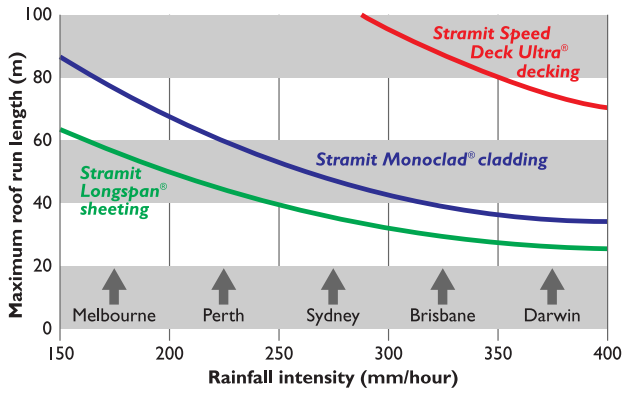
The performance increases of the new generation ***Stramit Speed Deck Ultra***® concealed fixed decking include improvements in spanning capacity, wind load performance (to cyclonic standards) as well as increased security through deeper, full-length interlocks in sidelaps and continuous interlocking clip rails.

Water carrying capacity

The taller rib profile of concealed fixed decks provides a high water carrying capacity on low-pitched roofs that is excellent for use throughout Australia.

In Sydney, for example, a deck roof run of 70 metres at 1° pitch will accommodate the highest rainfall intensity anticipated every 100 years (275mm per hour)[2]. Testing at Sydney University of Technology showed the water capacity of Stramit ***Stramit Speed Deck Ultra***® concealed fixed decking to be substantially greater than this. The diagram below shows a comparison of typical through-fixed profiles with ***Stramit Speed Deck Ultra***® concealed fixed decking at a 3° roof pitch.

Values for a 3 degree roof pitch for comparative purposes



For more detailed water carrying information on these and other profiles see Stramit's Roof Slope Guide.

Water resistance

The overlapped rib connection of concealed fixed decking provides anti-capillary features for improved resistance to water entry.

The simple inclined ribs of some through-fixed profiles may also provide a potential path for wind-driven rain when an anti-capillary feature is absent. The re-entrant shape of the ***Stramit Speed Deck Ultra***® concealed fixed decking rib makes this almost impossible.

Maximum water protection is also ensured by the absence of fastener penetrations. With typically 3000 holes for every 1000m² of through-fixed roofing, guaranteeing complete water tightness would seem unrealistic. With so many fixings there will inevitably be variations in quality. Added to this is the susceptibility of through-fixed profiles to rib compression from foot traffic, which can undo the most skilled installer's work.

Stramit Speed Deck Ultra® concealed fixed decking was tested by the CSIRO against the combined effects of wind and rain, registering no leakage at all, even at the testing equipment limit.

Foot traffic performance

The tall re-entrant ribs of most concealed-fixed decks make them intrinsically superior in resisting foot traffic. The wide flat pans make it easy for fixers and maintenance personnel to walk in this area, the correct path for most profiles. Even when careless feet venture on to the ribs, the stronger concealed-fixed ribs are considerably more resistant.

Stramit has recognised the need for different categories of foot traffic conditions in its Foot Traffic Guide. This introduces the concept of 'high-maintenance', 'normal', and 'controlled' foot traffic limits. Regardless of the foot traffic category, concealed-fixed decks invariably outperform through-fixed.

Ease of installation

Wider 700mm sheet coverage and full-width rail clips speed up installation times, making concealed fixed decking more attractive to installers. The addition of fixing clips is more than compensated by a number of factors. Firstly, through-fixing requires at least daily clearing of swarf from drilling. This is imperative on painted surfaces to protect the coating and is also important on zinc-aluminium alloy to avoid localised premature corrosion.

The full width clips of ***Stramit Speed Deck Ultra***® concealed fixed decking compress insulation blanket making the decking easier to install. The presence of blanket is an inconvenience for other products that can lead to time wastage.

Stramit Speed Deck Ultra® concealed fixed decking also uses short hex-headed screws. These are considerably easier to handle than longer or wafer-headed screws. As well as reducing wastage from dropped fasteners, the convenience is significant with a process repeated hundreds or thousands of times.

On a through-fixed roof, integrity from leakage is only as good as the worst fastener. A typical commercial roof of 5000 square metres of through-fixed sheeting has around 20,000 screw penetrations. They must all be perfectly aligned, perfectly driven and perfectly sealed for maximum roofing performance.

Wind load performance

When designed in accordance with the Australian Wind Load Code and correctly installed, concealed fixed decks have proved themselves in harsh conditions, including cyclones, for half a century.

*Close to the waterfront, Cairns Hospital's **Speed Deck Ultra**® concealed fixed decking roof withstood Cyclone Justin without difficulty.*

The design improvements incorporated in ***Stramit Speed Deck Ultra***® concealed fixed decking have doubled the wind load strength performance of concealed fixed decking.

Testing at the Cyclone Structural Testing Station has shown that ***Stramit Speed Deck Ultra***® concealed fixed decking meets the cyclonic requirements of TR440 and Darwin Deemed to Comply manual, providing a single set of load tables for use anywhere in Australia.

Bird-Proofing

Most roofs require some form of bird-proofing, ***Stramit Speed Deck Ultra***® concealed fixed decking has automatic bird-proofing due to its transverse ribs.

Maintenance

Durability

On pierced fixed roofs, sheeting performance is dependent on fastener durability. The sheeting performance of concealed fixed roofing is independent of fastener durability, as the fasteners are located under the deck sheeting.

When pre-painted roofing is through-fixed, the coating on the sheets is vulnerable to damage from hot swarf created during fastener installation. Even worse is the staining caused if sheeting is not cleared every day to remove swarf particles. Through-fixing can also damage the shank coating on the fastener. On crest-fixed installations, the shank is exposed to the possibility of corrosion from condensation between the sheeting and the insulation blanket.

On both clip-fixed and through-fixed roofs that are close to the sea it is recommended that the final row of clips or screws be protected from the unwashed external environment by appropriate sealing.

Additional caps or washers can also be potential sources of corrosion on through-fixed roofs.

Thermal movement

Concealed fixed decking avoids the potential damage from thermal expansion and contraction of sheeting. A typical temperature difference of 50°C can occur between roof sheeting and the structure of an insulated building. With such a temperature difference a 20 metre roof sheet will be 11mm longer than the structure it is attached to. Most concealed fixed clips are able to accommodate this gradual movement sideways, while still retaining the deck. For this reason through-fixed roofs are often limited to run lengths of around 15 metres. Concealed-fixed decks commonly reach 25 metres in run length, and are usually limited by transport considerations only.

Significant failures of pierced fixed roofing have occurred on commercial buildings where dimensional changes from thermal expansion have not been accurately incorporated in the roof design. These can result in elongation of fastener penetrations, consequent water leaks, fastener failure and unacceptable frictional noise. Through-fixed profiles which incorporate special sealing may exacerbate these problems.

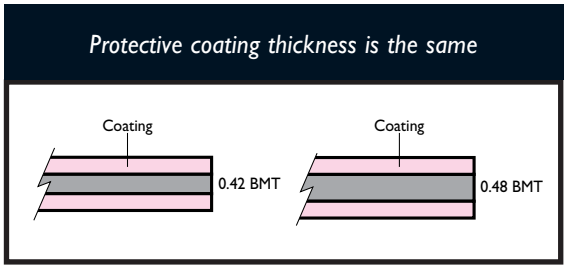
Security from intrusion

Illegal entry to commercial premises via the roof is part of the modus operandi of professional criminals. Pierced fixed roofing presents little resistance, as fasteners can easily be unscrewed with hand tools and the roofing sheets removed.

Entry is much more difficult with concealed fixed roofing. Once correctly interlocked, the roof sheeting can only be prised from the hidden clips with great difficulty. The time required for this operation and the noise created both act as effective deterrents to intruders.

Warranties

Warranties issued by our steel suppliers are based on the type and thickness of protective coatings applied to the base steel of the roof sheeting, not the base metal thickness. A 0.42mm BMT deck has the same thickness of protective coating as 0.48mm BMT decking and sheeting profiles and therefore the same guarantee of durability. In fact the thinner steel may actually have marginally improved cut-edge protection due to its higher ratio of sacrificial coating.



Stramit uses only quality Australian steel in its roofing products. This enables us to offer a Sheeting Performance Warranty in addition to a supplier's Coated Steel Material Warranty.

Aesthetics

The visual appeal of smooth, clean lines unmarred by fasteners, as well as tall, narrow ribs and sharp shadow lines, have made concealed fixed decking a favourite with architects since its first appearance on the market.

With the overlap concealed below the re-entrant, a concealed fixed deck provides lateral visual continuity. The appearance of pierced fixed roofing suffers from exposed overlaps and screw heads, sometimes exacerbated by deformed ribs caused by uneven screwing pressure.

Clean lines unmarred by fasteners and narrow ribs with sharp shadow lines have made concealed fixed decking a favourite with architects and designers.

Stramit Speed Deck Ultra® concealed fixed decking has a full width clip design to compress the insulation evenly beneath the deck. A common problem with older style concealed-fixed deck was that every 2nd or 3rd span bulged. For through-fixed roofs, the bulge is present in all pans where insulating blanket is used. Either of these cases detract from the overall appearance of a finished roof.

Other useful Stramit guides

As well as the standard range of Technical Product Manuals, Installation Leaflets, Case Studies and other promotional literature, Stramit has a series of Design Guides to aid architects, engineers and specifiers.

These include

- Roof System Selection Guide
- Foot Traffic Guide
- Bullnosing, Curving and Crimping
- Acoustic Panels
- Cyclonic Areas
- Spring Curving Guide
- Roof Slope Guide

Please contact your nearest Stramit location for any of these guides, and other literature, or refer to the Stramit website www.stramit.com.au

Notes

[1] Based on cost comparison between trapezoidal pierced fixed roof cladding and ***Stramit Speed Deck Ultra***® concealed fixed decking on a portal frame building with 4000 square metre roof and 20-metre run length, allowing for construction cost of $600 per square metre and extra cost for deck roof of around $2 per square metre (i.e. 0.3%).

[2] Roof Slope Guide: Roofing Profile Rainwater Capacities (Stramit Industries, 1995).

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Building Products

The Stramit web page can be found at:
www.stramit.com.au
Details of many ***Stramit***® products can also be seen on the RAIA site 'Product Selector' at:
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