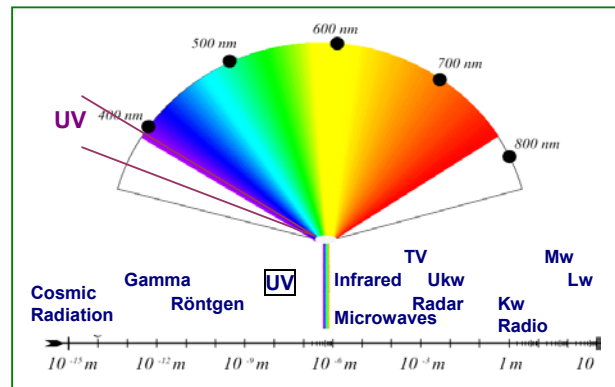


WEATHERING & UV RESISTANCE OF FIBERSTRUCT GRP SYSTEMS

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What is UV light ?

Ultraviolet A (UVA) light refers to wavelengths of light in the range of 320 to 400 nanometers that are invisible to the human eye. UVA is the light that can be transmitted through typical plastic materials, such as PET and olefins (HDPE and PP). UV radiation can break down cellular and chemical compositions, however, exposure of UV to the surface of GRP gratings, pultrusions (handrails) and pipes shows low effect, and no damage of the physical properties related to strength or pressure rating.



UV damaging effect on GRP

- **'fiber blooming'**: free fibers coming out of the GRP material
 - chemical attack on the glass in the matrix can result in deterioration of the GRP matrix
 - can cause infection to human skin (when touching the GRP material)
- **'chalking'**: A 'chalking' effect appears of the upper thermoharder material. (Special to epoxy)
 - Chalking process stops after a surface thickness of approximate 0,5 mm has been reached and UV-penetration is not longer possible
- **de-coloration** :
 - Most colours will lose their intensity after 4-5 years. The Fiberstruct handrail (yellow) will become light-yellow to white after a long time. This does not influence the quality of the material, and has to be, as the European law does not permit to use a more stable colouring pigment, which can harm the environment (like Cadmium).

Radiation transparency (Marine, Military & Communication applications)

Fiberglass is a much better insulator than metals, as it has much lower thermal conductivity. Pigment added to the resins of fiberglass can provide color throughout the part, while metals require prefinishes, anodic coatings or paint. Fiberglass is transparent to radio waves and EMI/RFI transmissions and is often used for radar and antennae enclosures and supports; metals are highly reflective. Pultruded fiberglass shapes can be easily fabricated in the field with common carpenter tools and do not require torches or welding, like metal shapes do. Finally, the glass mat in pultruded fiberglass shapes evenly distributes the load of an impact, while metals easily deform.



UV protection

GRP products can be protected against UV-radiation by following production procedures:

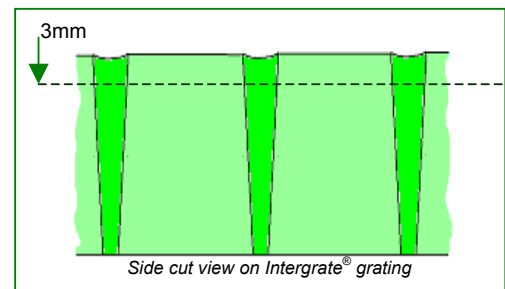
- **Pigmentation/colouring**
Standard resins are more or less transparent. By using colour pigments the penetration of UV-radiation is prevented.
- **Additives**
Numerous anti-oxidants, UV light stabilizers for plastics, UV inhibitors or UV absorbers can be used. Fiberstruct does not use UV-inhibitor, but practise 'Pigmentation' (see German 'Freibewitterungstest')
- **Synthetic outer veil**
Fiberstruct delivers only pultruded handrails and constructions, where during the pultrusion process, a synthetic (polyester) outer veil has been processed in order to avoid damage of the human skin due to 'fiber blooming'. This veil prevents the penetration of fibres to the outside.
- **Resin rich protective layer**
Since UV degradation is a surface phenomenon, the most efficient means of prolonging the integrity of the reinforcement is to place a resin-rich protective layer between the structural fibreglass and the outer surface. The thicker the surface coating, the better the weathering characteristics.
- **Painting**
In the event fiberglass blooming is not acceptable in use, it can be painted (f.i. polyurethane paint)



German 'Freibewitterungstest' for Fiberstruct IFR GRP gratings executed for the 44.000m² Wuppertal project

UV Protection in our Fiberstruct products

- **FIBERSTRUCT GRATING**
In our Intergrate[®] gratings, 2 prevention have been built in:
 - pigmentation
 - resin rich top in which no glassfibers are embedded.remark: pultruded grating therefore is more sensitive for weathering and wearing.
- **FIBERSTRUCT HANDRAILS & CONSTRUCTIONS**
All our Interstruct[®] profiles have been produced with a synthetic polyester outer veil and a pigmented resin with UV absorbers. Colouring in accordance with European law.



In many outside 'Sun & Sea' applications our GRP gratings perform for more than 30 years without a loss of mechanical integrity. Case histories are available. Do not hesitate to contact our Engineering Department for more advise.

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