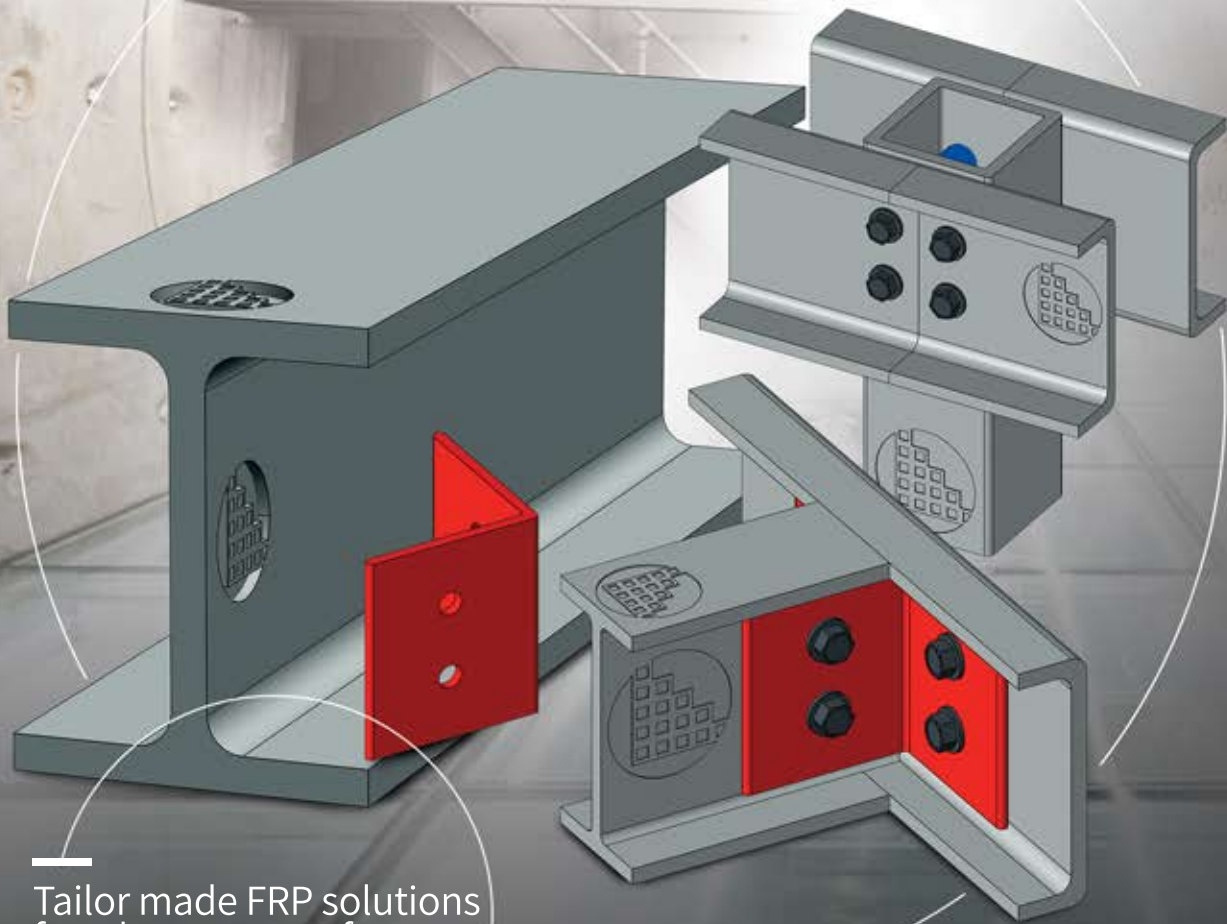


# FRP BEAM DESIGN GUIDE



Tailor made FRP solutions  
for a large range of  
industries since 2004



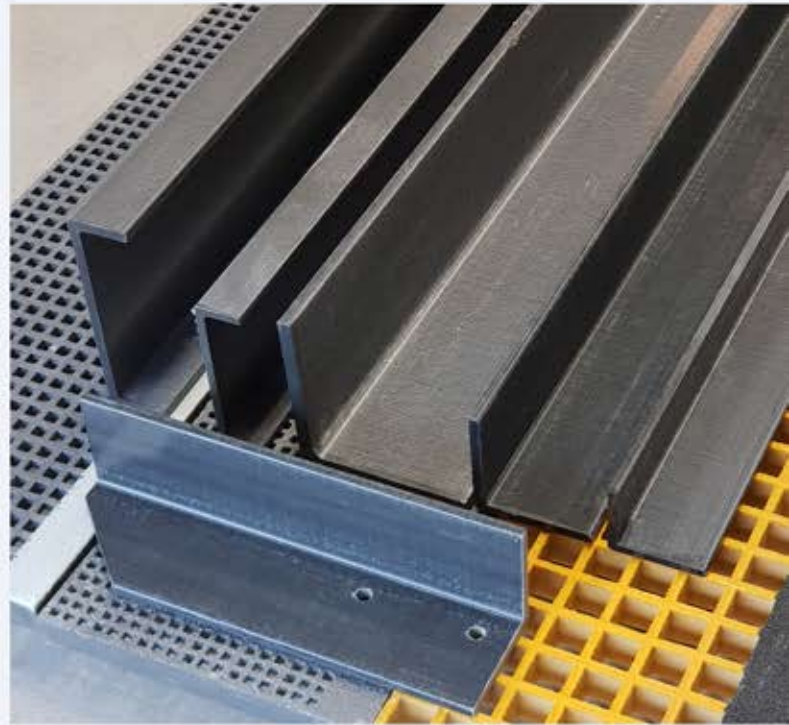
**StairCareFRP**  
STRONGER, SAFER & SMARTER

## FRP BEAM DESIGN GUIDE NOTES

**StairCare-frp** Company understands the importance of customizing solutions to meet each project's unique needs. Our FRP pultrusion beams offer design flexibility, allowing us to create various shapes and profiles tailored to specific load-bearing requirements. We also emphasize the significance of fire safety, during the manufacturing process fire retardant is added to the resin and fibreglass mix to offer significant fire resistance.

Whether you're designing platforms, walkways, bridges, ladders, or handrails, Staircare offers a wide range of **FRP** pultrusion beams to suit your needs. This design guide provides valuable information to engineers and designers, helping them incorporate **FRP** pultrusion beams seamlessly into their projects. These beams are easy to install, reduce transportation costs, and deliver excellent performance, making them an ideal choice for enhancing structures and achieving superior results.

**At StairCare-frp**, we remain committed to our valued partners with the latest material advancements and design techniques. We are confident that our Comprehensive FRP Pultrusion Beam Design Guide will be an invaluable resource, offering practical guidance and insights for creating safe, reliable, and sustainable structures.



## MATERIAL PROPERTIES

Our **StairCare-frp** composite beams are made with glass fibers and designed specifically for industries like construction, infrastructure, and transportation. These beams combine the exceptional strength and durability of glass fibers with a resilient polymer matrix, resulting in a composite material with impressive properties.



The table below provides minimum mechanical properties for FRP composite beams reinforced with glass fibers. Engineers, designers, and manufacturers can use these guidelines to select, design, and implement the beams effectively. Following these standards ensures optimal performance, safety, and reliability in various structural applications.

Please note that these values have been established through rigorous testing and analysis to ensure that StairCare-frp composite beams meet or exceed the minimum requirements for mechanical performance.

## Minimum Characteristic Mechanical Properties for Mechanical Property StairCare-frp Composite Beams

Mechanical Property	Minimum Requirement	ASTM Test Method
Longitudinal Tensile Strength	206.8 MPa	D638
Transverse Tensile Strength	48.3 MPa	D638
Longitudinal Tensile Modulus	20.7 GPa	D638
Transverse Tensile Modulus	5.5 GPa	D638
Longitudinal Compressive Strength	206.8 MPa	D6641
Longitudinal Compressive Modulus	20.7 GPa	D6641
Transverse Compressive Modulus	6.9 GPa	D6641
In-Plane Shear Strength	55.2 MPa	D5379
In-Plane Shear Modulus	2.8 GPa	D5379
Interlaminar shear strength	24.1 MPa	D2344
Longitudinal pin-bearing strength	144.8 MPa	D953
Transverse pin-bearing strength	124.1 MPa	D953
Pull-through strength per fastener t = 3/8 in = 9.5 mm t = 1/2 in = 12.7 mm t = 3/4 in = 19 mm	2891.3 N 4003.4 N 5560.3 N	


#### ■ PHYSICAL PROPERTIES FOR STAIRCARE-FRP MATERIALS


Physical Property	Requirement	ASTM Test Method
Barcol Hardness	Greater than 40	D2583
Glass Transition Temperature	Greater than 180°F (82°C)	D4065
Coefficient of Thermal Expansion	Less than $7.5 \times 10^{-6}$ in/in/°F (longitudinal)	D696
Moisture Equilibrium Content	Less than 2%	D570, §7.4


## FRP BEAM TABLE


**FRP pultruded shapes** come in different sizes and shapes, like beams, channels, angles, and tubes. The dimensions of these shapes, such as width, height, thickness, and length, are important for choosing the right one for a specific use. They are used in various projects like buildings, bridges, and platforms. The dimensions help determine their strength, durability, and cost-effectiveness. If you need specific dimensions, please consult with Staircare. We can provide detailed information and help you select the right size for your project.


Size (mm)	Weight (kg/m)	I BEAM
SC-R IB 15x25x6.4x4	0.47	
SC-R IB 15x32x6.4x4	0.52	
SC-R IB 15x38x4x6.4	0.6	
SC-R IB 30x38x3x3	0.54	
SC-R IB 45x180x9x12	5.2	
SC-R IB 50x102x6.4x6.4	2.3	
SC-R IB 50x102x8X8	2.85	
SC-R IB 70x140x6.4x6.4	3.2	
SC-R IB 76x152x6.4x6.4	3.5	
SC-R IB 76x152x9.5x9.5	5.2	
SC-R IB 102x203x9.5x9.5	7	
SC-R IB 102x203x12.7x12.7	9.2	
SC-R IB127x152x9.5x9.5	7	
SC-R IB127x152x12.7x12.7	9.2	
SC-R IB127x254x9.5x9.5	8.9	
SC-R IB127x254x12.7x12.7	11.7	
SC-R IB152x305x9.5x9.5	10.7	
SC-R IB152x305x12.7x12.7	14.2	

Size (mm)	Weight (kg/m)	SQUARE HOLLOW SECTION
SC-R SHS 25x25x3.2	0.5	
SC-R SHS 25x25x6.4	0.85	
SC-R SHS 32x32x6.4	1.2	
SC-R SHS 38x38x3.2	0.83	
SC-R SHS 38x38x6.4	1.5	
SC-R SHS 50x50x3.2	1.1	
SC-R SHS 50x50x5	1.6	
SC-R SHS 50x50x6.4	2	
SC-R SHS 76x76x3.2	1.7	
SC-R SHS 76x76x6.4	3.4	
SC-R SHS 76x76x9.5	4.8	
SC-R SHS 89x89x6.4	4	
SC-R SHS 102x102x3.2	2.4	
SC-R SHS 102x102x6.4	4.6	
SC-R SHS 102x102x9.5	6.6	
SC-R SHS 127x127x8	7.2	
SC-R SHS 152x152x9.5	10.2	

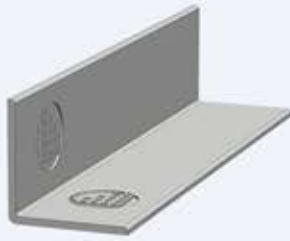
Size (mm)	Weight (kg/m)	FS
SC-R FS19x6.4	0.23	
SC-R FS25.4x8	0.38	
SC-R FS30x3	0.17	
SC-R FS30x6.4	0.36	
SC-R FS35x8	0.53	
SC-R FS38x5	0.36	
SC-R FS40x8	0.6	
SC-R FS50x2	0.2	
SC-R FS50x4	0.38	
SC-R FS50x6	0.57	
SC-R FS50x8	0.76	
SC-R FS50x15	1.4	
SC-R FS50x25	2.3	
SC-R FS102x5	1	
SC-R FS120x10	2.3	
SC-R FS152x10	2.8	
SC-R FS250x12	5.7	

Size (mm)	Weight (kg/m)	C-Channel
SC-R C-Channel 50x145x3.2x3.2	0.43	
SC-R C-Channel 75x35x5x5	1.3	
SC-R C-Channel 76x36x6.4x6.4	1.7	
SC-R C-Channel 90x35x5x5	1.4	
SC-R C-Channel 102x27x3.2x3.2	0.9	
SC-R C-Channel 102x44x4.8x4.8	1.6	
SC-R C-Channel 102x44x6.4x6.4	2.1	
SC-R C-Channel 152x42x6.4x6.4	2.7	
SC-R C-Channel 152x42x9.5x9.5	3.9	
SC-R C-Channel 152x50x9.5x9.5	4.2	
SC-R C-Channel 203x56x6.4x6.4	3.7	
SC-R C-Channel 203x56x9.5x9.5	5.3	
SC-R C-Channel 254x70x12.7x12.7	8.9	
SC-R C-Channel 292x70x12.7x12.7	9.8	
SC-R C-Channel 305x76x12.7x12.7	10.4	
SC-R C-Channel 356x89x19x19	17.9	

Size (mm)	Weight (kg/m)	ROUND TUBE
SC-R RT 25x3.2	0.4	
SC-R RT 32x5	0.8	
SC-R RT 32x6.4	1	
SC-R RT 38x3.2	0.7	
SC-R RT 38x6.4	1.2	
SC-R RT 50.8x6.4	1.7	
SC-R RT 50x5	1.3	
SC-R RT 60x6.4	2	
SC-R RT 76x6.4	2.6	
SC-R RT 102x6.4	3.6	
SC-R RT 102x9.5	5.2	

Size (mm)	Weight (kg/m)	ROUND TUBE
SC-R RSR 4	0.02	
SC-R RSR 5	0.04	
SC-R RSR 6	0.05	
SC-R RSR 8	0.1	
SC-R RSR 9.5	0.14	
SC-R RSR 12.7	0.25	
SC-R RSR 15	0.34	
SC-R RSR 20	0.6	
SC-R RSR 25.4	1	
SC-R RSR 32	1.5	
SC-R RSR 38	2.1	
SC-R RSR 51	3.8	

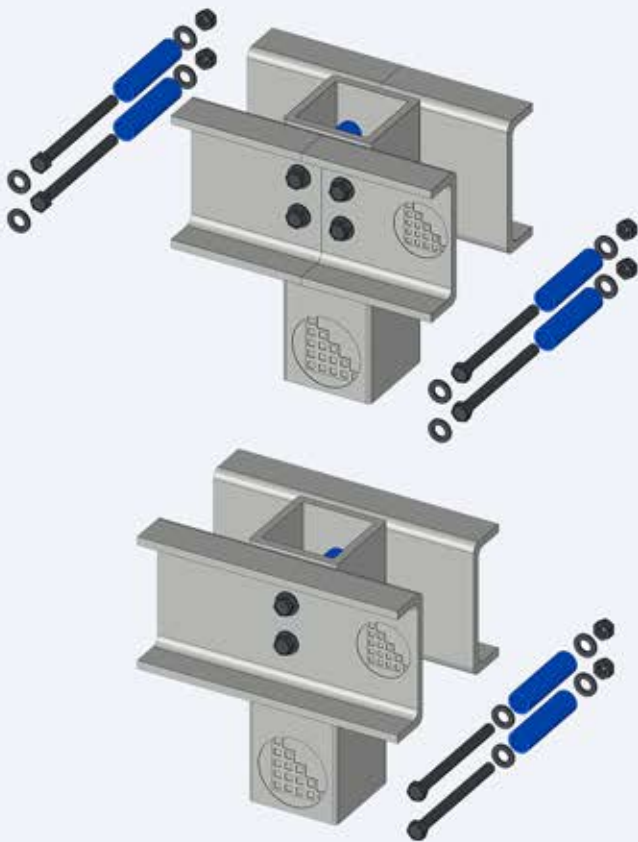
Size (mm)	Weight (kg/m)	EA
SC-R EA 25x25x6.4	0.5	
SC-R EA 30x30x5	0.5	
SC-R EA 32x32x4	0.44	
SC-R EA 38x38x5	0.66	
SC-R EA 38x38x6.4	0.82	
SC-R EA 50x50x3.2	0.58	
SC-R EA 50x50x6.4	1.1	
SC-R EA 76x76x6.4	1.7	
SC-R EA 76x76x9.5	2.5	
SC-R EA 102x102x6.4	2.4	
SC-R EA 102x102x9.5	3.4	
SC-R EA 102x102x12.7	4.5	
SC-R EA 127x127x12.7	5.7	
SC-R EA 152x152x9.5	5.2	
SC-R EA 152x152x12.7	6.9	



Size (mm)	Weight (kg/m)	WF
SC-R WF 76x76x6.4x6.4	2.6	
SC-R WF 102x102x6.4x6.4	3.6	
SC-R WF 102x102x8x8	4.5	
SC-R WF 152x152x6.4x6.4	5.4	
SC-R WF 152x152x9.5x9.5	8	
SC-R WF 203x203x6.4x6.4	7.5	
SC-R WF 203x203x9.5x9.5	10.9	
SC-R WF 203x203x12.7x12.7	14.3	
SC-R WF 254x254x9.5x9.5	13.6	
SC-R WF 254x254x12.7x12.7	18	
SC-R WF 305x305x12.7x12.7	21.8	

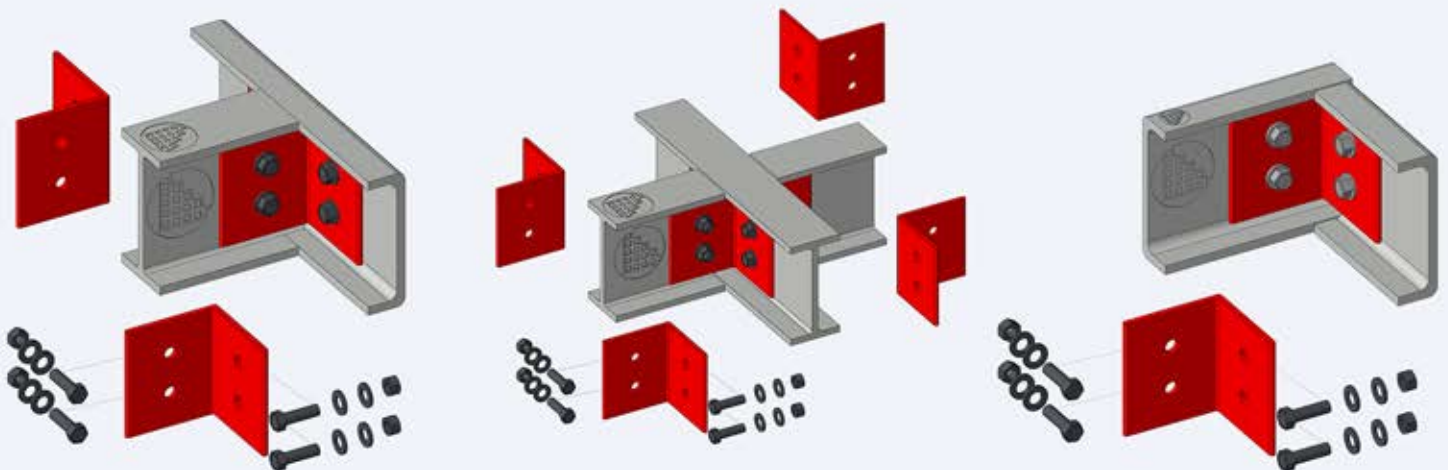


Size (mm)	Weight (kg/m)	RHS
SC-R RHS 51x25x3	0.8	
SC-R RHS 51x25x6.4	1.5	
SC-R RHS 75x38x4	1.6	
SC-R RHS 91x38x4	1.8	
SC-R RHS 100x50x5	2.6	
SC-R RHS 100x75x5	3.1	
SC-R RHS 101x51x6.4	3.4	
SC-R RHS 150x100x6.4	5.8	



The typical connection graphs for **StairCare-frp** pultruded beams offer essential information about the load-carrying capacity and behavior of connections under different configurations and loading conditions. These graphs provide a visual representation of the relationship between key parameters such as load, displacement, and stiffness

for various connection types, including bolted connections, adhesive bonding, or hybrid connections. By examining these graphs, engineers can make informed decisions regarding the appropriate connection design, ensuring compatibility with the strength and performance characteristics of **StairCare-frp** pultruded beams.



# FRP COMPOSITES FABRICATION SERVICE, PROFILE AND GRATING SALES



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