

FRP Cable Trays



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:

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

Indiana designs and manufactures FRP Cable Trays 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 Selling its Products to Indian market as well as exporting to overseas markets especially 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.

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



Indiana FRP cable trays are of the highest quality, they are strong, chemical resistant, fire retardant and provide electrical insulation and ultra violet protection.

Indiana

FRP cable trays are lightweight, cut to length and can be installed quickly. They are elegant, attractive and lighter than MS cable trays.

Indiana

FRP cable trays have been used world wide and have proved that they are of world class quality. Indiana offers competitive prices and a complete





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

The FRP advantages

In comparison to galvanized steel:

- Corrosion resistance is not related to the zinc coating quality as on the steel.
- No risk of injury, Resistant to salt water, sulfur, chlorine or basic environments.

In comparison to aluminium:

- No electrolytic corrosion due to contact of two metals in humid environment.
- Much more longer life span in basic chlorine or halogen atmosphere.

In comparison to stainless steel:

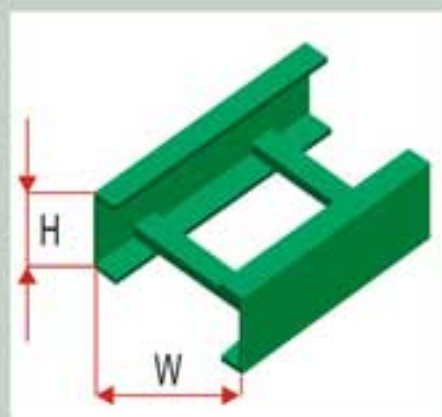
- Absence of corrosion under tension (mechanical).
- Recommended in chlorine environments

In comparison to metals:

- No earthing required.
- Resistance to corrosion contributes to reduce the life cycle costs (LCC) of installations.
- No requirement for electric continuity test.
- Will not deform under impact.
- Easy to work (cut, drill) at site and is much easier to move and place because it is light weight.

These are made up of C shaped side channel. 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

Features



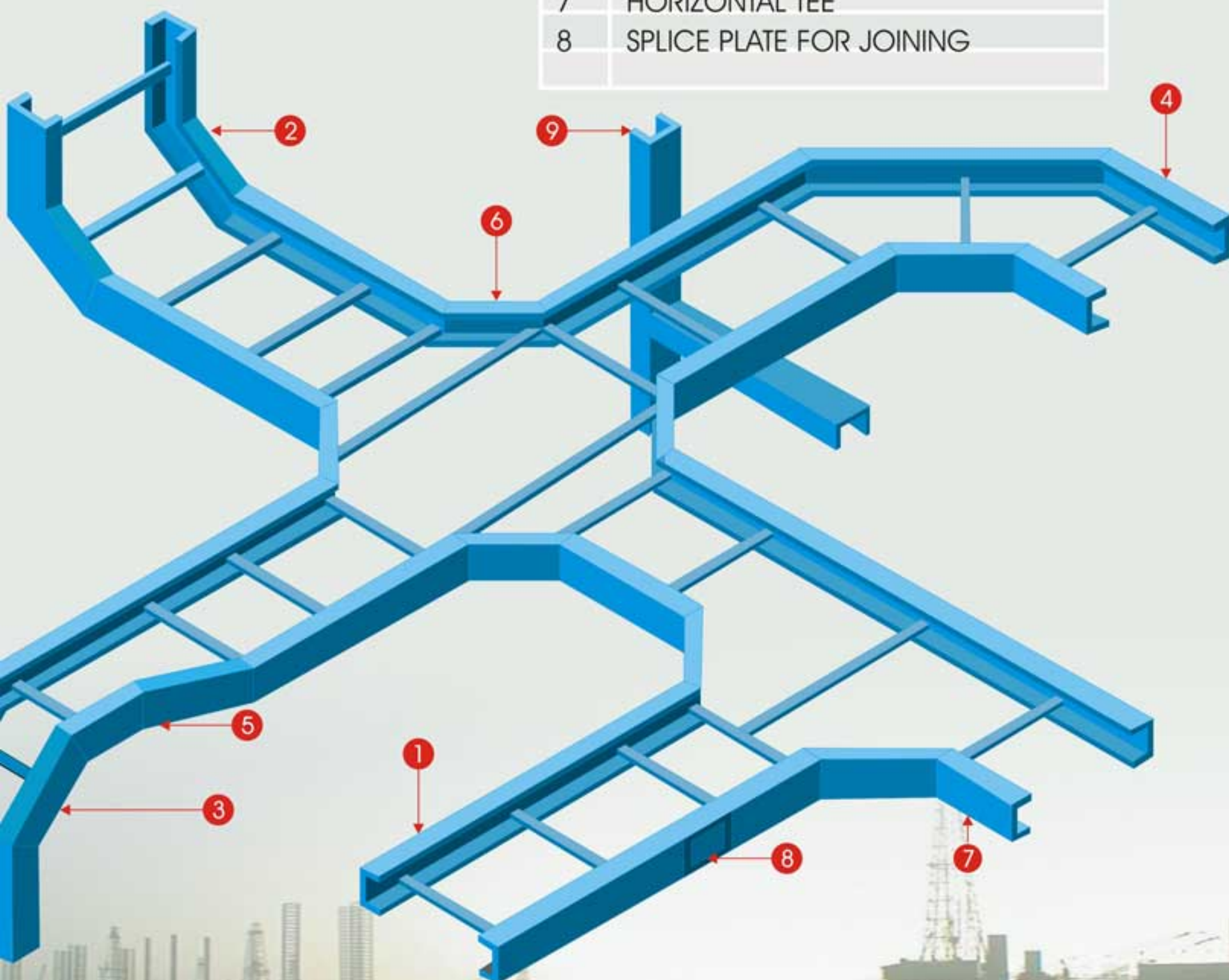
WIDTH	150	150	300	300	500	500	600	600	900	900	1000
HEIGHT	100	75	100	75	100	75	100	75	100	150	150
THK	5	3	5	3	5	3	5	3	5	5	5

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



Fibreglass Cable Tray Assembly System

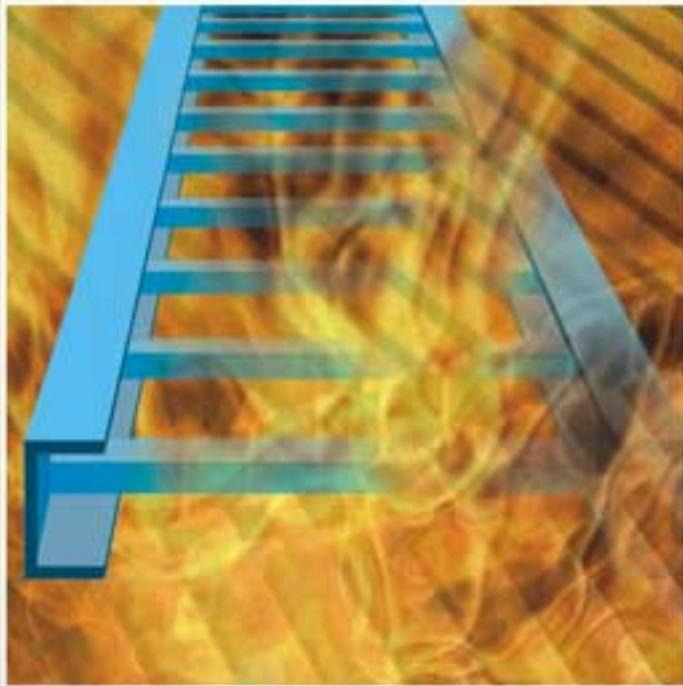
NO	ITEM NAME
1	STRAIGHT RUN
2	90° INSIDE VERTICAL BEND
3	90° OUTSIDE VERTICAL BEND
4	90° HORIZONTAL BEND
5	LEFT HAND REDUCER
6	HORIZONTAL CROSS
7	HORIZONTAL TEE
8	SPLICE PLATE FOR JOINING



Why Specify Indiana FRP Cable Trays?

Indiana FRP cable trays are
load tested to meet
loading as per

EIL Specification
(EIL-OEDS-422-Rev. 4 speci.)



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.

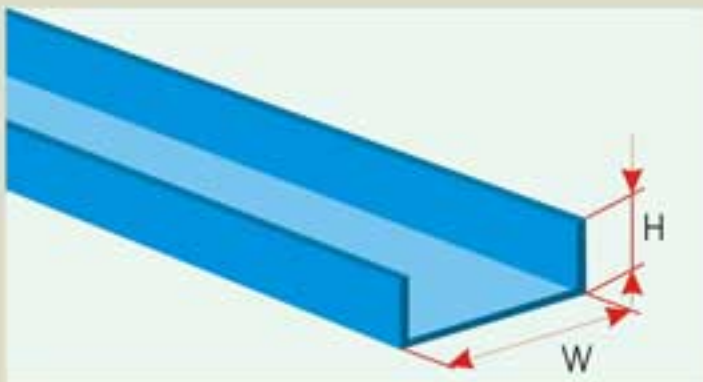
- ▶ Indiana FRP cable trays are manufactured by our in house pultrusion process.
- ▶ Indiana FRP cable tray systems have been tested and used in offshore platforms, chemical plants, petrochemical industries, refineries, paper mills, ports, jetties, fertilizer plants and proved that they are of excellent quality.
- ▶ In addition to the daily exposure to wind and weather Indiana FRP cable trays can withstand corrosive conditions in petroleum and Chemical industries also.
- ▶ They are corrosion resistant, non-conductive and non-magnetic, light in weight and their strength to weight ratio surpasses that of equivalent steel.
- ▶ Indiana FRP cable trays are rust proof, They don't require painting and are available in gray colour. (Custom colours are available on request)
- ▶ Indiana FRP cable trays are manufactured in Isophthalic, Bisphenol and Vinylester resin giving superior range of chemical resistance.

Surface Veil is applied during the pultrusion process to ensure resin rich surface

Indiana has supplied more than 40,000 Metres of FRP Cable Trays to ONGC (Through the Contractors), Which are being used on their existing offshore platforms.



FRP Perforated Type Cable Trays



RANGE

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

HIGHLIGHTS

Fibreglass reinforced
Solid bottom
Cable trays are pre drilled to accept splice plates
Special ultra-violet protection
Fire resistant polyester
Corrosion and temp, resistant
Light weight
Perforated type
Standard length 3 mts./2.5 mts.

FEATURES

The channel type, solid bottom, pre-drilled cable trays are designed for light loads namely instrumentation and control cables and for transition from cable trays to individual control points.

CAPABILITIES

Uniformly Distributed Load (UDL) bearing capabilities in kg/mtr.is given below without failure or permanent

WIDTH	UDL in Kg/Mtr.	SPAN (mm)
50	10	1000
75	15	1000
100	20	1000

Indiana FRP Cable Tray have been tested by independent authorities as per specification, also inspected and approved by

Lloyds Register of shipping,
 Engineers india limited,
 Mecon Ltd.
 John Brown Technology India (Pvt), Ltd,
 Larsen and Toubro Ltd,
 Bureau Veritas,
 Essar Group of Companies,
 And Many More.

FRP Accessories

Ladder Type/ Perforated Type Cable Tray



SUPPORT LOCATIONS

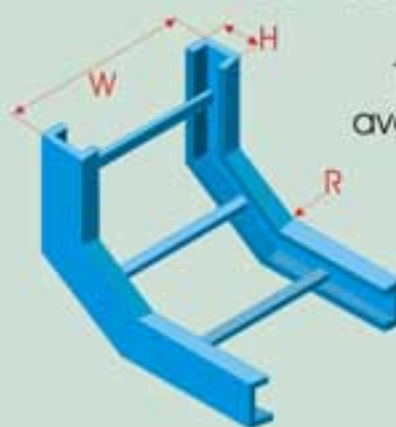
Straight Sections

Supports should be located whenever practical, so that all splice plate connectors between horizontal straight sections are located between the support point and the quarter point of the span. It is desirable to have the straight sections act as a continuous beam to enable the individual spans to act collectively to reduce deflection

A support should be located 600 mm away on each side of an expansion splice plate.

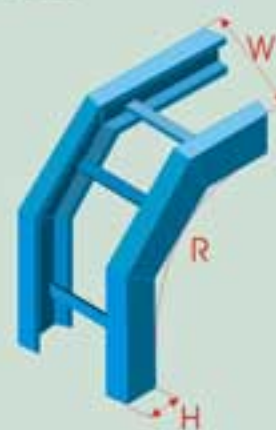
Sloping trays should be supported at intervals not exceeding those for horizontal trays of the same design for the same installation.

90° Vertical Bend Inside/Outside



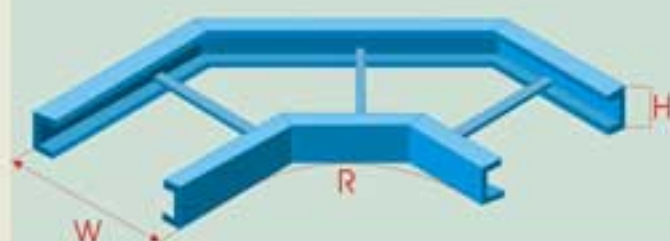
The 90° vertical bends are available to the corresponding tray type and width

RADIUS
200
300



90° Horizontal Bend

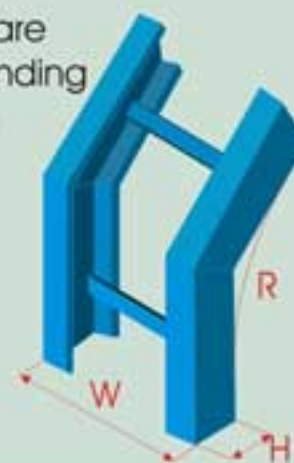
The horizontal bends are available to the corresponding tray type and width



45° Vertical Bend Inside/Outside

The 45° vertical bends are available to the corresponding tray type and width

RADIUS
200
300



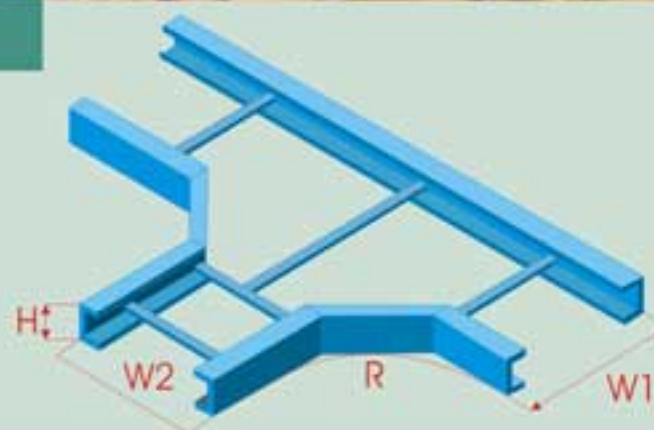


Indiana

Horizontal Tee

The horizontal tee are available to the corresponding tray type and width

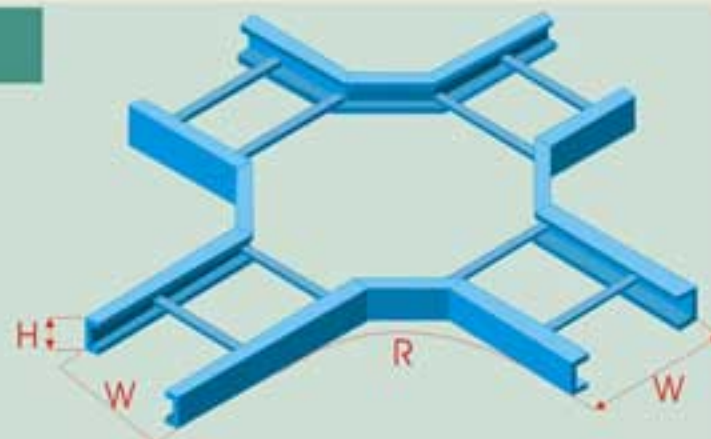
RADIUS
200
300



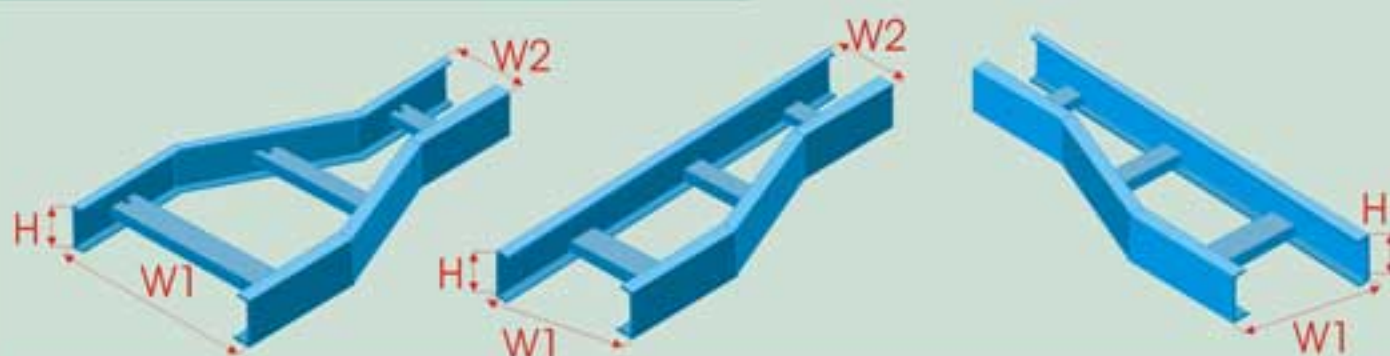
Horizontal Cross

The horizontal cross are available to the corresponding tray type and width

RADIUS
200
300



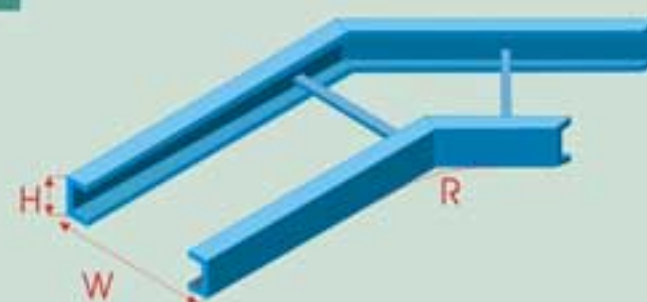
Reducer



45°Horizontal Bend

The 45°horizontal bends are available to the corresponding tray type and width

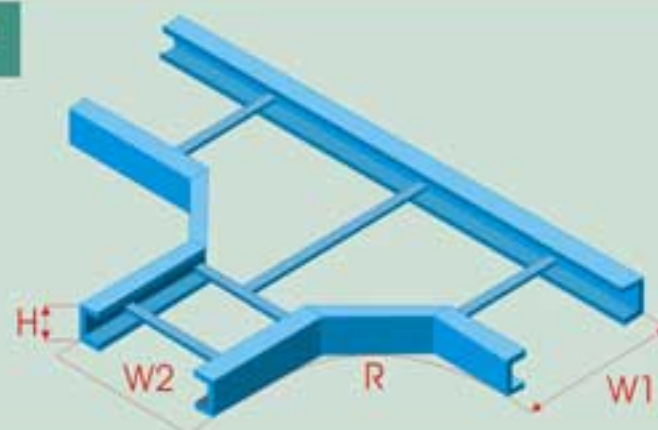
RADIUS
200
300



Horizontal Tee Equal / Unequal

The horizontal tee are available to the corresponding tray type and width

RADIUS
200
300



Fitting

Indiana FRP CABLE TRAY

Fittings are manufactured from directly pultruded material or using mitered material.

Mitered construction involves cutting standard pultruded side rail segments and holding them together using connector plates and an adhesive. All cut surfaces are also sealed for maximum UV and chemical corrosion protection.

Application

A wide variety of industries take advantage of the benefits of Indiana FRP Cable Tray systems and structural profiles.

- Chemical Industries
- Waste water & sewage treatment plants
- Petrochemical Industries
- Offshore Oil & Gas
- Mineral Processing
- Food & Beverage
- Fertiliser Processing
- Galvanising & Plating
- Cooling Towers
- And many more

The major differences between pultruded side rails and moulded rails are:

Pultruded FRP is not Conventional FRP

Property	Conventional FRP	Pultruded FRP
Strength	Poor	High
Glass Content	20% to 30%	60% to 70%
Fiber Placement	Highly varying	consistent
Process	Batch	Continuous
Type of Operation	Manual	Automatic
Output	Limited	High volume
Cross-Section	Non-uniform	Constant
Quality	Dependant on labour	High consistent

Indiana FIBREGLASS STRUT SYSTEMS

INDIANA is proud to present our new line of Fiberglass strut (channel) and a wide variety of fittings.

Indiana strut is the solution used for corrosive environments because it is far more corrosion resistant and considerably less expensive¹ than stainless steel.

Most Indianastrut products are either available in Isophthalic Polyester resin or Vinyl ester resin offering following advantages:

Corrosion Resistance, Resistance to Sunlight (UV resistance), Easy to drill and cut, Lightweight, high strength and Fire



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. Isophthalic 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 alkalis (such as hydrocaustic soda) and organic solvents comes in contacts.

INDIVIDUAL APPLICATION

These recommendations should only be used as 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



Pultrusion

Pultrusion is a continuous, automated closed molding process that is cost effective for high volume production of constant cross section parts.

The basic process involves

- 1** Pulling of continuous fibres through a resin bath, blended with a catalyst and then in to pre forming fixture where the section is partially pre-shaped and excess resin is removed.
- 2** It is then processed through a heated die, which determines the sectional geometry and finish of the final product.
- 3** A flying cut-off saw is programmed to cut the product to the desired length.

Indiana FRP profiles are designed and manufactured as structural components. It is therefore, essential to control the position and orientation of the glass fibre reinforcement in longitudinal and transverse direction to maintain their structural integrity. In addition, the presence of surface veil on the surface of all structural shapes which causes a resin rich barrier layer which enhances greater degree of corrosion

M A N



Glass Roving



Glass Mat

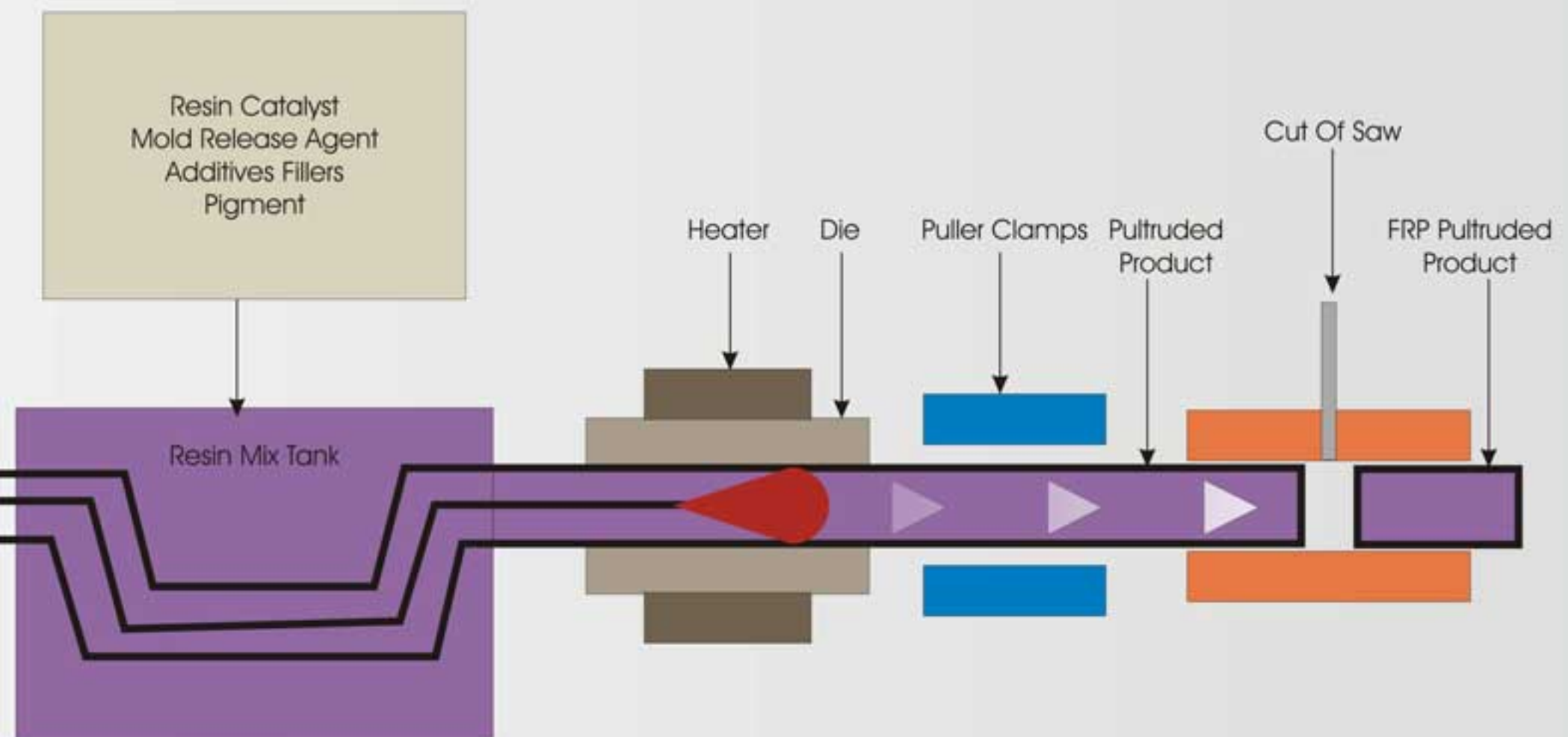


Surface Veil



The pultrusion process used to manufacture Indiana profiles achieves the optimum combination of these parameters. Each reinforcing fibre is passed through the heated chambers to remove micro-molecular layer of moisture. The specifications of the resins, reinforcements and other materials used can be varied to suit specific requirements, to manufacture products which will outperform many traditional metal profiles. Custom made moulded

MANUFACTURING PROCESS



PRODUCT FEATURES: Construction

All cable tray systems are designed using high strength to weight ratio pultruded structural composite profiles.

The ladder type system comprises of two side rails connected by transverse rungs. All rungs to side rail connections have a mechanical and adhesive lock.

Channel tray can be provided plain or

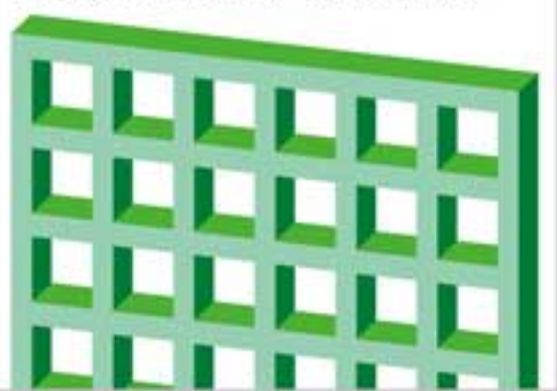
All fittings, horizontal bends, risers, reducers, tees, used to enable cable routings to deviate from a straight line onto another planes are constructed from the same profiles as the straight ladder sections.

Standard joining of cable tray sections and fittings is accomplished with splice plates and stainless steel 304 / 316 fasteners.

FRP Gratings

Types of FRP Gratings

MOULDED FRP GRATING



STANDARD MESH

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

PULTRUDED FRP 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 = 30mm, 50mm, 40mm,
 C/C distance for cross bar = 50mm, 75mm, 100mm, 150mm
 Other tailor made mesh size also can

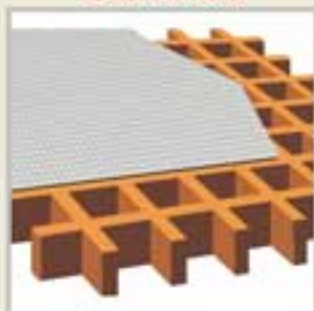
ECONOMICAL MESH

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

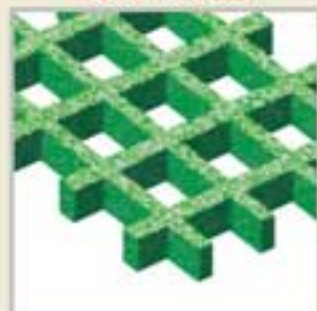
Note:

1. All dimensions are in mm unless otherwise stated
2. Standard Size 2MX1M
3. Other tailor made Sizes can also be supplied
4. Material of Construction: ISO phthalic Resin (Fire Retardant) 'E' Glass Rovings

CHEQUERED PLATE GRATINGS



ANTI-SKID GRATINGS



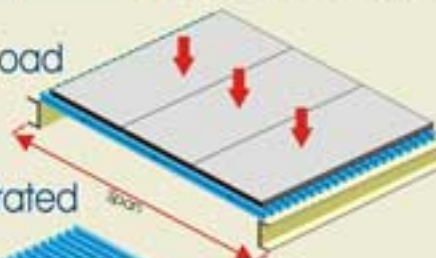
Grating Characterisation

Width & Length

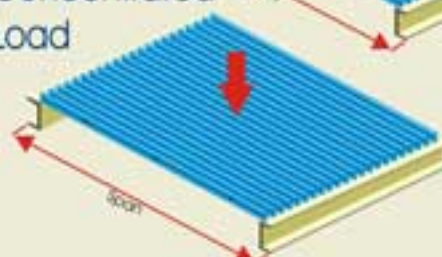
Grating sizes are specified using span (load bar length) & Width (measurement from end to end of cross rods)



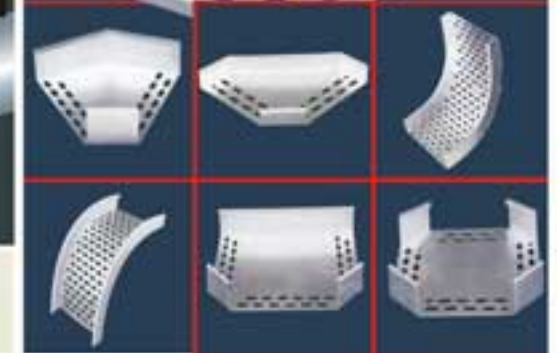
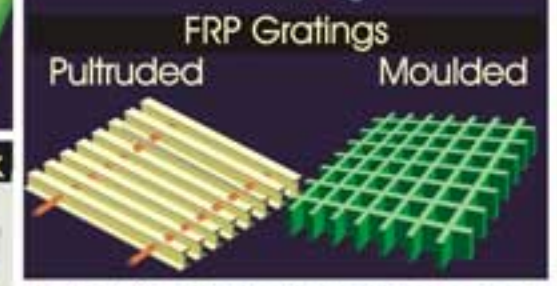
Uniform Load



Concentrated Load



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, they can be cut to size as per client's requirement and can be installed



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 Hardware

Trash Racks in FRP

Ready-fix Handrails in Mild Steel,

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

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