



# INDUSTRIAL PIPING SYSTEM FOR SHIP BUILDING



FRP SOLUTIONS



# FRP SOLUTIONS

**Fibre-reinforced plastic (FRP)** (also called **fibre-reinforced polymer**, or **fiber-reinforced plastic**) is a composite material made of a polymer matrix reinforced with fibres. The fibres are usually glass, carbon, aramid, or basalt. Rarely, other fibres such as paper, wood, or asbestos have been used. The polymer is usually an epoxy, vinylester, or polyester thermosetting plastic, though phenol formaldehyde resins are still in use.

FRPs are commonly used in the aerospace, automotive, marine, and construction industries. They are commonly found in ballistic armor as well.

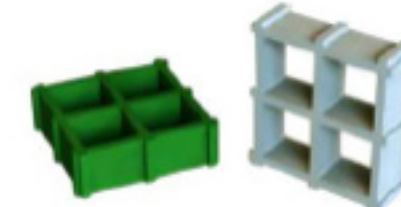
## MOULDED GRATINGS



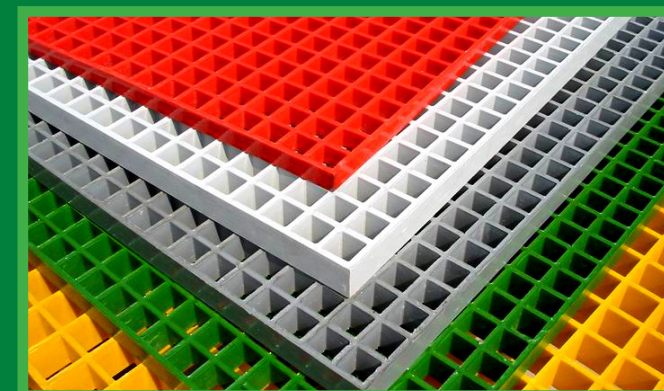
Covered gratings



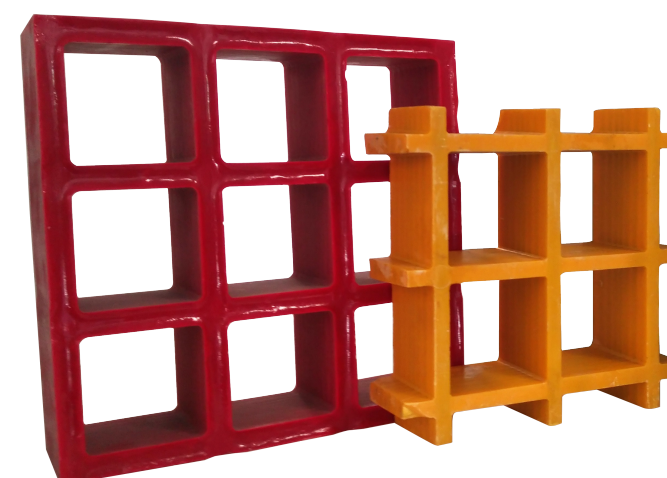
Micro mesh safety gratings



38x38 gratings



Moulded Gratings are the best solution for aggressive environments that have corrosion problems and, depending on customer needs, are available in various types of resins, mesh and surface. The grids



have a square mesh pattern for multidirectional resistance. When the area of the mesh is 38x38mm, 70% of it is open; 72% in those of 50mm; 48% in those of 19x19mm; and 12% in those of 8x8mm.



## CHARACTERISTICS

- **Corrosion resistant:** It is resistant to corrosion produced by most acids, salts and other chemical products.
- **Impact resistant.**
- **Flame retardant:** It has a flame retardant capacity according to ASTM-E84/M-1 F-1 Tunnel Tests.
- **UV resistant:** Is it not affected by long exposure to solar radiation. Made with colored resin. No need to paint or lose color.
- **Anti-slip:** It is manufactured with concave, grained or chequered contact surfaces that significantly reduce the risk of slippage.
- **No maintenance.**
- **Dimensionally stable.**
- **No conductive.**
- **No electronic or magnetic interference.**

## INSTALLATION MODES FOR THE GRATINGS

### INSTALLATION ON PLATFORMS AND CORRIDORS



1. The length of the edge of the grids rests on the support profiles at least 40mm. The separation between two gratings after installation should not exceed 6mm.
2. The grids shall be anchored by a minimum of four clips type M to the support, the edges of two non-supported grids shall be joined by C-type clips at a distance of not more than 1,8m.

### INSTALLATION ON VANES OR DITCHES

1. Depending on the size of the mesh of the grid, it is preferable to adjust it in order that the meshes are cutted in a closed strip.
2. The width of the support strip of the grids on the concrete slab must be at least 40mm. The play between the grid and the concrete will be between 3 and 6mm.
3. Intermediate bonding and load bearing / partitioning FRP profiles are used on which the molded grids are attached to them with stainless steel anchor clips.





## ESTRUCTURAL PROFILES



The structural profiles ESCOM are manufactured with a pultrusion process (hot-rolled one-section profile) and contain up to 70% glass fiber, which guarantees an excellent mechanical resistance.

Studied by specialists in composite structures, they take into account all the characteristics that are asked of a support beam or profile, such as longitudinal stiffness, bolt cutting, wing flexion and impact resistance.



## RAILINGS

Railings shall be measured per linear meter with their proportional part of anchoring elements.

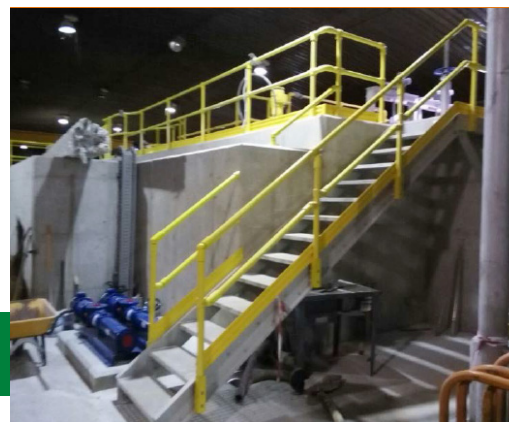
In the absence of a standard on composite handrails, ESCOMTM uses as a reference the standard UNE EN ISO1422-3 and NFE85 101 "Industrial use elements, metal rails". This standard sets out, in particular, the requirements concerning the design, dimensions and tests of metal railings with respect to their fixed, removable and removable parts.

The fields of application of these handrails are mainly the installations and industrial buildings, since for security reasons it is advisable to protect the people.



FRP ERGONOMIC HANDRAIL

FRP ROUND RAILING



FRP /ALUUMINIUM MIXED RAILING



## STAIRWAYS



## STAIRS

The inclination of the stairs must be between 30/45° and the standard maximum long are generally 6m. We can design the stairs according to customers needs or use the client design.

Stairs shall be valued in a unitary manner with the proportional part of brackets for anchoring to walls as reflected in plans and measurements provided by the customer.

Inclined staircases are supplied as a complete kit consisting of lateral stringer, step support, rungs, grille step, railings, all in PRFV material. As for the tortillería and clips, they are supplied in stainless steel. AISI-316.

By default, the footprint is 277mm and the riser is between 160/200mm. The guide weight of a ladder 800mm wide is approx. 30 kg/m.



The steps are mounted inside the support profiles forming their structure which in this case will be GRP. The play between the step and the support angle will be 3 to 6 mm. The grille step should be anchored with 2 clips per side.

The clips supplied by our company are in M and C. The clips M serve to position the grid on the support structure, the clips in C are to connect the edges of the grids.



## ROUND STAIR

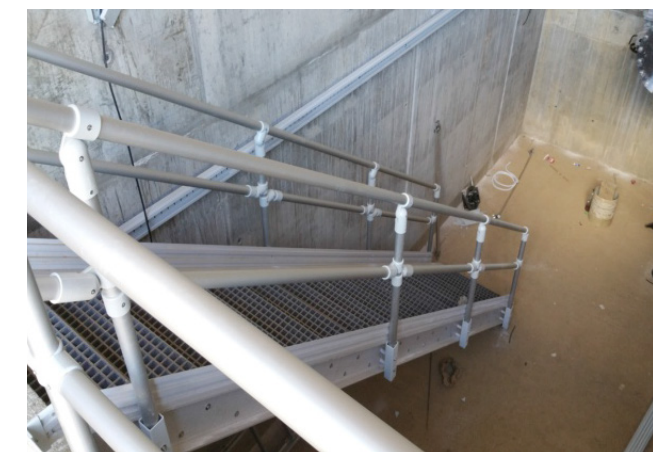
Stairs shall be valued in a unitary manner with the proportional part of brackets for anchoring to walls as reflected in plans and measurements provided by the customer.

Circular ladders are supplied to fit the contours of a circular reactor by the installation of PRFV U200x100x10 profiles, anchored to the wall of the decanter by means of GRP lugs and A-4 stainless steel anchors.



## STANDARD STAIRCASE

### STANDARD STAIRCASE WITHOUT CARDS AND FASTENING PILLARS



### STANDARD STAIRWAY Laterally Fixed To Wall



### SCISSOR LADDER WITH SUPPORT STRUCTURE





## VERTICAL STAIRCASE

Stairs shall be valued in a unitary manner with the proportional part of wall anchoring supports as reflected in customer-supplied drawings and measurements. For the longest ladders, an assembly system is provided for their joining. The assembly system consists of two FRP strips and stainless steel screws and nuts. As seen in the drawing, the stairs are fixed to the wall with molded squares placed every 2.5 m (included in the price of the simple staircase). Stairs are supplied with a tolerance of  $\pm 1$  cm.



## PLATFORMS AND WALKWAYS

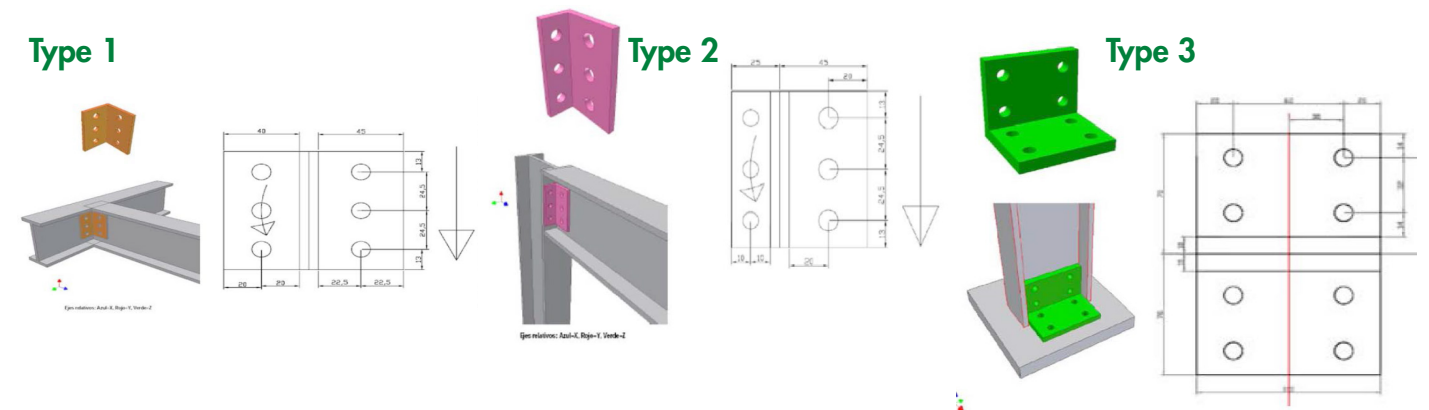
Tramex platforms and walkways will be valued per square meter including in that price the proportional part of support profiles, unions and screws in stainless steel. Aisi 316. platforms and walkways are generally composed of perimeter support profile, intermediate joining profiles and support / load distribution on which the molded grids are attached to them with the stainless steel anchor clips, the set forming a total kit or Part of the platform in question. Platforms and walkways can be supplied as pre-assembled kits ready for installation. If the need arises, the guardrails are supplied with the necessary mounting accessories: handrail joints, intermediate bar and skirting board, as well as fastening to floor (grid), etc.

The weight of a platform of 800 mm. Wide is



approx. In 45/50 kg. All inclusive. (The variations will be given by the required width and the thickness / mesh of the grid).

These types of materials (GRP) provide durability and years of service without maintenance or corrosion



Supported by wall



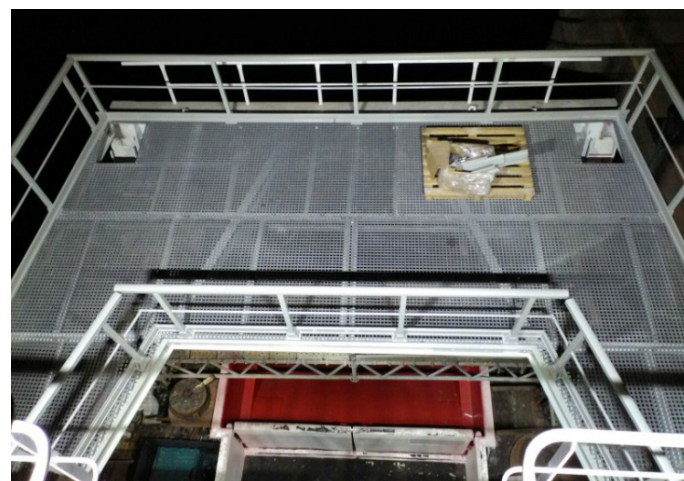
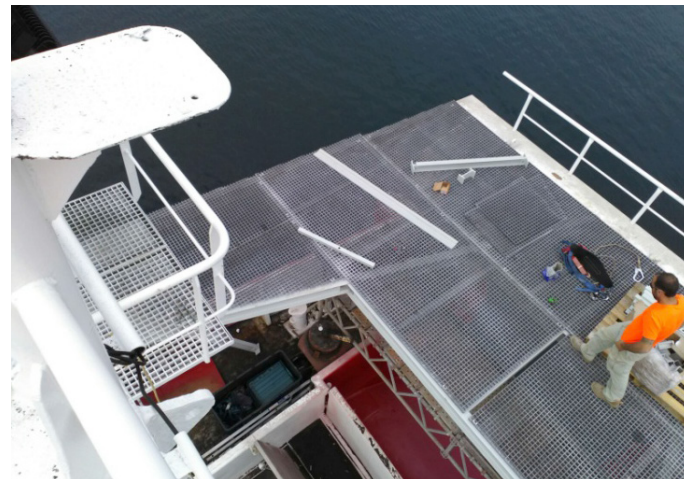
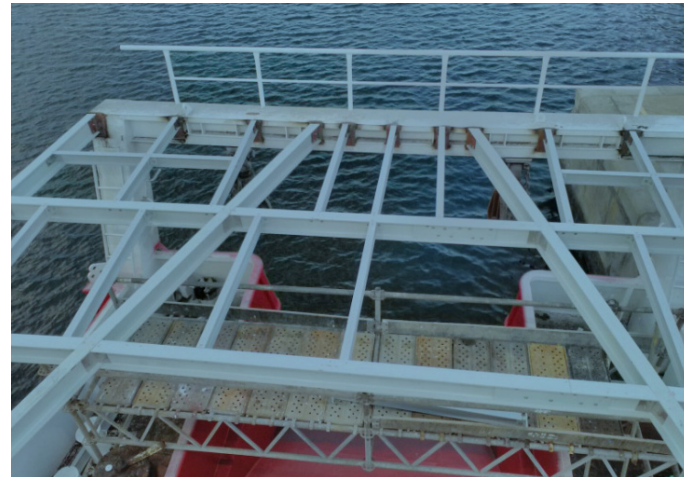
Laterally supported to wall



Structure to floor



## Boat platforms



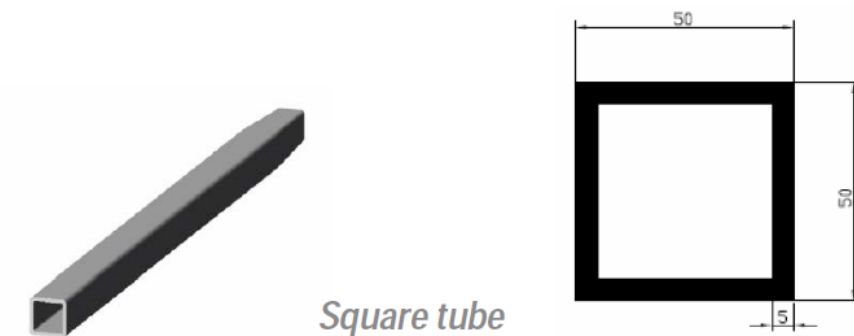
## DEFLECTOR SCREENS

The deflector screens shall be evaluated with all reinforcements and fasteners.

The deflector screens will be formed by 8 mm pultruded GRP sheet. Of thickness, profile tube support square 50 x 50 x 5 mm. And support base for square tube in PRFV where its positioning is necessary.



The measures of the deflector screens will be constructed and mounted on site according to the plans and measurements provided by the client.



## CUSTOMIZED GRP CAPS

The caps shall be valued in a unitary manner with the proportional part of supports for anchoring to walls as reflected in plans and measurements provided by the client.

The prfv covers are supplied as a complete kit including the fasteners and fastening clips, which will be in AISI-316 stainless steel. There are many different types of covers. Some examples are:



Square open  
30X38X38 Grid cap



Round open  
30X38X38 Grid cap



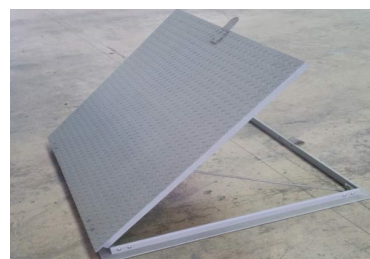
Square blind chequered  
25+30X38X38 Grid cap



Sliding FRP cap with  
chequered grating watertight



Abatible FRP cap with  
chequered grating watertight



Abatible FRP cap with  
chequered grating watertight



## FRP FENCES

The fencing shall be valued per linear meter with the proportional part of supports for anchoring to walls as reflected in plans and measurements provided by the client.



The FRP enclosures are supplied as a complete kit including the fasteners and fastening clips, which will be in stainless steel. AISI-316. There are many different types of fencing. Some highlights:

## FRP WALLS, FACADES AND CEILINGS

The walls shall be measured per square meter with the proportional part of supports for anchoring to walls as reflected in plans and measurements provided by the client.

The FRP walls, facades, ceilings and other decorative elements are supplied as a complete kit including the fasteners and fastening clips, which will be in stainless steel. AISI-316. There are many different type.







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