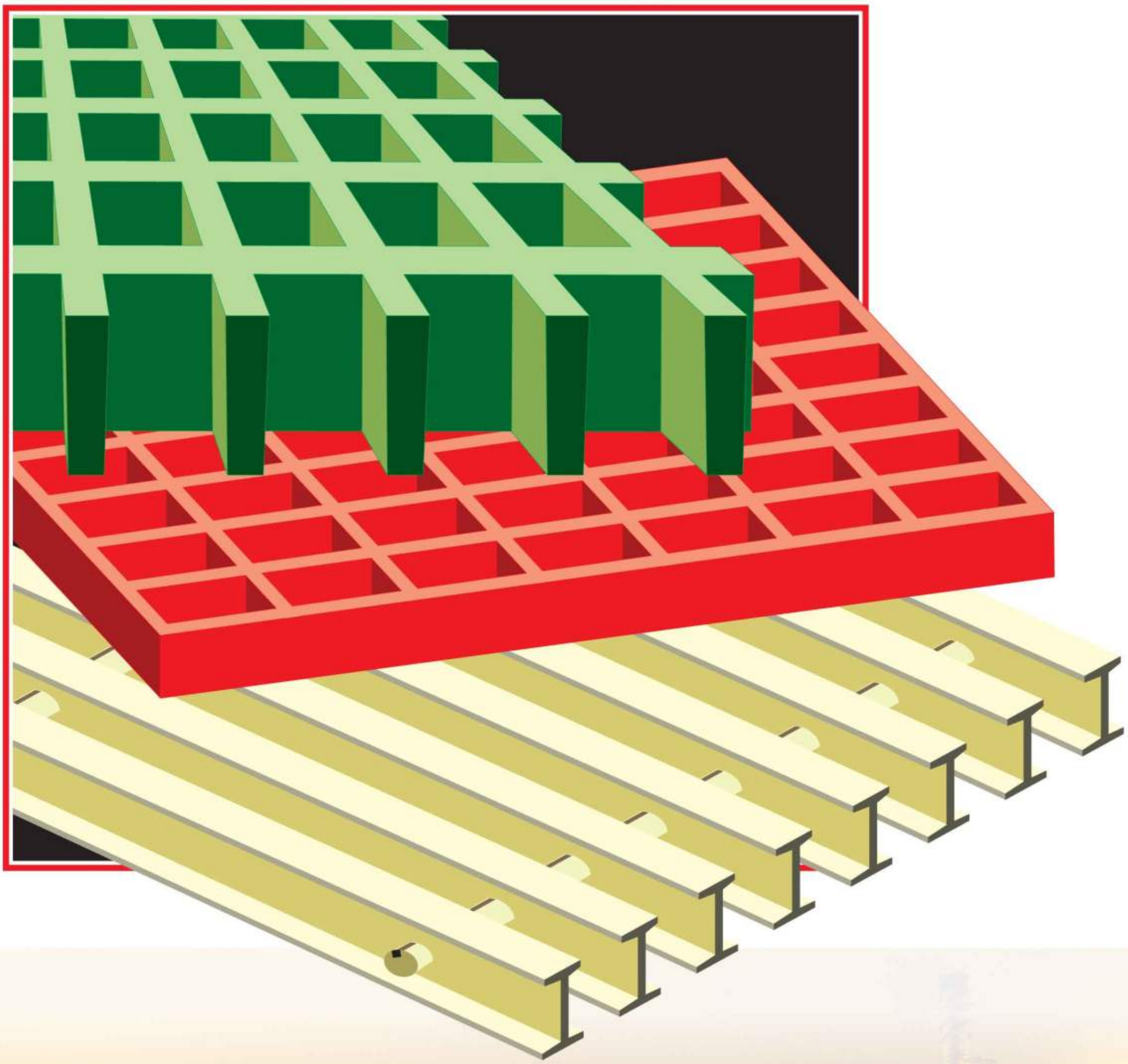
Indiana

FRP Gratings



Indiana Started operations in the year 1968 as pioneers in the manufacturing of gratings and cable trays in India, and is today recognized as a multi product and diversified group supplying to customers worldwide.

Indiana MANUFACTURES:

- **Gratings in FRP**,
  Mild steel, stainless steel and aluminium
- Cable trays and Accessories in FRP,
  Mild steel, stainless steel and aluminium
- Handrails

Indiana designs and manufactures FRP Gratings for various industries like Chemicals, Petrochemicals, Refineries, Oilfield & Gas companies, Off shores, Ports, Power Plants, Paper Mills, Jetties, Fertilizer Plants and various others, to suit **individual requirements.**

Indiana is associated with leading consultants, contractors and multinational companies worldwide. and has been exporting its products to the Middle-East (Bahrain, Qatar, ' Kuwait, Oman, Saudi Arabia, UAE, etc.), Far-East (Singapore, Indonesia, Malaysia, Thailand, etc), Australia, United Kingdom, and U.S.A.

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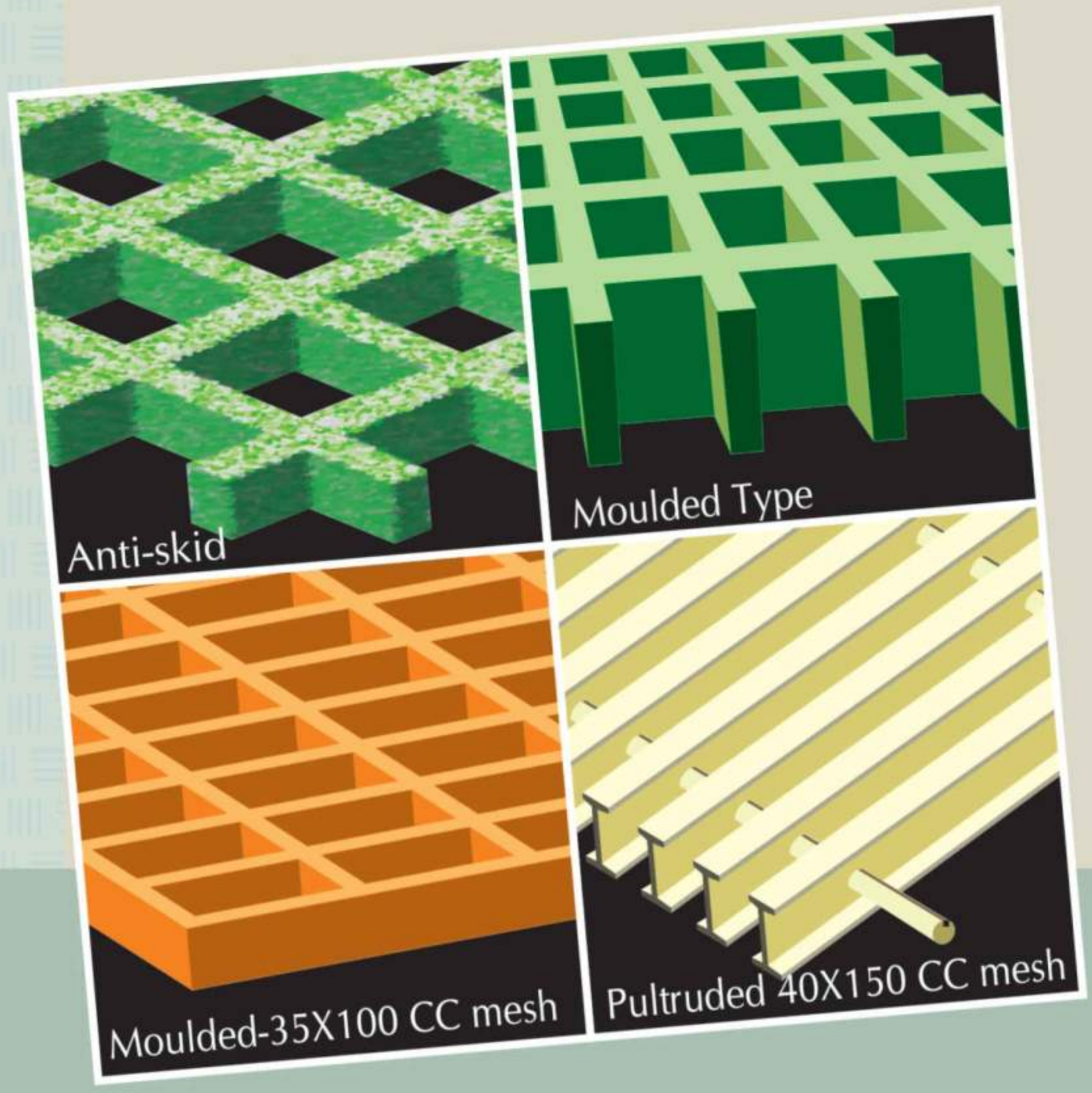

Indiana has been providing Fibreglass Reinforced Plastic gratings for walkways and other allied usages in Moulded and Pultruded type for years. FRP gratings are made of highest quality materials giving optimum chemical resistance, fire retardance, anti skid surface, strength, electrical insulation and ultra-violet protection. As FRP gratings are lightweight so can be cut to size as per client's requirement and can be installed quickly using standard working tools.

Why Fibreglass Gratings?

Strong, Yet Light

FRP (fiberglass reinforced plastic): The resiliency of fiberglass gratings - enable to absorb loads or shocks that would otherwise permanently deform metal grating, and because of this elasticity, designs are usually based on deflection calculations.

Corrosion Resistance

The Corrosion Resistance property of FRP gratings is much higher than that of steel or aluminum gratings, hence are widely used in Chemical Industries, salt water environments, waste treatment plants where the atmosphere is highly corrosive.

Non Conductive, Dielectric

Properties of FRP gratings make it ideal for application such as switchgear and control room facilities , thus reducing the possibility of electric shock, since it does not reflect electromagnetic radiation. It is also well suited for use around transmitting equipment such as microwave towers and radar installations

Non-sparking

Qualities make FRP gratings highly desireable for use in environments where liquids, fumes and dust pose as potential ignition.

Aesthetic Appearance

FRP gratings last longer because they are self pigmented & are not coloured. Hence, they don't wear off as in the case of painted finishing. An added advantage of FRP gratings is that they never rust.

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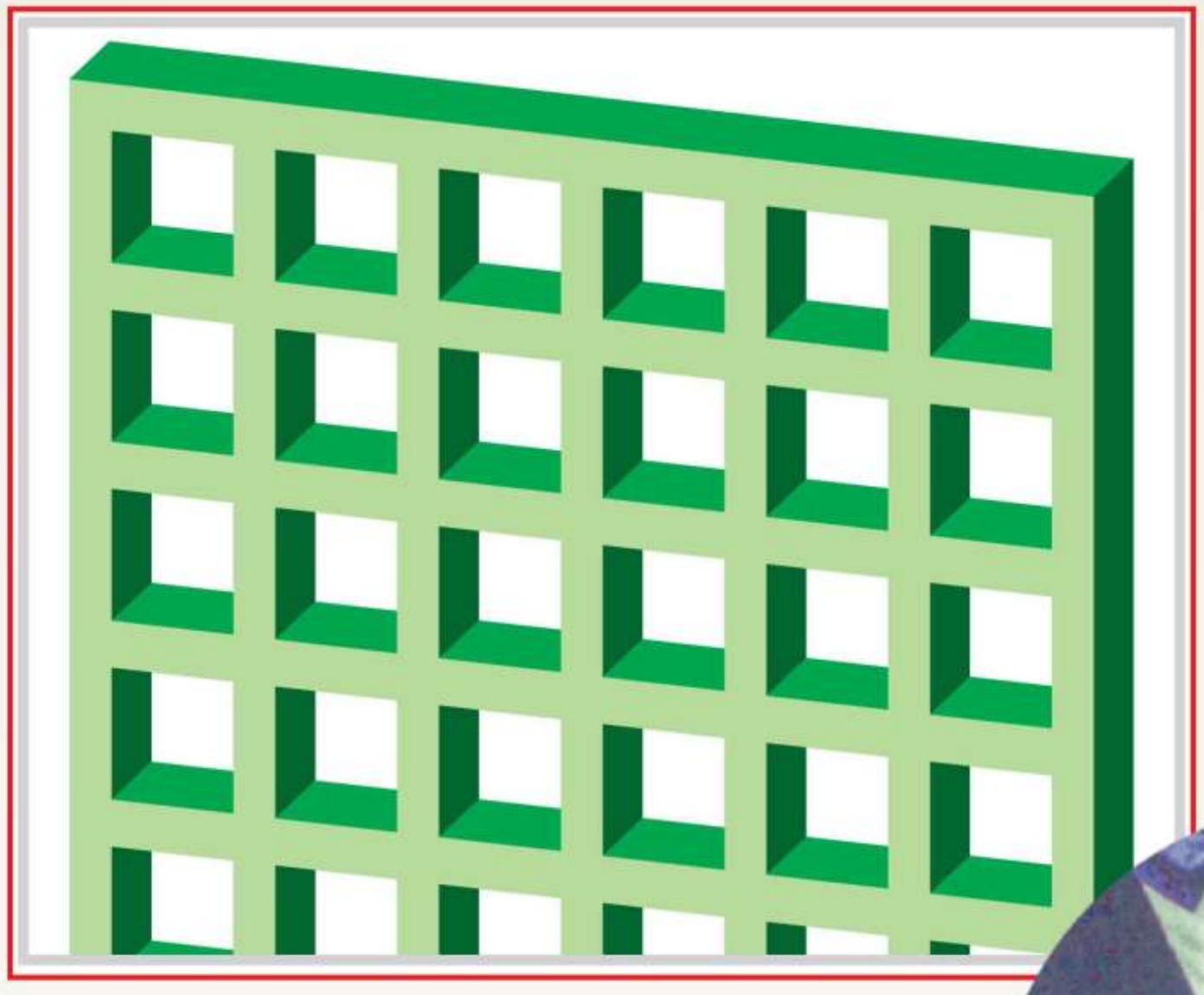
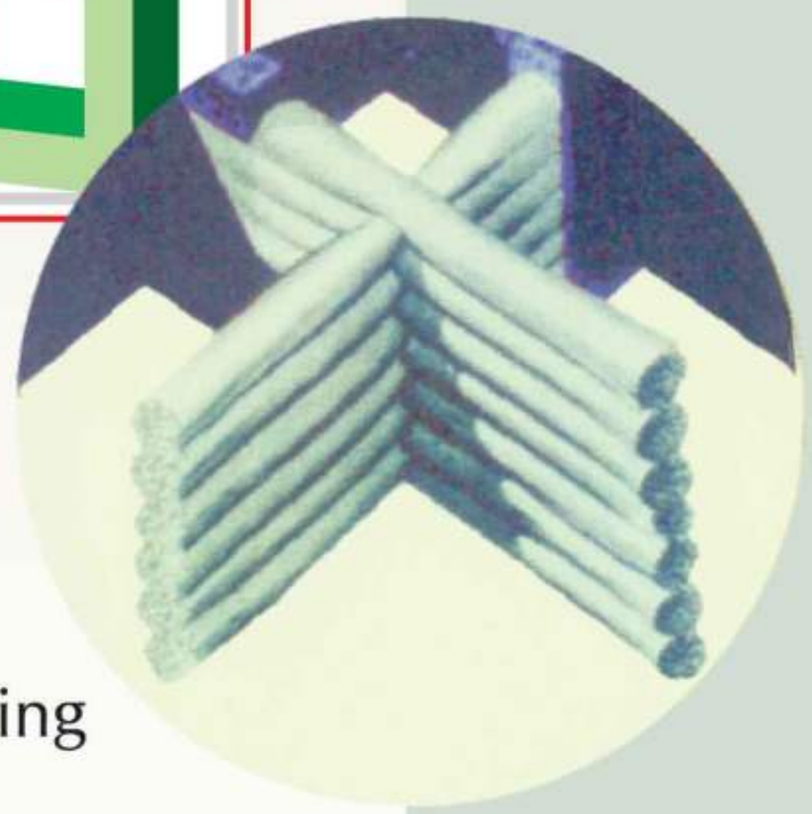
Advantages of FRP Gratings

- Corrosion resistant - Resistant to almost all chemicals & in most hostile environments
- Light weight - Density 4 times less than steel & 1.5 times to aluminum
- Non-conductive - Does not carry electric current
- Maintenance free - No painting, no cleaning required
- Lowest in life cycle cost
- No rusting. No painting (in built colour, colour can be of your choice to suit your plant colour)
- Easy to install
- Aesthetic- Improves the plant look with attractive colours
- Gives comfort while walking or standing
- Easy to clean - Washable since they are completely rust & corrosion proof
- No welding required while installing
- Slip resistant - Special anti-skid surface prevents accidents due to slipping
- Fire retardant - Available with class 1 fire rating & oxygen index less than 32
- Thermally insulated - so can be installed in areas of high temperatures
- Durable & resilient
- Resistant to microbial growth
- Low installation cost - can be installed by anybody being lightweight & can be cut by hand tools
- High strength to weight ratio
- Easy to cut to any size - Requires hand tools
- Long service life due to superior corrosion resistance, high strength
- Impact resistant
- Monolithic one-piece construction in moulded type
- UV resistant - Prolonged exposure to sunlight is not a problem with FRP grating
- Available in any colour of your choice

Types of FRP Gratings

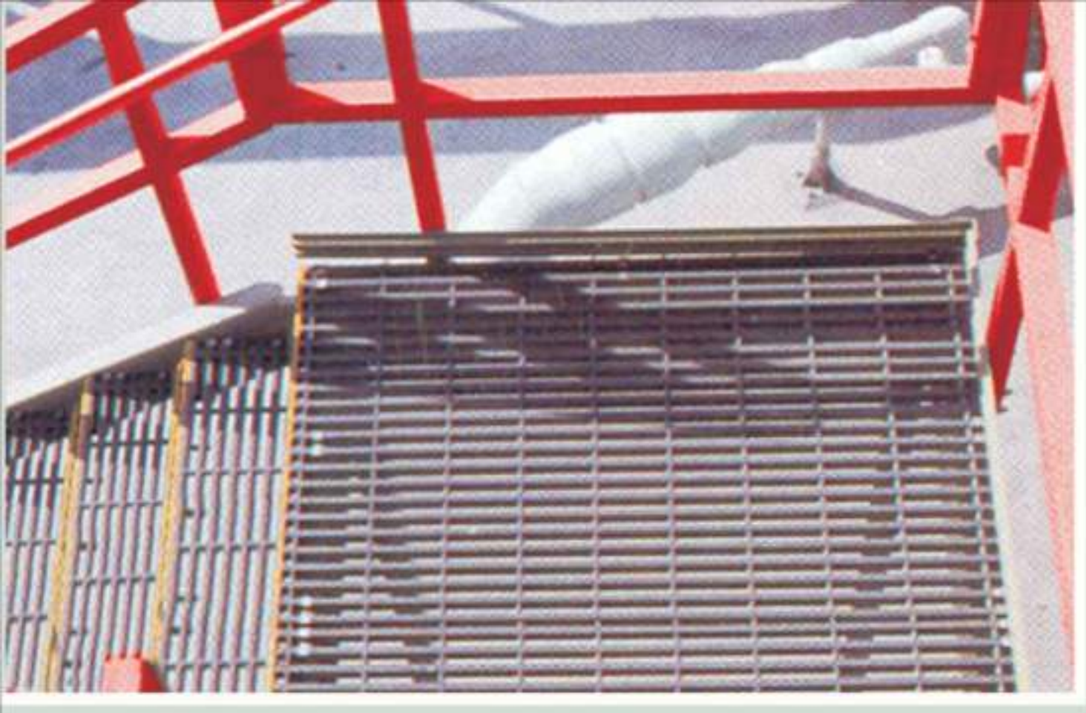
MOULDED FRP GRATING





The Process:

Moulded FRP gratings are manufactured by interweaving continuous thoroughly wetted Fibreglass strands with thermosetting resin system. Liquid resin and the glass rovings are poured in the standard mould manually. Moulded gratings are taken out of the mould only after complete curing of the resin.



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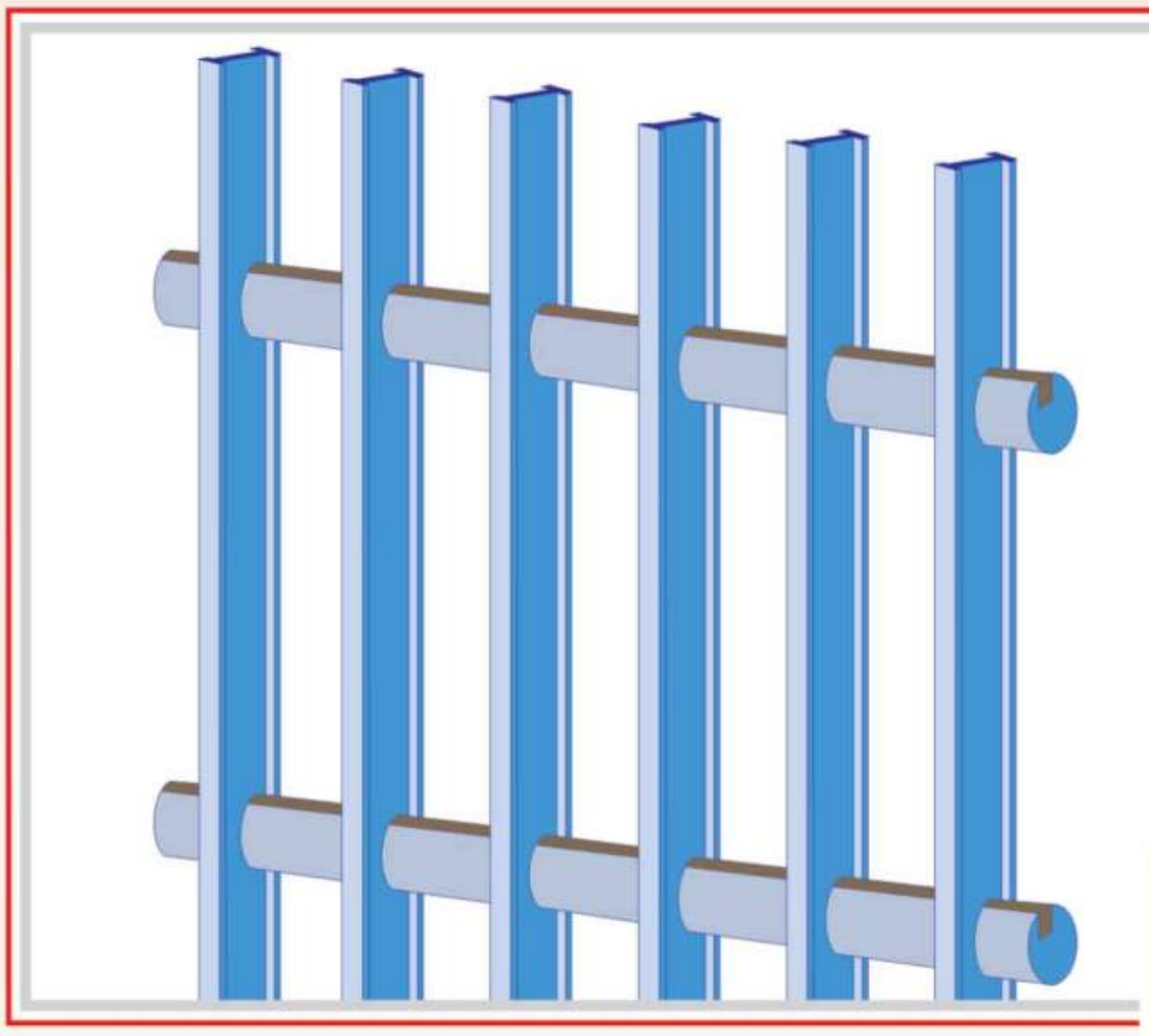
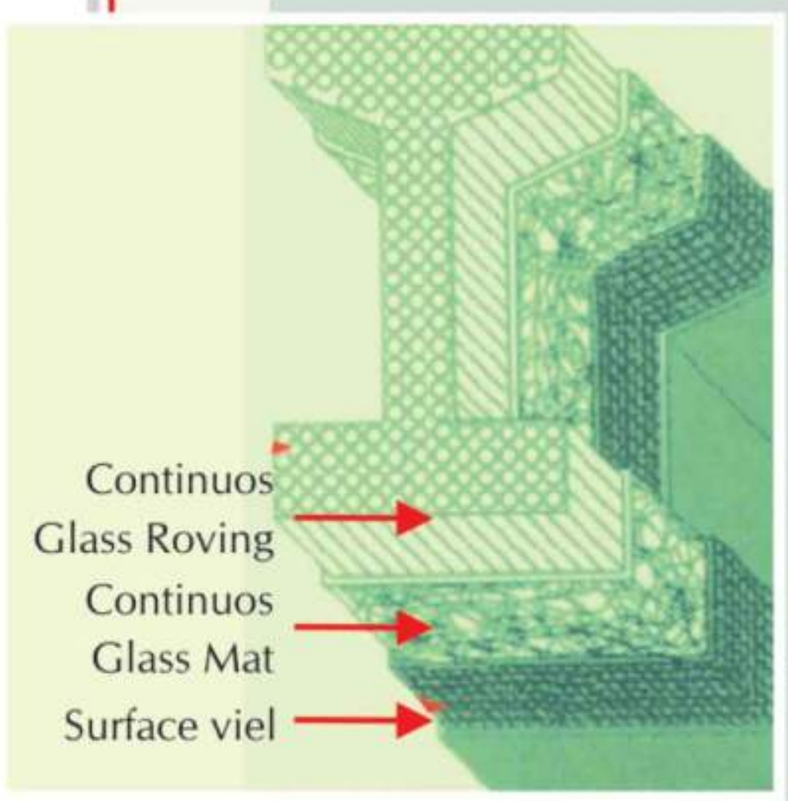
PULTRUDED FRP GRATING





The Process:

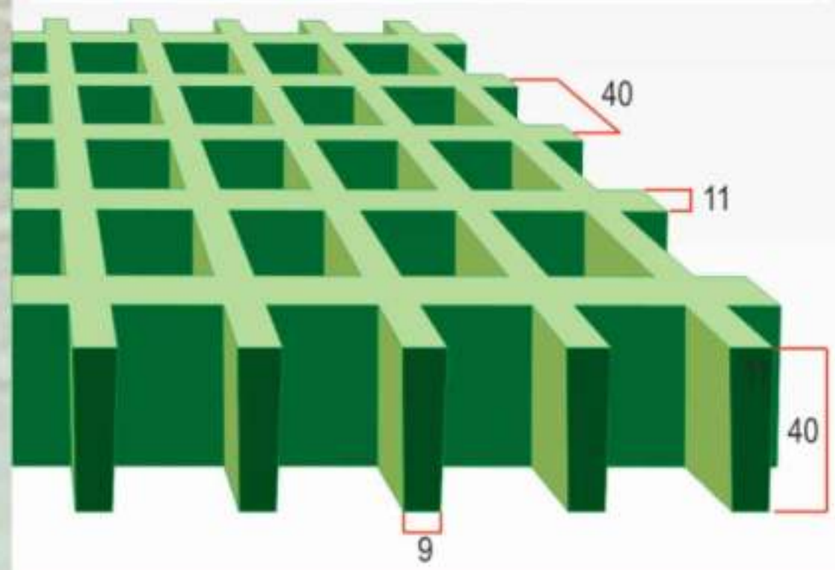
Glass strands, Mat and Surface veil are drawn through a resin where the material is impregnated with liquid resin. Desired geometrical shapes are formed and cured, as they are pulled through a heated steel die.

These sections are then pulled out mechanically on a continuous basis and are cut to required length. These section bars are then assembled with Cross bars to achieve desired spacing.

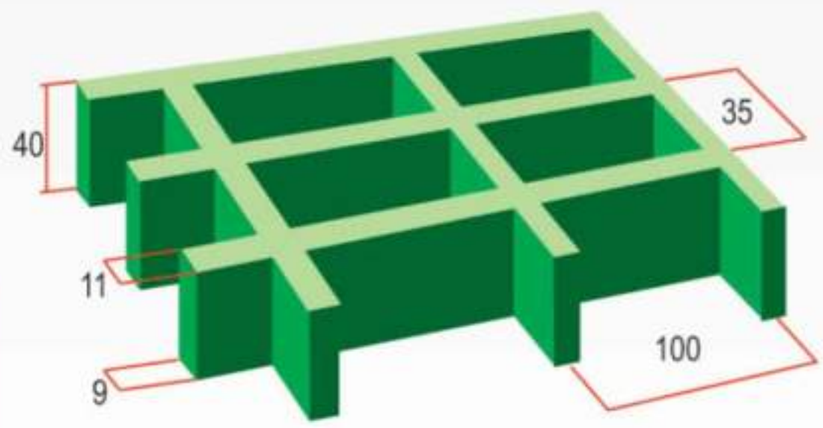
Mould Type FRP Gratings

STANDARD MESH

Pitch of rib	40X40c/c mesh
Average Rib Thickness	9X11 mm
Grating Thickness (height)	40 mm maximum

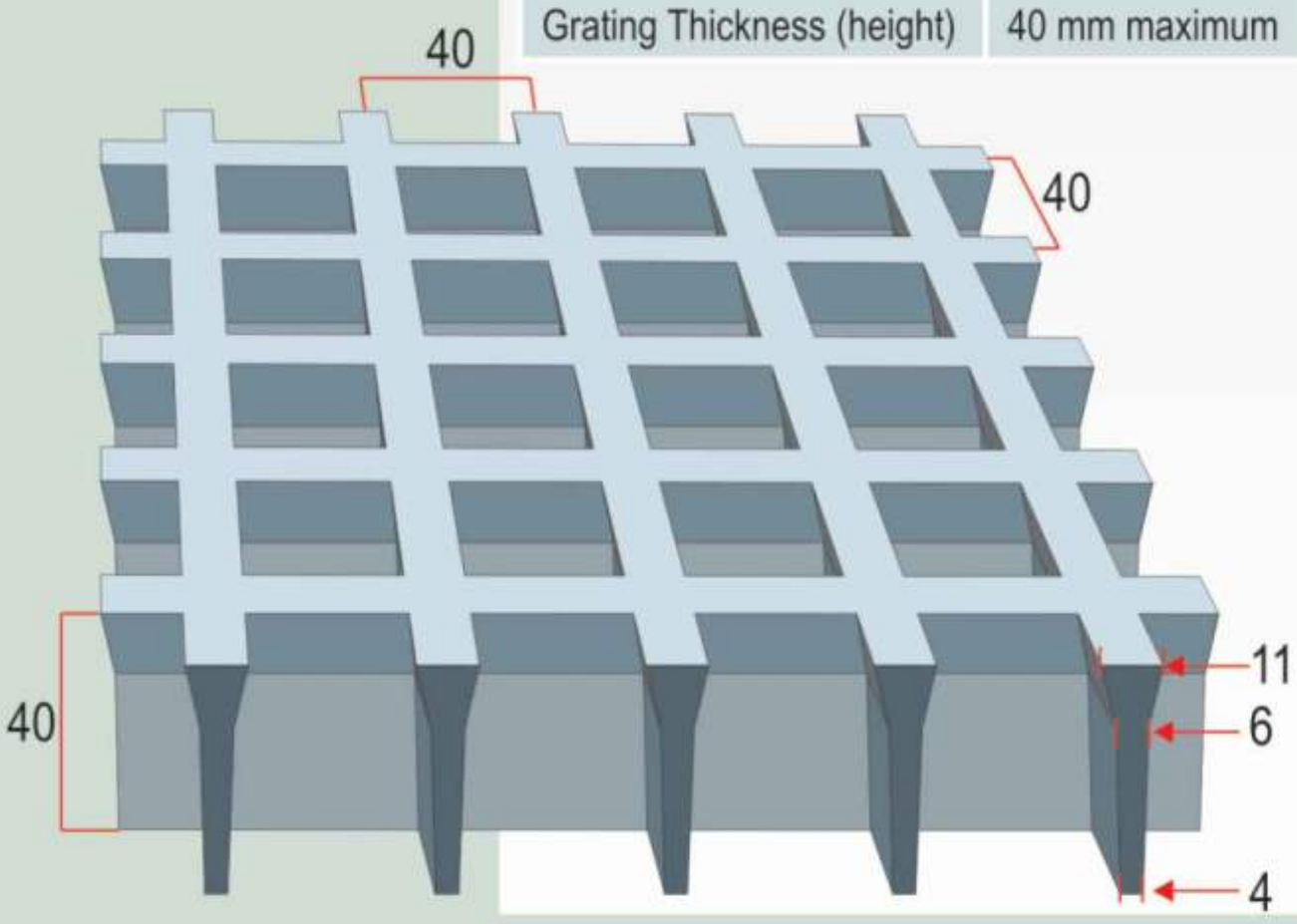


Pitch of rib	35X100c/c mesh
Average Rib Thickness	9X11 mm
Grating Thickness (height)	40 mm maximum



ECONOMICAL MESH

Pitch of rib	40X40c/c mesh
Average Rib Thickness	4X6X11 mm
Grating Thickness (height)	40 mm maximum



The height of the Gratings is directly proportional to the loading capabilities of the gratings. Hence the height is chosen based on the loading recommended by the client and also maximum allowable permissible deflection.

Standard Grating Size: 1mtr.x2 mtrs.

Colour Grey

'H' can be manufactured as 25mm/30mm/40mm

Note:

1. All dimensions are in mm unless otherwise stated
2. Standard Size - 2M x 1M, 1M x 1M
3. Other tailormade Sizes can also be supplied
4. Material of Construction:ISO phthalic Resin (Fire Retardant)
   'E'Glass Rovings
5. Tolerance: Length/Width: +/-6 mm
   Height/Mesh : +/-2mm

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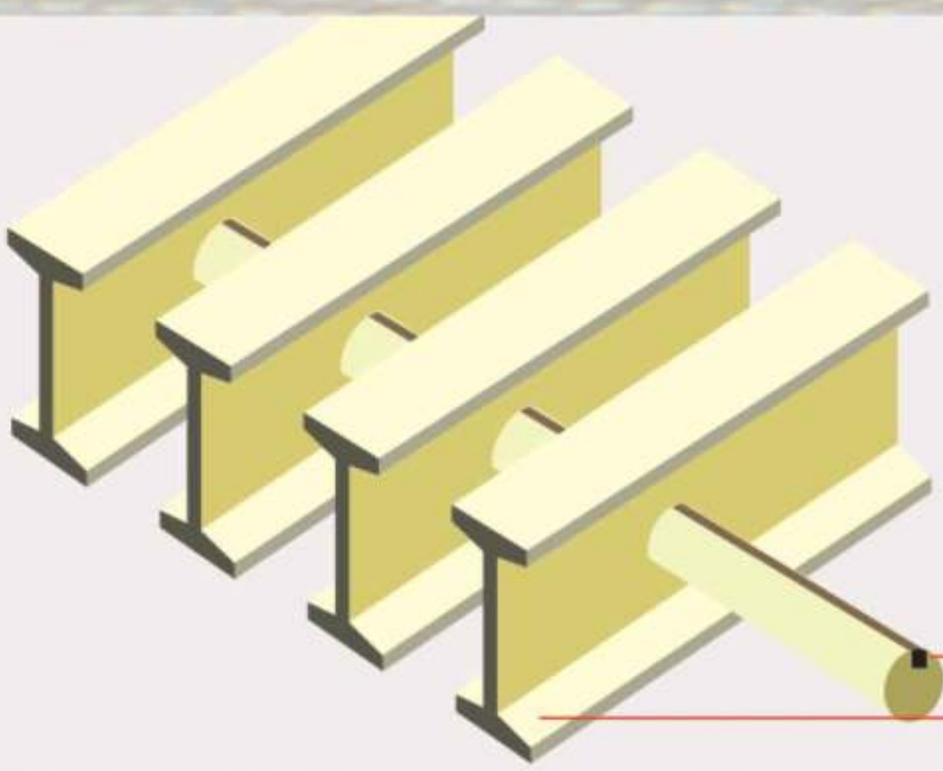
Pultruded FRP Gratings



Gratings comprise of pultruded high strength bearing bars which are adhesively bonded to pultruded cross rods passing through the centre of the bearing bars. These bars does the distribution of load across the grating.

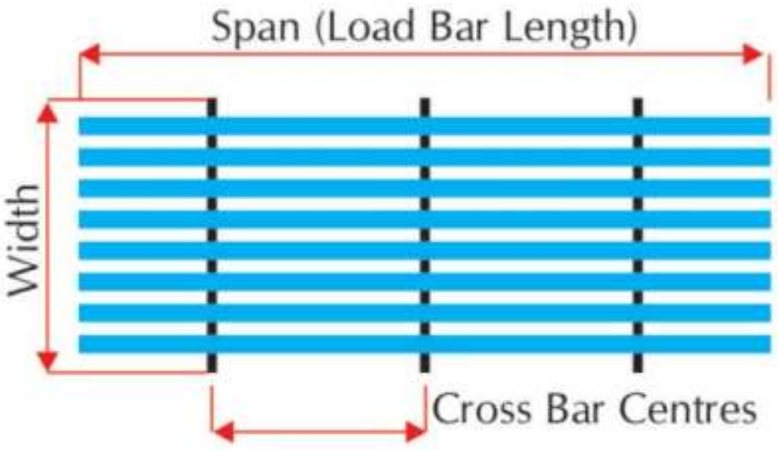
Gratings are fabricated out of various pultruded Section such as 'T','I' & Flat as bearing bar.

H = 25mm, 30mm, 40mm
C/C distance for bearing bar = 40mm,
C/C distance for cross bar = 150mm
Other tailor made mesh size also can be supplied

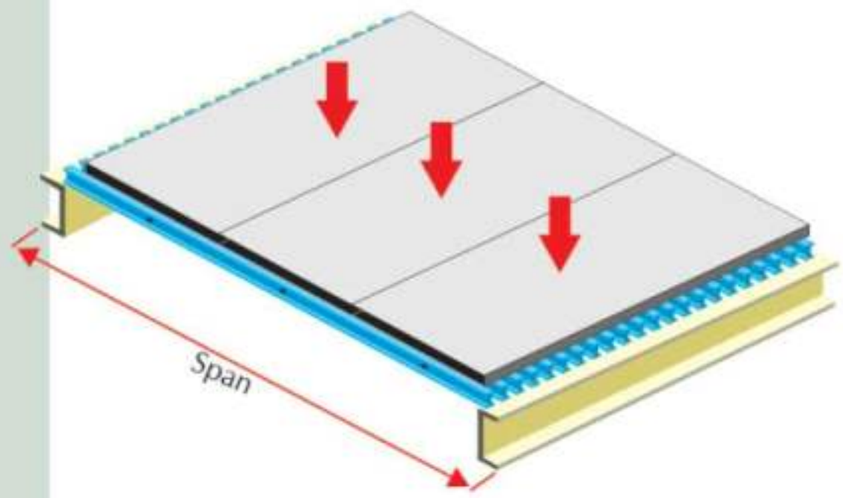
GRATING CHARACTERISATION

Width & Length

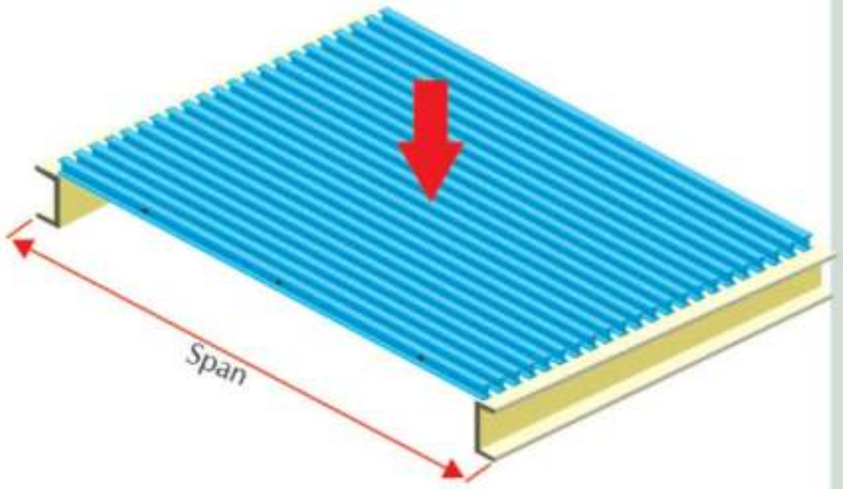
Grating sizes are specified using span (load bar length) & Width (measurement from end to End of cross rods)



Uniform Load

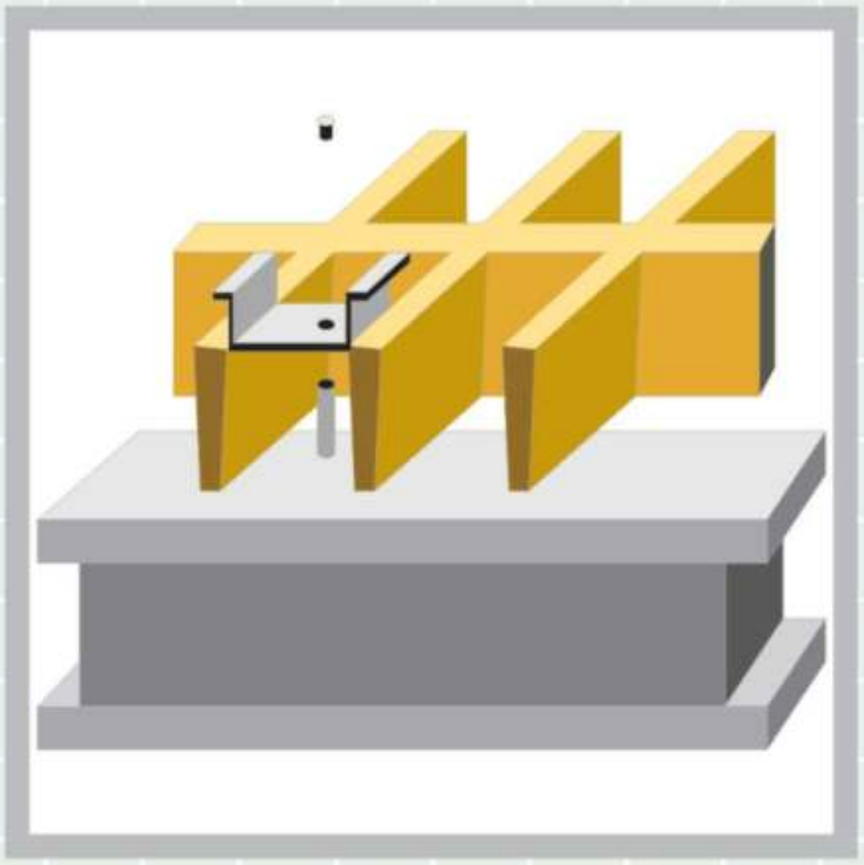


Concentrated Load

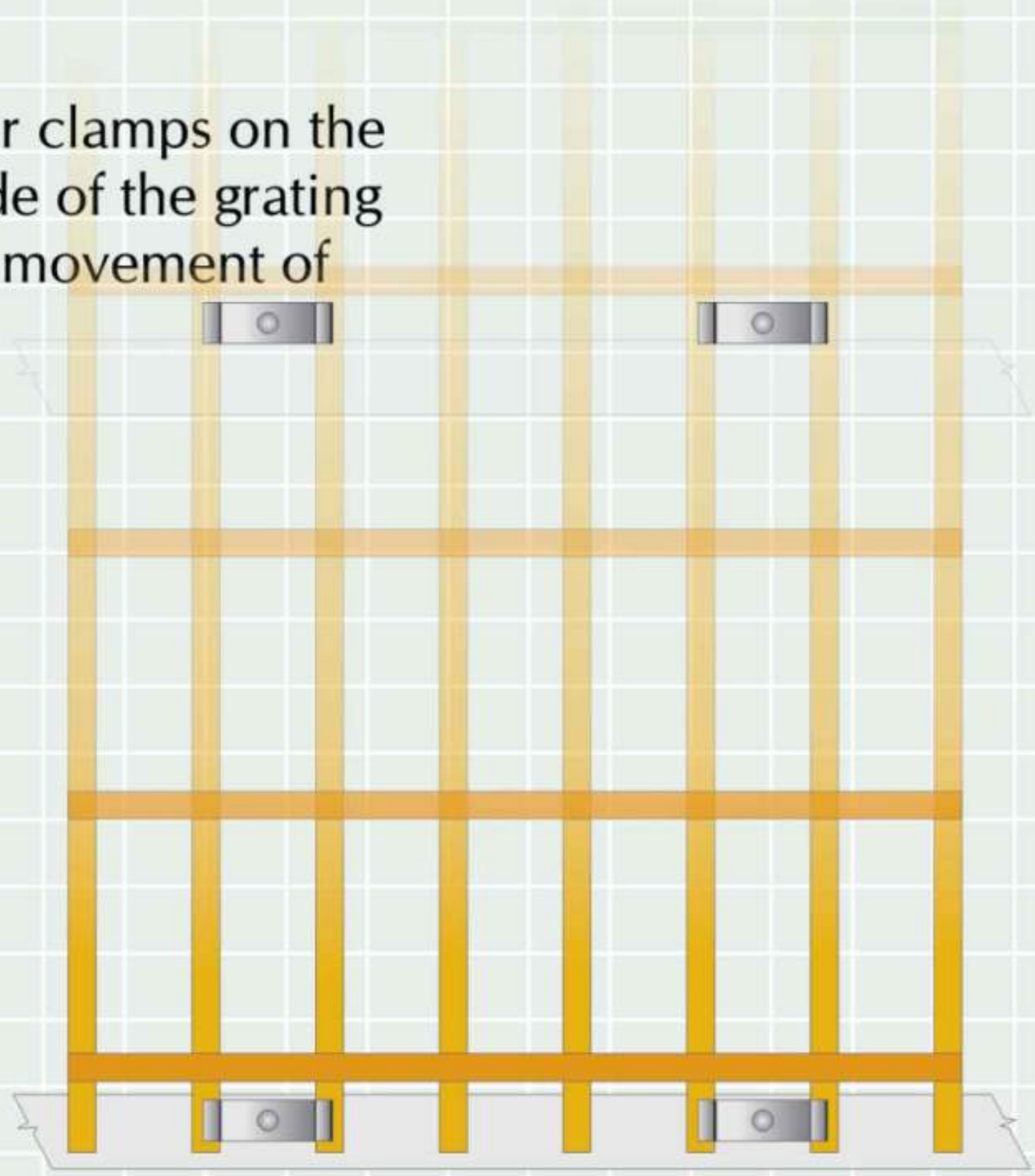


Installation

REGULAR INSTALLATION PRACTICE



- Stainless Steel Clamp have to be inserted in the mesh opening of FRP grating.
- A hole has to be drilled in the supporting member.
- Clamp has to be tightened with nut and bolt through the hole of the support span member.
- It is advisable to fix four clamps on the four corners of each side of the grating In order to prevent the movement of grating when loaded.



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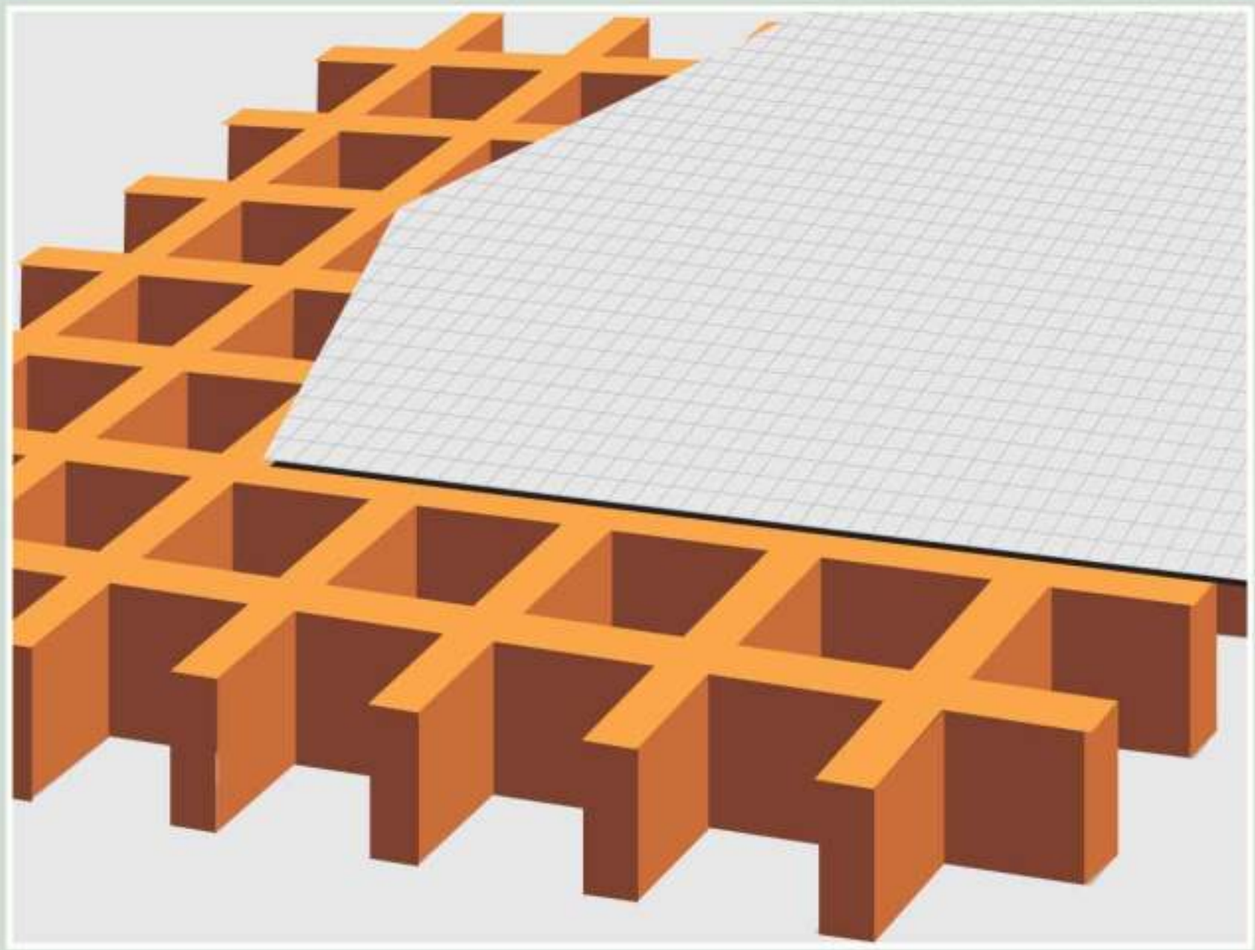
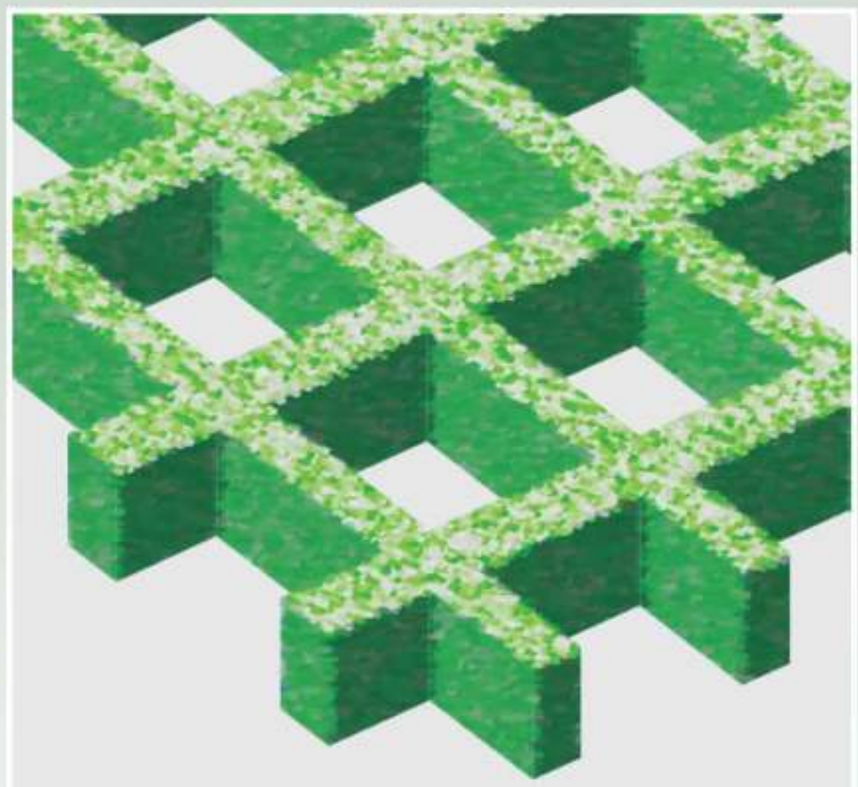
CHEQUERED PLATE GRATINGS



ANTI-SKID GRATINGS



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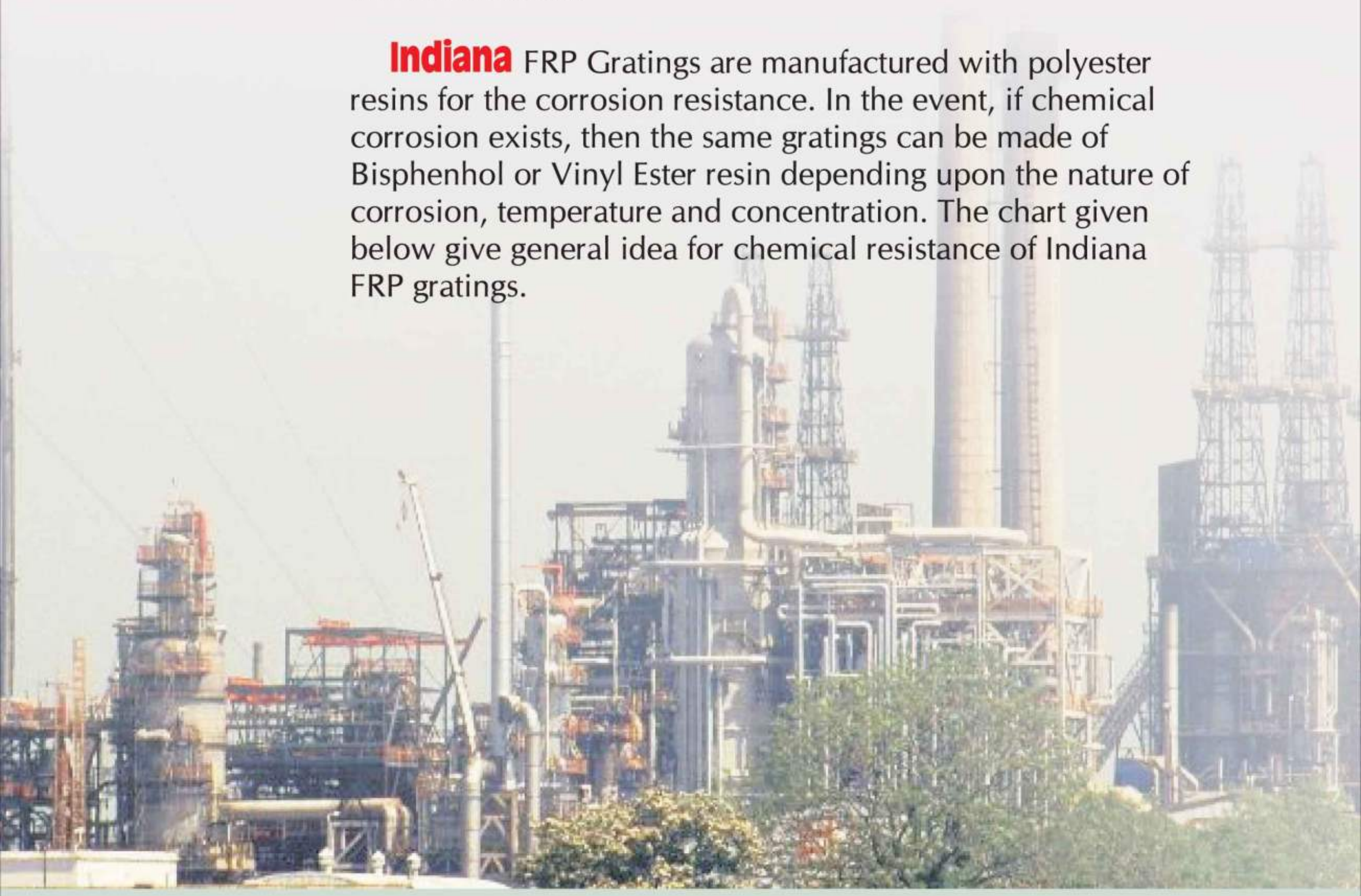
Corrosion Resistant

Indiana FRP Gratings are corrosion resistant and are unaffected by various types of chemicals under different temperature conditions.

Indiana FRP Gratings are made out of glass reinforcement with unsaturated polyester resins. They are impervious to either climatic environmental, gaseous and specific or general chemical attacks.

Indiana FRP Gratings are manufactured with polyester resins for the corrosion resistance. In the event, if chemical corrosion exists, then the same gratings can be made of Bisphenhol or Vinyl Ester resin depending upon the nature of corrosion, temperature and concentration. The chart given below give general idea for chemical resistance of Indiana FRP gratings.



Corrosion Resistance Guide of Resin Systems:

The corrosion guidelines presented in the following table are for normal tray applications where corrosive exposure is limited to fumes, vapours and occasional splashes at the temperatures indicated. Isopthalic Polyester is the standard resin used in the Indiana FRP Cable Tray System. A Vinyl ester resin system is available on a special order basis where strong acids (such as hydrochloric acid), strong alkalies (such as hydrocaustic soda) and organic solvents comes in contacts.

INDIVIDUAL APPLICATION.

These recommendations should only be usedas a guide and **Indiana** does not take responsibility for design or suitability of materials for specific applications which are not covered in this' guide, and may require screening tests to evaluate resin systems, consultation with the **Indiana** is recommended

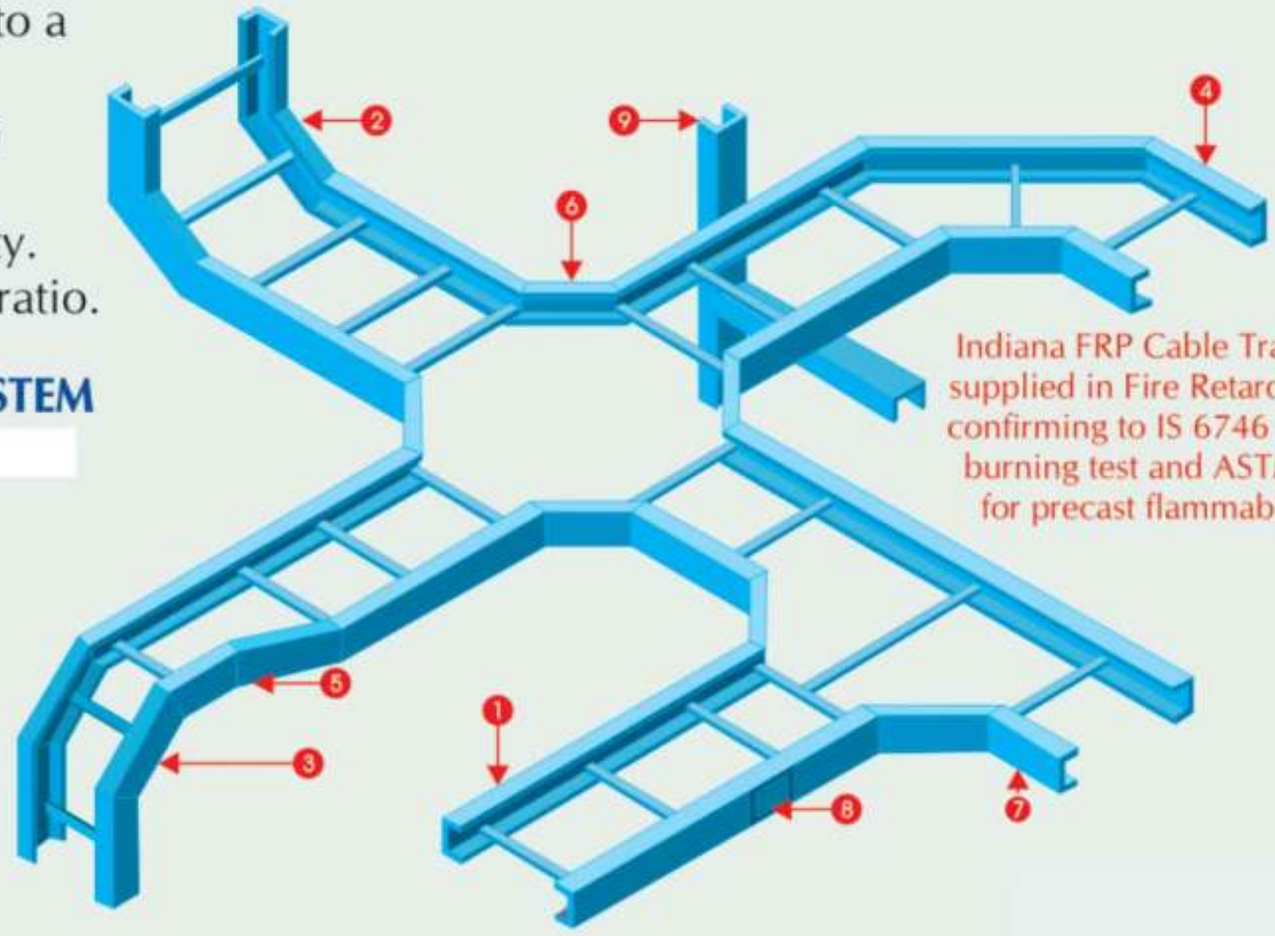
Chemical	75° F (24°C)	15° F (66°C)	Chemical	75° F (24°C)	15° F (66°C)
Acetic Acid 15%	P	P	Magnesium Salt	P	P
Acetic Acid 50%	P	V	Mercuric Chloride	P	P
Acetic Acid (Glacial)	NR	NR	Mercurous Chloride	P	P
Acetone	V*	NR	Mercury	P	P
Aluminum Chloride	P	P	Methyl Alcohol	P	NR
Aluminum Hydroxide	P	V	Methyl Ethyl Keton	NR	NR
Aluminum Potassium Sulphate	P	P	Mineral Oils	P	P
Aluminum Sulphate	P	P	Naphta	P	P
Ammonia, Dry Gas	P	P	Nickel Salts	P	P
Ammonia, Liquid	NR	NR	Nitric Acid, 0-10%	P	V
Ammonium Chloride, Sat'd	P	P	Nitric Acid>10%	NR	NR
Ammonium Hydroxide 20%	P*	V	Oleic Acid	P	P
Ammonium Nitrate, Sat'd	P	P	Oxalic Acid	P	P
Ammonium Sulfate, Sat'd	P	P	Perchloroethylene	P	P
Amyl Alcohol	P*	V*	Phenol,0-2%	V	NR
Benzene	P	NR	Phenol,>2%	NR	NR
Benzene Sulfonic Acid 30%	P	V	Phosphoric Acid	P	P
Benzole Acid, Sat'd	P	P	Potassium Carbonate,0-15%	P	V
Butyl Alcohol, Normal	P	NR	Potassium Carbonate,15-sat'd	NR	NR
Calcium Salts	P	P*	Potassium Hydroxide	V	NR
Carbon Disulfide	NR	NR	Potassium Permanganate	P	V
Carbonic Acid, Sat'd	P	P	Potassium Persulfate	V	NR
Carbon Tetrachloride	P*	P*	Potassium Salts	P	P
Chlorine, Dry Gas	P	P	Silver Nitrate	P	P
Chlorine, Wet Gas	V	V	Sodium Bicarbonate	P	P
Chlorine Dioxide	P*	V*	Sodium Bisulfate	P	P
Chlorine Water	P	P*	Sodium Carbonate	P	V
Chlorobenzene	NR	NR	Sodium Chloride	P	P
Chromic Acid 5%	P	V*	Sodium Dichromate	P	V
Citric Acid, Sat'd	P	P	Sodium Hydroxide	V	NR
Copper Sulfate	P	P	Sodium Hypochlorite,0-5%	P	V
Crude Oil, Sour	P	P	Sodium Hypochlorite,5-10%	V	V
Diesel Fuel	P	P	Sodium Hypochlorite,>10%	V	NR
Ethyl Alcohol	NR	NR	Sodium Nitrate	P	P
Ethylene Glycol	P	P	Sodium Silicate <6%	V	V
Fatty Acids	P	P	Sodium Sulfate	P	P
Ferric Salts	P	P	Sodium Sulfide	V	V
Ferrous Sulfate	P	P	Sodium Thiosulfate	V	NR
Fluoboric Acid, Sat'd	P	V	Styrene	NR	NR
Fluosilicic Acid 0-35%	V	V*	Sulfuric Dioxide, Dry or Wet Gas	P	P
Formic Acid, Vapor	P	P	Sulfuric Acid, Vapor	P	P
Fuel Oil	P	P	Sulfurous Acid	V	NR
Gasoline	P	P*	Tannic Acid	P	P
Glycerine	P	P	Tartaric Acid	P	P
Hydrochloric Acid 0-10%	P	P	Toluene	NR	NR
Hydrochloric Acid 10-36%	P	V*	Trisodium Phosphate	V	V
Hydrofluoric Acid	NR	NR	Water, City	P	P
Hydrogen Chloride, Dry or Wet Gas	P	V			
Hydrogen Peroxide	NR	NR			
Hydrogen Sulfide, Dry or Wet Gas	P	V			
Kerosene	P	P			
Lactic Acid	P	P			
Lime Slurry, Sat'd	P	P			
Lithium Chloride, Sat'd	P	P			

P	- Polyester resin system
V	- Vinylester resin system
NR	- not recommended
*	- some limitation apply - consult the factory

FRP Cable Tray System

Fibreglass Reinforced Plastics (FRP) are increasingly being considered as a superior material of construction in many fields. FRP has proved immensely beneficial in a wide range of Industrial applications due to the following salient features present in it:

- Resistance against corrosion to a wide range of chemicals.
- Excellent electrical insulation properties.
- Very low thermal conductivity.
- Very high strength to weight ratio.



Indiana FRP Cable Trays can be supplied in Fire Retardant Grade confirming to IS 6746 for surface burning test and ASTM -D-635 for precast flammability test.

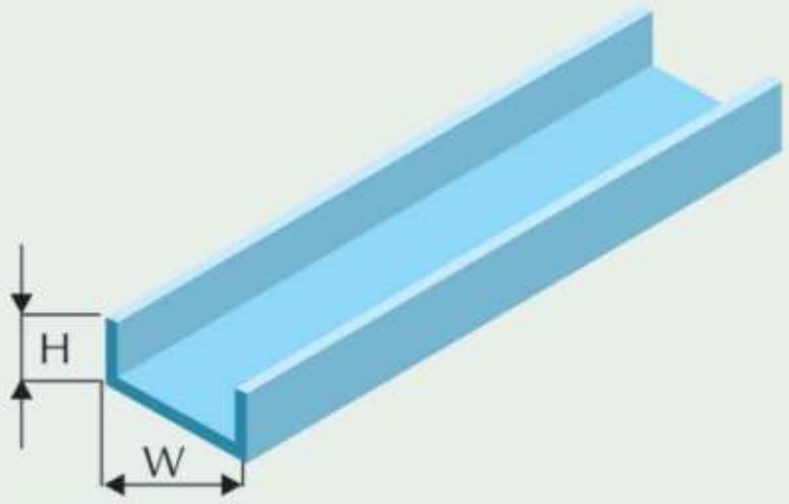
FRP CABLE TRAY ASSEMBLY SYSTEM

NO.	ITEM NAME
1	Straight Run
2	90° Inside Vertical Bend
3	90° Outside Vertical Bend
4	90° Horizontal Bend
5	Left Hand Reducer
6	Horizontal Cross
7	Horizontal Tee
8	Splice Plate For Joining
9	FRP Support

TYPES OF FRP CABLE TRAYS

PERFORATED TYPE

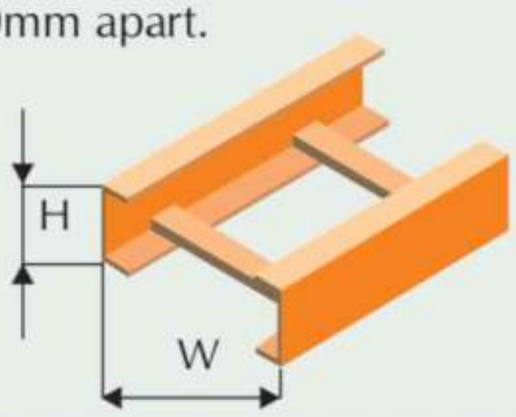
These are channel type, solid bottom, pre-drilled cable trays and are designed for light loads namely instrumentation and control cables.



WIDTH	100	75	50	150	200	300	500	600
HEIGHT	30	35	35	50	50	50	75	100
THK	5	3	3	5	5	5	3	5

LADDER TYPE

These are made up of 'C' shaped side channel to provide excellent strength. Rungs are secured to side channels by pressure contact moulding or by bolting. Rungs internals are designed to eliminate rolling over during cable installation and spaced at 300mm/ 250mm apart.



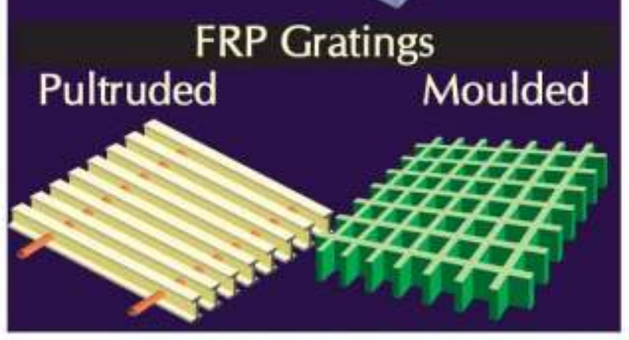
WIDTH	150	150	300	300	500	500	600	600	900	900	1000
HEIGHT	100	75	100	75	100	75	100	75	100	150	150
THK	5	3	5	3	5	3	5	3	5	5	5

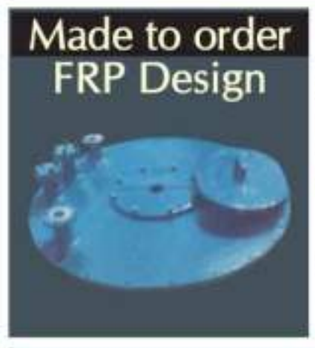
Indiana also manufactures and supplies other accessories such as bends and covers, details of which are specified in our detailed catalogue, that would be available on request.

We also design and manufacture tailormade FRP profiles to suit your individual requirements:

- Square Tube
- Round Tube
- I-Beam
- C-Channel
- L-Angle

Other styles of FRP Pultrusion profiles are available on request.





Range of products

Floor Gratings in Mild Steel, Hot Dip Galvanised, Aluminum, Stainless Steel and FRP

Ladder Type Cable Trays & Accessories in Mild Steel, Hot Dip Galvanised, Aluminum, Stainless Steel and FRP

Perforated Cable Trays & Accessories in Mild Steel, Hot Dip Galvanised, Aluminum, Stainless Steel and FRP

Trunkings, Support Systems and Hardwares

Trash Racks in FRP

Ready-fix Handrails in Mild Steel, Hot Dip Galvanised, and FRP

Do ask for our Catalogues for more detailed information on the above products.

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