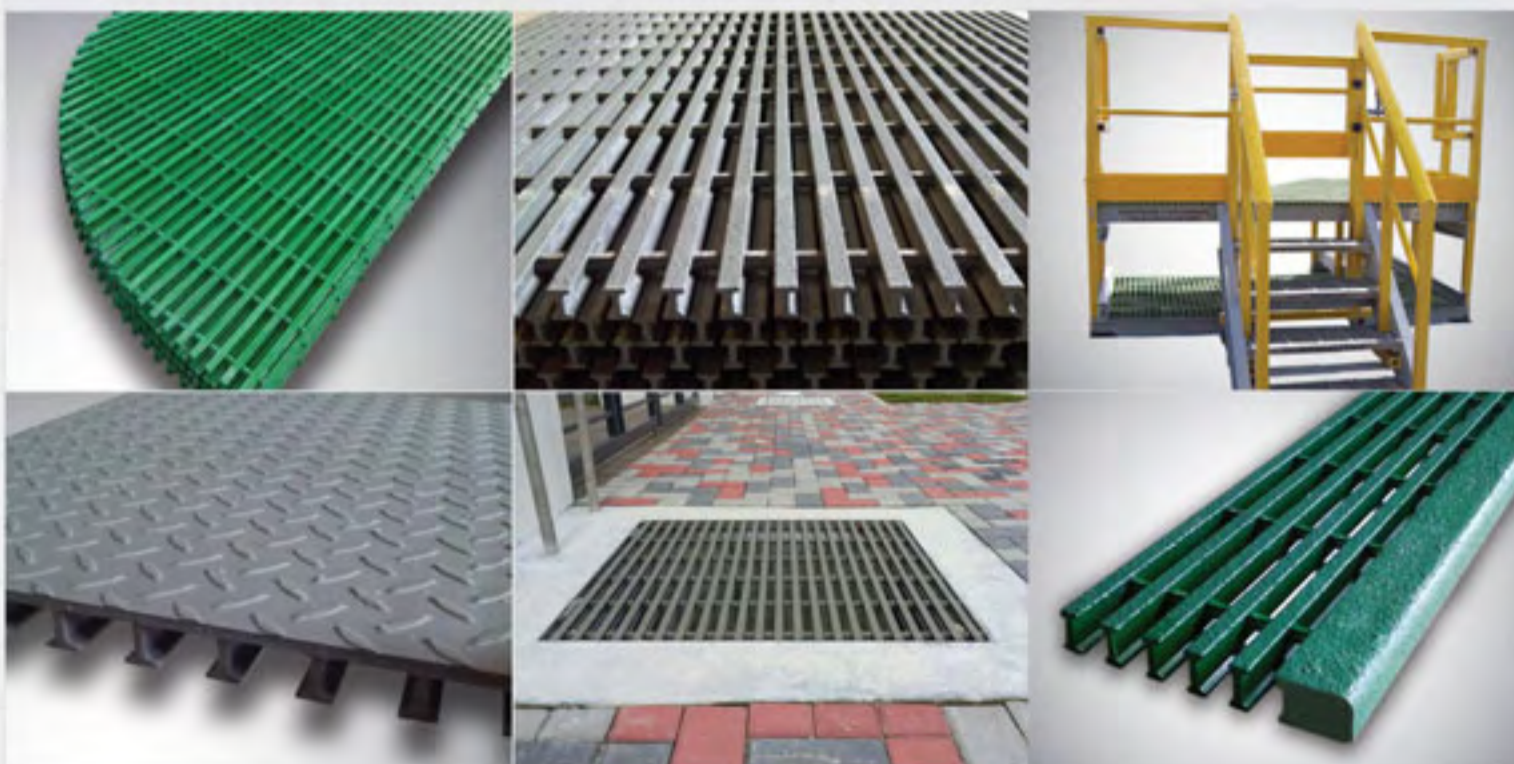
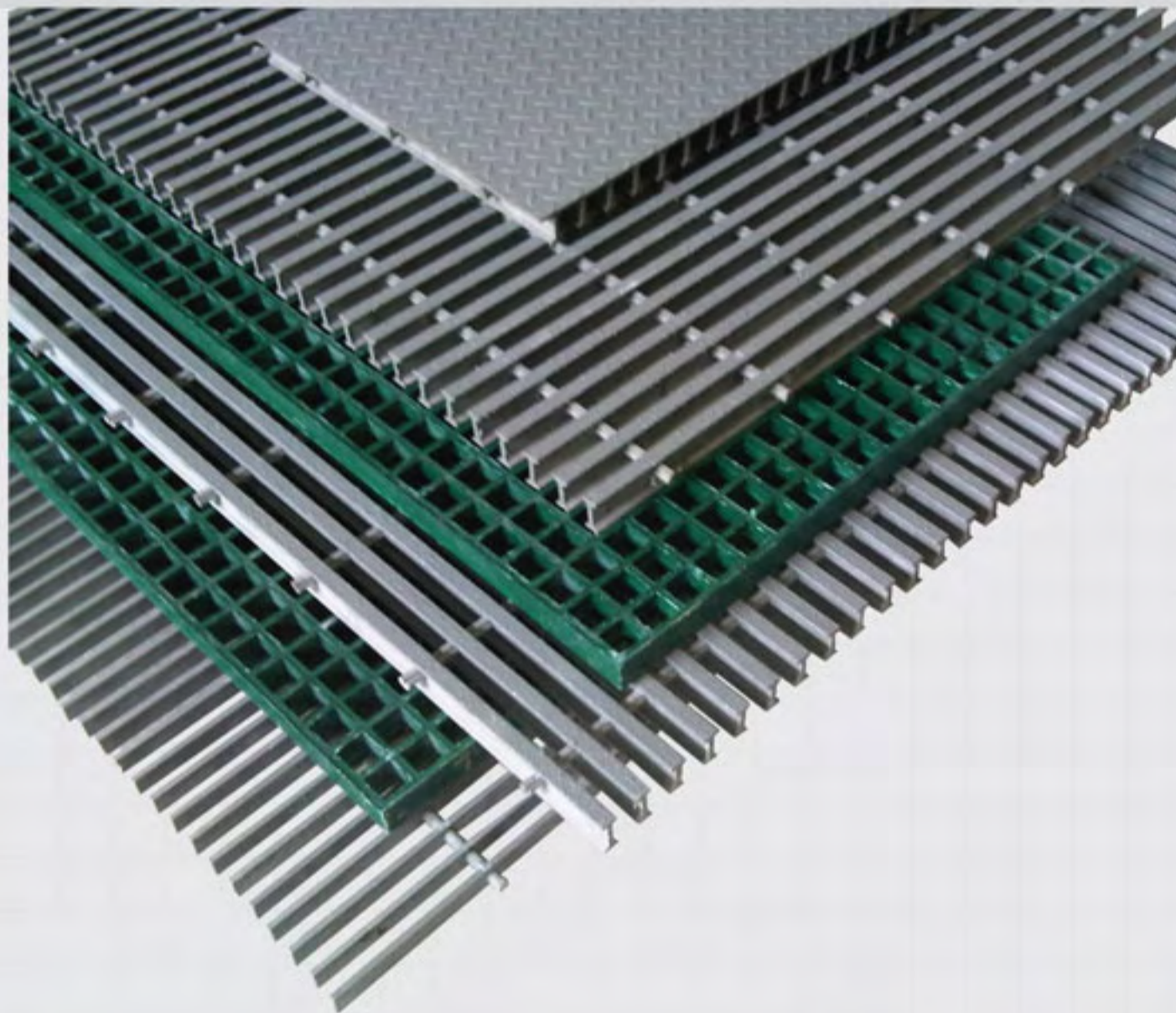


THE SPECIALIST OF FIBERGLASS REINFORCED PLASTIC



GRATINGS in FRP/GRP

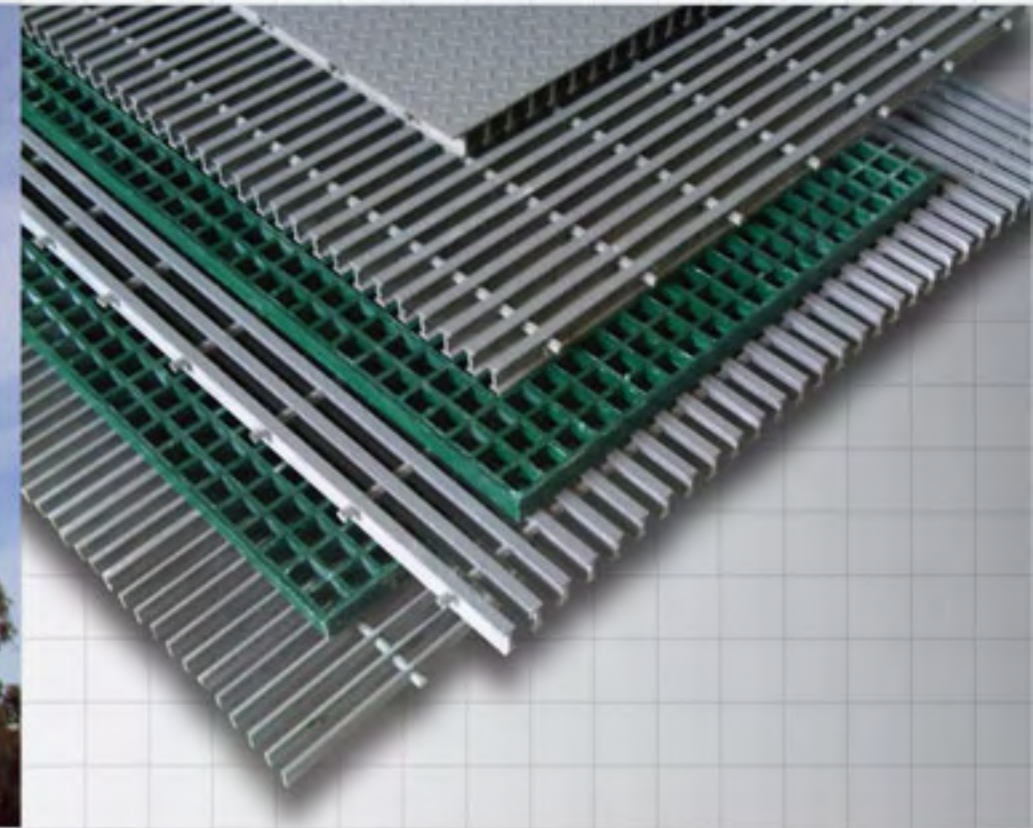
PG - MG SERIES



NEW REVOLUTION OF FIBERGLASS

ACEON GRATE





ACEON[®] offers a wide range of premium Pultruded and Molded FRP/GRP Gratings which is manufactured under brand of **ACEON**[®]. Compared against other conventional materials, **ACEON**[®] FRP grating provides a series of benefits, unmatched impact resistance, while the strength-weight-ratio is only one-third of steel grating. In addition, it is easy to cut and install.

Different type of resin has different property and performance. The resins that are widely used include Orthophathalic, Isophathalic, Vinylester, and Phenolic. Ortho and ISO resins are most common resins used for general application whereby VE resin is used for chemical environment application. ISO FR and Phenolic resins are designed for fire concern application.

PRODUCTS APPLICATION

ACEON[®] Grating can be used for either new applications or replacing existing applications which is exposed to corrosive environment. It is proven can be used for most aggressive environment in different industries such as:-



Chemical Plant, Refinery, General Industries, Marine, Offshore, Oil & Gas, Mining, Shipyard, Pulp & Paper, Transportation, Air Pollution Control, Water and Waste Treatment, Cooling Tower, Public Amenities, Others

FRP ADVANTAGES

01. Excellent UV/Weathering Resistant
02. Excellent Corrosion Resistant
03. Excellent Strength and Light Weight
04. Low Thermal Conductivity and Expansion
05. Anti Slip Finishing
06. Non Conductive
07. Fire Retardant
08. Long Life Span
09. Outstanding Appearance
10. Cost Effective

Why ACEON FRP Grating ?



Long Life Span

ACEON® FRP / GRP Grating produced from premium grade of resin, glass fiber and selected additives including UV inhibitor.



Anti Corrosion & Weathering

The perfect formulation of raw materials produces long life span, excellent corrosion and weathering resistant properties to the products.



Excellent Strength

Unlike thermoplastic properties, ACEON® grating achieves excellent strength and comply to relevant BS standards towards loading with the tensile strength is up to 450MPa. ACEON® load bearing profile was modeled and analyzed by 3D modeling software to ensure the perfect material composition and strength to weight ratio.



Light Weight

ACEON® grating is light weight as compared to conventional materials with the density is around 1/4 of steel materials. This will greatly improve handling and maintenance purposes.



Outstanding Appearance

High Quality finishing of homogenous colored FRP gratings eliminate the needs for painting work as compared to metallic gratings.



Cost Effective

With its long life span, anti-corrosion and maintenance free advantages, ACEON® grating is the best choice for cost effective solutions.



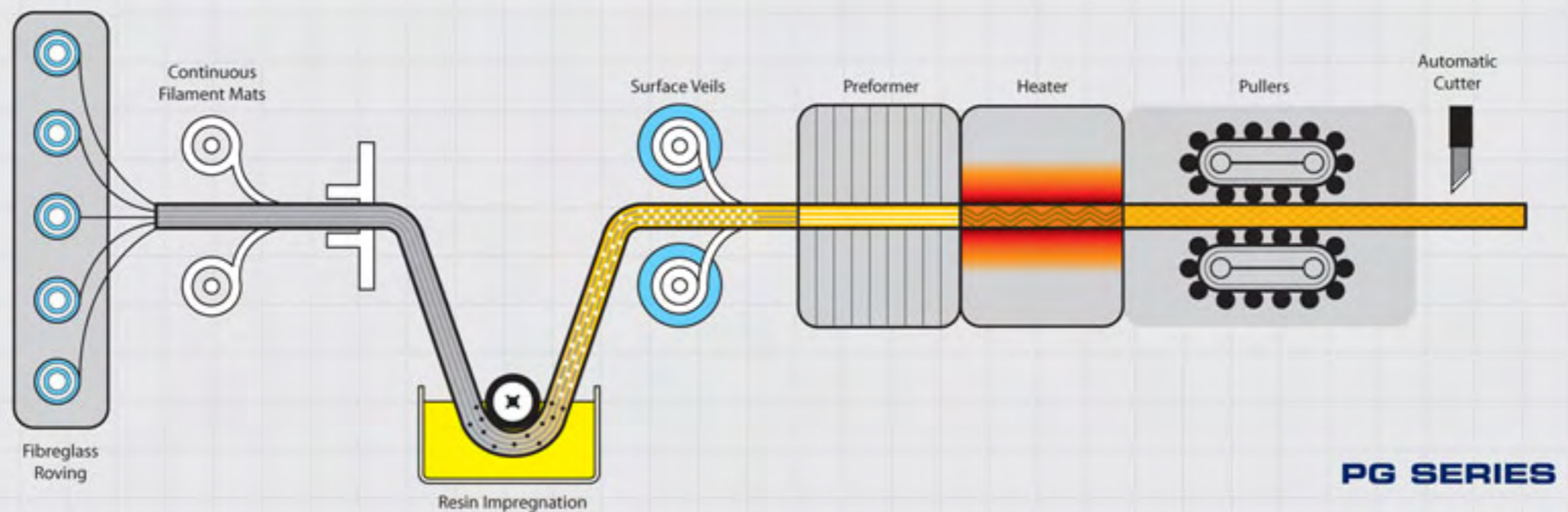
Quality Assurance

ACEON® is a FRP / GRP specialist with ISO9001:2008 certified. With our worldwide project references and commitment towards best quality and services, we are confident to deliver the best to meet clients requirements and satisfactions.

Manufacturing Process

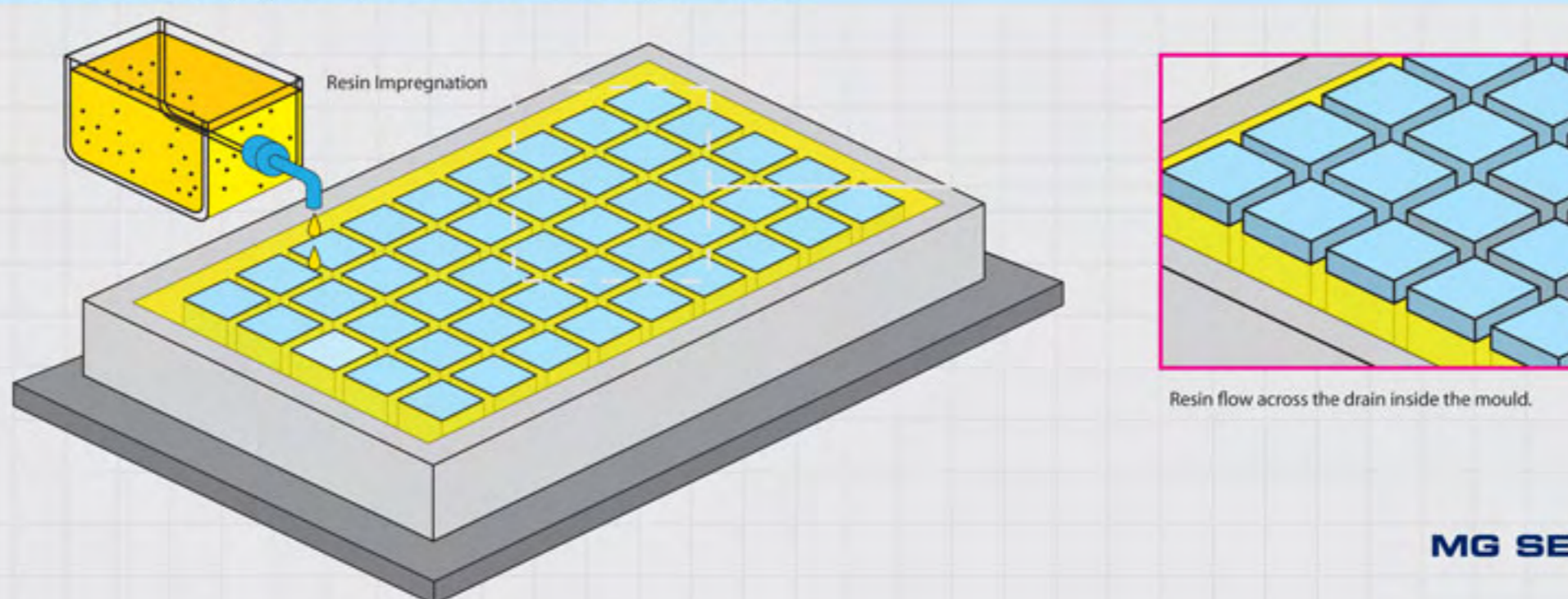
ACEON® offers both Pultruded & Molded FRP / GRP Gratings to suit your application. Pultruded gratings provide maximum stiffness and minimum deflection over long span support. Molded gratings are constructed in one-piece mold with excellent bi-directional reinforcement systems.

CONTINUOUS PULTRUSION DIAGRAM



Pultrusion is a continuous molding process using fiber reinforcements with thermosetting resin matrices. Pre-selected reinforcement materials, such as fiberglass roving, mat, woven fabrics or stitched fabric, are drawn through a resin bath in which all material is thoroughly impregnated with a liquid thermosetting resin. Typical resins include polyesters, vinyl esters and phenolics. The wet-out fiber is formed to the desired geometric shape and pulled into a heated steel die. Once inside the die, the resin cure is initiated by controlling precise elevated temperatures. The laminate solidifies in the exact cavity shape of the die, as it is continuously pulled by the pultrusion machine. Most any constant cross-section part can be pultruded. Pultrusion allows the designer to customize the selection of the resin system, the type and form of fiberglass reinforcements, and the placement of the reinforcements within the composite profile.

MOLDED GRATING PROCESS DIAGRAM



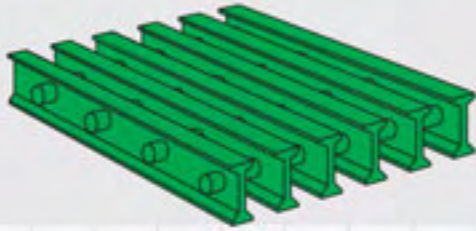
Molded grating is manufactured in an open, heated mold that resembles a large waffle iron. Continuous glass fibers are placed in the mold in alternating layers and thoroughly wetted out with resin. This continuous process produces an integral, one-piece construction, which offers excellent corrosion resistance as well as bi-directional strength. When the weaving process is completed, the mold is heated to cure the panel. If the grating is to have embedded grit, the mold will receive the grit at this time before the part is cured. After curing, the part is extracted from the mold. The standard part would have a meniscus (concave) top surface for slip resistance. Should a standard grit surface be specified, the grit would be bonded to the top of the completed grating panel as a secondary operation.

Materials & Certifications

RESIN FORMULATION AND TYPE OF FRP GRATING

Resin formulation used in pultrusion process determines the performance of the grating in terms of corrosion resistance, UV resistance, chemical resistance and fire retardant characteristics. Different applications require different performances, thus, ACEON® specially developed 4 types of resin formulation to suit client's application. The formulations are as follows: -

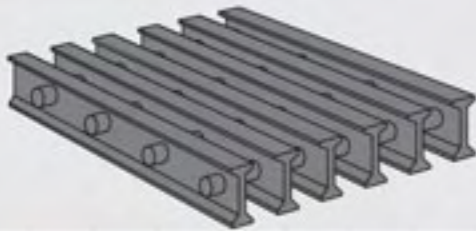
VE VINYLESTER



CHEMICAL RESISTANT

VE is VINYL ESTER system specifically engineered to provide premium chemical resistancy in highly corrosive environments. It utilizes an advanced resin system which delivers outstanding resistance to a wide range of harsh corrosive environments ranging from acidic to caustic, plus a high degree of solvent resistance.

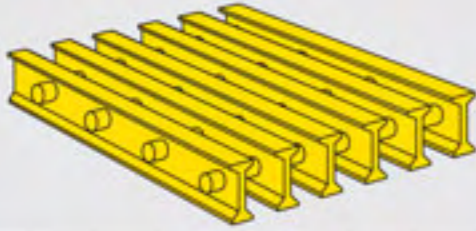
ISO ISOPHTHALIC



GENERAL APPLICATION

ISOPHTHALIC resin system designed to meet corrosive conditions for sewerage, construction, offshore and most of the industrial applications. It is excellent for weathering resistance and moderate resistance to caustic & solvent environments.

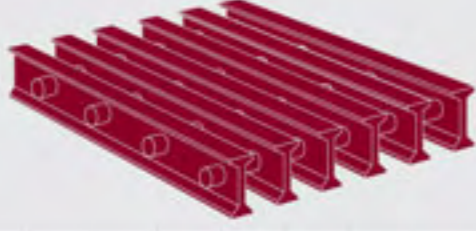
GFR ISO | VE FR



FIRE RETARDANT

GFR has all the characteristics of ISO or VE, and offers superior fire retardant rating conform to ASTM E84 and BS476 Part7. It is low smoke and halogen free during combustion and designed for application where fire retardancy is required.

PHE PHENOLIC



FIRE RESISTANT

Phenolic grating has superior fire and high temperature resistance properties. After the Phenolic resin fully cured, the high strength of the chemical bonds formed gives grating an exceptional level of fire performance and resistance to ignition & high temperatures. It is complied to USCG approval.

QUALITY TEST & CERTIFICATION

ACEON® FRP products are tested and certified by accredited third party laboratories or inspection organizations such as ABS, PSB, SIRIM, SGS and Global Group. Our products are tested in accordance with major international test standards such as ASTM, BS, IEC, NEMA and UL.



Size of ACEON® Gratings

SIZE OF ACEON® PULTRUDED GRATINGS

| 16mm/ 5/8" | 25mm/ 1" | 38mm /1 1/2" | 50mm / 2" |

*Item No. model	Thickness (mm)	Mesh Slot (mm)	Max. Panel Size (mm)	Weight (kg/sqm)
01:ACE - BS - 16x17	16	17	1220 x 6096	7.6
02:ACE - BS - 16x22	16	22	1220 x 6096	6.5
03:ACE - PG - 25	25	22	1220 x 6096	11.8
04:ACE - PG - 38	38	22	1220 x 6096	15.3
05:ACE - PG - 50	50	22	1220 x 6096	19.5
06:ACE - PG - 25 - ST	25	22	-	-
07:ACE - PG - 38 - ST	38	22	-	-
08:ACE - PG - 50 - ST	50	22	-	-
07:ACE - PG - 25 - CP	25	22	-	-
08:ACE - PG - 38 - CP	38	22	-	-
09:ACE - PG - 50 - CP	50	22	-	-

BS - Flat Bar Grating

PG - Pultruded Grating

ST - Stair Tread

CP - Chequer Plate

Sand gritted and non gritted finishing

SIZE OF ACEON® MOULDED GRATINGS

| 13mm/ 1/2" | 25mm/ 1" | 38mm /1 1/2" | 50mm / 2" |

*Item No. model	Thickness (mm)	Mesh Slot (mm)	Max. Panel Size (mm)	Weight (kg/sqm)
01:ACE - SM - 13x50	13	50 x 50	1220 x 3660	6.38
02:ACE - SM - 25x38	25	38 x 38	1220 x 3660	12.8
03:ACE - SM - 30x38	30	38 x 38	1525 x 4000	14.3
04:ACE - SM - 38x38	38	38 x 38	1525 x 4000	18.9
05:ACE - SM - 50x50	50	50 x 50	1525 x 4000	23.8
06:ACE - MM - 22x40x20	22	40 x 40 (20 x 20)	1527 x 4047	14.89
07:ACE - MM - 30x40x20	30	40 x 40 (20 x 20)	1527 x 4047	18.78
08:ACE - MM - 38x38x19	38	38 x 38 (19 x 19)	1220 x 3660	23.74
09:ACE - RM - 25x25x100	25	25 x 100	1220 x 3660	15.3
10:ACE - RM - 38x25x152	38	25 x 152	1220 x 3660	24.6
11:ACE - ST - 38x38x152	38	38 x 152	578 x 3660	18.8

SM - Square Mesh

MM - Micro Mesh

RM - Retangular Mesh

ST - Stair Tread

Sand gritted and non gritted finishing

Recommended Loading

Recommended Design Loading of ACEON® Pultruded Gratings

*Item No. model	*Span (mm)	Deflection (mm)	Uniform Load (kg/sqm)	Concentrated Load (kg)
01:ACE - PG - 25	450	2.25	975	450
02:ACE - PG - 25	600	3.00	750	350
03:ACE - PG - 25	750	3.75	600	300
04:ACE - PG - 38	600	3.00	1500	1050
05:ACE - PG - 38	750	3.75	1125	800
06:ACE - PG - 38	900	4.50	950	600
07:ACE - PG - 38	1200	6.00	625	400
08:ACE - PG - 50	600	3.00	2500	1650
09:ACE - PG - 50	750	3.75	1550	1000
10:ACE - PG - 50	900	4.50	1025	800
11:ACE - PG - 50	1200	6.00	800	550
12:ACE - PG - 50	1500	7.50	550	400

*Span is based on simple supported method.

Deflection is based on Engineering design 1/200 from span according to BS 4592

Recommended Design Loading of ACEON® Molded Gratings

*Item No. model	*Span (mm)	Deflection (mm)	Uniform Load (kg/sqm)	Concentrated Load (kg)
01:ACE - SM - 25X38	450	2.25	950	330
02:ACE - SM - 25X38	600	3.00	680	250
03:ACE - SM - 25X38	750	3.75	350	150
04:ACE - SM - 38X38	600	3.00	1380	700
05:ACE - SM - 38X38	750	3.75	1000	500
06:ACE - SM - 38X38	900	4.50	650	350
07:ACE - SM - 38X38	1200	6.00	250	200
08:ACE - SM - 50X50	600	3.00	2350	800
09:ACE - SM - 50X50	750	3.75	1600	680
10:ACE - SM - 50X50	900	4.50	980	550
11:ACE - SM - 50X50	1200	6.00	600	400
12:ACE - SM - 50X50	1500	7.50	280	220

*Span is based on simple supported method.

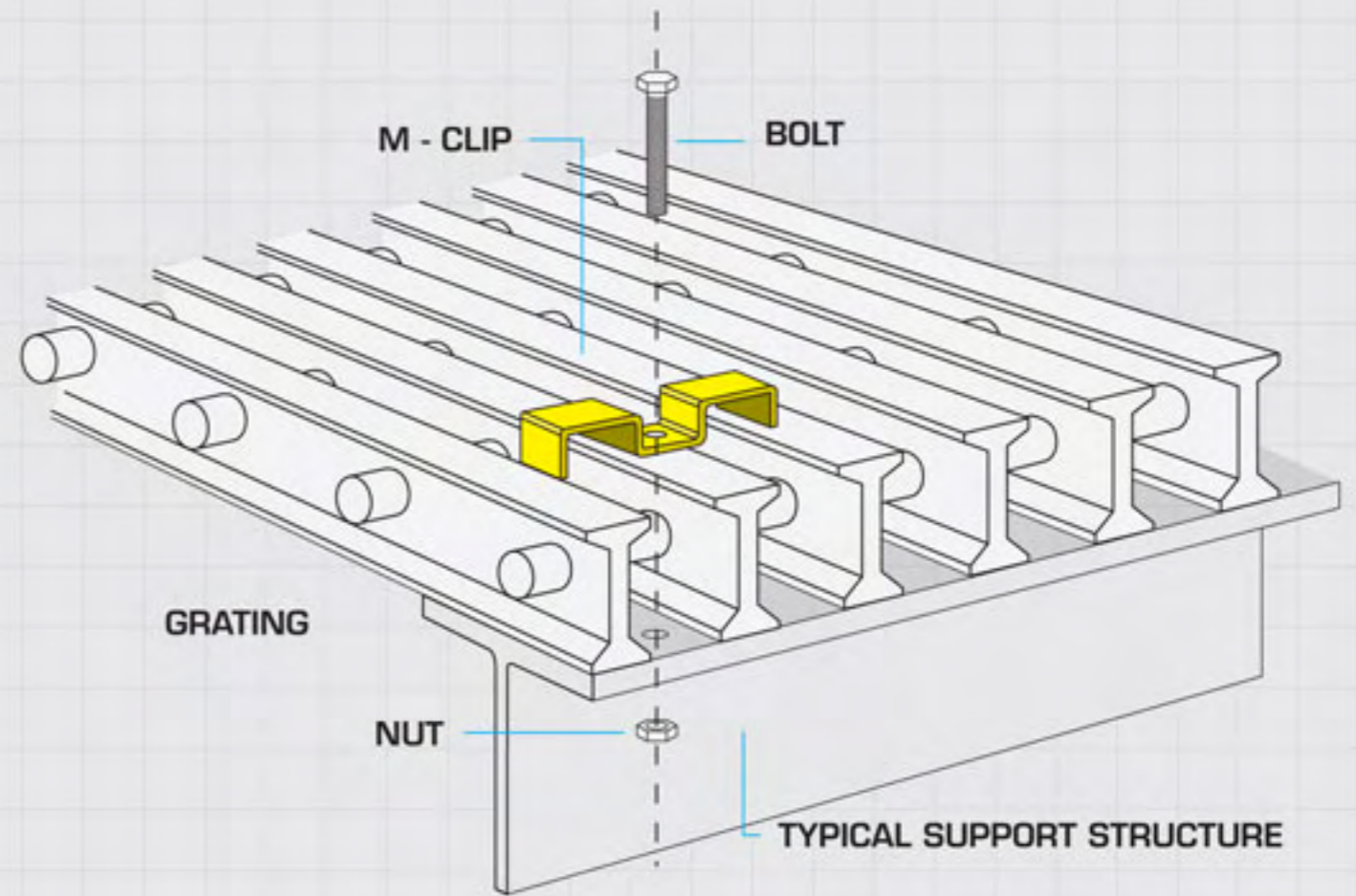
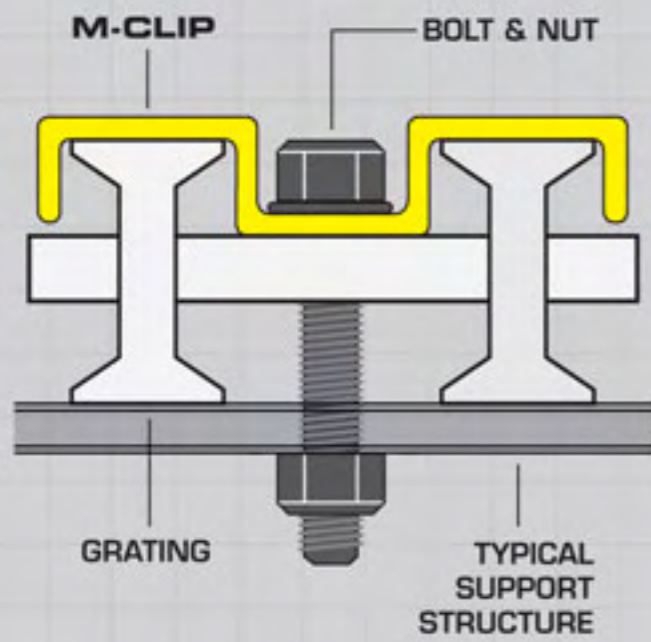
Deflection is based on Engineering design 1/200 from span according to BS 4592

Above loading table shows the common mesh sizes of molded grating only . Please contact us for the loading of other mesh sizes.

Note: ACEON® Grating is not designed for vehicle load but it can be custom-made for certain heavy duty applications. ACEON® Grating is suitable for most of the chemical environment. Please contact us for further information on Chemical Resistance Properties.

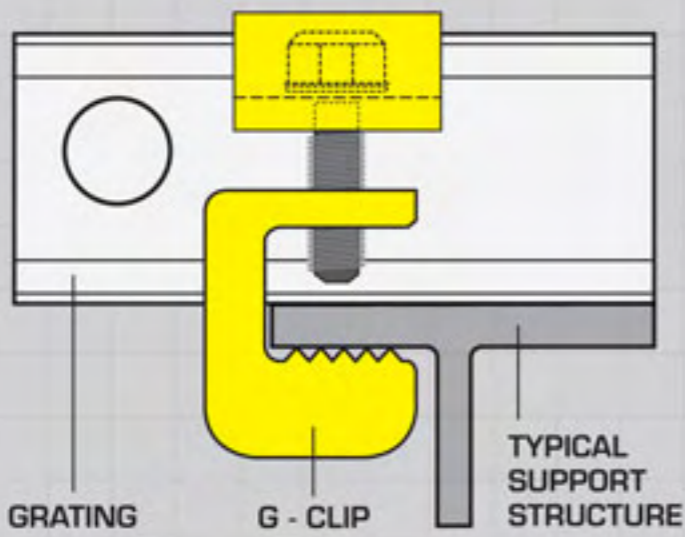
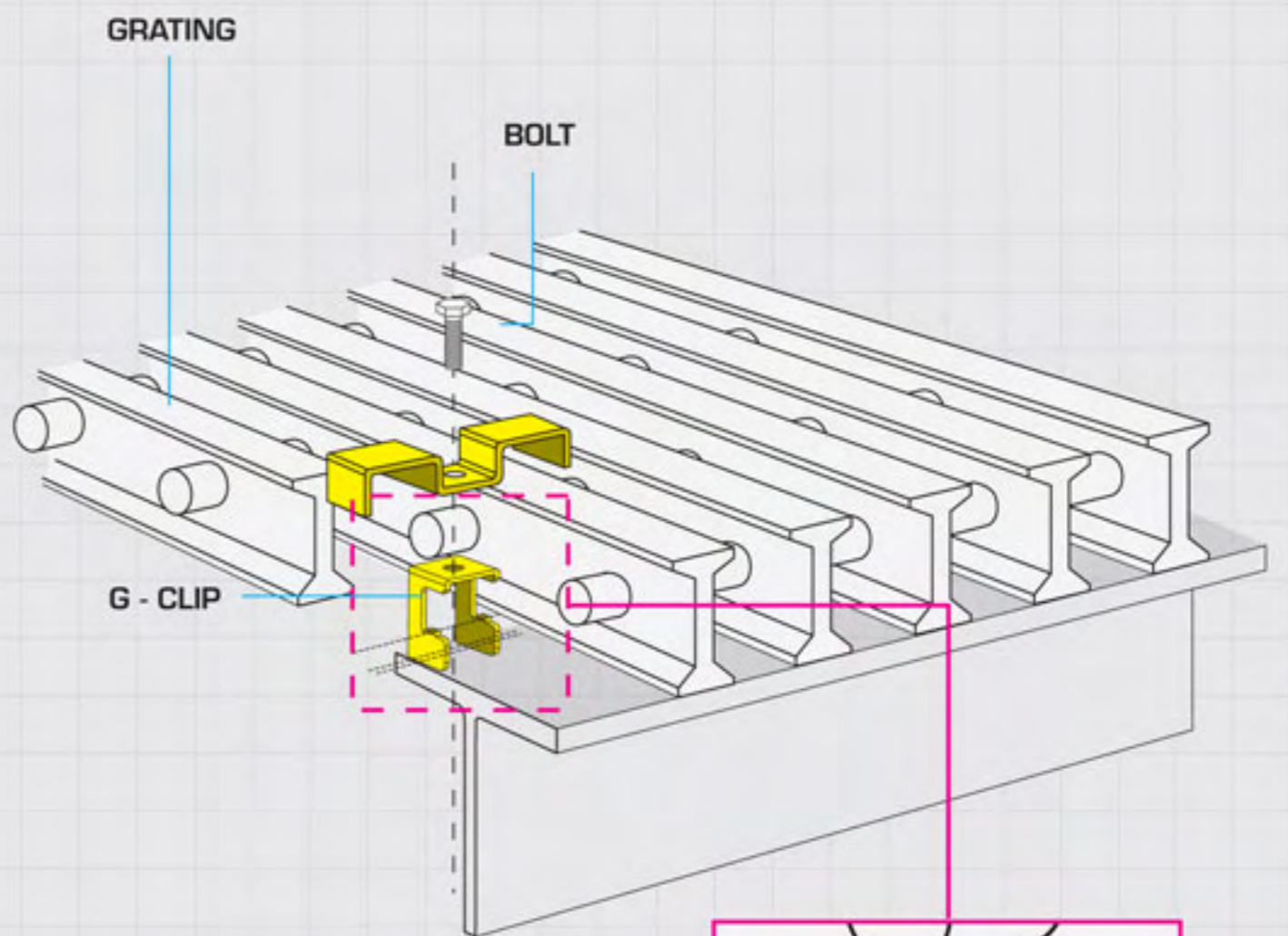
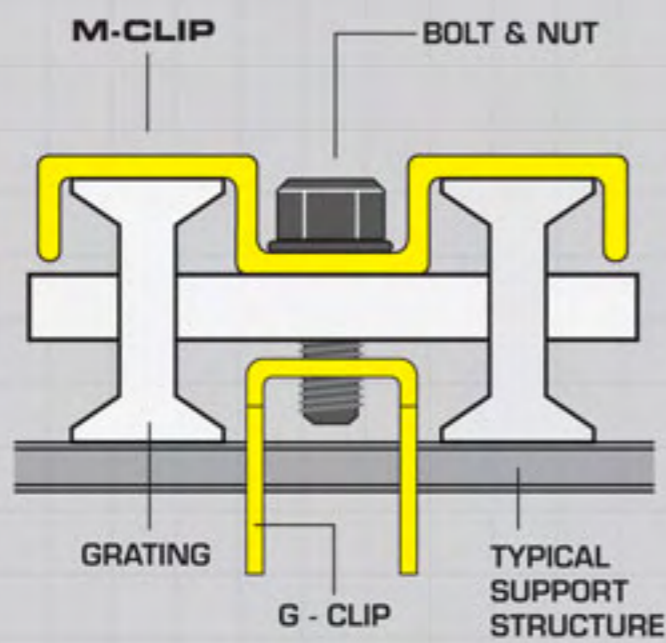
M-CLIP

M-Clip is used to fix the grating panels to the support structure by using bolt and nut method. This installation requires drilling through the support structure.

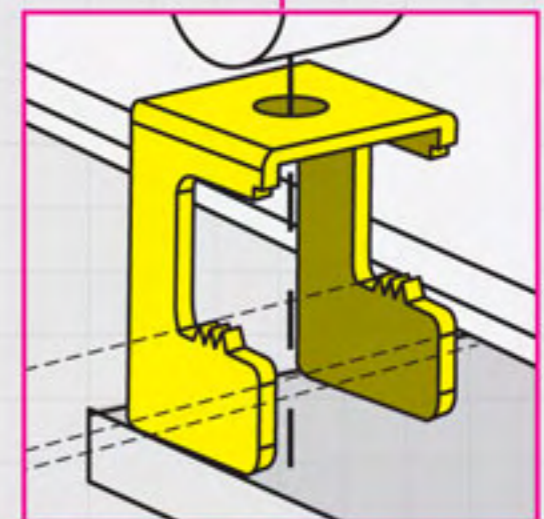


G-CLIP

G-Clip is designed to fix the grating panels to the support structure with no hole drilling required on the support structure.



DETAIL VIEW FOR "G CLIP"



Application & Reference



1

Oil & Gas, Power Plant and Refinery

ACEON® grating is suitable for the most aggressive environment such as offshore, power plant and refinery application.



2

Chemical Plant, Water & Waste Treatment

ACEON® grating can be used as maintenance platform, trench cover etc in chemical plant, water industry and sewerage treatment plant.



3

Public Amenities & Transportation

ACEON® grating is applicable in transport and public amenities sector, such as railway - LRT station, Harbour, Jetty, etc.



4

General Industries and Others

ACEON® grating is a perfect solution for the construction sector and general industries. It is suitable for replacing the old rusted metal gratings and also commonly use for replacing metal grating due to vandalism problem.

Typical Properties of Pultrusion FRP Products

Typical Properties

MECHANICAL

(Full roving construction)

Tensile Strength, Longitudinal:
400 - 500 MPa

Flexural Stress, Longitudinal:
200 - 400 MPa

Elastic Modulus, Flexural, Longitudinal:
15,000 - 30,000 MPa

Compressive Strength:
150 - 300 MPa

Impact Strength:
1 - 2 kJ/M

Elongation at Rupture
2 - 3%

Hardness (Barcol 934-1)
50 - 60

Specific Gravity:
1.8

THERMAL

Coefficient of Thermal Expansion:
8 - 10 10^{-6} m/m K

Thermal Conductivity:
0.2 - 0.3 W/ $^{\circ}$ K.M

Recommended Operating Temperature
-50 to +100 $^{\circ}$ C

ELECTRICAL

Dielectric Strength:
12 kV/mm

Volume Resistivity:
 10^{10} - 10^{12} Ω /cm²

FIRE RETARDANT & SMOKE

(For ISO FR Resin Formulation)

B.S. 476 P7 - Class 1

B.S. 476 P6

ASTM E84 - Class A

Smoke Development Index < 450

IEC 60695 - 960 $^{\circ}$ C Max.

FIRE RESISTANT

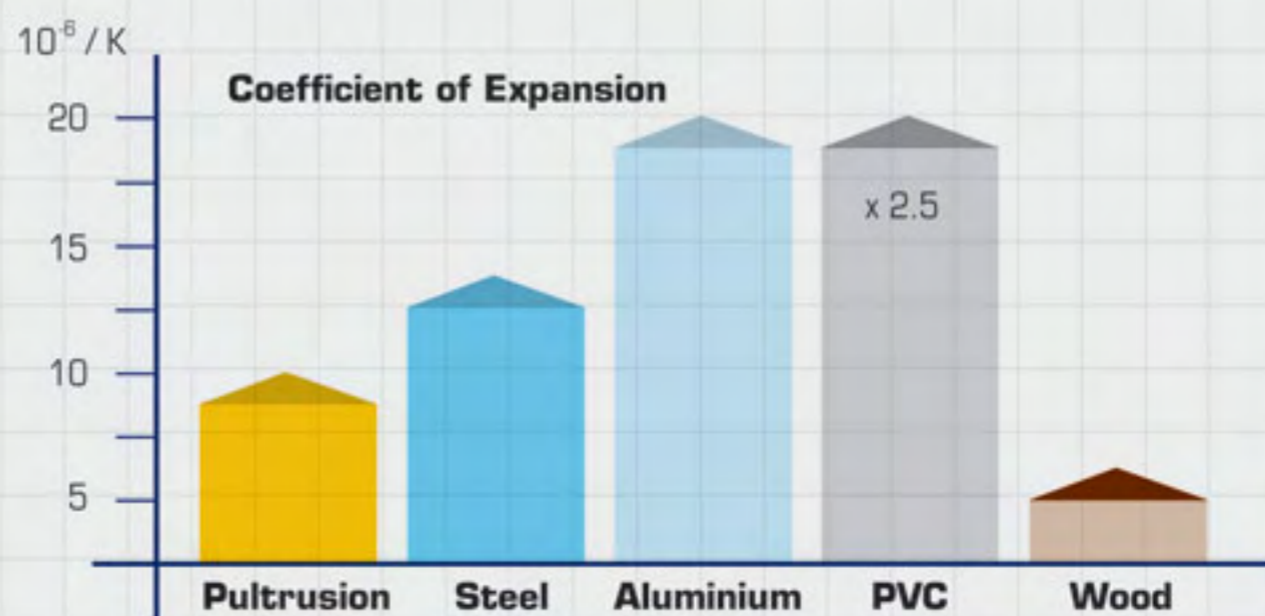
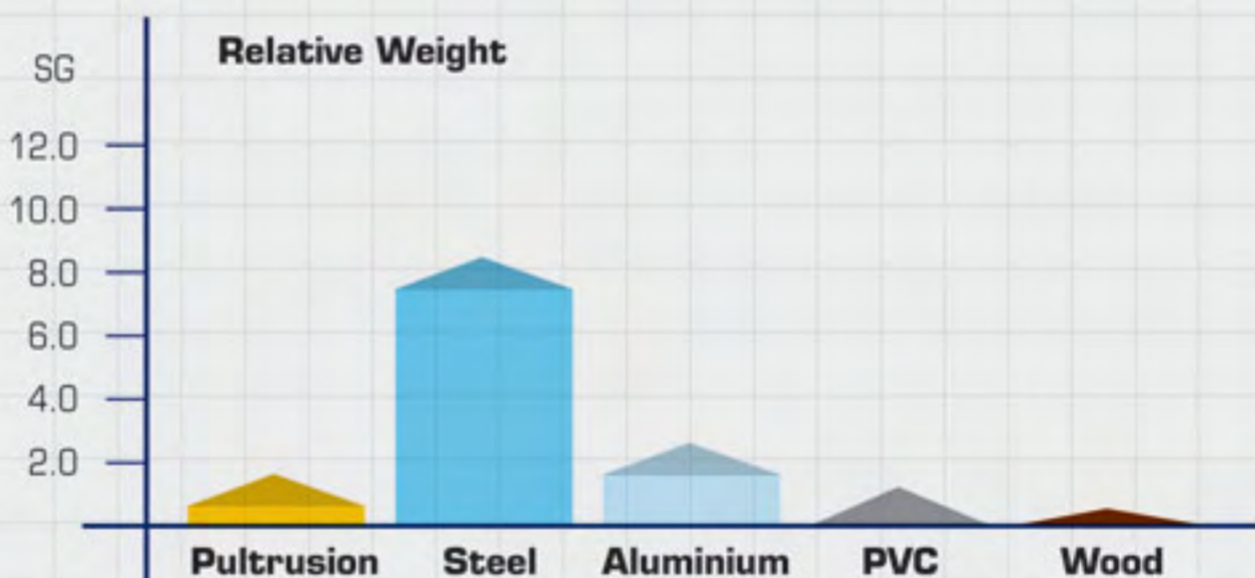
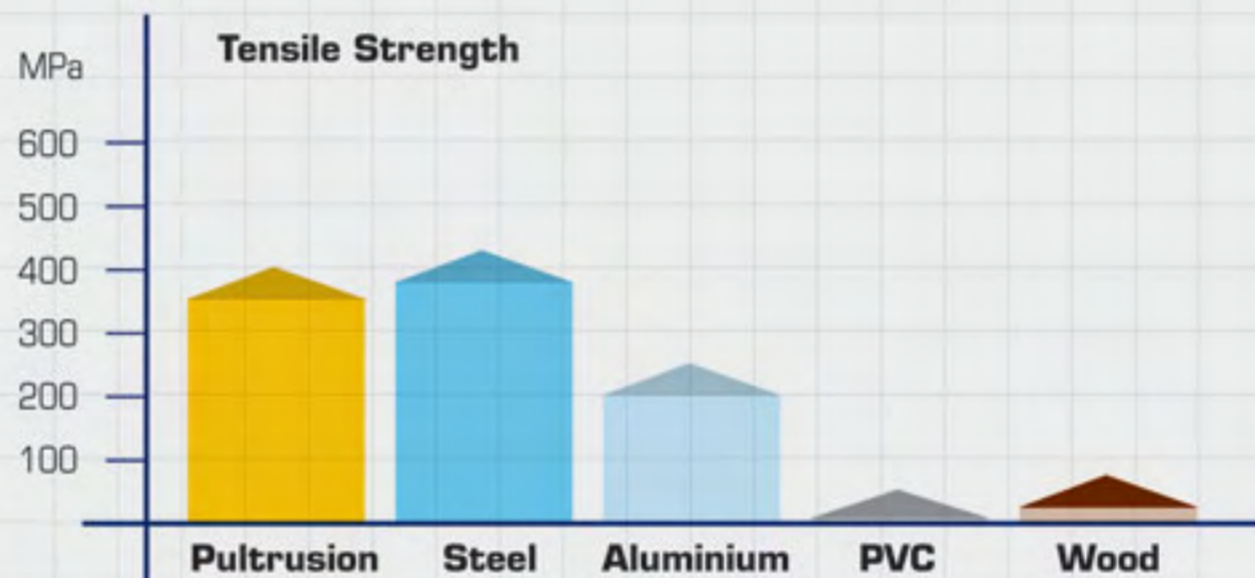
(For Phenolic Resin)

U.S.C.G - Level 2

Comparisons

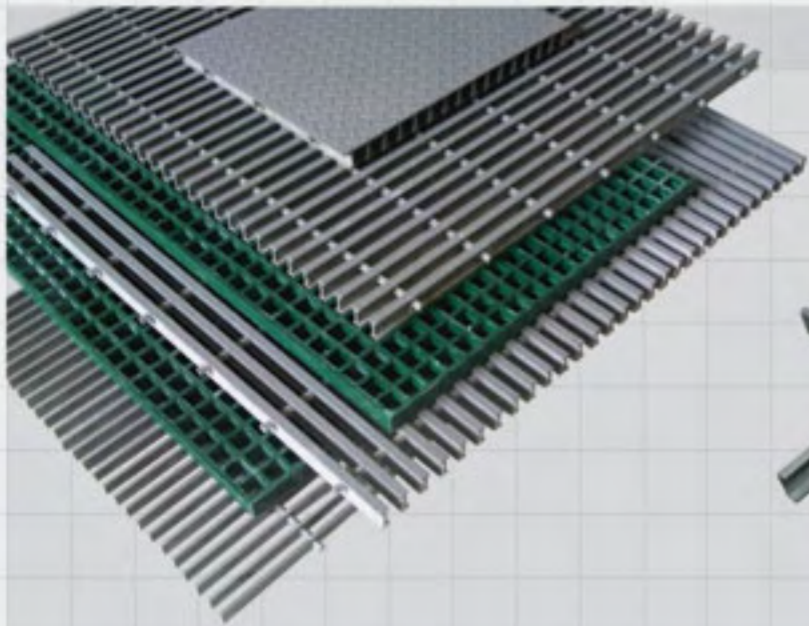
The below properties comparison between FRP Pultruded profiles with other materials are based on the typical values.

As summary, FRP Pultruded profiles give high strength with minimum weight solution to your applications. This is absolutely important and convenient for easy handling, installation, maintenance and weight concern applications.



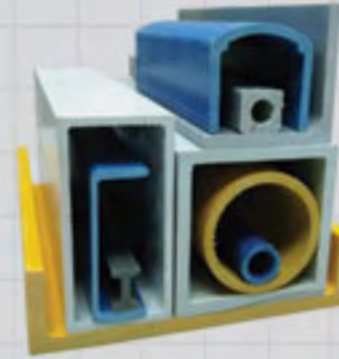
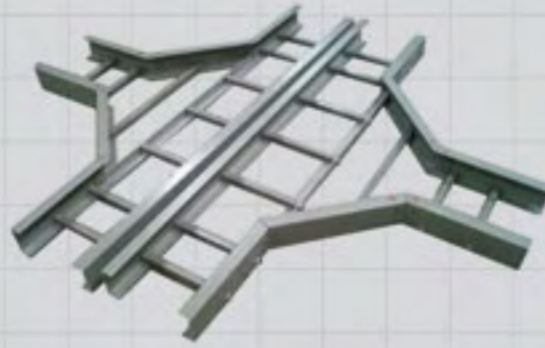
Full Range of **ACEON® FRP Products**

Assisting you to choose a best product from ACEON to deliver the best result in your project.



FRP PULTRUSION

ACEON produces a wide range of premium FRP Pultruded products. Our key products included FRP Cable Ladders and Trays, FRP Gratings, FRP Structural Profiles, FRP Handrails and Ladders.



FRP PANEL TANKS

ACEON offers both sides gelcoat protected FRP Panel Tank for your sectional water tank solution to ensure longer life span and weathering resistant.



FRP FILAMENT WINDING

ACEON equipped with filament winding machine and capable in filament round tank, scrubber system, pipping & ducting and etc; which suitable for high pressure application.



FRP MOULDING

ACEON specialized in custom FRP design and application of gelcoat in contact molding system will give a superior appearance to your product.



www.aceonfrp.com



บริษัท พาวเวอร์ ทีม เอ็นจิเนียริง แอนด์ เซอร์วิส จำกัด (สำนักงานใหญ่)

169/301 มบ.มัตถนา 3 ถนน กาญจนภิเษก แขวงดอกไม้

เขตประเวศ กรุงเทพฯ 10250

โทร. 02-136 6533 แฟก. 02-181 5786

E-mail : voravat@pte.in.th Mobile : 086-903 8951

POWER TEAM ENGINEERING & SERVICE CO.,LTD. (Head Office)

169/301 Mooban Manthana 3, Kanjanapisek Road, Dokmai,

Pravet Bangkok 10250

Tel.+66 2 136-6533 Fax.+66 2 181-5786

E-mail : voravat@pte.in.th Mobile : 086-903 8951

GROUP OF COMPANIES

ACEON COMPOSITE SDN. BHD.

ACEON PANEL TANK (M) SDN. BHD.

ACEON MANUFACTURING (M) SDN. BHD.

ALLIANCE COMPOSITE ENGINEERING SDN. BHD.

Lot 5181, Batu 12,
Jalan Balakong,
43300 Seri Kembangan,
Selangor Darul Ehsan,
Malaysia.

T. +603-8961 6576, +603-8961 6577

F. +603-8961 6566

E. sales@aceonfrp.com