PERMASTRUCT®

LOW MAINTENANCE. HIGH STRENGTH. SUBSTRATE SOLUTIONS

FRP SUBSTRATE

PermaStruct® Fibre-reinforced-plastic members have a high strength to weight ratio obtaining comparative or better performance to traditional F27 timber materials with the added benefits of being up to 50% lighter, waterproof and corrosion proof. With increased longevity and superior strength.

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PERMASTRUCT® FRP SUBSTRATE

PermaStruct® FRP & F27 Hardwood Performance Comparison

The below table shows the typical residential and commercial loading structural performance of F27 hardwood. PermaStruct® has created profiles that obtain the same performance at a lighter weight, which allows like for like substitution. No complicated span tables are needed!

Profile Shape	F27 Hardwood Profile	Codes	Item Codes	PermaStruct® FRP Equivalent	Load (kPa)	Joist Spacing (mm)	Pack Size	Single Span (mm)
	50x50	PB50x50x6.4	PB50X50X6.4S	50x50x6.4mm - SHS	3	450	84	700
	90x45	PC90x53x6	PC90X53X6S	90x53x6mm - C Channel	3	450	48	1500
	140x45	PC155x53x6.3	PC155X53X6.3S	155x53x6.3mm - C Channel	5	450	30	2000
	190x45	PC250x63x6.3	PC250X63X6.3S	250x63x6.3mm - C Channel	5	450	20	3100

Benefits of PermaStruct® FRP

- Comparative FRP profiles are up to half the weight per lineal metre when compared with F27 timber.
- FRP alternatives match the structural performance of the F27 hardwood in load, joist spacing and bearer spans.
- Longer lasting than hardwoods and not susceptible to moisture, mould, rot or white ants.
- Greater flexural strength, meaning it is less likely to experience mechanical failure.

Available in Dark Grey RAL:7024
*Custom colours available for larger orders

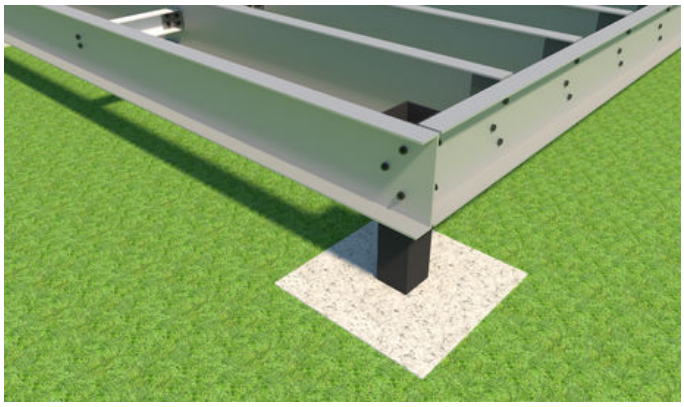
Properties of PermaStruct® FRP

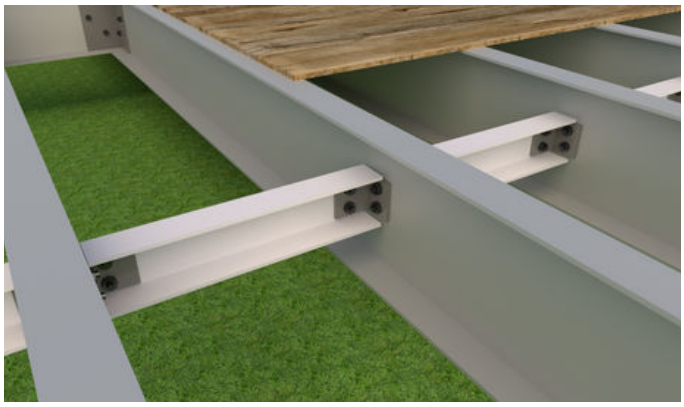
- Compliant with Australian Standards and Building Codes Of Australia (AS1145, AS1170, AS5100, AS1657).
- Pre-drilling required, coarse thread screws or bolts required for connections. Please refer to the technical guide for typical connections.
- Compliant with AS1530.3 - Early Fire Hazard Properties
- **Strength:** F27 timber is a structural grade of timber that has high strength and stiffness, while FRP is stronger.
- **Durability:** F27 timber is vulnerable to moisture, rot, and insects, while FRP is more resistant to these factors, making it a more durable option for outdoor use.
- Weight: F27 timber is heavier than FRP, which is lighter and easier to handle.
- **Maintenance:** F27 timber requires regular maintenance, such as painting or staining, to protect it from the elements, while FRP does not require any maintenance.
- **Fire resistance:** F27 timber is flammable, while FRP has fire-resistant properties, making it a safer option.
- **Sustainability:** F27 timber comes from a renewable resource (trees), but requires deforestation, while FRP is made from a combination of resin and glass fibers, which are recyclable and have a lower environmental impact.

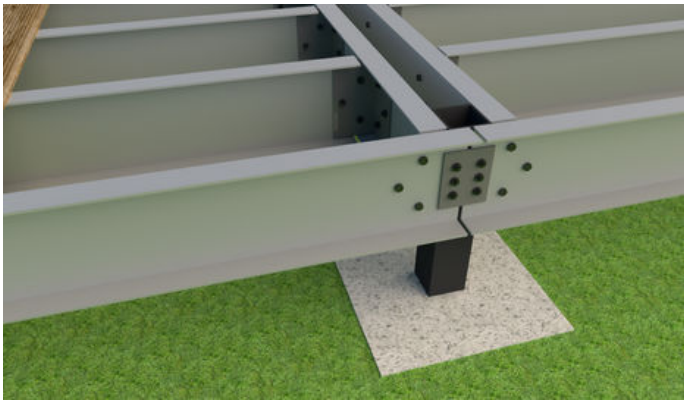
Availability of PermaStruct® FRP

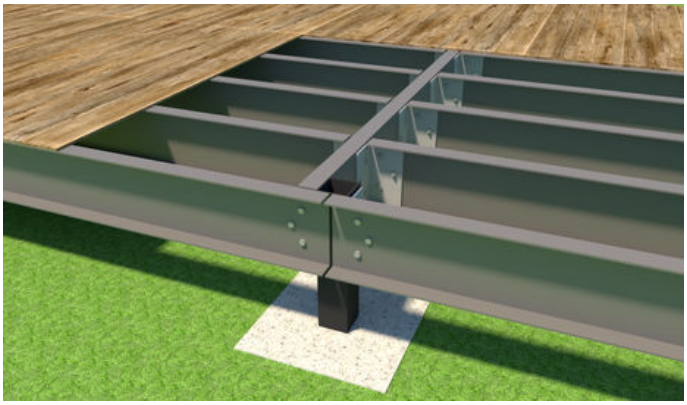
- Available in 5.80m lengths, custom lengths available at minimum order quantities of 800 L/M (lead times apply).
- Large orders are available with a 16 week lead time.
- Profiles available in Graphite Grey RAL7024. Custom RAL colours available with min order quantities of 800 L/M.

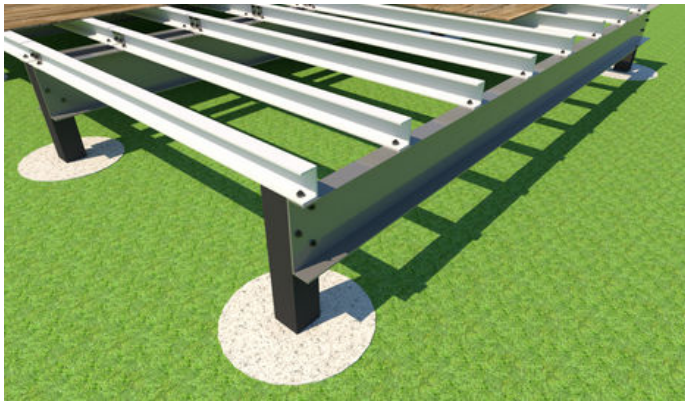
PermaStruct® FRP Substrates Typical Connections

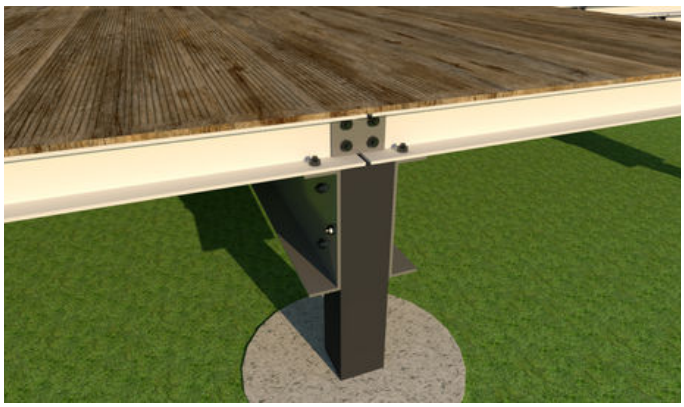


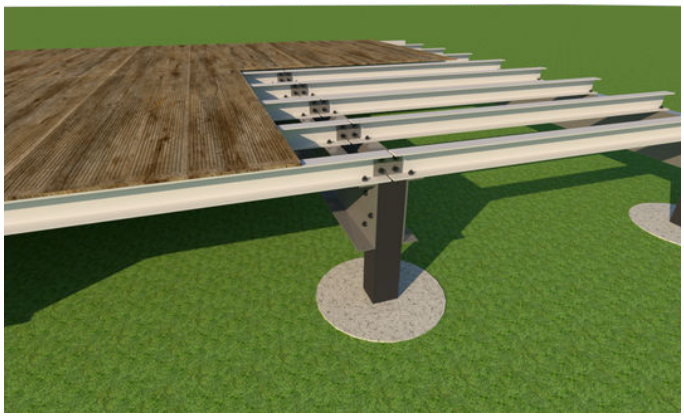












Typical Coupon Properties:

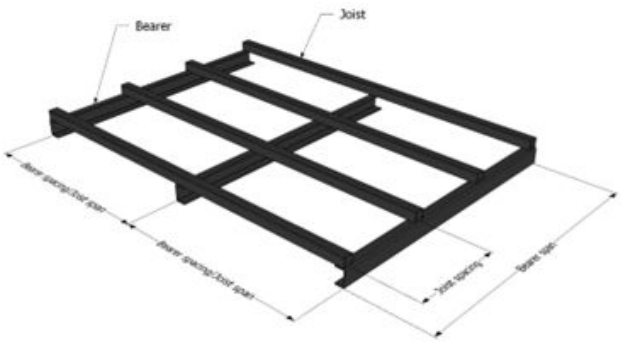
Material Properties	Units	Value	Test Method
Tensile Strength, LW	MPa	250	ASTM D-638
Tensile Strength, CW	MPa	60	ASTM D-638
Tensile Modulus, LW	GPa	25	ASTM D-638
Tensile Modulus, CW	GPa	6.9	ASTM D-638
Compressive Strength, LW	MPa	207	ASTM D-695
Compressive Strength, CW	MPa	103	ASTM D-695
Compressive Modulus, LW	GPa	17.2	ASTM D-695
Compressive Modulus, CW	GPa	6.9	ASTM D-695
In-plane Shear Modulus	GPa	3	ASTM D-7078
Interlaminar Shear Strength	MPa	31	ASTM D-2344
Pin-bearing Strength, LW	MPa	220	ASTM D-935
Pin-bearing Strength, CW	MPa	120	ASTM D-935
Barcol Hardness		45	ASTM D-2583
Water Absorption	% Max by wt.	0.5	ASTM D-570
Density	g/cc	1.98	ASTM D-792
Glass Transition Temperature	˚C	80	ASTM D-7029
Flammability Classification		V-0	UL-94
Flammability Extinguishing		< 25	ASTM D-635
Tunnel Test		FSI < 25	E-84

*Based on full section test

LW: Lengthwise CW: Crosswise

PERMASTRUCT® FRP SUBSTRATE

Allowable Span / Cantilever PermaStruct® FRP Substrates Profiles



Substrate Joists:

FRP Profile Size	1.5 KPa Live load + 0.4 KPa Decking load															
	Joists Spacing (mm)															
	300		350		400		450		500		550		600		650	
	Maximum Joists Span and Cantilever (mm)															
	Span	Cantilever	Span	Cantilever	Span	Cantilever	Span	Cantilever	Span	Cantilever	Span	Cantilever	Span	Cantilever	Span	Cantilever
SHS 50x50x6.4	1000	400	1000	400	900	300	900	300	900	300	800	300	800	300	800	300
CS 90x53x6	2000	800	2000	700	1900	700	1800	700	1700	600	1700	600	1600	600	1600	600
CS 155x53x6.3	3300	1200	3100	1200	3000	1100	2800	1100	2700	1000	2700	1000	2600	1000	2500	900
CS 250x63x6.3	5000	1900	4700	1800	4500	1700	4400	1700	4200	1600	4100	1500	4000	1500	3900	1500

FRP Profile Size	3 KPa Live load + 0.4 KPa Decking load															
	Joists Spacing (mm)															
	300		350		400		450		500		550		600		650	
	Maximum Joists Span and Cantilever (mm)															
	Span	Cantilever	Span	Cantilever	Span	Cantilever	Span	Cantilever	Span	Cantilever	Span	Cantilever	Span	Cantilever	Span	Cantilever
SHS 50x50x6.4	800	300	800	300	800	300	700	300	700	300	700	200	600	200	600	200
CS 90x53x6	1700	600	1600	600	1500	600	1500	500	1400	500	1400	500	1300	500	1300	500
CS 155x53x6.3	2700	1000	2500	900	2400	900	2300	900	2200	800	2200	800	2100	800	2000	800
CS 250x63x6.3	4100	1600	3900	1500	3700	1400	3600	1400	3500	1300	3400	1300	3300	1200	3200	1200

FRP Profile Size	5 KPa Live load + 0.4 KPa Decking load															
	Joists Spacing (mm)															
	300		350		400		450		500		550		600		650	
	Maximum Joists Span and Cantilever (mm)															
	Span	Cantilever	Span	Cantilever	Span	Cantilever	Span	Cantilever	Span	Cantilever	Span	Cantilever	Span	Cantilever	Span	Cantilever
SHS 50x50x6.4	700	300	700	200	600	200	600	200	600	200	600	200	500	200	500	200
CS 90x53x6	1400	500	1400	500	1300	500	1200	400	1200	400	1100	400	1100	400	1100	400
CS 155x53x6.3	2300	900	2200	800	2100	800	2000	700	1900	700	1800	700	1800	600	1700	600
CS 250x63x6.3	3500	1300	3300	1300	3200	1200	3100	1100	3000	1100	2900	1100	2800	1000	2700	1000

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Substrate Bearers:

FRP Profile Size	1.5 KPa Live load + 0.4 KPa Decking load															
	600		800		1000		1200		1400		1600		1800		2000	
	Maximum Bearers Span and Cantilever (mm)															
	Span	Cantilever	Span	Cantilever	Span	Cantilever	Span	Cantilever	Span	Cantilever	Span	Cantilever	Span	Cantilever	Span	Cantilever
SHS 50x50x6.4	800	300	700	300	700	200	600	200	600	200	600	200	500	200	500	200
CS 90x53x6	1600	600	1500	500	1400	500	1300	500	1200	400	1100	400	1100	400	1000	400
CS 155x53x6.3	2600	1000	2300	900	2200	800	2000	700	1900	700	1800	700	1800	600	1700	600
CS 250x63x6.3	4000	1500	3600	1400	3300	1300	3100	1200	3000	1100	2800	1100	2700	1000	2600	1000

FRP Profile Size	3 KPa Live load + 0.4 KPa Decking load															
	Bearers Spacing (mm)															
	600		800		1000		1200		1400		1600		1800		2000	
	Maximum Bearers Span and Cantilever (mm)															
	Span	Cantilever	Span	Cantilever	Span	Cantilever	Span	Cantilever	Span	Cantilever	Span	Cantilever	Span	Cantilever	Span	Cantilever
SHS 50x50x6.4	600	200	600	200	500	200	500	200	500	200	400	100	400	100	400	100
CS 90x53x6	1300	500	1200	400	1100	400	1000	-	1000	-	900	-	900	-	800	-
CS 155x53x6.3	2100	800	1900	700	1800	600	1600	600	1600	600	1500	500	1400	500	1400	500
CS 250x63x6.3	3300	1200	2900	1100	2700	1000	2600	900	2400	900	2300	800	2200	800	2100	800

FRP Profile Size	5 KPa Live load + 0.4 KPa Decking load															
	Bearers Spacing (mm)															
	600		800		1000		1200		1400		1600		1800		2000	
	Maximum Bearers Span and Cantilever (mm)															
	Span	Cantilever	Span	Cantilever	Span	Cantilever	Span	Cantilever	Span	Cantilever	Span	Cantilever	Span	Cantilever	Span	Cantilever
SHS 50x50x6.4	500	200	500	200	400	100	400	100	400	100	400	100	400	100	300	100
CS 90x53x6	1100	-	1000	-	900	-	900	-	700	-	600	-	600	-	500	-
CS 155x53x6.3	1800	600	1600	600	1500	500	1400	500	1300	500	1200	400	1100	400	1000	400
CS 250x63x6.3	2800	1000	2500	900	2300	800	2200	800	2000	700	1900	700	1800	700	1700	600

NOTES TO TABLES:
The maximum joist and bearer spans are based on a maximum decking mass of 0.4 kN.m2 (40 kg/m2).
Live load + Dead load deflection limit = span/300.
The allowable cantilevers are only applicable to fixed-end support.
Cantilevers shall not exceed 50% of the actual backspan.
Design shall be in accordance with Australian Standards, e.g. AS1170.0, AS1170.1.
Relative deflections are used in the above tables.

Allowable Uniform Loads of PermaStruct®

FRP Substrates Profiles

FRP Profile Load Table – SHS 50×50×6.4 mm							
Span (m)	Maximum UDL (kN/m) F.O.S. = 3	Deflection					
		L/100	L/120	L/150	L/250	L/360	L/500
		Load (kN/m)					
0.5	19.99	-	-	-	12.16	8.44	6.08
0.8	12.49	8.06	6.72	5.37	3.22	2.24	1.61
1	8.23	4.21	3.51	2.81	1.68	1.17	0.84
1.5	3.66	1.27	1.06	0.85	0.51	0.35	0.25
2	2.05	0.54	0.45	0.36	0.22	0.15	0.11
2.5	1.31	0.28	0.23	0.19	0.11	0.08	0.06
3	0.91	0.16	0.13	0.11	0.06	0.04	0.03
3.5	0.67	0.10	0.08	0.07	0.04	0.03	0.02
4	0.51	0.07	0.06	0.05	0.03	0.02	0.01
4.5	0.40	0.05	0.04	0.03	0.02	0.01	0.01
5	0.32	0.03	0.03	0.02	0.01	0.01	0.01
5.5	0.27	0.03	0.02	0.02	0.01	0.01	0.01
5.8	0.24	0.02	0.02	0.01	0.01	0.01	0.01

FRP Profile Load Table – CS 90×53×6mm							
Span (m)	Maximum UDL (kN/m) F.O.S. = 3	Deflection					
		L/100	L/120	L/150	L/250	L/360	L/500
		Load (kN/m)					
0.5	19.34	-	-	-	-	-	-
0.8	12.08	-	-	-	11.41	7.93	5.71
1	9.67	-	-	-	7.09	4.92	3.54
1.5	6.44	5.74	4.78	3.82	2.29	1.59	1.15
2	4.16	2.50	2.08	1.67	1.00	0.69	0.50
2.5	2.66	1.30	1.08	0.87	0.52	0.36	0.26
3	1.85	0.76	0.63	0.51	0.30	0.21	0.15
3.5	1.36	0.48	0.40	0.32	0.19	0.13	0.10
4	1.04	0.32	0.27	0.22	0.13	0.09	0.06
4.5	0.82	0.23	0.19	0.15	0.09	0.06	0.05
5	0.66	0.17	0.14	0.11	0.07	0.05	0.03
5.5	0.55	0.12	0.10	0.08	0.05	0.03	0.02
5.8	0.49	0.11	0.09	0.07	0.04	0.03	0.02

SHS 50x50x6.4 CS 90x53x6 CS 155x53x6.3 CS 250x63x6.3

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FRP Profile Load Table – CS 155×53×6.3 mm							
Span (m)	Maximum UDL (kN/m) F.O.S. = 3	Deflection					
		L/100	L/120	L/150	L/250	L/360	L/500
		Load (kN/m)					
0.5	37.08	-	-	-	-	-	-
0.8	23.17	-	-	-	-	-	20.01
1	18.54	-	-	-	-	16.35	11.77
1.5	12.36	-	-	-	8.18	5.68	4.09
2	9.26	9.18	7.65	6.12	3.67	2.55	1.84
2.5	5.93	4.84	4.04	3.23	1.94	1.35	0.97
3	4.11	2.85	2.37	1.90	1.14	0.79	0.57
3.5	3.02	1.81	1.51	1.21	0.73	0.50	0.36
4	2.31	1.22	1.02	0.82	0.49	0.34	0.24
4.5	1.83	0.86	0.72	0.58	0.35	0.24	0.17
5	1.48	0.63	0.53	0.42	0.25	0.18	0.13
5.5	1.22	0.48	0.40	0.32	0.19	0.13	0.10
5.8	1.10	0.41	0.34	0.27	0.16	0.11	0.08

FRP Profile Load Table – CS 250×63×6.3 mm							
Span (m)	Maximum UDL (kN/m) F.O.S. = 3	Deflection					
		L/100	L/120	L/150	L/250	L/360	L/500
		Load (kN/m)					
0.5	61.81	-	-	-	-	-	-
0.8	38.63	-	-	-	-	-	-
1	30.90	-	-	-	-	-	-
1.5	20.60	-	-	-	-	17.67	12.72
2	15.45	-	-	-	12.09	8.40	6.05
2.5	12.36	-	-	10.96	6.58	4.57	3.29
3	9.52	-	8.21	6.57	3.94	2.74	1.97
3.5	6.99	6.34	5.28	4.22	2.53	1.76	1.27
4	5.35	4.31	3.59	2.87	1.72	1.20	0.86
4.5	4.23	3.05	2.54	2.04	1.22	0.85	0.61
5	3.42	2.24	1.87	1.49	0.90	0.62	0.45
5.5	2.83	1.69	1.41	1.13	0.68	0.47	0.34
5.8	2.54	1.45	1.21	0.96	0.58	0.40	0.29

- The above table is based on short term load only.
- The effect of long-term deflection has not been considered in the above table.
- Self-weight of the profile has not been considered in the above table.
- Beam simply supported at both ends.
- Load is applied perpendicular to major axis.
- Safety factor is equal to 3.0 for ultimate material flexural and shear stress.
- Higher safety factors may be required for permanent loading, impact loading or high temperature consideration.
- Lateral torsional buckling needs to check.

For enquiries contact:

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