

SIG Roof Lines



Austria's Alpine gem

A CorTen clad chapel strikes an unexpected note deep in the wild Tyrol, but its garnet-like shape gives clues to why it is there

ENRICO GANO

Poised on a rock spur beside a still lake on a mountain plateau 2km above the Ziller valley in the heart of the Austrian Tyrol, the Garnet Chapel commands a spectacular view in one of Europe's harshest climates.

The new 700m³ geometric building, designed by Swiss architect Mario Botta, is highly sculptural, its reddish brown CorTen steel-clad facade taking the form of a crystal.

The idea to build the chapel in the shape of a garnet crystal came from the client, Josef Brindlinger, whose great-grandfather found several garnets of exceptional purity at the location. The form of a cut garnet features 12 rhomboid surfaces, 14 corners and 24 edges.

'The chapel was commissioned to enhance the top of the mountain,' says Botta. 'It would complement the arrival nearby of a cableway, chalets, a restaurant and other tourist facilities, and remember the local saint, Blessed Engelbert Kolland.'

The facade weighs 17 tons and comprises 12 rhombuses made of 120mm-thick plywood panels clad with 300mm-wide CorTen steel sheets that rest on a total 2,280 threaded rods anchored into the supporting structure.

Behind the CorTen, the walls and roof have a layer of company FDT's Rhepanol fk polyisobutylene-based synthetic roof waterproofing membrane. The highly durable product, specified by the project's partner architect, Besto of Austria, is able

to handle the region's strongly fluctuating temperatures, thunderstorms and very strong winds.

Supplied in the UK by SIG Design and Technology, Rhepanol fk has an integrated synthetic fleece and a prefabricated self-sealing edge, making it very stable, even in strong winds. It is UV resistant and remains flexible at temperatures as low as -60°C.

'Due to the harsh conditions, we had to have a waterproof surface within a week of assembling the walls,' said Besto director Bernhard Stoehr. 'Rhepanol meant the water proof surface could be glued ahead of fitting.'

The synthetic membrane contains no toxic plasticisers or halogen fire-proofing agents. It is also fully recyclable.

The builders had just three months to erect the chapel, between the last of the

snow in mid-June and new snowfall in September, so the facades were precision engineered off-site and installed in a strict sequence to achieve structural stability once all 12 elements were held together in tension.

Local specialist roofing contractor Robert Stadlmeyer carried out waterproofing works on the plywood panels, which were laid flat on the ground. To prevent wind uplift, the membranes were bonded in strips to the supporting timber structure.

The severe weather meant full adhesion sometimes took a day or two, so the Gripfix system was used to provide mechanical fastening – similar in nature to velcro – ensuring elements were ready for installation.

After waterproofing, the threaded rods needed to support the CorTen Steel cladding were anchored into half the panels on the ground. To achieve a fast, accurate and permanent waterproof flashing against these rods, the roofers used FDT's lightning conductor sleeve with Rhepanol collar.

'Because we had to screw into the surface 2,280 times to attach the cladding to the rods, we needed a system that ensured every point was safely waterproofed,' said Stoehr.

Inside the finished chapel, natural daylight floods the larch-clad space through a central opening and circles the room as the sun rises and sets. It's a sight to behold for architects and religious pilgrims alike. ●



The 120mm thick plywood structural panels, while covered with Rhepanol and CorTen externally, are lined with larch internally.



Keeping clear of growing pains

As green roofs move into the mainstream, Simon Blackham of SIG Design and Technology describes the secrets of a successful specification

Once something of an exotic novelty, green roofs are heading towards the mainstream as their thermal and acoustic qualities as well as their bio-diversity benefits become more widely understood.

The mass of a green roof increases its thermal performance by acting as an extra insulant. It can also help with rainwater attenuation by slowing the flow of water off roofs in the case of very heavy rain, at the same time dampening the sound of a downfall, something especially useful in education buildings. Green roofs also work well in combination with solar PV as their evapo-perspiration helps to stop the panels from exceeding the optimum performance temperature of 25°C. Biodiverse roofs –also known as brown roofs – can bring additional advantages in the planning process.

Along with aesthetic appeal, these factors have helped increase the popularity of green roofs as clients look to do something more interesting than the instant greening offered by sedum. Architects however can be apprehensive about specifying them. But don't be scared. No two green roofs are the same but specification is straightforward if you follow a few basic rules.

Make the decision early

Green roofs should be included in the original design concept for the building so there can be early engagement with the supplier and manufacturer. This is key to cutting costs. Also, if there is just one supplier for the whole

job – from insulation to membrane to green roof – it is covered by a single guarantee which keeps liability simple for the client.

Choose the right roof for your purpose

There are four main types (see right) of roof to suit different aesthetic and biodiversity priorities, which each have their own weight and cost implications. These range from the lightweight Extensive Modular type for an instant green effect through to the far heavier Intensive option. This is suitable for more ambitious planting and the only option that requires regular irrigation and maintenance.

Make sure that whichever option you choose, the roof meets both FLL penetration standards – for rhizome as well as root.

On top of a warm roof construction, a typical green roof build-up has three layers. A drainage/protection layer generally consists of a laminated, composite water reservoir core with a moisture-retentive protective fleece on the underside and a geotextile filter mat on the upper side. Above this is the factory blended growing medium layer with a plant layer on top. Plants can be grown by seed, plug planted or supplied as a pre-grown blanket.

Accommodate the weight

The weight of a green roof varies considerably – from around 64.5 kg/m² to 200 kg/m² depending on the type. Once a choice has been made, the structural engineer should speak to the supplier to get the figures for both dry weight (parched) and maximum saturation in

Above FOA's 2007 Meydan Umraniye retail complex in Istanbul used green roofs as a key element of its design.

order to provide sufficient structural support for the loading in the design. The height of the green roof system will affect the height of the upstand needed. It's much easier to get this right in the beginning than correct it later.

Don't forget the pitch

A common mistake is not taking account of the battens needed for a pitched green roof to prevent the green roof layer slipping off. This detailing needs to be thought about along with the roof design.

Get the phasing right

The rest of the roof should be finished before work starts on the green roof, to avoid other trades walking on it and damaging it. Make sure there are walkways for maintenance – sedum in particular doesn't like being walked on. Once the green roof is on, you're less likely to have a problem with the actual roof than with a more traditional, exposed roof because the waterproofing membrane is tucked away and protected, so less likely to suffer surface damage and UV degradation.

Use the best installers

Green roofs should only be installed by qualified contractors. SIG recommends its DATAC (Design and Technology Accredited Contractor) network of expert installers. ●

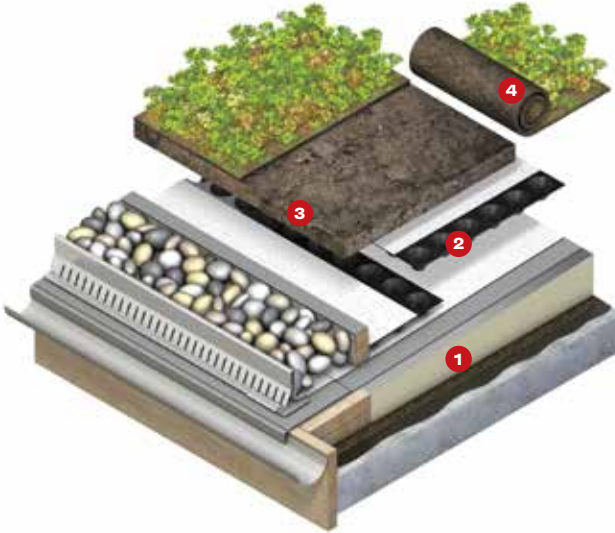
Extensive Modular

- 1 Shallow tray
- 2 Growing medium
- 3 Maintenance-free plants



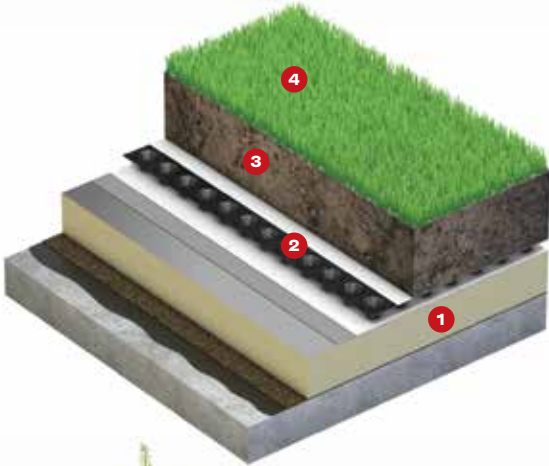
Extensive Built-up

- 1 Warm roof construction
- 2 Drainage/protection layer
- 3 Growing medium layer
- 4 Plant layer



Intensive

- 1 Warm roof construction
- 2 Drainage protection layer
- 3 Greater depth of growing medium
- 4 Plant layer may contain trees and shrubs



Biodiverse

- 1 Warm roof construction
- 2 Drainage protection layer
- 3 Growing medium layer
- 4 Low maintenance plants, may include native species



GREEN ROOF TYPES

EXTENSIVE (Modular)

Build-up height: 80-90mm
Weight: 64.5kg/m²
Suitable for smaller projects requiring instant greening. Supplied with a pre-grown sedum layer fully established in shallow trays that clip together. The growing medium supports hardy succulents, herbs and grasses with limited growth that are stress-tolerant and require no maintenance.

EXTENSIVE (Built-up)

Build-up height: 70-120mm
Weight: 80-125kg/m²
More economic for larger areas than the modular type. These are supplied in separate elements such as drainage layer, growing medium and plant layer which are installed on site. Planting can be pre-grown, plug-planted or seeded, in which case it can take two months with irrigation to get established.

INTENSIVE

Build-up height: 150-1500mm
Weight: 200 kg/m²
This roof garden option is far heavier and therefore needs more structural support. It also requires irrigation but is capable of supporting lawns, shrubs and even some small trees. Usually this is specified for structures that are built into a hillside and have a particular desire to blend into the landscape.

BIODIVERSE

Build-up height: 70-200mm
Weight: 90-225 kg/m²
Popular for recreating or enhancing a pre-development habitat in order to encourage a particular plant or wildlife such as bats, bees, butterflies and birds. May include plug-planted sedums and hardy native species according to the habitat being created. Low maintenance.

SIG Design and Technology offers a complete and impartial design and supply service, which covers all eight steps to help create the perfect roof. It designs flat roofs, green roofs, and zinc, copper and stainless steel roofing and cladding.

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Cool customer

A cold-applied waterproofing system steals the show at the Vue cinema in Doncaster



When a Vue Cinema on the outskirts of Doncaster needed a section of flat asphalt roof refurbished as part of extension and maintenance works, a zero odour solution was required that would allow the building to stay open to the public throughout installation.

The 750m² roof, located in the centre of the cinema above a stair and lift core and projection rooms, was covered with a lot of mounted plant, equipment and trunking, making it too disruptive and noisy to take up and replace the existing asphalt.

A liquid cold-applied waterproofing product was considered ideal to avoid the need for complex edge detailing associated with single ply or bitumen products around the plant.

Fumes emitted by solvents in traditional cold-applied liquid waterproofing posed a health and safety risk because of the potential to enter the cinema through air conditioning intakes on the roof and stay in the air for up to four days.

With these concerns in mind, specification manager Cameron MacAndrew, from roof design and supply business SIG Design and Technology, chose to recommend Hydrostop EU AH-25, a wet-on-wet cold applied liquid waterproofing

system that contains no solvents or isocyanates, with a very low VOC content.

'Hydrostop AH-25 emits no fumes and no odour, which meant the cinema could continue business as usual for the week,' said MacAndrew. 'Because it goes down wet on wet in a single pass install, it is a lot faster than most other cold applied systems that require base coats to dry before installers return to apply several top coats.'

For the installation process the roof was first cleaned. Then a base coat of AH-25 was applied, into which a 110 gsm layer of



Above The Vue Doncaster — with roof-mounted plant hidden behind the parapet of its facade.

Left The refurbished roof of the Doncaster Vue — all the interfaces competently dealt with using Hydrostop EU AH-25.

polyester reinforcing fleece was embedded, whereupon it was immediately saturated with a second coat of liquid.

AH-25 is totally impervious to standing water, unlike bitumen roofing products, and uses moisture in the atmosphere to fuel the curing process, whereas other cold applied liquid waterproofing requires a catalyst to be mixed in, complicating the application.

The product comes with 25-year guarantee, which is better than competing systems' maximum 20-year guarantee, for essentially the same amount of money,' said MacAndrew. 'And installers like it because it saves having to wear additional PPE or a use a respirator, as required when working with other liquid waterproofing.' ●

SPEEDY DOES IT

The refurbishment and insulation of a 1970s social housing estate at Greenock in Inverclyde, Scotland involved the upgrade of 27 small 4.5m by 6m flat roofs for housing association Inverclyde Homes.

Due to concerns about potential disturbance to residents from fumes, noise and leaving large amounts of scaffolding erected around the roofs for an extended time, the cold-applied liquid Hydrostop AH-25 was specified.

'Using a conventional liquid waterproofing system, a primer is installed on the first day, a base coat the next day, and then a top coat on day three, but AH-25's wet-on-wet application reduced the installation time for each roof and allowed the scaffolding to be dismantled a lot faster,' said Chris Page, product manager for premium liquids and felts at SIG Roofing. 'The product is odour-free and the contractor Horsburgh Construction was able to install it using silent techniques with no power tools required to complete the works.'

