

GRP Moulded Grating Specification

Identification of the Product & Company

Product Name:	GRP Moulded Grating Glass Reinforced Plastic (GRP) safe access products
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Quality Assurance



The GRP Moulded Gratings covered by this specification are manufactured by our **ISO-9001:2008** certified partners.

Evergrip are closely involved in the production process of all our products with regular visits to and inspections of the factory facilities.

Product Description

A high quality GRP Moulded Grating system offering a wide choice of sizes, material types & applications. For safety critical applications the product has been tested and approved to standards listed later in this document.

The range is designed to offer a cost effective, low maintenance alternative to stainless or galvanized steel when used in new build or refurbishment projects.

Available in a range of colours and finishes, GRP Moulded Grating provides all the advantages of lightweight, high strength and durability, coupled with a corrosion resistant, maintenance free, minimum 25 year lifespan.

The gratings are manufactured from polyester resin by a moulding process with a choice of resin types to suit all environments.

They provide worker or general public safety and comfort in a variety of locations throughout industrial and public access areas.



General Properties & Design Criteria

1. Chemical resistance

Corrosion is a major problem for metal or wooden gratings, stair treads and other products in industries such as chemical plants, food and beverage factories, water and wastewater and power facilities. GRP grating is designed to provide safe, long-lasting, economical solutions in environments where chemicals and other corrosive elements attack and destroy metal or wood. According to the environmental requirements, a choice of resin type such as Orthophthalic or Isophthalic polyester, Vinylester or Phenolic are offered in the matrix material.

2. High strength-to-weight ratio

GRP grating is manufactured as a composite of continuous fibreglass strands and high quality resin integrally constructed for strength and is only one quarter the weight of a comparable steel grating allowing for easy removal, access below floor level and installation with no heavy equipment and less manpower. Properly installed, GRP meets the specified load requirements for steel gratings and has greater impact resistance.

3. Fire retardant

GRP grating has a flame spread rating of 25 or less depending on the resin system used - as tested to American Standard ASTM E-84. Test reports are available on request. Special fire retardant requirements can also be met through material additives.

4. Ergonomic

Where employees may experience fatigue after standing on solid concrete or heavy galvanized steel platforms, GRP gratings are the best solution to ease the strain on the back, feet and legs of workers, increasing comfort and productivity. In a raised floor scenario, the natural slight flexibility of the material is more comfortable to stand on for long periods.

5. Slip-resistant

GRP moulded grating naturally has a concave top surface for slip resistance after it is extracted from the mould. For additional durability, Evergrip grating incorporates as standard, a high quality aluminium oxide grit surface which is bonded to the top of the completed grating under factory conditions providing superior slip and wear resistance. Diamond patterned cover top or gritted cover tops are also available.

6. Long Product Life Expectancy

A lifespan of 25 years is guaranteed for Evergrip gratings, when installed under correctly specified conditions. Fibreglass products are known to be in use considerably beyond this time with only cosmetic degradation to the product.

7. Low maintenance

Install and forget. GRP grating is easy to clean, open mesh versions permit debris to fall through the grating panel and prevent any hazardous buildup on walking surfaces. Gratings require no re-painting and are excellent not only for their inherent chemical resistance but also a colour-fast appearance and ultraviolet resistance characteristics.

8. Safety

NON-CONDUCTIVE properties make gratings ideally suited in electrically hazardous locations acting as an insulator. NON-MAGNETIC properties allow gratings to be used in sensitive installations where the inherent magnetic properties of metal grating would prove dangerous.

9. Commercial Advantages

While the cost of GRP grating is marginally greater than steel, installation costs are around 20-40% less than that of steel and maintenance cost is near zero. Steel gratings may require regular maintenance and the accumulated cost of this is high. Lifecycle costs for GRP grating have been shown to be significantly lower than that of steel leaving aside the other advantages it offers.

10. Additional features

- Transparent to electromagnetic radiation
- Highly durable
- Full range of fixings & fasteners available
- Available with a choice of standard colours: steel grey (RAL7046), green (RAL 6029), orange, or red (RA3001). Any RAL colour is available to special order (minimum order quantity may apply).



Raw Material Composition

- Glass fibre reinforcement
- Choice of resin type:
Orthophthalic/Isophthalic Polyester, Vinylester or Phenolic
- Inert fillers
- UV stabilisers
- Promoters and flame retardants
- Chemical colour pigment offering a natural (through colour) finish that never requires painting

Fibreglass Properties

Typical Material Properties	Value
Density kg/m ³ (Specific Gravity)	2500
Water Absorption %	0.2
Compressive Strength N/Tex	0.42
Line Density Tex	2400
Line Density variability coefficient %	1.71
Diameter µm	24

Resin Properties

Typical Material Properties	Value
Density kg/m ³ (Specific Gravity)	1250
Hardness (Barcol)	38
Tensile Strength Mpa	69.01
Tensile Modulus GPa	3.1
Flexural Modulus GPa	3.288
Flexural Strength MPa	107.3
Impact Strength KJ/m ²	10
Flexural Modulus Gpa	3.13
Elongation at break %	5.89
Heat Distortion Temperature °C	79.1

Strict control of raw materials ensure an excellent and consistent quality to the product. All raw materials are sourced from carefully selected suppliers.



1. Grating Resin Types

Resin system	Resin Type	Description	Application
Vinyl ester	Type V	Superior chemical resistance, fire retardant, flame spread rating ASTM E84 Class 1,25 or less, operating temperature-50°C~110°C.	Can be used in the environments with aggressive chemicals.
High flame resistant vinyl ester	Type HV	Superior chemical resistance, enhanced fire retardancy, flame spread rating ASTM E84 Class 1,10 or less, operating temperature-50°C~110°C.In receipt of assessment from ABS(American Bureau of Shipping).	Can be used in the environments with aggressive chemicals requiring better flame resistance.
Isophthalic Polyester	Type I	Industrial grade chemical resistance and fire retardancy, flame spread rating ASTM E84 Class 1,25 or less, operating temperature -50°C~105°C.	Can be used in the environments of middle concentration inorganic acid, inorganic alkali etc.
Food grade polyester resin	Type F	Food grade chemical resistance and fire retardancy, operating temperature -50°C~105°C.	Often used in food plants or drinking water plants.
Orthophthalic polyester resin	Type O	Moderate chemical resistance and fire retardancy, flame spread rating ASTM E84 Class 1,25 or less, operating temperature -50°C-100°C.	Perfect for use in water/wastewater or air-aging application, light industrial applications and in the wave zone areas of offshore platforms where the environment is moderate. Although Type O is the least chemical resistant resin, it still offers superior performance to traditional flooring products such as steel, aluminum and wood and is the most economical resin available.
Phenolic resin	Type P	Low smoke and superior fire resistance, flame spread rating ASTM E84 Class 1,5 or less, smoke developed index, operates to 180°C.	Used in areas where fire resistance, low smoke and low toxic fumes are critical.

2. Fibreglass

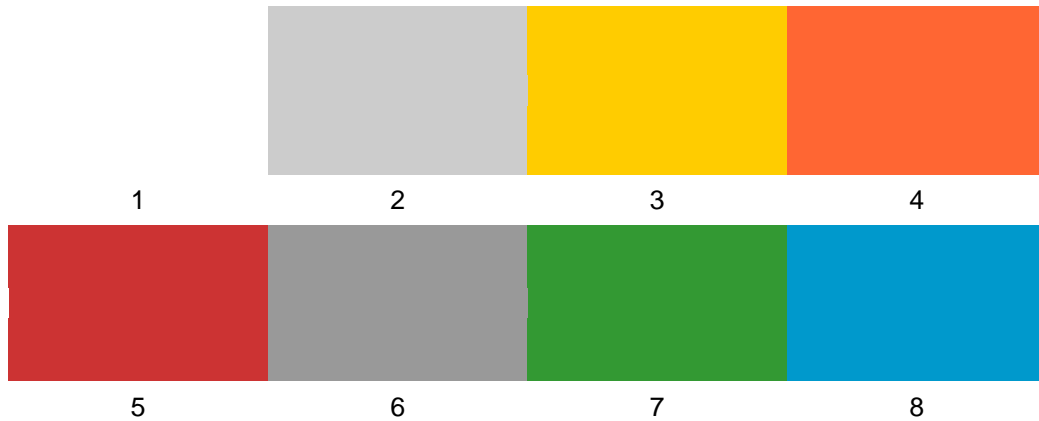
Constituent	Specification	Property	Application
E-glass	2400TEX OR 4800TEX	Excellent soaking ability ensures solid combination with resin, thus perfect physical property and anti-chemical property	For environments requiring high strength and chemical resistance
C-glass	2400TEX	Excellent soaking ability ensures solid combination with resin and good anti-acid property.	For environments without alkaline chemicals



Choice of colour

Gratings can be manufactured to any RAL colour specified. The moulded-in colour is achieved by a consistent mixing of pigment and resin. The fresh colours can enhance the working environment with great effect.

Colour samples for gratings



3. Surface Type Options

Covered

Smooth (flat), Gritted, Diamond (chequer-plate) pattern. The standard covering GRP plate is 3mm thick.

Micromesh

Micromesh (or minimesh) has one quarter of the opening of regular square mesh grating. The smaller opening prevents objects as small as 13mm from falling through. Also, because of this close spacing it offers smooth movement for small wheeled trolleys, wheel chairs, etc.

Conductive top

Specially formulated with a carbon black surface, eliminating hazardous static electricity when electrically grounded. Available with all resin types, conductive gratings are primarily used in the high-tech electronic industries, munitions manufacturing plants and other spark sensitive environments where sophisticated equipment may be damaged by static electricity. The specialised grating has an electrical resistance of less than 26 kilo-ohms per 300mm.

GRP stair treads and tread covers

GRP stair treads can be made from moulded grating,

Mesh size (typical): 38 x 38mm or 25 x 152mm
Standard width / length: 228mm, 367mm, 305mm / 762mm, 914mm

Tread covers use fibreglass fabric as reinforcement and are non-conductive, easy to install & light weight

Standard thickness: 3mm or 6mm

Smooth

Possessing the same characteristics as other GRP gratings but without an anti-slip surface. Widely used for decorative purposes or as shelves/packs, fencing. Heavier duty types for ballast panels

GRP plate

GRP plate is a composite of fibreglass fabric mat and resin.

Surface options: flat, gritted or diamond pattern
Standard thickness: 3mm, 5mm or 12mm



Size Specification

Depth (mm)	Mesh Size (mm)	Mould Size (mm)	Weight (kg/m ²)
13	50.7x50.7	3660x1220	5.0
15	38x38	3660x1220	6.5
	20x20/40x40	4047x1247, 4047x1007, 3007x1007, 2007x1007	10.5
20	38x38	3660x1220	9.2
25	38x38	1525x4007, 3660x1220, 3050x995,	12.3
	40x40	4047x1247, 4047x1007, 3007x1007, 2007x1007	12.2
	25x100	3007x1009	13.8
	25.4x101.6	3660x1220	13.1
	19X19/38X38	4007x1220, 3660x1220, 2440x1220, 3050x995	15.5
30	38x38	4007x1525, 3660x1220, 3050x1525, 3050x995	14.6
	40x40	4047x1247, 4047x1007, 3007x1007, 2007x1007	14.2
	20x20/40x40	4047x1247, 4047x1007, 3007x1007, 2007x1007	18.1
	12.6 ³ /38.1 ³	4040x1220	23.5
38	38x38	4006x1525, 3660x1220, 3050x1525, 3050x995	19.0
	40x40	4047x1247, 4047x1007, 3007x1007, 2007x1007	19.0
	25.4x152.4	3660x1220	21.4
	38.1x101.6	3660x1220	14.5
	20x20/40x40	4047x1247, 4047x1007, 3007x1007, 2007x1007	22.0
40	40x40	4047x1247, 4047x1007, 3007x1007, 2007x1007	20.0
	38x38	3969x1525, 1525x3050, 3660x1220, 3050x995,	20.0
	20x20/40x40	4047x1247, 4047x1007, 3007x1007, 2007x1007	23.7
50	50.7x50.7	3665x1225	21.5
	38x152	3660x1220	21.0
	38x38	3665x1225	42.0
63	38x38	3665x1225	52.0
P25	38x38	3660x1220, 3050x995	11.0
P30	38x38	3660x1220, 3050x995	13.5
P38	38x38	3660x1220, 3050x995	17.0
P50	50.7x50.7	3665x1225	20.0



Loading Data

Summary of load bearing capabilities is shown below. Further data are available on request.

Span(mm)	Mesh(mm)	Height (mm)	Concentrated Line Load kg/m @ 1% Deflection	Uniform Load kg/m ² @ 1% Deflection
305	38/38	25	572	10002
	25/100	25	1016	NR
	40/40	25	506	8848
	19/19	25	690	NR
	38/38	30	982	NR
	40/40	30	880	NR
	20/20	30	1080	18885
	38/38	38	1456	NR
	40/40	38	1334	NR
	25/152	38	2186	NR
20/20	38	1690	NR	
457	38/38	25	252	2941
	25/100	25	410	4785
	40/40	25	240	2801
	19/19	25	318	3711
	38/38	30	430	5018
	40/40	30	390	4551
	20/20	30	546	6372
	38/38	38	800	9336
	40/40	38	760	8869
	25/152	38	1220	14238
	20/20	38	936	10923
50/50	50	1556	NR	
610	38/38	25	144	1259
	25/100	25	228	1993
	40/40	25	140	1224
	19/19	25	184	1609
	38/38	30	252	2203
	40/40	30	212	1854
	20/20	30	300	2623
	38/38	38	460	4022
	40/40	38	440	3847
	25/152	38	680	5945
	20/20	38	560	4896
	50/50	50	896	7834
38/38	60	3112	NR	
914	38/38	25	62	362
	25/100	25	102	595
	40/40	25	60	350
	19/19	25	80	467
	38/38	30	120	700
	40/40	30	96	560
	20/20	30	150	875
	38/38	38	204	1190
	40/40	38	190	1109
	25/152	38	306	1786
	20/20	38	250	1459
	50/50	50	418	2439
38/38	60	1452	8473	
1219	38/38	38	118	516
	40/40	38	108	473
				cont.



	Mesh(mm)	Height (mm)	Concentrated Line Load kg/m @ 1% Deflection	Uniform Load kg/m ² @ 1% Deflection
	25/152	38	174	761
	20/20	38	136	595
	50/50	50	240	1050
	38/38	60	832	3640
1372	50/50	50	188	731
	38/38	60	654	2542
1524	38/38	60	528	1848



Chemical Resistance

Standard gratings are not recommended for continued exposure to high concentrations of acids & alkalis and some solvents. Further details are available on request. Please check before specifying into highly aggressive environments, where an alternative resin based product may need to be utilised.

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Substance	Type V		Type I		Type O	
	Concentration %	Temperature F/°C	Concentration %	Temperature F/°C	Concentration %	Temperature F/°C
Acetic Acid	50	180/82	50	125/52	5	77/25
Aluminium Hydroxide	100	180/82	100	160/71	ALL	-
Ammonium Chloride	ALL	210/99	ALL	170/77	ALL	-
Ammonium Bicarbonate	50	160/70	15	125/52	ALL	-
Methacrylic Acid	99	95/35	-	-	-	-
Ammonium Hydroxide	28	100/38	28	N/R	ALL	N/R
Ammonium Sulphate	ALL	210/99	ALL	170/77	ALL	-
Benzene	100	92/40	ALL	N/R	ALL	N/R
Benzoic Acid	SAT	210/99	SAT	150/66	ALL	77/25
Borax	SAT	210/99	SAT	170/77	SAT	113/45
Calcium Carbide	ALL	180/82	ALL	170/77	ALL	-
Calcium Nitrate	ALL	210/99	ALL	180/82	ALL	-
Carbon Tetrachloride	100	92/40	100	N/R	100	N/R
Chlorine, Dry Gas	-	210/99	-	140/60	-	N/R
Chlorine Water	SAT	200/93	SAT	80/27	SAT	N/R
Chromic Acid	10	150/65	5	70/21	5	N/R
Citric Acid	ALL	210/99	ALL	170/77	ALL	77/25
Calcium Chloride	ALL	210/99	ALL	170/77	ALL	104/40
Copper Cyanide	ALL	210/99	ALL	170/77	ALL	77/25
Copper Nitrate	ALL	210/99	ALL	170/77	ALL	-
Ethanol	10	155/82	50	75/24	10	77/25
Ethylene Glycol	100	200/93	100	90/32	100	104/40
Hydrofluoric Acid	10	149/65	-	-	-	-
Ferric Chloride	ALL	210/99	ALL	170/77	ALL	104/40
Ferrous Chloride	ALL	210/99	ALL	170/77	ALL	86/30
Formaldehyde	37	140/60	50	75/24	25	86/30
Gasoline	100	180/82	100	75/24	100	95/35
Glucose	100	210/99	100	170/77	ALL	-



Substance	Type V		Type I		Type O	
	Concentration %	Temperature F/°C	Concentration %	Temperature F/°C	Concentration %	Temperature F/°C
Glycerine	100	210/99	100	150/66	100	-
Hydrobromic Acid	50	150/65	50	120/49	18	-
Hydrochloric Acid	37	150/65	37	75/24	10	86/30
Hydrogen Peroxide	30	150/65	5	100/38	5	N/R
Lactic Acid	ALL	210/99	ALL	170/77	ALL	77/25
Lithium Chloride	SAT	210/99	SAT	150/66	ALL	-
Magnesium Chloride	ALL	210/99	ALL	170/77	ALL	104/40
Magnesium Nitrate	ALL	210/99	ALL	140/60	ALL	86/30
Magnesium Sulphate	ALL	210/99	ALL	170/77	ALL	104/40
Mercuric Chloride	100	210/99	100	150/66	100	104/40
Mercurous Chloride	ALL	210/99	ALL	140/60	ALL	104/40
Nickel Chloride	ALL	210/99	ALL	170/77	ALL	104/40
Nickel Sulphate	ALL	210/99	ALL	170/77	ALL	104/40
Nitric Acid	20	130/54	20	70/21	20	N/R
Oxalic Acid	ALL	210/99	ALL	75/24	ALL	N/R
Perchloric Acid	30	100/38	10	N/R	10	N/R
Phosphoric Acid	100	210/99	100	120/49	80	N/R
Potassium Chloride	ALL	210/99	ALL	170/77	ALL	104/40
Potassium Dichromate	ALL	210/99	ALL	170/77	ALL	77/25
Potassium Nitrate	ALL	210/99	ALL	170/77	ALL	104/40
Propylene Glycol	ALL	210/99	ALL	170/77	ALL	104/40
Sodium Acetate	ALL	210/99	ALL	160/71	ALL	104/40
Sodium Bisulphate	ALL	210/99	ALL	170/77	ALL	-
Sodium Bromide	ALL	210/99	ALL	170/77	5	-
Sodium Cyanide	ALL	210/99	ALL	170/77	5	N/R
Sodium Hydroxide	25	180/82	N/R	N/R	N/R	N/R
Sodium Nitrate	ALL	210/99	ALL	170/77	ALL	104/40



Substance	Type V		Type I		Type O	
	Concentration %	Temperature F/°C	Concentration %	Temperature F/°C	Concentration %	Temperature F/°C
Sodium Sulphate	ALL	210/99	ALL	170/77	ALL	104/40
Stannic Chloride	ALL	210/99	ALL	160/71	ALL	104/40
Sulphuric Acid	50	183/80	25	75/24	10	-
Tartaric Acid	ALL	210/99	ALL	170/77	ALL	-
Vinegar	100	210/99	100	170/77	ALL	-
Methanol	10	183/84	N/R	N/R	N/R	N/R
Sea Water	ALL	210/99	ALL	158/70	ALL	113/45
Water, Distilled	100	180/82	100	170/77	ALL	86/30
Zinc Nitrate	ALL	210/99	ALL	170/77	ALL	104/40
Zinc Sulphate	ALL	210/99	ALL	170/77	ALL	104/40

Operating Temperature Range

The material exhibits a wide operating temperature range typically Minimum **-50°C** to **Maximum +100°C**

Fire Resistance

Manufactured and tested with fire resistant properties in accordance with American Standard **ASTM E-84**

Vinylester, Isophthalic and Orthophthalic: Class 1, 25 or less

High Flame Resistant Vinylester: Class 1, 10 or less

Phenolic: Class 1, 5 or less

Anti-slip Certification

On testing, all grating surface types present a 'Low' or 'Extremely Low' risk of slip in either dry or wet conditions. A full set of results for tests conducted by the Health & Safety Laboratory are available on request.

Dimensional Tolerances

Manufacturing Tolerances:

Standard Panel Size: +1mm -1mm
 Cut Panel Size: +2mm -2mm
 Thickness: +1mm -1mm
 Mesh Pattern: +0.5mm -0.5mm



Mechanical & Electrical Properties

Characteristic	Value	Test Standard
Tensile Strength	411Mpa	ASTM D-638
Tensile Modulus	24.2Gpa	ASTM D-638
Flexural Strength	763Mpa	ASTM D-790
Flexural Modulus	18.5Gpa	ASTM D-790
Compressive Strength	451Mpa	ASTM D-695
Compressive Modulus	23.3Gpa	ASTM D-695
Flame Spread Index	10	ASTM E-84
Water Absorption	0.279%	ASTM D-570
Surface Resistivity	$1.4 \times 10^{10} \Omega$	ASTM D-257
Axial Dielectric Strength	9.7kV/mm	ASTM D-149
Warp Dielectric Strength	1.384kV/mm	ASTM D-149
Relative Permittivity	3.97	ASTM D-150
Dielectric Dissipation Factor	0.028	ASTM D-150
Barcol Hardness	48	ASTM D-2583

Service Life, Routine & Maintenance Inspections

GRP gratings carry a design life in excess of 25 years. GRP materials have already proven successful in building and constructions for 50+ years, with no discernable degradation in performance. Some minor fading of colour may take place over time where the product is continually exposed to sunlight.

Unless the product is subject to conditions outside of the design criteria, no routine inspection of the material would be required. Simple cleaning with a brush & mild detergent solution will restore appearance.

Cutting/Process and Installation of Grating

Evergrip gratings can be easily cut to size for installation with no requirement for hot-work permits. Tools used may include diamond tipped blades and tungsten carbide tipped drill bits/tools.

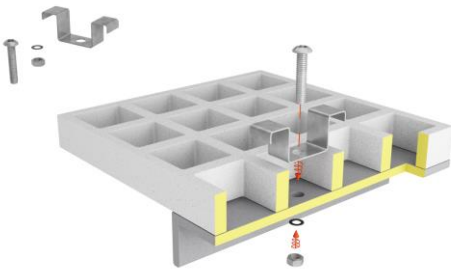
Before final installation, all cut and processed parts should be sealed with a polyester topcoat or other suitable sealant to ensure continued chemical resistance.

Fastener Range

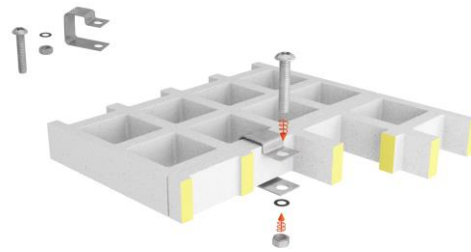
A comprehensive range of fasteners to suit all common installation requirements are available from stock:



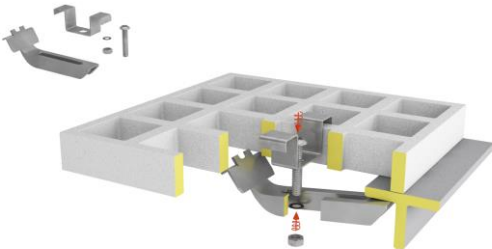
Standard Clips



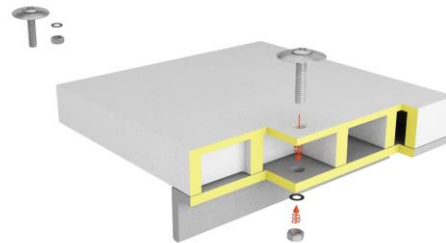
Type: M



Type: G (or C)



Type: J



Type: Disc Top Fix

Common types of standard clip made in 316 stainless steel used for fixing grating panels are shown above.

Type M

Hold down clips designed to fix grating onto a support structure & prevent it from turning

Type G (or C)

Applied to connect two adjacent grating bars

Type J

For use in securing grating to support frames

Type Disc Top Fix

To secure solid top gratings to supporting structure. Hidden fix systems are also available leaving a plain surface finish



Disposal & Environmental Considerations

GRP is an inert product. Scrap and waste material should be disposed of in approved landfill facilities adhering to local regulatory handling and documentation requirements. The material presents no special hazard to the environment. Research is currently underway to investigate recycling opportunities for end of life materials. Other countries within the European Union are utilising the material in the manufacture of cement products.

Handling, Re-working & Machining of GRP Materials - COSHH Advisory Notes

Operators should ensure that correct manual handling techniques are adhered to when lifting & moving products to prevent personal injury.

General guidelines are issued when cutting or machining GRP products with power tools. The material produces a non-toxic, biologically inert dust. The dust levels should be kept as low as is reasonably practicable and must not exceed the Occupational Exposure Limit of 10mg/m³ total inhalable dust and 4mg/m³ respirable dust – 8 hour TWA value.

When working out of doors, it is unlikely that these levels will be reached. When working indoors or in confined spaces, adequate ventilation should be provided and when extensive operations are necessary, suitable dust extraction should be provided. Operators should wear suitable dust masks & goggles.

In isolated cases, GRP dust may cause slight, transient skin irritation. Should these effects be prolonged or should any signs of a rash occur, medical advice should be sought. All exposed skin should be thoroughly washed with soap and water. Any eye contamination should be washed out with copious amounts of bottled sterile water or fresh clean water.

Do not smoke, eat or drink in working areas.

The above information is correct at the time of printing but does not purport to be comprehensive and as such should be used as guidance only. Evergrip Limited shall not be held liable for any damages resulting from use of this product or from handling or contact with the product, nor for any damages directly or indirectly resulting from inaccuracies in the data provided.