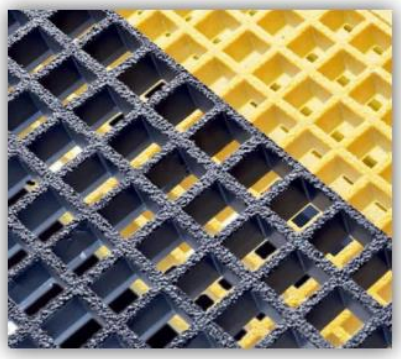
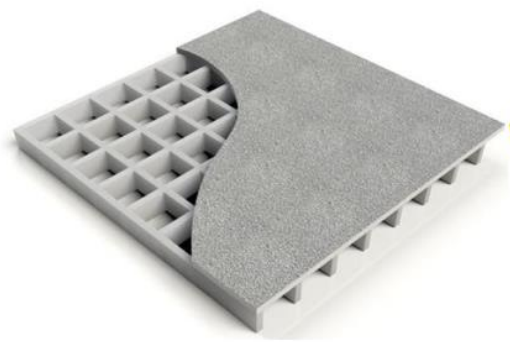
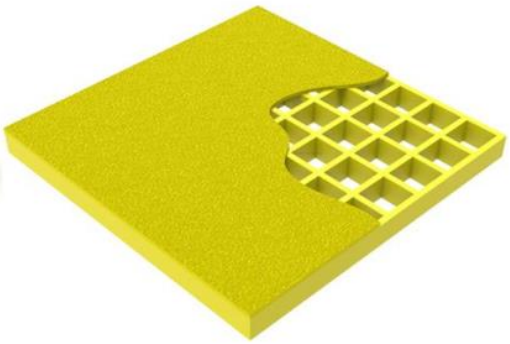
STRATIS

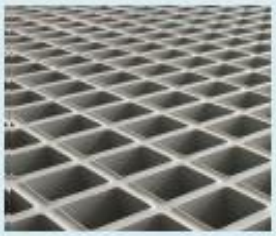
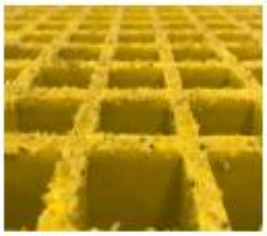
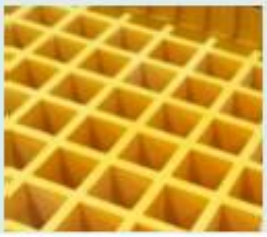
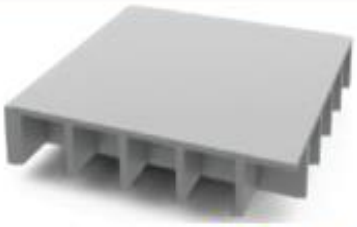
SHIP SUPPLIES







FRP MOLDED GRATINGS

Grating with Concave Surface		
Grating with Sanded Surface		
Grating with Smooth Surface		
Covered Grating with Chequered Plate Effect Surface		
Covered Grating with Sanded Surface		
Covered Grating with Smooth Surface		

FRP Molded Gratings can be produced in desired colors due to the pigments used.

PRODUCT DESCRIPTION

FRP is a composite material that is reinforced with glass fiber and consists of a polyester or vinyl ester matrix resin with high physical and chemical resistance values. FRP Molded Gratings are produced with open, heated mold system and wet lamination technique with continuous glass fiber, resin chemical additives and pigment. Molded gratings are removed from the mold after the heating and cooling processes. Due to content, FRP Molded Gratings are light, anti-corrosive, dielectric materials with high chemical and mechanical strength. FRP Molded Gratings are produced in various resin systems, colors and different surface types to meet specific project requirements.

CONTENT

Main components of FRP Molded Gratings are glass fiber, resin, chemical additives and pigment. By changing one or more of these components, grating production can be made in accordance with the ambient conditions.

- **Resin:** The resin used in FRP molded gratings gives the material high properties such as high chemical resistance, flexibility and UV resistance. Different resin types can be used in accordance with the ambient conditions in which the material will be used.
- **Glass fiberr:** Multi-layered and continuous glass fiber is used in FRP molded gratings. With the glass fibers used, the grids have high physical strength.
- **Chemical Additives:** In addition to the chemicals used for the reaction, chemical additives such as UV stabilizer, flame retardant and smoke density reducer are used to improve the physical and chemical properties of FRP Molded Gratings.
- **Pigment:** FRP Molded Gratings can be produced in desired colors thanks to the pigments used in the resin. By this means, it can be easily used in architectural projects by producing the desired colors.

PRODUCTION PROCESS

FRP Molded Grating is produced in an open, heated mold system. Continuous E-glasses are placed in the mold in alternating layers and completely wetted with resin. This continuous process provides excellent corrosion resistance. FRP Molded Gratings provide high bidirectional strength in both transverse and longitudinal use of the panels thanks to fiber layers and fiber placement in alternating layers. FRP Molded Gratings are produced using different resins for use in different chemical environments (See FRP Molded Grating Chemical Resistance Guide). By this means, it provides usage area in different sectors. It is much lighter and easily processable than similar metal cast gratings. Due to the high resin content, it requires optimum chemical resistance and minimum maintenance.(See FRP Molded - Hot Dip Galvanized - Stainless Steel Grating Comparison Table).We have a variety of molds available, resulting in a wide range of panel sizes, thickness, and mesh patterns.

COMPARISON TABLE OF STANDARD RESIN SYSTEMS

	Chemical Resistance	Flame Retardancy	Low Smoke	Free Halogen	Temperature Performance	Flame Spread Rating ASTM E84
O-Series Orthophthalic Polyester	★★★	★★★★	—	—	★★★	Class 1, FSI≤25
I-Series Isophthalic Polyester	★★★★★	★★★★★	—	—	★★★★	Class 1, FSI≤25
V-Series Vinylester Polyester	★★★★★	★★★★★	—	—	★★★★★	Class 1, FSI≤25

FRP MOLDED GRATING CHEMICAL RESISTANCE GUIDE

Chemical Environment	% Concn.	Orthophthalic Polyester (ORTHO)	Isophthalic Polyester (ISO)	Vinylester Polyester (VINYL)
		Max. Service Temperatures (°C)		
Acetic Acid	0-25	25	35	95
Acetic Acid	25-50	*	25	80
Acetone	10	20	*	*
Aluminium Chloride	Saturated	45	50	100
Ammonium Chloride	>0,5	45	50	100
Ammonium Citrate	>0,5	40	45	65
Ammonium Hydroxide	0,5-5	*	25	80
Ammonium Nitrate	Saturated	40	45	90
Ammonium Sulfate	Saturated	45	50	100
Barium Chloride	>0,5	50	45	100
Beer	>0,5	*	55	50
Benzene	100	*	*	*
Benzene	(Vapor)	*	*	*
Benzoic Acid	Saturated	50	50	100
Benzyl Achocol	100	25	25	*
Boric Acid	>0,5	50	50	90
Cadmium Cyanide	All	*	*	80
Cadmium Cyanide	All	*	*	80
Calcium Bisulfite	>0,5	40	45	90
Calsium Hydroxide	100	20	35	80
Calsium Nitrate	>0,5	50	50	100
Calsium Oxide	All	*	*	80
Calsium Sulphate	All	50	50	95
Carbon Tetrachloride	100	20	25	*
Carbondioxide (Gas)	All	50	50	65
Carbonic Acid	Saturated	50	50	80
Carbonmonoxide (Gas)	All	75	70	80
Castor Oil	100	75	70	70
Chloride Water	Saturated	*	25	100
Detergens (Organic)	All	-	-	70
Deterjan (Sulfonated)		45	45	90
Diezel Fuel	100	35	30	80
Dipropylene Glycol	100	50	55	80
Ethyl Alchocol	10	30	30	50
Ethyl Alchocol	50	20	25	40
Ethyl Alchocol	100	20	25	*
Ethylene Glycol	100	20	35	90
Ferrous Chloride	>0,5	40	45	95
Ferrous Nitrate	>0,5	40	45	95
Ferrous Sulfate	>0,5	40	45	95
Flue Gas (Wet)	All	*	45	90

(*) Not Recommended

FRP MOLDED GRATING CHEMICAL RESISTANCE GUIDE

Chemical Environment	% Concn.	Orthophthalic Polyester (ORTHO)	Isophthalic Polyester (ISO)	Vinylester Polyester (VINYL)
		Max. Service Temperatures (°C)		
Fluosilicic Acid	11-20	*	*	50
Formaldehyde		-	-	50
Formic Acid	10	25	35	80
Gasoline	100	*	*	45
Glucose	100	-	60	100
Heptane	100	30	25	80
Hydrogen Peroxide	5	-	-	65
Hydrogen Peroxide	30	-	-	40
Hydrogen Sulfide	5	55	60	100
Jet Fuel	100	*	*	*
Kerosene	100	40	30	80
Lactic Acid	All	50	55	100
Magnesium Bicarbonate	All	30	40	80
Magnezyum Sülfat	>0,5	45	50	95
Maleic Asid	Saturated	45	45	90
Mercury	100	55	60	100
Methyl Alchocol	40-100	30	25	*
Milk and Milk Products	All	25	28	70
Naphta, Aromatic	100	30	25	*
Naphthalene	100	45	40	80
Nickel Chloride	>0,5	50	50	90
Nickel Nitrate	>0,5	50	50	90
Nickel Plating Solution		45	45	80
Nickel Sulfate	>0,5	50	0	90
Nitric Asid	0-5	45	45	65
Nitric Asid	6-10	-	-	-
Nitric Asid	11-20	40	25	50
Nitric Asid	21-29	-	-	-
Nitric Asid	30-35	*	*	40
Nitric Asid	36-40	*	*	*
Oleic Asid	100	50	50	100
Perchloric Asid	10	*	20	65
Perchloric Asid	30	*	*	40
Phosphoric Acid	0,5-85	50	50	90
Phthalic Acid	All	45	45	100
Potassium Carbonate	0-50	*	*	65
Potassium Chloride	>0,5	50	45	90
Potassium Ferricyanide	>0,5	50	45	90
Potassium Hydroxide	0-45	*	*	45
Potassium Permanganate	>0,5	*	*	90
Potassium Sulfate	>0,5	50	45	90

(*) Not Recommended

FRP MOLDED GRATING CHEMICAL RESISTANCE GUIDE

Chemical Environment	% Concn.	Orthophthalic Polyester (ORTHO)	Isophthalic Polyester (ISO)	Vinylester Polyester (VINYL)
		Max. Service Temperatures (°C)		
See Water		45	50	100
Sodium Hypochlorite	0,5-5,25	*	*	50
Sodium Acetate	>0,5	50	50	100
Sodium Bicarbonate	All	50	50	100
Sodium Bisulfate	>0,5	50	50	100
Sodium Carbonate	All	*	*	70
Sodium Chloride	>0,5	50	50	100
Sodium Chlorite	>0,5	50	50	100
Sodium Ferricyanide	>0,5	50	45	100
Sodium Hydroxide	All	*	*	60
Sodium Hydroxide	All	*	*	60
Sodium Sulfate	>0,5	50	45	100
Sodium Sulfide	>0,5	50	50	100
Sodium Tiyosülfat	All	45	50	80
Stannous Chloride	>0,5	50	50	100
Stiren	100	*	*	*
Sulphuric Acid	0,5-25	50	60	90
Sulphuric Acid	26-50	60	60	80
Sulphuric Acid	51-70	*	*	80
Sulphuric Acid	>0,5	50	50	*
Tannic Acid	>0,5	50	50	100
Toluene	100	*	*	*
Urea	All	-	-	65
Vegetable Oils	100	40	50	95
Water (Demineralized)	100	45	45	80
Water (Distilled)	100	45	45	80
Water (Deionized)	100	45	45	80
Xylene	100	30	*	25
Zinc Chloride	Saturated	50	50	100
Zinc Sulfade	All	50	50	100

(*) Not Recommended

SAMPLE APPLICATIONS

FRP MouldedGrating systems are designed to accommodate a wide variety of applications. Such as;

- General Industry
- Chemical Plants
- Food and Beverage Operations
- Water/Wastewater Treatment Facilities
- Industrial walkways, work platforms and stair treads
- Shipbuilding Industry and the Marine Industry
- Power Plants
- Pulp and Paper Plants
- Transportation (Railroad etc.)
- Architectural Applications
- Drainage Channel Applications
- Agriculture & Animal Husbandry Applications





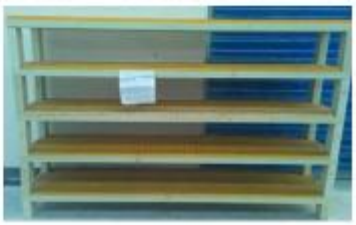










SAMPLE APPLICATIONS

ADVANTAGES

There is no scrap value. Since it is made of non-recyclable material, there is no risk of stealing.

FRP Gratings have high chemical resistance. It is suitable for areas that will be exposed to chemical corrosion.

It is much lighter compared to metal gratings. It also provides ease of transportation and assembly due to its lightness.

The combustion characteristics of FRP gratings can be changed with special type resin and chemical additives. In this way, flame retardant characteristics can be gained.

It is used for many years with zero maintenance costs. It can be easily cleaned with pressurized water. Since the color is given during the production phase, the paint does not create maintenance costs.

One of the most important features of FRP Gratings is corrosion resistance. Thanks to its superior resin systems, it has a wide range of use in many areas subject to corrosion.

It is UV resistant, so its color does not fade in the face of sunlight.

One of the properties of composite materials is flexibility. Therefore, it does not cause noise pollution during passage of vehicles compared to metal gratings.

FRP gratings have high impact resistance thanks to the high ratio of glass fiber it contains. It has one of the highest strength / weight ratios compared to its alternatives.

Concave and sandy surface gratings feature anti-slip feature. It is preferred in applications with oily and wet floors and in places where work safety is important.

Composite materials have low thermal conductivity coefficients. Therefore, FRP Gratings are thermal insulators.

FRP gratings do not conduct electricity. It is primarily preferred in environments requiring electrical insulation and in areas requiring high work safety.

FRP gratings are flexible materials. It provides high strength thanks to its flexibility against heavy loads and machines. Unlike steel, when it is forced to change shape, it returns to its original shape.

It is not affected by temperature differences, it is resistant to temperature changes. There will be no change in its dimensions depending on time and temperature.

FRP Gratings are more durable compared to their alternatives thanks to their superior physical and chemical properties.

Since the resin is colored during the production phase, it is self-colored. It can be produced in desired colors.

RAW MATERIALS DATA

Material Properties	Glassfiber Rovings	Resin
Hardness (Barcol)	45	70-80
Tensile Strength (Mpa)	1950-2200	60-70
Modulus of Elasticity (Gpa)	60-75	4-5
Flexural Strength (Mpa)	190	130-150
Density (g/cm3)	2.6	1.12
Max Operating Temperatures (˚C)	200	140
Water Absorbtion (%)	-	0.1

PRODUCT DATA

Description:	High performance composite grating system
Top finish:	Standard, grit top, concave top, plain top, embedded grit and covered top
Thicknesses:	25mm, 30mm, 38mm, 50 mm
Panel Sizes:	See enclosed list
Mesh Patterns:	See enclosed list
Chemical Resistance:	See enclosed list
UV Info:	All grating panels have a UV inhibitor added to the polyester resin mix
Panel Tolerances:	+/- 2mm width, length and diagonal
Cut Panel Tolerances:	+/- 4mm width, length and diagonal (if dimension falls on a load bar, cut will either be before or after the load bar, so tolerance could be larger
Mesh Pattern Tolerance:	+/- 1.5mm (outside load bars are approx. 1mm larger)
Service Temperatures:	50 to 105°c
Breakdown Voltage :	18 kV
Surface Resistance:	10^{12} ohm
Load Capabilities:	See enclosed list
Design Life:	25+ years (subject to traffic analysis). However GRP materials have been in the construction industry for 50+ years with no discernable degradation in performance
General Usage:	Standard pedestrian traffic, vehicular traffic, static items
Other Info:	Made via heated hydraulic mould system

FRP GRATING TYPES

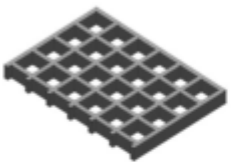
1) Standart Mesh FRP Molded Gratings

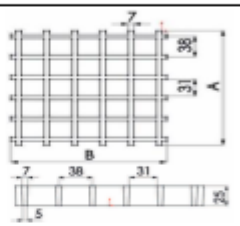
Our FRP Molded Grating Standard Mesh gratings are manufactured in 25 mm, 30 mm, 38 mm and 50 mm thicknesses as concave, sandy and flat surface in accordance with customer demand.FRP Molded Gratings are lightweight, durable and non-corrosive and can be supplied with a wide variety of stainless steel clips, clamps and holding fixtures to suit any situation.

FRP Molded Grating shows maximum working performance by showing high slip resistance in wet areas and continuously working with water. FRP gratings compared to other alternative products such as metal gratings, it provides the advantage of long-term use thanks to its outstanding slip resistance and corrosion resistance.

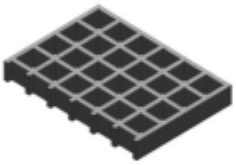
GRATING SPECIFICATIONS/TYPES

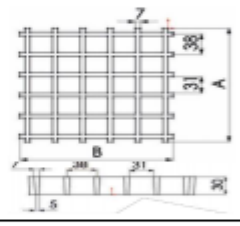
Grating Size:	38x38
Panel Depth:	25
Load Bar Thickness:	7
Open Area:	68%
Approx. Weight:	12.5 kg/sq.m
Panel Sizes:	1000 x 4040



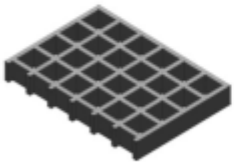


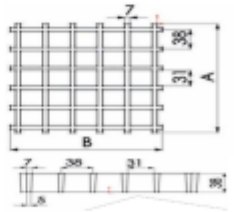
Grating Size:	38x38
Panel Depth:	30
Load Bar Thickness:	7
Open Area:	68%
Approx. Weight:	15.6 kg/sq.m
Panel Sizes:	1000 x 4040



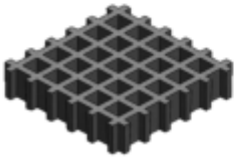


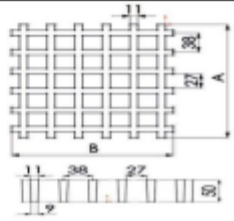
Grating Size:	38x38
Panel Depth:	38
Load Bar Thickness:	7
Open Area:	68%
Approx. Weight:	19.5 kg/sq.m
Panel Sizes:	1000 x 4040 1220 x 3660





Grating Size:	38x38
Panel Depth:	50
Load Bar Thickness:	11
Open Area:	56%
Approx. Weight:	31 kg/sq.m
Panel Sizes:	1000 x 4040





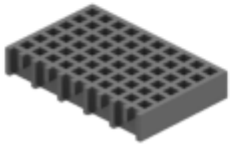
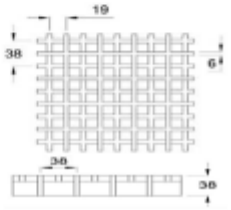
FRP GRATING TYPES

2) Mini Mesh FRP Molded Gratings

Our FRP Molded Mini Mesh Gratings have all the features of our Standard Mesh Gratings. Mini Mesh gratings have a smaller opening area and thanks to this feature, they prevent small objects such as screws, nuts and bolts from falling during operation. It also complies with the max 20 mm width rule for pedestrian walkways, wheelchairs, prams and other wheelbarrows. It is suitable for use in municipal parks, various walkways, bridges, piers and poolside. Mini Mesh FRP Our Mini Mesh GRP Gratings comply with ADA (Americans with Disabilities Act) standards. As with all our gratings, they can be supplied with a wide variety of galvanized steel clips, clamps and holding fixtures to suit any situation.

ADA: Americans with Disabilities Act. *ADA is a civil rights law designed to prevent the restriction of the freedom of persons with disabilities in all common areas of public life, including workplaces, schools, transportation and all open public and private places. It has determined the necessary rules and conditions to keep the comfort of going up and down with walking sticks / crutches, wheelchairs, etc.*

GRATING SPECIFICATIONS/TYPES

Grating Size:	38x38		
Panel Depth:	25		
Load Bar Thickness:	7		
Open Area:	42%		
Approx. Weight:	12.5 kg/sq.m		
Panel Sizes:	1000 x 4040		

FRP GRATING TYPES

3) Covered Type FRP Molded Gratings

Covered type FRP Molded Gratings are produced by combining one side or both sides smooth, sanded or patterned composite panel with smooth surface gratings. The combined standard composite plate thickness is at least 3 mm. Due to the nature of the manufacturing process, covered gratings are often slightly warped. As a result of this, covered gratings may rock and pose a trip hazard if they are not secured with the appropriate hold down clips. We recommend hold down clips for all covered grating applications.

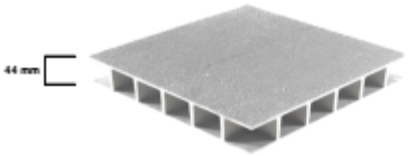
Covered gratings are preferred in environments where open cells are not desired in gratings.For example gratings are suitable for use in cable channel covers and walkways because they are completely closed. In addition, they are used in walking paths and platforms at construction sites, lakesides, factorie areas and sandy, muddy, slippery places to create a safe working area. Due to the closed upper surfaces, their strength is also increased compared to open grating types.

Depth:	**28**
Grating Size:	**38x38**
Approx. Weight:	**16.5 kg/sq.m**

Depth:	**41**
Grating Size:	**38x38**
Approx. Weight:	**22 kg/sq.m**

Depth:	**53**
Grating Size:	**38x38**
Approx. Weight:	**34 kg/sq.m**

Depth:	**44**
Grating Size:	**38x38**
Approx. Weight:	**25 kg/sq.m**



FRP Molded Grating Surface Types

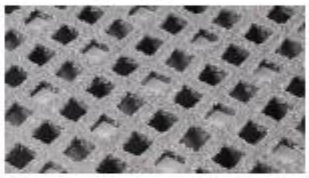
FRP molded gratings are produced as part of the production process in the concave surface type. It can be manufactured in various sizes and colors as coarse / fine sand, smooth surface and closed according to surface characteristics, customer demand or application point requirement.

Grating with Concave Surface

It is the most common and standard surface type among FRP molded gratings. The grating cross section is concave. It is suitable for use in many environments, including wet and oily conditions.

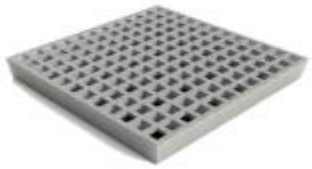

Grating with Sanded Surface

Grating with Sanded Surface are more preferred in cases where extra anti-slip is required. Grating with Concave Surface and Grating with Smooth Surface are obtained by coating with binder resin with sand. These types of gratings have higher shear resistance. The cleanability of the grating is limited in environments where oily substances are used.

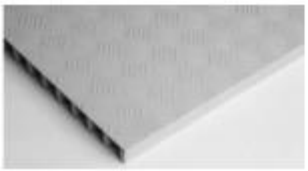

Grating with Smooth Surface

Flat Surface Gratings are obtained by processing the Concave Grating surfaces and making them flat and smooth, while Covered Type Flat Surface Gratings are obtained by combining the flat surface gratings with the flat surface composite plate. They are generally used for decoration. For example, flat surface gratings can be applied in facade railings, cover panels and architectural decorative applications.


Covered Grating with Chequered Plate Effect Surface

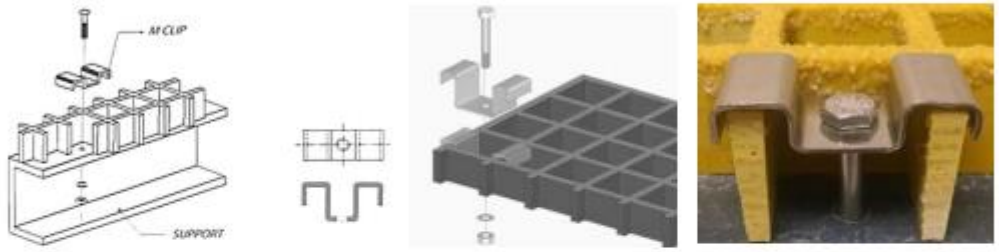
It is obtained by combining the upper part of the Flat Surface Standard Mesh or Mini Mesh GRP Molded Grid with a Chequered Plate Effect Surface.



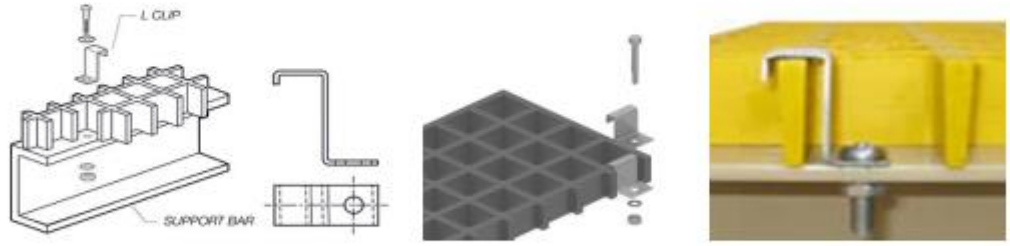
Fasteners

Fasteners are necessary auxiliary equipment for FRP Grating Platform assemblies. They are used to combine FRP gratings and to be fixed to the carrier construction on or inside the gratings. It is specially designed for gratings used in areas where pedestrians can walk. In areas where there is a risk of falling, gratings should be fixed at least on four corners. All fasteners require maintenance and their effectiveness should be checked regularly. Galvanized fittings are preferred in order to increase the resistance in terms of corrosion, weather conditions and other factors.
M Type fastener is more preferred. However, upon request, our FRP Gratings can also be supplied with L Type and C Type fasteners.

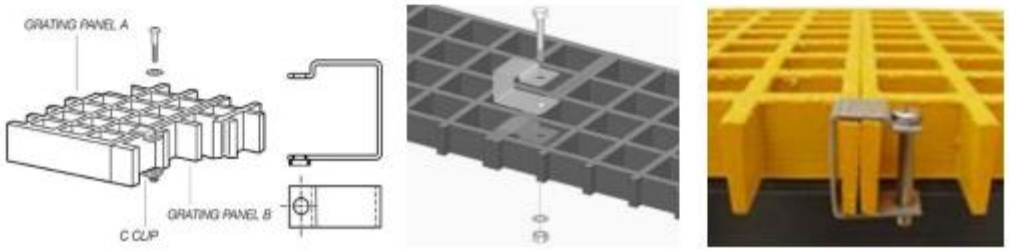
M Type Metal Clips



L Type Metal Clips



C Type Metal Clips



LOAD CAPACITY TABLE

Grating Type	 Openings *mm*	 Point Load *F (kg)*	 Ultimate Load *x F*	 Distributed Load *q (kg/m2)*	 Ultimate Load *x q*
38x38 H25 mm	300	1000	2 x F	5190	3 x q
38x38 H30 mm		1700		9250	
38x38 H38 mm		3510		18500	
38x38 H50 mm		13400		71850	
19x19 / 38x38 H38 mm		3570		19040	
38x38 H25 mm	450	450	3 x F	1550	4 x q
38x38 H30 mm		750		2700	
38x38 H38 mm		1500		5450	
38x38 H50 mm		5950		21150	
19x19 / 38x38 H38 mm		1570		5600	
38x38 H25 mm	600	255	4 x F	655	5 x q
38x38 H30 mm		425		1160	
38x38 H38 mm		875		2325	
38x38 H50 mm		3325		8800	
19x19 / 38x38 H38 mm		880		2350	
38x38 H25 mm	750	150	5 x F	345	7 x q
38x38 H30 mm		270		580	
38x38 H38 mm		550		1180	
38x38 H50 mm		2100		4500	
19x19 / 38x38 H38 mm		564		1200	
38x38 H25 mm	900	105	6 x F	197	8 x q
38x38 H30 mm		190		341	
38x38 H38 mm		380		680	
38x38 H50 mm		1475		2630	
19x19 / 38x38 H38 mm		391		695	
38x38 H25 mm	1000	85	7x F	140	9 x q
38x38 H30 mm		150		240	
38x38 H38 mm		305		500	
38x38 H50 mm		1190		1915	
19x19 / 38x38 H38 mm		316		505	
38x38 H25 mm	1200	60	8 x F	80	10 x q
38x38 H30 mm		101		140	
38x38 H38 mm		219		295	
38x38 H50 mm		829		1100	
19x19 / 38x38 H38 mm		219		290	