Hambleside Danelaw
Rooflights

TECHNICAL MANUAL
What is GRP?

ZENON

LOW CARBON DAYLIGHT SOLUTIONS

ISSUE 2

What is GRP?

Glass Reinforced Plastic or Polyester (GRP) was born out of the development of continuous glass filament production technology developed in the USA by Owens Corning Fiberglass in 1938. This transformed what had previously been a decorative product into an engineering material, used particularly for the insulation of electric motor windings. The combination of glass cloth manufactured from these glass filaments and thermosetting polyester resins in the early 1940's led to the creation of glass reinforced plastics, or more specifically, glass reinforced polyesters and the start of the composites industry.

Continuous glass filaments

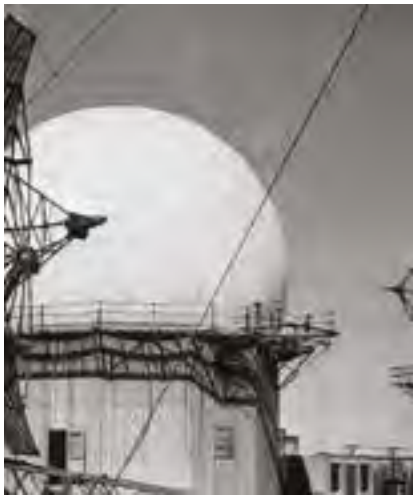
Glass fibre rovings

The development of this industry was accelerated by the onset of World War II, when GRP was further developed, commonly using short glass fibres or 'rovings' cut from continuous filaments and used for making radomes (the structural spheres that enclose radar antenna), fuel tanks and body armour mouldings; the glass reinforcements providing the high structural strength necessary for these products.

Modern materials for construction

Today there are a wide range of thermoset resins available for use with various glass fibre materials for all sorts of applications. From boat construction such as lifeboats, minesweepers and luxury yachts where high strength, durability and marine corrosion resistance is required, through to fuel and chemical containment tanks & pipelines; GRP materials find uses everywhere. This universal material is also used for vehicle body panels and construction products ranging from door canopies to fine architectural mouldings.

Thermoset materials, once cured, have very stable mechanical properties and are generally unaffected by heat unless this is sufficiently high to cause them to char or burn. This gives the characteristic of relatively low rates of thermal expansion and high durability



WWII GRP Radome

leading to very long service life periods. By comparison, thermoplastic materials readily soften and lose their strength with increases in temperature until they melt at relatively low temperatures, losing their shape and mechanical properties, setting to a distorted solid state again on cooling. By their very nature they are less stable and less durable.

To improve the durability of GRP when used in outdoor applications and exposed to UV radiation and weathering, the life of the material can be further prolonged by the application of a surface gel coat or transparent surface protective film.

The characteristics of GRP make it an ideal product for use in rooflight panels and sheets. Especially where a material is required that can be moulded to match the profiles of the surrounding

metal cladding sheets while benefitting from a high strength to weight ratio and extended service life.

Design flexibility

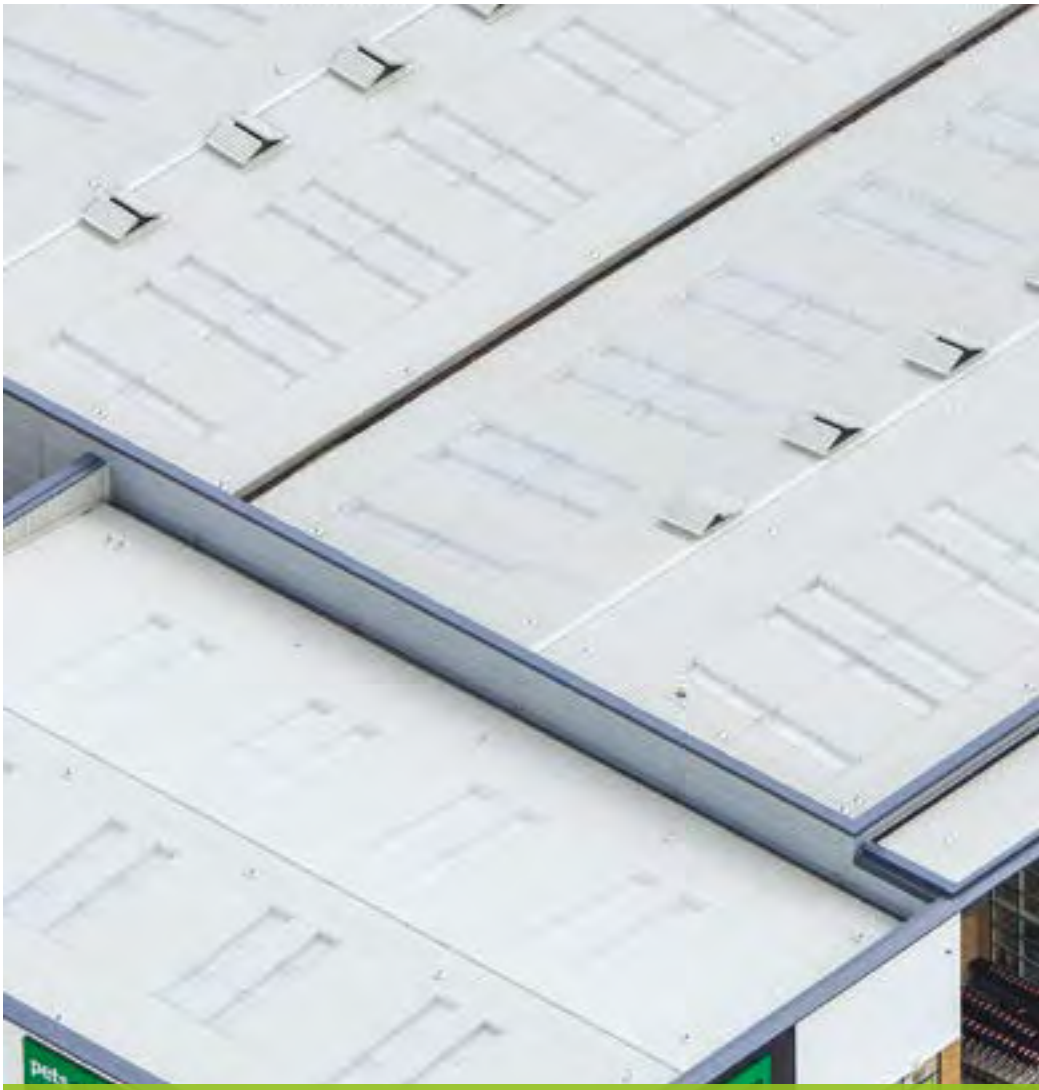
Because GRP can be either moulded or continuously profiled, it can be used to match the vast majority of design criteria, from architectural mouldings, to pre-cured, mechanically fixed GRP roof membrane sheets.

This versatility means that GRP can be used to allow specifiers to realise a wide array of design possibilities without having to consider conventional material constraints, such as formability, corrosion, embrittlement etc.

Durability

GRP, as a stable thermoset material, can be expected to give extremely long-lasting performance. There are numerous examples from the marine and car-building industries of excellent longevity.

Within the construction sector, the roof of the New Covent Garden Flower Market, to name just one, has been in continuous service for over 40 years. Since this time, ongoing product developments within the rooflight sector have included better UV-stabilised resins, weather-protective surface films and specifically 'woven' reinforcements, which combine to provide service life expectations of 30 years and more, making GRP the perfect



Modern Zenon GRP rooflights

life-span match for metal-clad building envelopes. This means that the rooflights will not need to be renewed before the surrounding metal roofing, saving on time, materials and costs and potentially halving the embodied carbon of the rooflights.

The environmental story

GRP is a fully recyclable material. Rooflights and other products can be processed to provide filler materials for non-translucent products, or used in cement manufacture, allowing materials to contribute to a 'cradle to cradle' or circular economy model. By careful re-engineering of the resin and glass reinforcements it is possible to reduce the embodied carbon further still, sometimes by as much as 40%, when compared to traditional fibreglass products with comparable strength, helping to contribute to the current Government target of 'zero carbon' for non-domestic buildings.

When combined with the unique Hambleside Danelaw Zenon Insulator core, which is made from sustainable wood pulp, our GRP rooflights can enhance the spread of

natural daylight inside the building while significantly reducing the embodied carbon for the insulant. At end of life the Zenon Insulator is compostable, meeting the stringent German DIN standard for compostable materials.

At Hambleside Danelaw, our own processes are recognised as being a benchmark for the sector, outperforming the recognised standards for VOC emission levels, producing only 0.375% of the industry permitted emission levels. Our operational process only produces 0.3 kg of CO_2e per square metre of product made. Hambleside Danelaw Zenon Evolution rooflights have 40% less embodied carbon than the equivalent GRP industry rooflights.

Other company products benefit from the excellent mechanical properties and stability that GRP has to offer, extending and improving service life. The original and now ubiquitous GRP valley troughs, have now evolved into a full range of environmentally friendly flashing products safe for rainwater harvesting including the original and best designs for a fully dry-fixed slate or tile roofs reducing potential installation problems, maintenance costs and environmental issues.

The long life Dryseal GRP mechanically fixed flat roof system can be installed in new build applications or to overlay some existing roof coverings, subject to the substrate or deck being sound, reducing labour and disposal costs – and most importantly, landfill. It is also excellent for use with Green Roofs. For further information see www.hambleside-danelaw.co.uk

Bring in the reinforcements

Hambleside Danelaw rooflights are manufactured in a controlled manner in accordance with stringent industry standards such as ISO 9001 (quality management) and ISO 14001 (environmental management) and CE marked in accordance with UK Annex BS EN 1013:2012 + A1:2014.

The 'Zenon Pro' range uses traditional glass fibre rovings and/or mats to deliver nominal material weight classifications of 1.5kg/m^2 up to 5.4kg/m^2.

The Zenon Evolution range improves on Zenon Pro by incorporating a specifically woven continuous glass filament reinforcement to deliver ultra-high strength daylight solutions which significantly outperform the current non-fragility test requirements.

Zenon, a comprehensive range of low carbon rooflights for the metal building envelope from Hambleside Danelaw

Hambleside Danelaw Rooflights

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