

GranServices



Composites

lighter
lower cost
less maintenance
SUSTAINABLE



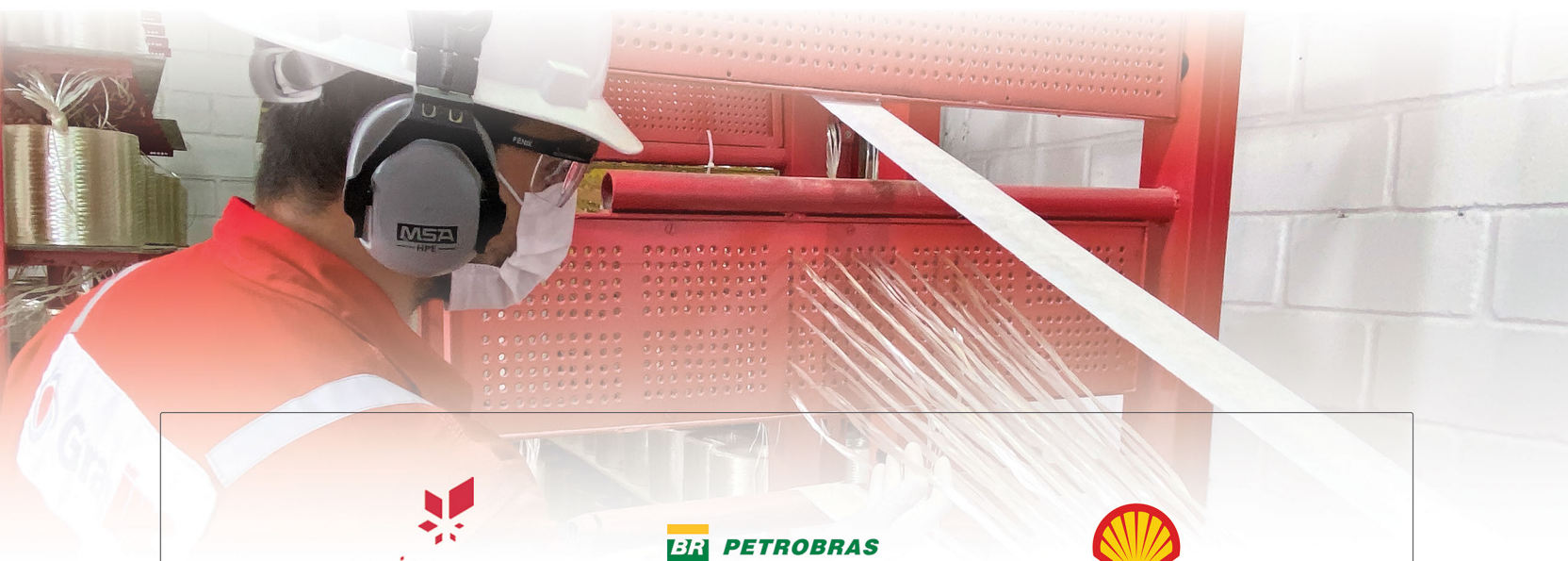


Gran Services offers innovative and integrated solutions for the energy sector. We serve the industry's leading companies working to increase efficiency and generate value for our customers, always respecting the highest standards of security and compliance.

Our focus is to provide efficient and sustainable solutions for the offshore industry and to develop the rising opportunities in the field of renewables.

We also supply structures made of fiberglass composite materials and special resins, such as floor rails, guardrails, stairs, poles and cable trays. This technology means lower costs, lower operational risk and reduced atmospheric emissions while reinforcing Gran Services mission of providing solutions focused on efficiency, value and sustainability.

Gran Services holds TYPE APPROVAL ABS certificates for the supply and installation of composite materials that meet the new regulatory requirements.



SOME OF OUR PARTNERS

MISSION

To be the main partner for our customers, creating value by applying integrated solutions to sustainability in their operations.

PRINCIPLES

Safety first
Trust and respect for people
Ethical, honest and transparent conduct

VALUES

Collaborative spirit with focus on value
Simplicity and discipline
Entrepreneurship
Innovation
Proactivity
Ability to adapt and achieve

OUR DNA GRAN SERVICES





SUSTAINABILITY

Gran Services seeks to contribute to sustainable development, continuously reducing the environmental impact of its operations.

In line with our commitment to continually reduce the impact environmental impact of our operations, we have adopted sustainable measures such as: replacing office light bulbs with LEDs; eliminate the use of disposable cups; rainwater harvesting and implementation solar generation technology at the base of operations in Macaé.

A better future depends on everyone!

WE ARE CARBON NEGATIVE

In line with the best global sustainability practices, we are committed to accounting for all greenhouse gas emissions according to the GHG (Greenhouse Gas Protocol) of Gran Services Macaé Base operations and collaborating with environmental initiatives that manage to absorb the same amount of CO₂ we generate, thus neutralizing our traces of carbon.

In addition to having set emission reduction targets for the coming years, we offset twice our emissions in 2019, 2020 and 2021 for our onshore activities, investing in projects that generate social and environmental benefits supported by the United Nations - UN in Brazil!

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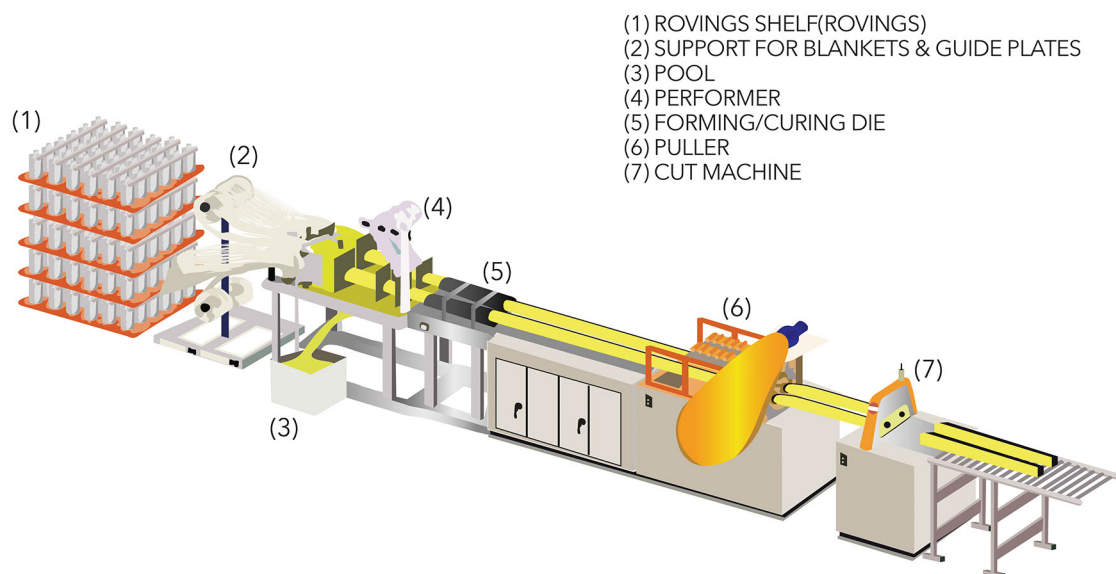
17 **PLATFORMS &
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WHY COMPOSITES?

Fiber reinforced polymer (FRP) is an engineering material, consisting of ceramic fibers, polymeric resin and additives to achieve desired properties. This combination creates a composite material that is extremely resistant, light and durable, which can be used in the development of a wide range of products. Fiber and resin type are chosen based on application requirements. For example, carbon fiber is used in airplanes, automobiles and high-performance sports. Meanwhile, the most common reinforcing material is fiberglass, given its combination of properties and low cost.

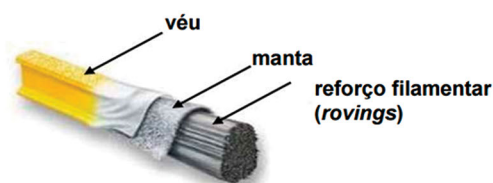
PRODUCTION PROCESS



Pultrusion:

Is a technique that uses a series of rollers to pull braided or woven strands of fiber into a resin bath to infuse them with polymer. The fiberglass strands are passed through a heated die which, cures the resin around the fibers to produce an FRP profile with a consistent cross-section shape ready for cutting into any length. This energy-efficient process is eco-friendly, affordable, and produces minimal waste. It is the desired method for continuous manufacturing and rapid production.

OUR PRODUCT



A) Veil: Fabric responsible for giving surface finish to the profile. It envelops the entire component and smoothes the surface of the product.

B) Blanket: Fabric responsible for wrapping the reinforcement threads and contributing to the gain of mechanical properties. This fabric is composed of randomly dispersed glass threads, which gives the material greater rigidity in all directions.

C) Fiber: Set of micrometric glass fibers which form filaments responsible for increasing the tensile strength of the profile. They are distributed along the profile in a unidirectional way.

Figura - Esquemático dos componentes envolvidos no processo de pultrusão;

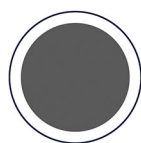
a) Véu;

b) Manta fenólica;

c) Fibra de vidro em forma filamental;

PULTRUDED PROFILE

The profile has mechanical characteristics from the matrix (resin) and reinforcement (fibers) junction; this union is called an interface. It is through this union that the transmission of mechanical forces from the external environment to the interior of the material occurs.



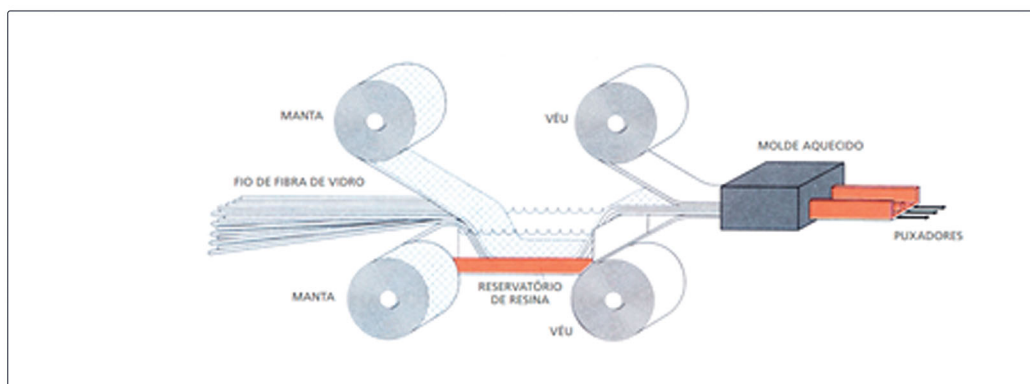
FIBER
BLANKET



RESIN



ADDITIVES



* Pultrusion Process - Demonstration

COMPÓSITOS

MAIN BENEFITS



Extreme fire resistance;



The lowest toxicity;



More resistant / Higher % of fiber;

COMPARISON WITH POLYESTER RESIN PRODUCTS

-99% flame spread

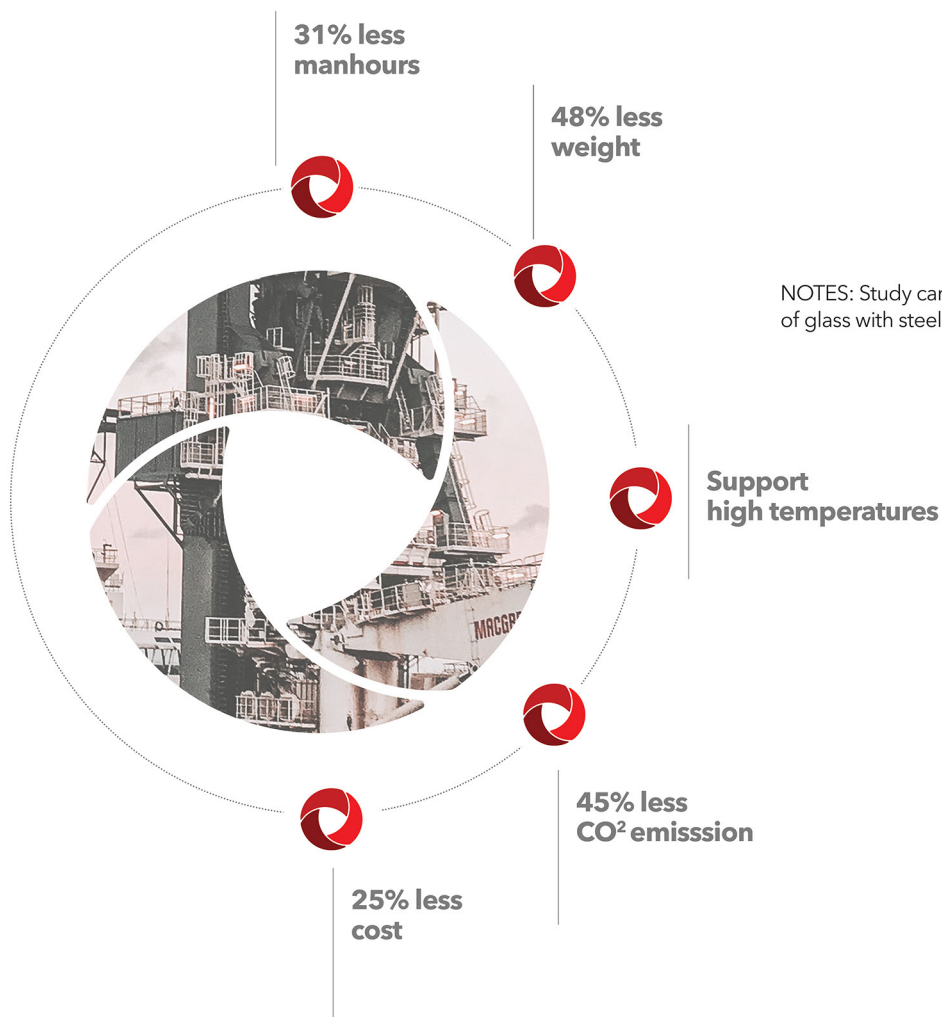
-80% CO emission

-60% CO² emission

-96% smoke density

ao menos +50% tensile strength
flexural strength

FIBERGLASS STUDY



NOTES: Study carried out by GranIHC, comparing fiber of glass with steel in an offshore environment over 20 years.

Composite

Lighter than equivalent aluminum and steel profiles.

Tensile strength close to steel and more resistant than any other material compared.


It suffers less volumetric variations due to temperature variations.


Better thermal and electrical insulation than aluminum and steel.


TECHNICAL STANDARDS

























COMPARATIVE WITH BASE IN THE TECHNICAL STANDARDS

- ASTM D 2583 - BARCOL HARDNESS
- ASTM D 2584 - FIBER CONTENT
- ASTM D 792 - SPECIFIC WEIGHT
- ASTM D 570 - WATER ABSORPTION
- ASTM D 543 - CHEMICAL RESISTANCE
- ASTM E 84 - FLAME SPREAD AND SMOKE DENSITY
- ASTM D 635 - FLAME SPREAD
- ASTM E 162 - FLAME SPREAD
- ASTM E 662 - SMOKE DENSITY
- NES 713 - SMOKE TOXICITY
- UL 94 - FLAMMABILITY
- ISO 5658-2 - FLAME SPREAD
- ISO 5659-2 - SMOKE DENSITY
- IMO MSC.61(67) - SMOKE DENSITY AND TOXICITY
- ABNT NBR 15708-1 - GENERAL REQUIREMENTS FOR PULTRUDED PROFILES
- ABNT NBR 15708-2 - GENERAL REQUIREMENTS FOR HANDRAILS
- ABNT NBR 15708-3 - GENERAL REQUIREMENTS FOR GRATINGS
- ABNT NBR 15708-4 - GENERAL REQUIREMENTS FOR CABLE TRAY SYSTEMS AND CABLE LADDER SYSTEMS
- ABNT NBR 15708-6 - GENERAL REQUIREMENTS FOR CAGED LADDERS
- ASTM D 257 - VOLUME RESISTIVITY AND SURFACE RESISTIVITY *1
- IEC 60093 - VOLUME RESISTIVITY AND SURFACE RESISTIVITY *1
- ASTM D 4385 - CLASSIFYING OF VISUAL DEFECTS
- ASTM D 2565 - ACCELERATED AGING
- ASTM G 155 - ACCELERATED AGING
- USCG PFM 2-98 - STRUCTURAL FLAME INTEGRITY
- IEC 61537 - REQUIREMENTS FOR CABLE TRAY SYSTEMS AND CABLE LADDER SYSTEMS
- IEC 60068-2-75 - HAMMER TEST
- IACS LL 47 - REQUIREMENTS FOR HANDRAILS
- IACS REC. 73 - REQUIREMENTS FOR CABLE TRAY SYSTEMS AND CABLE LADDER SYSTEMS
- ASTM D 3917 - DIMENSIONAL TOLERANCE

Safely meets requirements 

May meet requirements under certain conditions 


Does not meet requirements 


FENÓLICA	ESTER VINÍLICA	POLIÉSTER
		
		
		
		
		
		
		
		
		
		
		
		
		
		
		
		
		
		
		
		
		
		
		
		
		
		
		
		
		
		


GUIDING NORM | ABNT NBR 15708


The fire integrity matrix of FRP products is rated for use in L2 and L3 level areas. ABS rating.


COMPOSITE ADVANTAGES


- 


**Extreme
fire
resistance**
- 

**Low
maintenance
cost**
- 

**Low
toxicity**
- 

**Electrical
and thermal
insulation**
- 

**More
resistent
Higher %
of fiber**
- 

**Lightness
and mechanical
strength**
- 

**Chemical
corrosion
resistance**

MECHANICAL AND PHYSICAL PROPERTIES COMPARED TO OTHER MATERIALS

	PULTRUDED PROFILES	COMMON STEEL	STAINLESS STEEL	ALUMINUM
STRETCHING (%)	02	38	55	35
SPECIFIC WEIGHT (G/M2)	1,4 A 1,8	7,87	7,92	2,71
COMPRESSION RESISTANCE (KGF/CM²)	1.800	1.950	2.100	----
BENDING STRENGTH (KGF/CM²)	2.000	1.950	2.450	1.400

COMPARISON WITH OTHER MATERIALS

DENSITY



TENSILE STRENGTH



THERMAL EXPANSION



THERMAL CONDUCTIVITY



Source: internal data and international benchmarking.

COMPOSITES

WOOD

PVC

ALUMINUM

STEEL



FLOOR GRATINGS

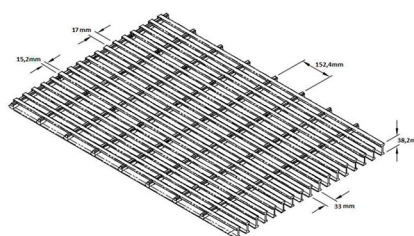


The COMPOSITE floor gratings meet the ASTM F3059-18 standards in level 2 and 3 and ABNT NBR 15708-3 Standard.

AVAILABLE MODELS:

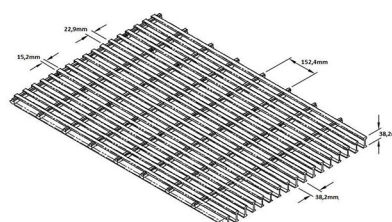
✓ Floor Grating - GM-50 1.1/2"

Height: 38mm
 Mesh: 38x152mm
 Open area: 60%
 Approximate weight: 16.0 kg/m²
 Standard Dimensions: 1200mm x 2000mm
 Recommended maximum span: 1200 mm



✓ Floor Grating - GM-60 1.1/2"

Height: 38mm
 Mesh: 38x152mm
 Open area: 60%
 Approximate weight: 16.0 kg/m²
 Standard Dimensions: 1200mm x 2000mm
 Recommended maximum span: 1200 mm

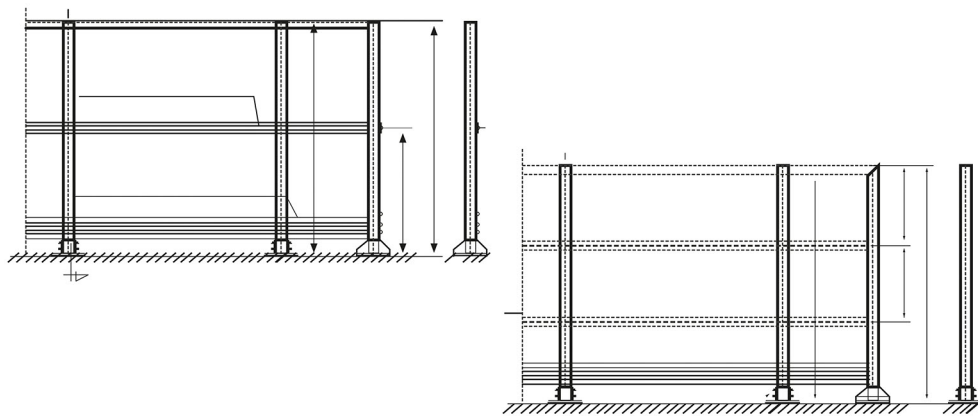


*other dimensions and special projects on request;

GUARDRAIL

The railing made of composites ensures more lightness and resistance, in addition to not requiring any type of maintenance.

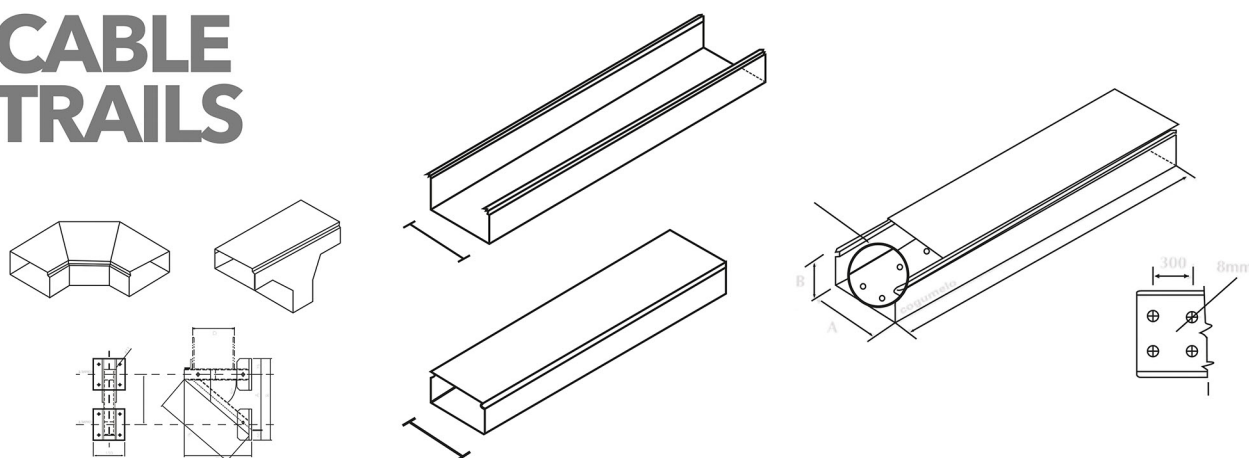
This type of guardrail has been used for over 15 years in various industries such as oil platforms, water and sewage treatment, pulp and paper, chemical industries, ports, terminals, laboratories and in other corrosive environments.



Dimensions and other specifications under consultation;



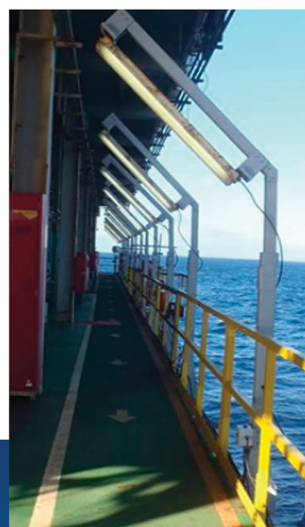
CABLE TRAILS



Cable trays used for electrical tray systems, made of composite material.

It presents excellent flammability performance without the need for additives, low gas emission and excellent mechanical resistance. Suitable for applications between -20°C and 200°C*.

*NOTE1: may vary depending on the usage environment.



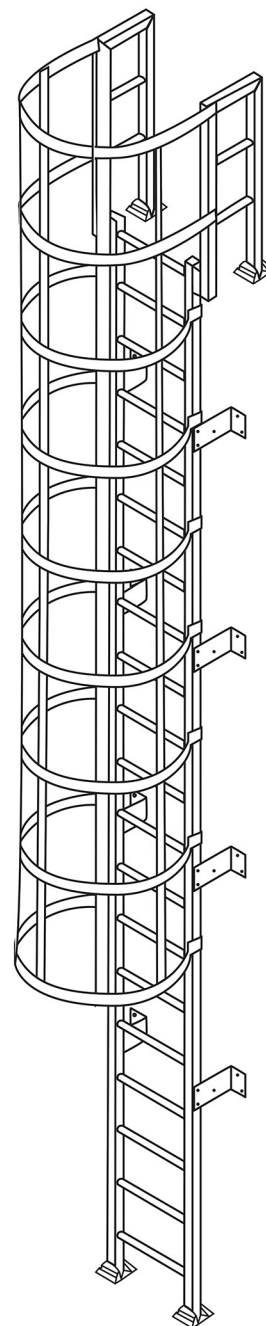
SEA VERTICAL LADDER

Made of composites, our marine ladders are maintenance-free, even when installed in places where corrosion violently attacks all types of materials.

Large industries have already proven the superiority of the composite over steel and aluminum.

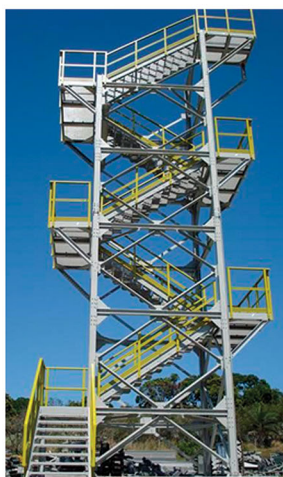
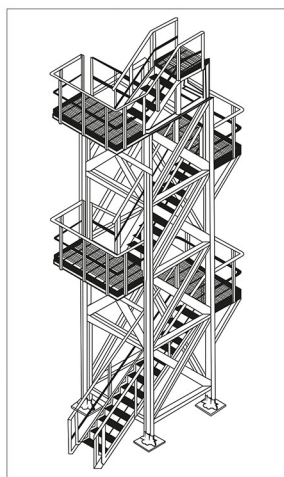


Dimensions and other specifications under consultation;



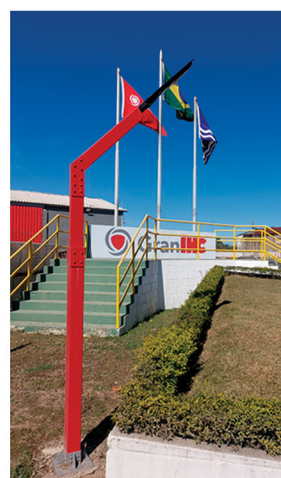
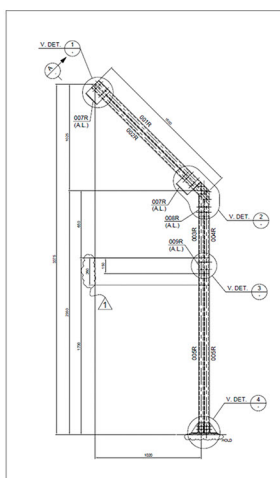
PLATFORMS & STRUCTURAL PROFILES

Composite platforms and structures are the most resistant on the market, complying with the strictest safety standards.



POLES

Our product line also has poles made of composite material, presenting numerous advantages over poles made of metal, concrete or wood. Its lifespan, for example, is five times longer than that of wooden posts and twice as long as that of concrete poles. They have thermal and electrical insulation characteristics, are resistant to chemical corrosion and oxidation and are immune to biological attacks such as fungi and termites. Due to their low density, they become extremely light, up to eight times less heavy than concrete and up to three times that of wood, which greatly facilitates their transport and installation in areas of difficult access.



ACCESSORIES AND CONNECTIONS | FLOOR GRID

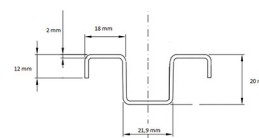
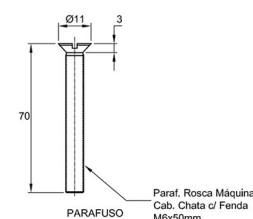
CLAMP SET W

Fixing clamp set for injected and pultruded floor grids, model W.

Comprises: W-type clamp, screw and bottom plate.

✓ Applicable Standards

ASTM A240/A240M - Standard specification Chromium and chromium nickel stainless steel plate.



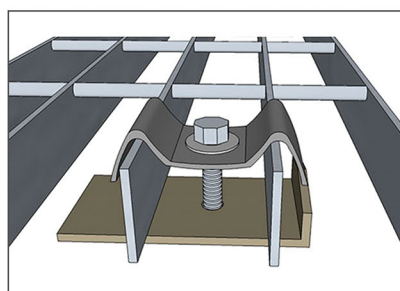
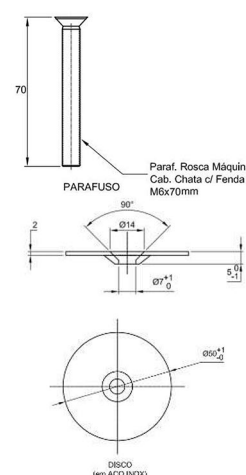
COG CLAMP

Fixing clamp for floor grating, model COG.

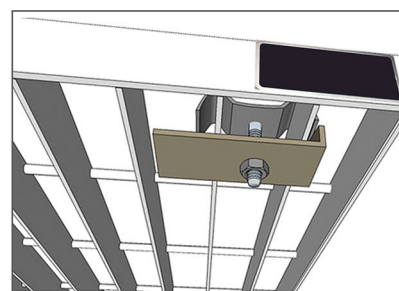
Comprises: disc, screw and bottom plate.

✓ Applicable Standards

ASTM A240/A240M - Standard specification Chromium and chromium nickel stainless steel plate.



CLAMP W - UPPER VIEW



CLAMP W - BOTTOM VIEW



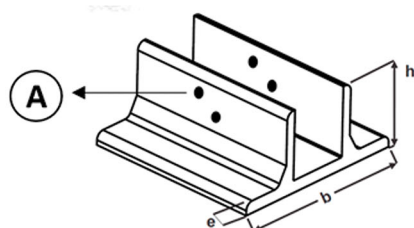
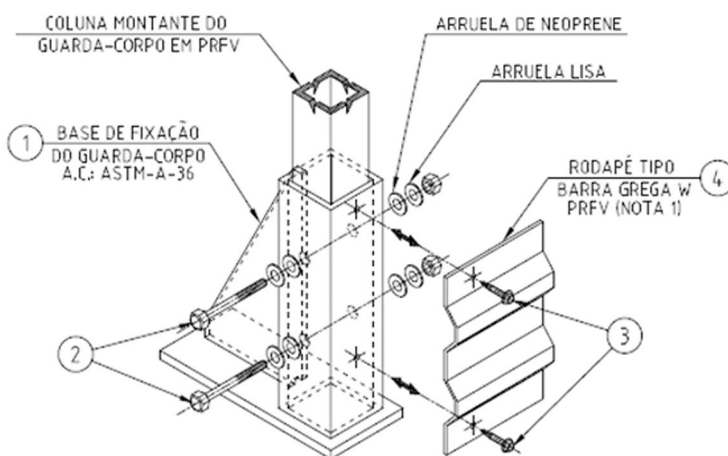
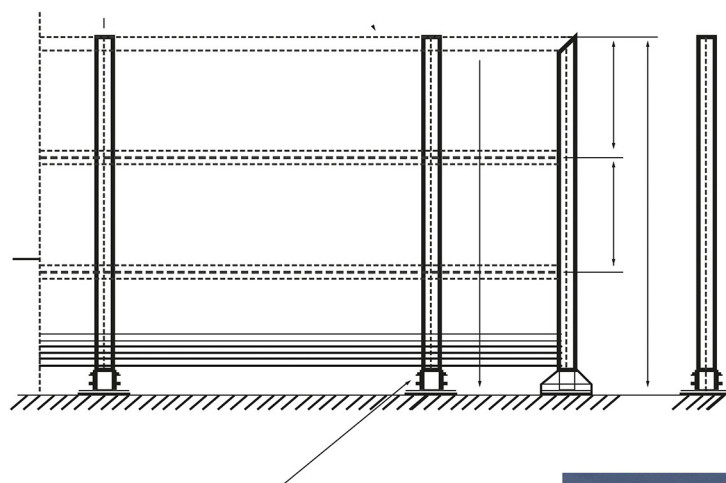
ACCESSORIES AND CONNECTIONS | BODYGUARD

FIXATION SYSTEM

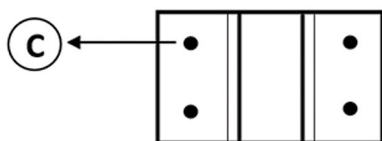
Fiber Shoes

Steel shoes

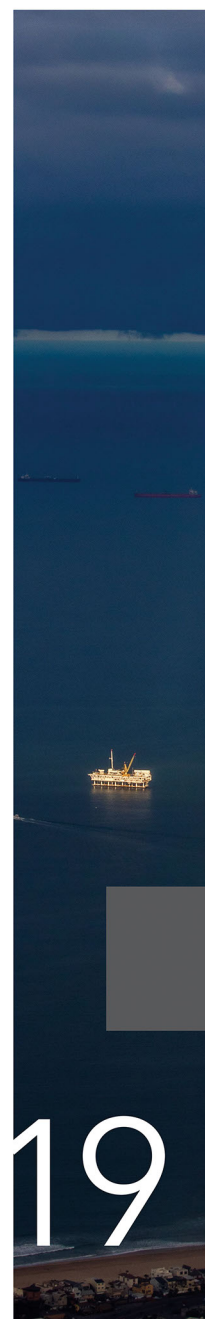
Screws



Sapata - Vista Isométrica



Sapata - Vista Superior

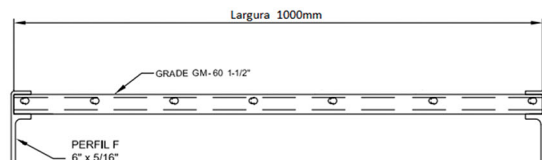
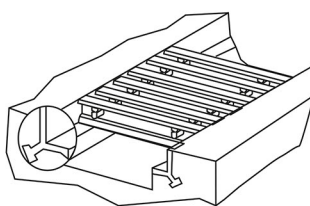
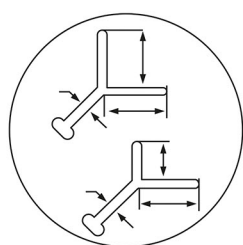


ACCESSORIES AND CONNECTIONS

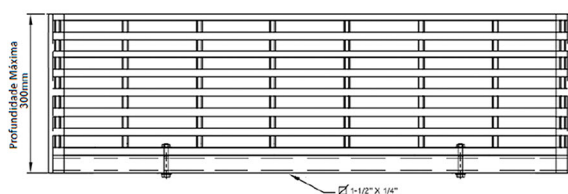
STEP LADDER

ANGLES IN "Y"

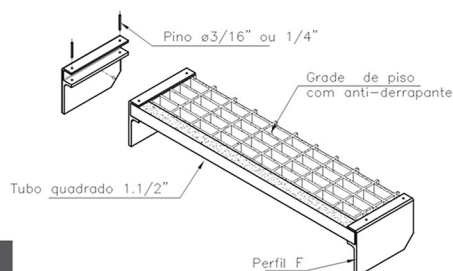
Y-contours provide a firm, sturdy base for the crates. They are pultruded in glass fibers and are compatible with the different heights of our mounted crates.



FRONT VIEW



TOPOGRAPHIC VIEW



ISOMETRIC VIEW

ACCESSORIES AND CONNECTIONS

STRUCTURES

PROFILE U 6"  / E) 6" x 1.1/2" x 1/4"

PROFILE H 6"  (X / Y / E) 6" x 6" x 3/8"

SQUARE TUBE PROFILE 2" X 1/4"

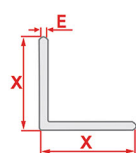
SQUARE TUBE PROFILE 1.1/2" X 1/4"



EQUAL FLIP ANGLE 4" X 1/4"

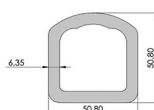
EQUAL FLIP ANGLE 3" X 1/4"

EQUAL FLIP ANGLE 2" X 1/4"



(X / E) 4" x 1/4"
(X / E) 3" x 1/4"
(X / E) 2" x 1/4"

2" X 1/4" TABLE TUBE PROFILE



ACCESSORIES AND CONNECTIONS

FRP POST

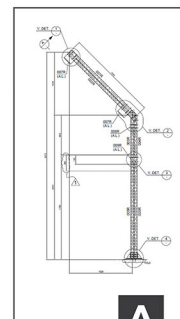
A) POLE - ISOMETRIC

B) 45° ANGLE - SIDE (2)

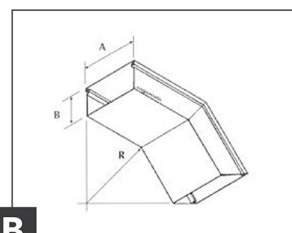
C) TILTING JOINT - FRONT

D) TILTING JOINT - LATERAL

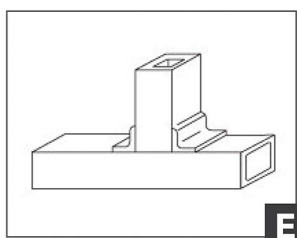
E) FIBER SHOE - FRONT



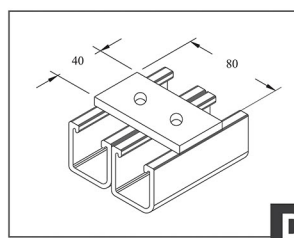
A



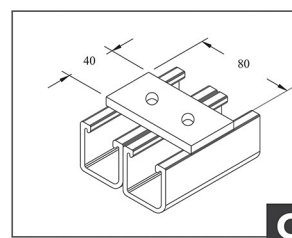
B



E



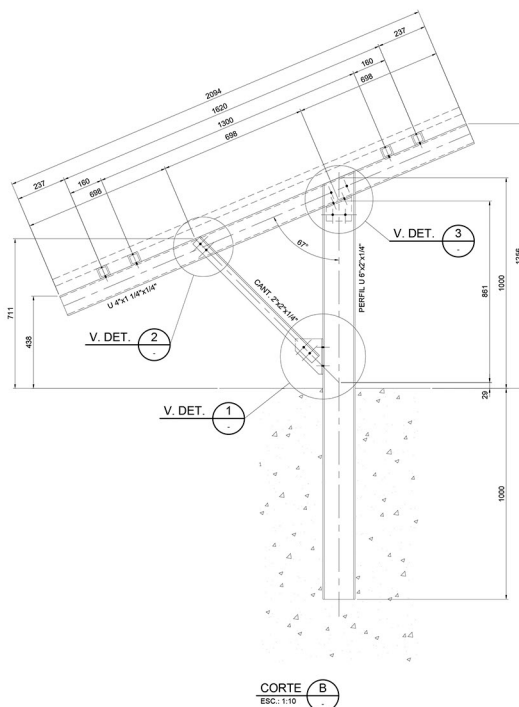
D



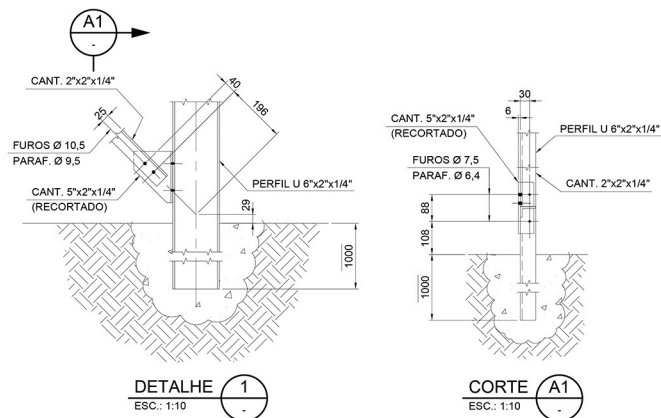
C

ACCESSORIES AND CONNECTIONS

SOLAR PANEL STRUCTURES



SIDE VIEW



FIXATION

SOLAR PANEL STRUCTURE

Structures can be adapted to any size of project and usability. They offer a firm and resistant base. They are pultruded in fiberglass and compatible with different types of solar panels.





GranServices

security & compliance

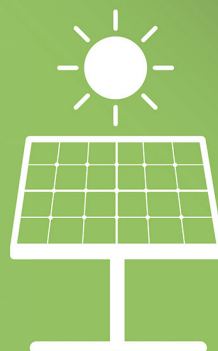
CORE VALUES

O B J E C T O



ISO 9001:2015
Quality Management System
ISO 14001:2015
Environmental Management system
ISO 45001:2018
Security Management System
and Occupational Health

Composites



 **granservices**

 **GranServices**

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