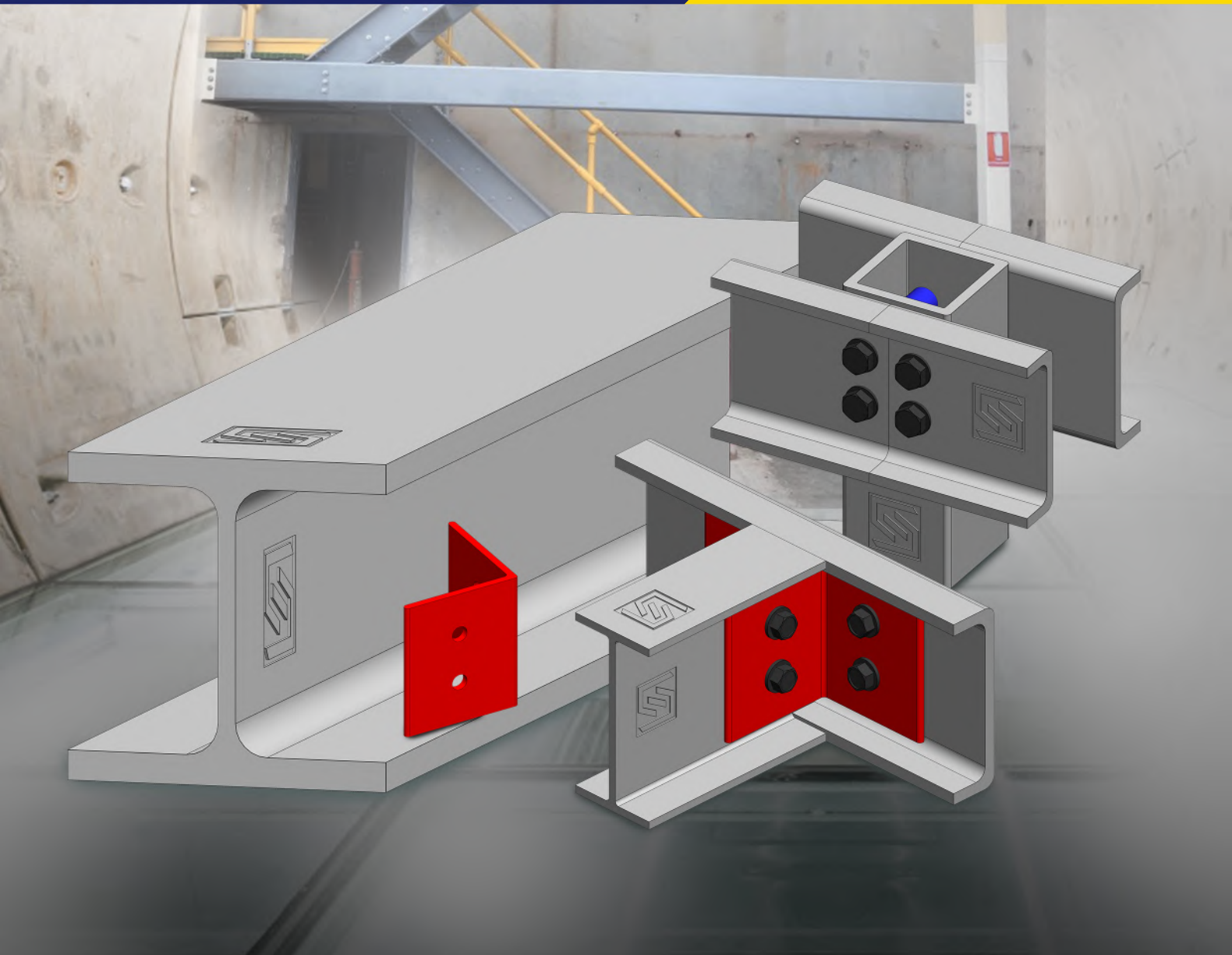


FRP BEAM DESIGN GUIDE STAIRCARE

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





FRP BEAM DESIGN GUIDE NOTES

Staircar Company understands the importance of customising 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 emphasise the significance of fire safety, during the manufacturing process fire retardant is added to the resin and fibreglass mix to offer significant fire resistance.



FRP BEAM DESIGN GUIDE NOTES

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

The table below provides minimum mechanical properties for Staircare composite beams reinforced with glass fibres. 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 composite beams meet or exceed the minimum requirements for mechanical performance.



Minimum Requirements for Mechanical Performance of Staircare Composit 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 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 7.5×10^{-6} in/in/°F (longitudinal)	D696
Moisture Equilibrium Content	Less than 2%	D570, §7.4



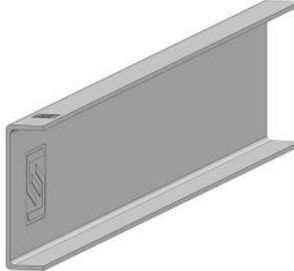
FRP BEAM TABLE

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
STAIRCARE IB 15x25x6.4x4	0.47	
STAIRCARE IB 15x32x6.4x4	0.52	
STAIRCARE IB 15x38x4x6.4	0.6	
STAIRCARE IB 30x38x3x3	0.54	
STAIRCARE IB 45x180x9x12	5.2	
STAIRCARE IB 50x102x6.4x6.4	2.3	
STAIRCARE IB 50x102x8x8	2.85	
STAIRCARE IB 70x140x6.4x6.4	3.2	
STAIRCARE IB 76x152x6.4x6.4	3.5	
STAIRCARE IB 76x152x9.5x9.5	5.2	
STAIRCARE IB 102x203x9.5x9.5	7	
STAIRCARE IB 102x203x12.7x12.7	9.2	
STAIRCARE IB127x152x9.5x9.5	7	
STAIRCARE IB127x152x12.7x12.7	9.2	
STAIRCARE IB127x254x9.5x9.5	8.9	
STAIRCARE IB127x254x12.7x12.7	11.7	
STAIRCARE IB152x305x9.5x9.5	10.7	
STAIRCARE IB152x305x12.7x12.7	14.2	

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

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

Size (mm)	Weight (kg/m)	C-Channel
STAIRCARE C-Channel 50x145x3.2x3.2	0.43	
STAIRCARE C-Channel 75x35x5x5	1.3	
STAIRCARE C-Channel 76x22x6.4x6.4	1.31	
STAIRCARE C-Channel 76x36x6.4x6.4	1.7	
STAIRCARE C-Channel 90x35x5x5	1.4	
STAIRCARE C-Channel 102x27x3.2x3.2	0.9	
STAIRCARE C-Channel 102x44x4.8x4.8	1.6	
STAIRCARE C-Channel 102x44x6.4x6.4	2.1	
STAIRCARE C-Channel 152x42x6.4x6.4	2.7	
STAIRCARE C-Channel 152x42x9.5x9.5	3.9	
STAIRCARE C-Channel 152x50x9.5x9.5	4.2	
STAIRCARE C-Channel 203x56x6.4x6.4	3.7	
STAIRCARE C-Channel 203x56x9.5x9.5	5.3	
STAIRCARE C-Channel 254x70x12.7x12.7	8.9	
STAIRCARE C-Channel 292x70x12.7x12.7	9.8	
STAIRCARE C-Channel 305x76x12.7x12.7	10.4	
STAIRCARE C-Channel 356x89x19x19	17.9	

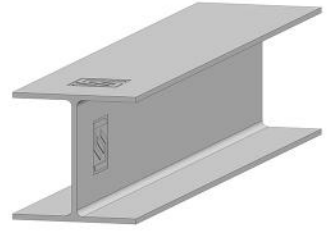
Size (mm)	Weight (kg/m)	ROUND TUBE
STAIRCARE RT 25x3.2	0.4	
STAIRCARE RT 32x5	0.8	
STAIRCARE RT 32x6.4	1	
STAIRCARE RT 38x3.2	0.7	
STAIRCARE RT 38x6.4	1.2	
STAIRCARE RT 50.8x6.4	1.7	
STAIRCARE RT 50x5	1.3	
STAIRCARE RT 60x6.4	2	
STAIRCARE RT 76x6.4	2.6	
STAIRCARE RT 102x6.4	3.6	
STAIRCARE RT 102x9.5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

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

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



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

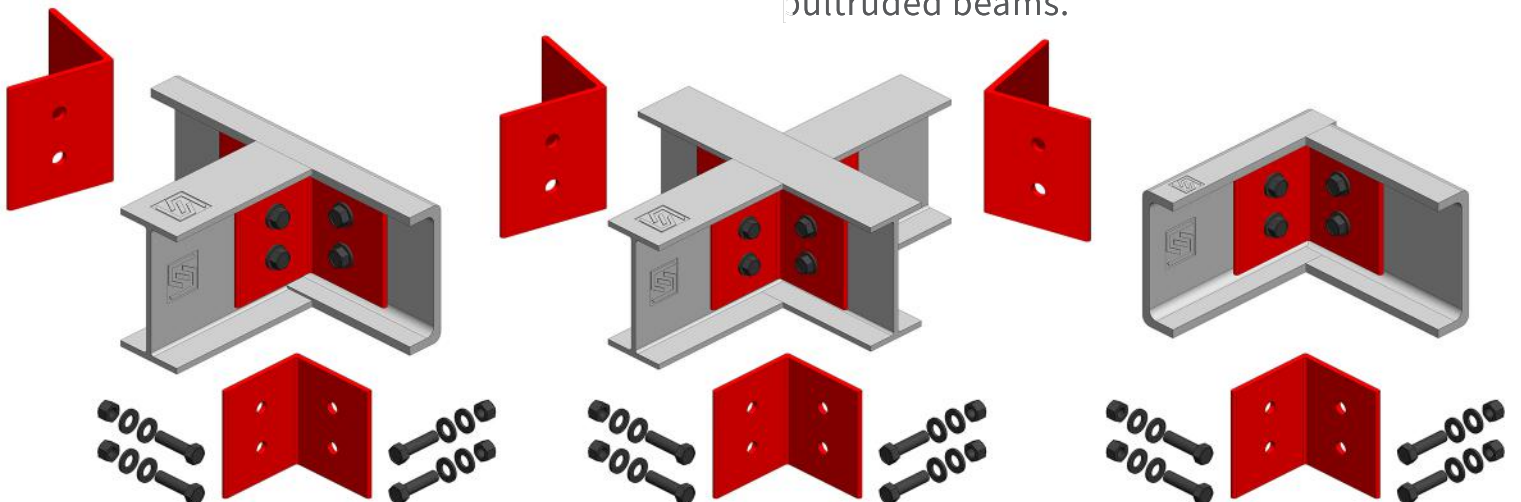
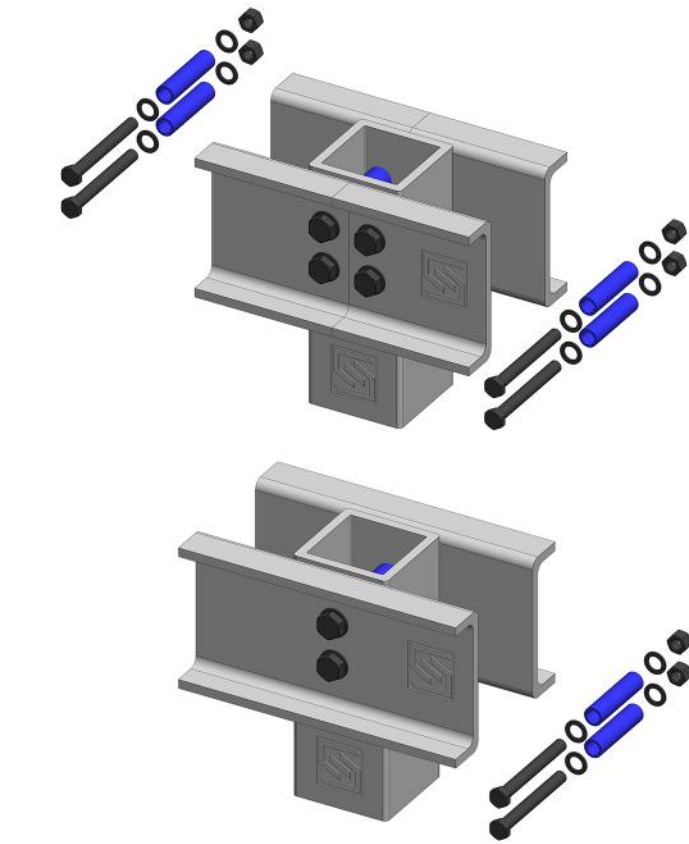


Size (mm)	Weight (kg/m)	RHS
STAIRCARE RHS 51x25x3	0.8	
STAIRCARE RHS 51x25x6.4	1.5	
STAIRCARE RHS 75x38x4	1.6	
STAIRCARE RHS 91x38x4	1.8	
STAIRCARE RHS 100x50x5	2.6	
STAIRCARE RHS 100x75x5	3.1	
STAIRCARE RHS 101x51x6.4	3.4	
STAIRCARE RHS 150x100x6.4	5.8	



The typical connection graphs for Staircare 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 pultruded beams.



FRP BEAM DESIGN GUIDE STAIRCARE

FRP Composites Fabrication Service, Profile and Grating Sales



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