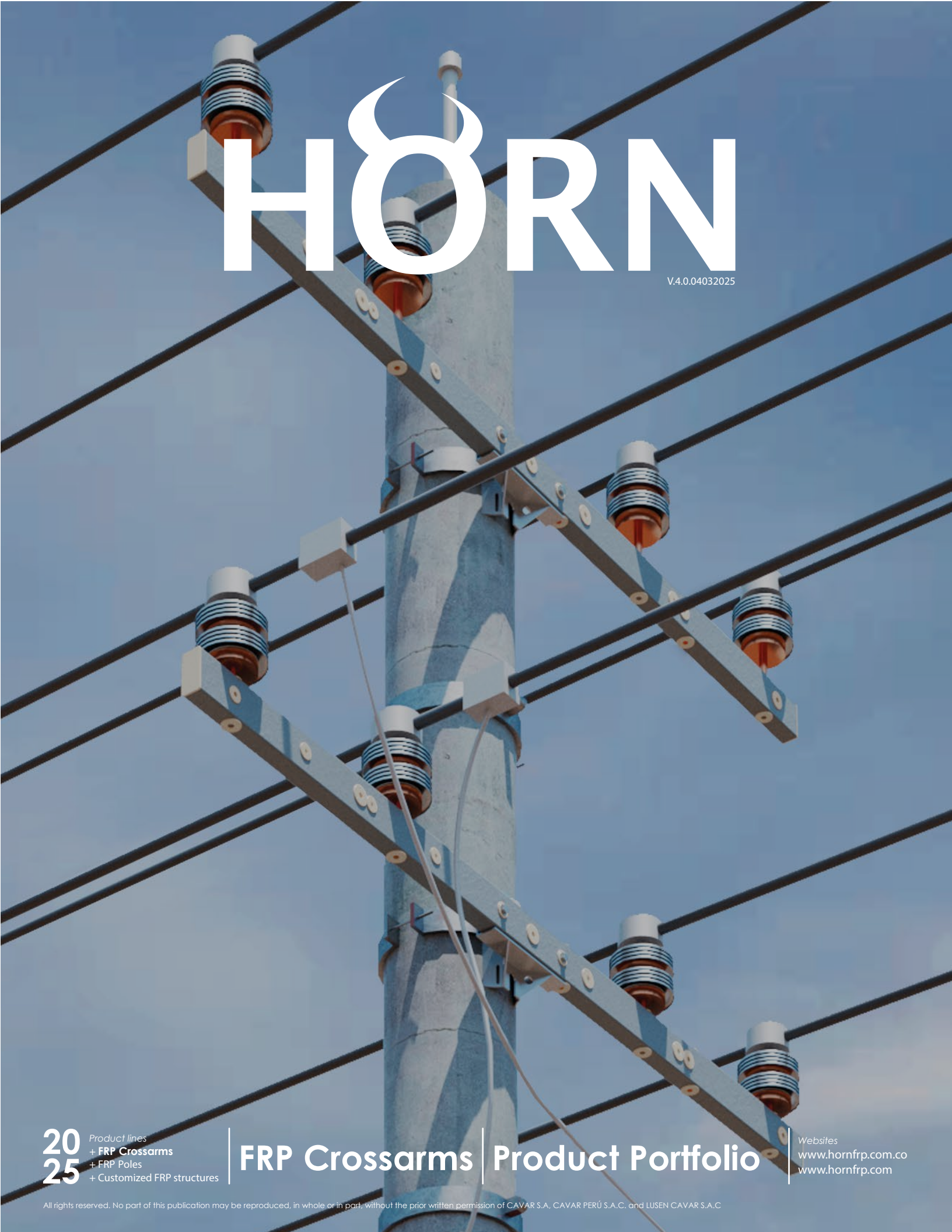


HORN

V.4.0.04032025

2025

Product lines
+ **FRP Crossarms**
+ FRP Poles
+ Customized FRP structures

FRP Crossarms | Product Portfolio

Websites
www.hornfrp.com.co
www.hornfrp.com

HORN®

About us

We are CAVAR S.A., an industrial company with 40 years of expertise. Our dedication to the job, commitment to innovation, and the drive to generate systemic value for both the industry and society define who we are.

We are in search of

We are proactively harnessing the skills and capabilities of our employees to cultivate a customer service culture. This commitment allows us to deliver a broad range of offerings to various industrial sectors, including telecommunications.

Future direction

At HORN, our vision is to revolutionize the construction industry by applying innovative solutions through the use of composite materials. Our goal is to strengthen our organization globally, emphasizing the promotion of both aesthetic and functional value through design.

Content

Fiber Reinforced Polyester
FRP

What is FRP?

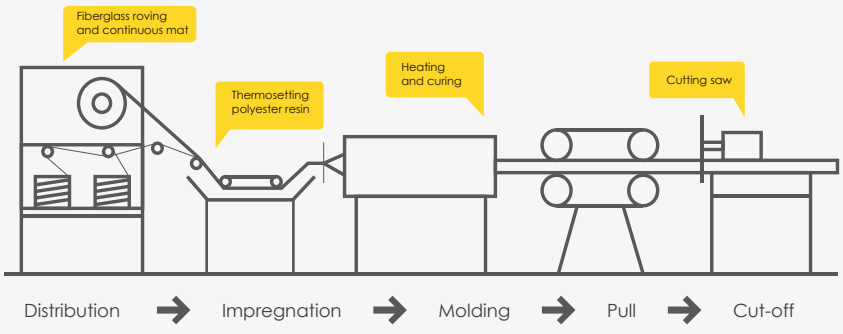
“Fiber Reinforced Polyester (FRP) is a composite material formed by combining thermosetting polyester resin with glass fibers, yielding a product with enhanced mechanical properties.”

Features of Fiberglass Composites

	FRP	STEEL	ALUMINUM	WOOD
Corrosion resistance	**Highest**	Low	Medium	High
Mechanical strength	**High**	High	Medium	Low
Weight	**Low**	High	Low	Medium
Electrical conductivity	**Lowest**	High	High	Low
Thermal conductivity	**Lowest**	High	Highest	Low
Electromagnetic Transparency	**Highest**	Low	Medium	High
Maintenance Costs	**Low**	High	Medium	High

Manufacturing Process

Pultrusion
Process



Physical and Mechanical Properties

Producer:
CAVAR S.A
Product
FRP Crossarms

FRP Material Properties			
Mechanical Properties	**Test Standard**	**Units**	**Value**
Longitudinal Tensile Strength	ASTM D638	MPa	600
Longitudinal Tensile Modulus	ASTM D638	GPa	30
Longitudinal Flexural Strength	ASTM D790	MPa	700
Longitudinal Flexural Modulus	ASTM D790	GPa	20
Transverse Flexural Strength	ASTM D790	MPa	150
Transverse Flexural Modulus of Elasticity	ASTM D790	GPa	7
Transverse Flexural Modulus of Elasticity	ASTM D695	MPa	500
Longitudinal Compressive Modulus of Elasticity	ASTM D695	GPa	20
Transverse Compressive Strength	ASTM D695	MPa	100
Transverse Compressive Modulus of Elasticity	ASTM D695	GPa	4
Interlaminar Shear Strength	ASTM D 5379	MPa	60
Longitudinal Poisson's Ratio	ASTM 3039	mm/mm	0,25
IZOD Impact Strength	ASTM D256	J/m	2960
Physical Properties	**Test Standard**	**Units**	**Value**
Barcol Hardness	ASTM D2583		45
Water Absorption	ASTM D570	% Max	0,6
Density	ASTM D792	g/cm^3	2,0 -2,2
Dielectric Strength (AC)	ASTM D149	KV/mm	13
Leakage Current	ASTM D149	uA	88
Flammability Classification	UL-94		V0
Flame Spread Index	ASTM E-84		25 Max

FRP crossarms to manage transmission and distribution systems, designed for strength and resilience, these components are essential in supporting overhead electrical lines while providing a lightweight and durable alternative . Crossarms are engineered to withstand harsh environmental conditions, including extreme temperatures, humidity, and corrosive elements; offers excellent resistance to degradation, ensuring a longer lifespan. This durability translates into reduced maintenance costs and fewer replacements over time, making FRP crossarms a cost-effective solution for utility companies.

certecnica
Más que certificaciones técnicas
PRODUCTO CERTIFICADO

Certificado No. 2014
RETIE 2013 / NTC 6183:2016
Acreditación ONAC 21-CPR-002
ISO/IEC 17065:2012

Product configuration

General Information

At HORN®, we focus on developing products made from composite materials designed for use in the utility and industrial sectors. Our team listens carefully to customer feedback and responds with products that meet or exceed required specifications and expectations.

The inherent advantages of composite materials are leading many utility companies to specify FRP crossarms for new and replacement transmission and distribution line installations.

Our crossarms are manufactured using pultrusion technology, which allows us to produce a lighter and more rigid product. Their lightweight nature helps reduce the risk of injury and lowers shipping and handling costs.

Many utility companies prefer Fiberglass Reinforced Plastic (FRP) crossarms over wood, as they improve grid reliability. FRP crossarms provide structural performance similar to steel—but without the negative effects of corrosion or electrical conductivity.

Environmental conditions

The environment where HORN brand FRP crossarms will be installed may have the following characteristics within the installation area, under the following conditions:

Environmental conditions	
Altitude above sea level	0 - 3000 m
Maximum relative humidity	Up to 95%
Minimum ambient temperature	0°C
Maximum ambient temperature	45°C
Solar radiation level	4500 W/m2
Wind speed	Up to 120 km/h

Advantages

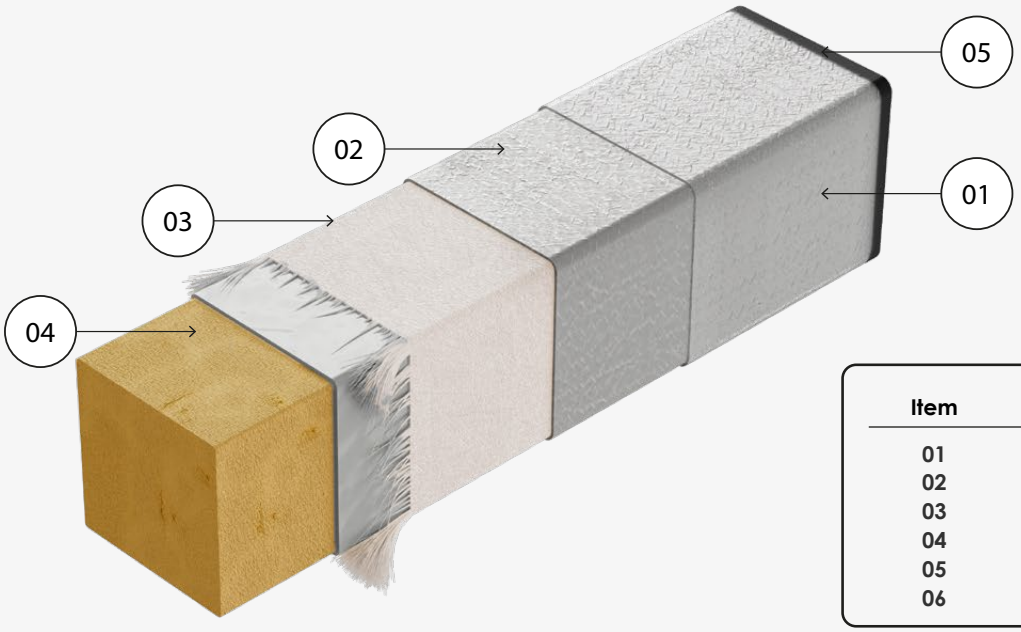
Engineered FRP Crossarms
Our crossarms are designed to withstand the rigors of electrical distribution, including storms, wind, and ultraviolet rays. They are manufactured using the pultrusion process and exhibit a typical strength coefficient of variation (COV) of less than 5%.

Lower Installed Cost
Once a utility company decides to try our FRP crossarm, they quickly realize that the savings in materials and labor surpass those of wood and steel crossarms.

Designed for Extended Service Life
FRP crossarms are engineered to withstand the effects of UV radiation. Extensive UV and humidity testing confirms that, statistically, there is no reduction in tensile strength when conditioned according to ASTM G154 after 5,000 hours of exposure.

Field Fabrication Possible
Unlike steel crossarms, FRP crossarms can be easily drilled in the field using basic tools. A hole can be made in the crossarm within a short period of time if needed.

Technical Characteristics of the Materials



Item	Description
01	Advanced UV protection
02	Resin/matrix
03	Glass fiber reinforcements
04	Filled with Polyurethane Foam
05	Side Covers
06	Light Gray Color

** Polyurethane foam filling is optional.*

Advanced UV Protection
Our fiberglass profiles incorporate three layers of UV protection. First, the fiberglass reinforcements—which form the structural core of the ladders—are encapsulated with a polyester surface veil. This veil creates a resin-rich outer layer that protects the fibers from blooming. Additionally, UV absorbers are formulated into the resin to prevent ultraviolet light from degrading the polymer matrix. Finally, the profiles are coated with a high-performance aliphatic polyurethane topcoat, which provides long-lasting protection against harmful sun exposure. UV testing, which involved alternating cycles of light and humidity every four hours for 2,500 hours, showed no reduction in flexural strength.

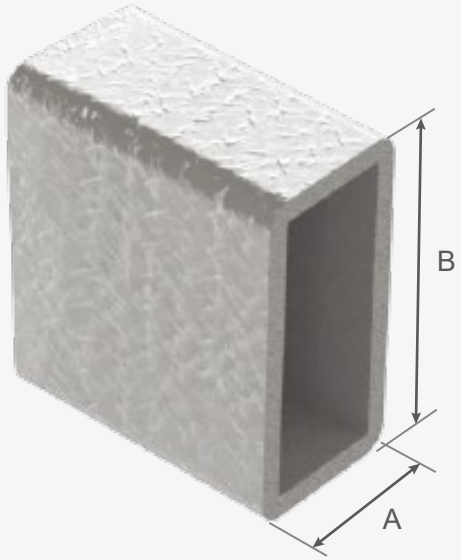
Resin/Matrix
FRP profiles are manufactured using a thermoset resin system that offers superior hardness and mechanical strength. Once cured, thermoset resins are highly durable and resistant to moisture and harsh environments.

Polyurethane Foam Core (*Optional)
Crossarms may include or exclude core filling material depending on customer requirements. When requested, they are filled with a two-component closed-cell polyurethane foam. The foam core prevents the ingress of moisture and insects into the interior of the crossarm.

Glass Fiber Reinforcements
All profiles are manufactured using electrical-grade E-glass reinforcements in the form of rovings, continuous filament mat (CFM), or engineered E-glass fabrics. All E-glass reinforcements meet a minimum tensile strength of 290 ksi (2000 MPa) in accordance with ASTM D2343.

Side Covers
Our crossarms are fitted with injection-molded thermoplastic polymer side coverui, engineered for high impact resistance and UV protection.

Dimensions

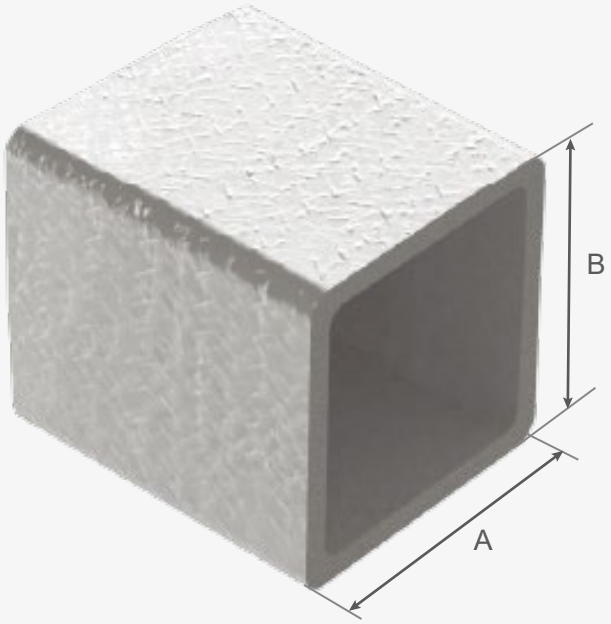


Square profile 4" X 2"

Item	Description	Value
A	External Width	50.80mm
B	Outer Height	101.60mm

Weight per Linear Meter (Unfilled): 3,96 kg
Weight per Linear Meter (With Filling): 4,31 kg

**Image colors are for reference only, as we can adapt to the specific requirements of each project.*



Square profile 4" X 4"

Item	Description	Value
A	External Width	101.60mm
B	Outer Height	101.60mm

Weight per Linear Meter (Unfilled): 5,30 kg
Weight per Linear Meter (With Filling): 5,67 kg

**Image colors are for reference only, as we can adapt to the specific requirements of each project.*

Qualification and Performance Tests

The HORN® crossarms have been subjected to testing in accordance with the requirements and acceptance criteria of NTC 6183-2016 and ASTM 8019 for the purpose of product certification. The tests conducted on the FRP material and the structure of the HORN® crossarm include:

FRP Material Properties		
Test applied	**Description**	**Test Standard**
Visual Inspection	Fiberglass-Reinforced Polyester (FRP) Crossarms for Overhead Power and Telecommunications Lines	NTC 6183-16
Dimensional inspection	Fiberglass-Reinforced Polyester (FRP) Crossarms for Overhead Power and Telecommunications Lines	NTC 6183-16
Flexural and Breaking Strength Tests	Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastic number and Related Products	ASTM D6109
Breaking Test	Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastic number and Related Products	ASTM D6109
Flexural Test	Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastic number and Related Products	ASTM D6109
Tightening Torque	Recommended practice for Fiber reforcerd Polymer products for overhead Utility Line Structures.	ASCE 104 No. 5.2.2
Through-Bolt or Tensile Strength	Recommended practice for Fiber reforcerd Polymer products for overhead Utility Line Structures.	ASCE 104 No. 5.2.3
Direct Shear	Recommended practice for Fiber reforcerd Polymer products for overhead Utility Line Structures.	ASCE 104 No. 5.2.4
Torsional Strength Test	Fiberglass-Reinforced Polyester (FRP) Crossarms for Overhead Power and Telecommunications Lines	NTC 6183-16
Long-Term Mechanical Test	Fiberglass-Reinforced Polyester (FRP) Crossarms for Overhead Power and Telecommunications Lines	NTC 6183-16

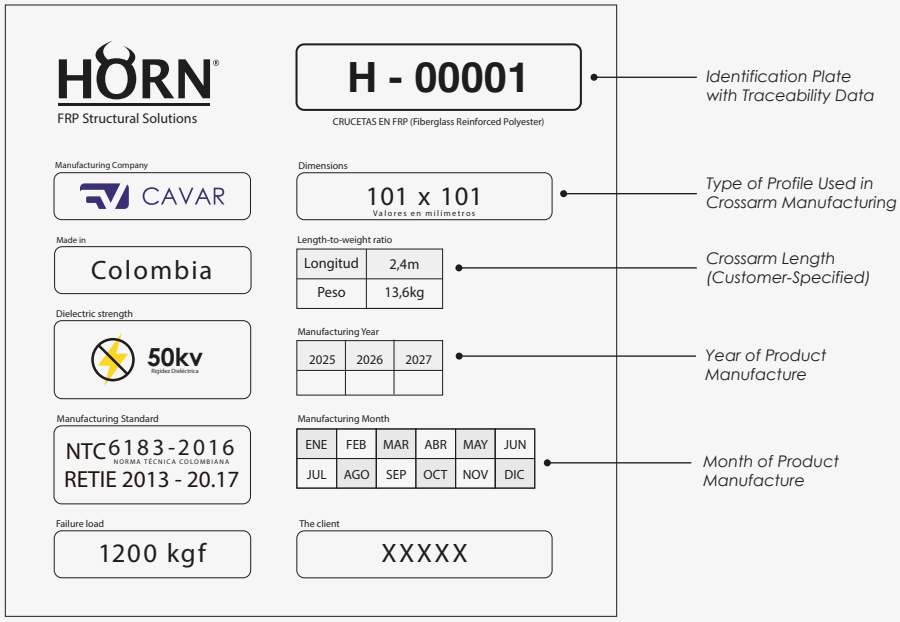
Qualification and Performance Tests

The HORN® crossarms have been subjected to testing in accordance with the requirements and acceptance criteria of NTC 6183-2016 and ASTM 8019 for the purpose of product certification. The tests conducted on the FRP material and the structure of the HORN® crossarm include:

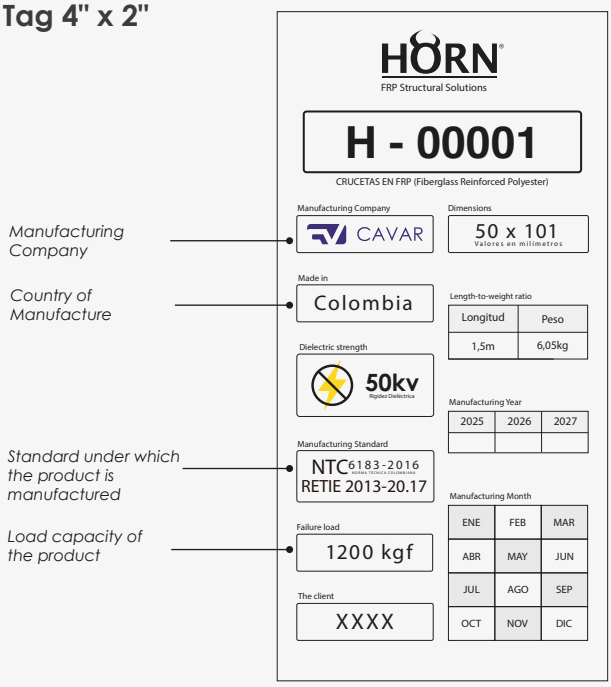
Propiedades del material PRFV		
Test applied	**Description**	**Test Standard**
Side cover Strength	Fiberglass-Reinforced Polyester (FRP) Crossarms for Overhead Power and Telecommunications Lines	NTC 6183-16
UV and Weathering Resistance	Standard Practice for Operating Fluorescent Light Apparatus for UV Exposure of Nonmetallic Materials.	ASTM G154
Thermal Deformation	Standard Test Method for Deflection Temperature of Plastics Under Flexural Load in the Edgewise Position	ASTM D648
Flammability	Fire hazard testing - Part 2-11: Glowing/hot-wire based test methods - Glow-wire flammability test method for end-products	NTC 5283
Water Absorption	Standard Test Method for Water Absorption of Plastics	ASTM D570
Dielectric Strength	Test Method for Dielectric Breakdow Voltage and Dielectric -Strength -Solid Electrical Insulating Materials at Cornmercial Power Frecuencies	ASTM D149
Tracking and Erosion Resistance	Electrical insulating materials used under sever ambient conditions – Test methods for evaluating resistance to tracking and erosion.	IEC 60587
Wet Power Frequency Withstand Voltage Test (Non-Disruptive)	Fiberglass-Reinforced Polyester (FRP) Crossarms for Overhead Power and Telecommunications Lines	NTC 6183-16
Flexural Strength and Stiffness Test for FRP Crossarms	Standard Test Methods for Determining the Full Section Flexural Modulus and Bending Strength of Fiber Reinforced Polymer Crossarms Assembled with Center Mount Brackets	ASTM 8019

Product Identification

Crossarm Label / Identification Tag 4" x 4"



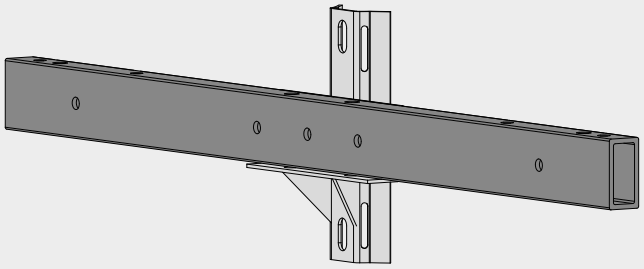
Crossarm Label / Identification Tag 4" x 2"

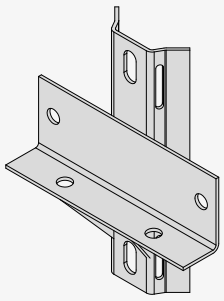


Pole Connection Hardware

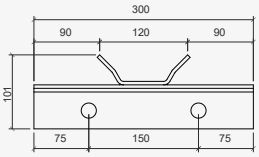
The 4" x 2" crossarms are equipped with galvanized steel metal fittings, optimized to ensure a precise structural fit and secure attachment to the pole. The perforations and fitting design can be adapted according to the client's requirements.

Suspension clamp system 4”x 2”

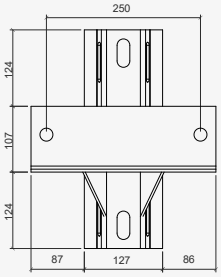




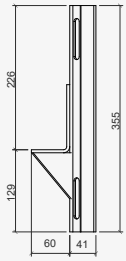
Top view



Front view

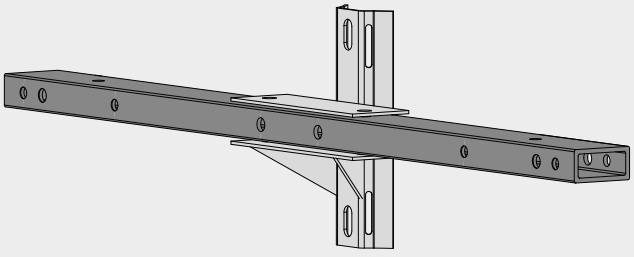


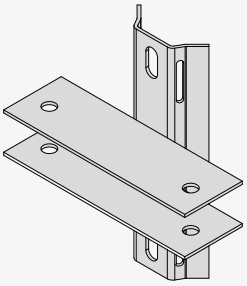
Side view



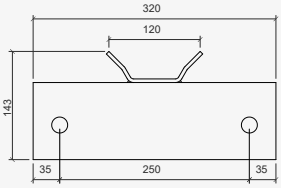
*Dimensions in millimeters

Retention clamp system 4”x 2”

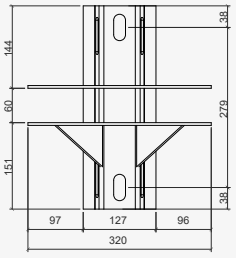




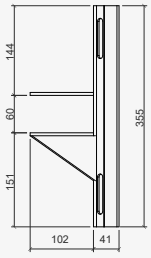
Top view



Front view



Side view



*Dimensions in millimeters

Pole Connection Hardware

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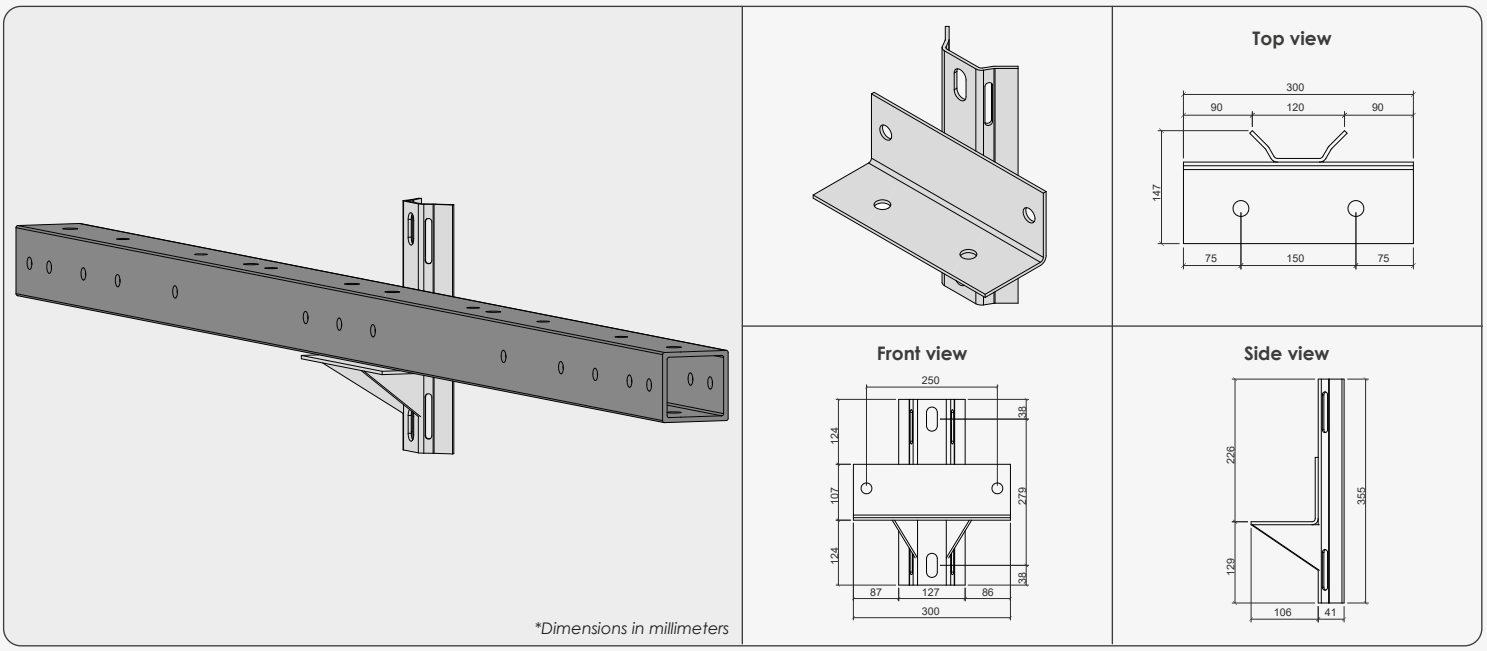
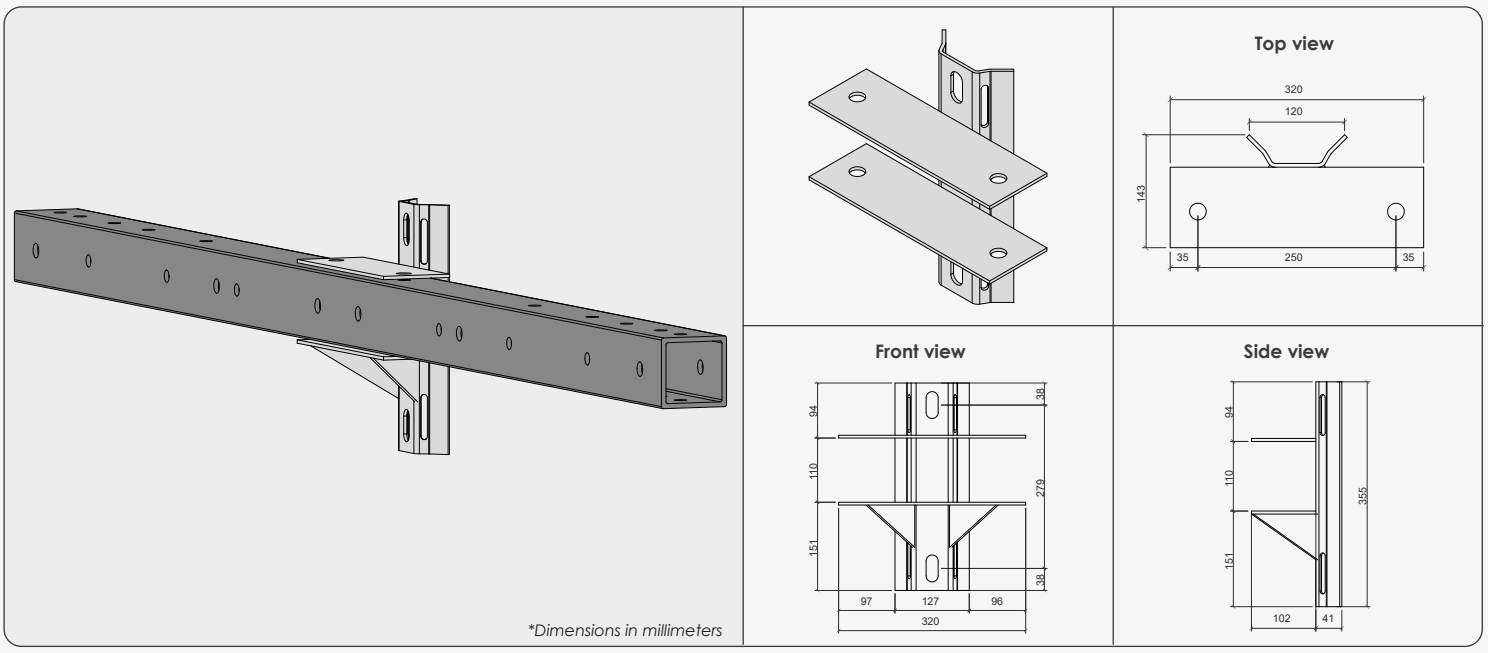
Suspension clamp system 4”x 4”



*Dimensions in millimeters

Retention clamp system 4”x 4”



*Dimensions in millimeters

HORN®

FRP Crossarms

Product Portfolio

ver 4.0.04032025