FIBRE FRAME
SPAN GUIDE
JOISTS, BEARERS & POSTS

GRP AUSTRALIA | 2024

FIBRE FRAME®

CONTENTS

PAGE NUMBER

1.0 INTRODUCTION

The Fibre Frame substructure framing system by GRP Australia offers a robust structural solution ideal for challenging environments like poolside decks, marine environments, low-ground decks, and various outdoor spaces. Fibre Frame is long-lasting, resistant to decay and termite damage, non-corrosive, lightweight, and simple to install.

This design guide contains information on the Fibre Frame joists, bearers and posts which are manufactured from glass reinforced plastic (GRP[1]).

Designed for Easy Installation:

Fibre Frame system includes propriety brackets and fasteners ensuring a smooth and efficient construction process. The lightweight nature of GRP makes handling and installation easier compared to heavier timber or steel structural materials.

For Fibre Frame brackets and fasteners details refer to *GRP-GU-08 Brackets, Fasteners & End Caps.*

This product guide is based on the following:

» **No Substitution:** The load tables contained in this brochure are specifically for GRP Australia Fibre Frame structural members and should not be applied to alternative member sizes or suppliers products.

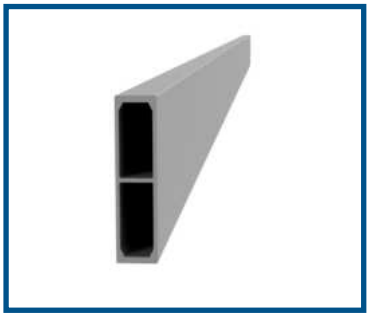
» **Installation:** the installation of the Fibre Frame products must be in accordance with this document and the associated Fibre Frame Brackets, Fasteners and end Caps brochure.

» **Current Product Guide:** Designers and users should check the GRP Australia website GRPAustralia.com.au, to ensure they are using the most up to date revision of this product guide.

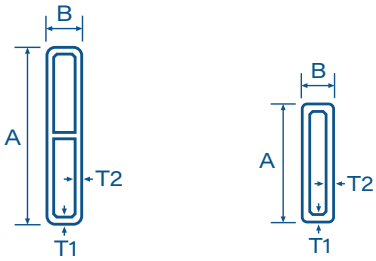
1 GRP stands for glass reinforced plastic, which is a type of composite material made of a polymer matrix reinforced with glass Fibres. FRP stands for Fibre reinforced plastic, which is a broader term that encompasses any composite material made of a polymer matrix reinforced with Fibres of various materials, such as glass, carbon, or aramid. Therefore, GRP is a specific type of FRP that uses only glass Fibres as the reinforcement.

2.0 PRODUCT RANGE OVERVIEW

2.1 BEARERS, JOISTS & POSTS

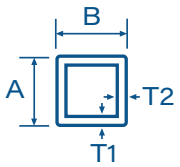


BEARERS / JOISTS



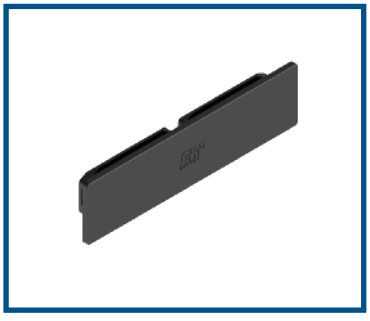
TYPE	DIMENSIONS (mm)	LENGTHS AVAILABLE (mm)			Weight (kg/m)
FF200x50	200 x 50 x 8 x 5	6050	3620	2420	5.6
FF140x45	140 x 45 x 6 x 4	6050	3620	2420	3
FF120x45	120 x 45 x 6 x 4	6050	3620	2420	2.8
FF90x45	90 x 45 x 5 x 4	6050	3620	2420	2.1

POSTS



TYPE	DIMENSIONS (mm)	LENGTHS AVAILABLE (mm)	Weight (kg/m)
FF100x100	100 x 100 x 8 x 8	5800	6
FF76x76	76 x76 x 6.4 x 6.4	5800	4.9

2.2 END CAPS



END CAPS

TYPE	DESCRIPTION	PAIRED PROFILES
EC100100	End Cap 100 x 100	FF100x100
EC7676	End Cap 76 x 76	FF7676
EC20050	End Cap 200 x 50 x 8 x 5	FF200x50
EC14045	End Cap 140 x 45 x 6 x 4	FF140x45
EC12045	End Cap 120 x 45 x 6 x 4	FF120x45
EC9045	End Cap 90 x 45 x 5 x 4	FF90x45

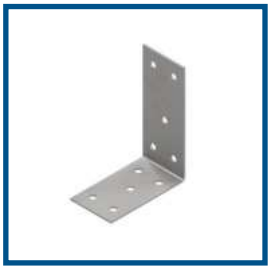
2.3 BRACKETS & FASTENERS

Refer to GRP Australia Brochure *GRP-GU-08 - Brackets & End Caps* for more details on brackets & fasteners.

FFAB10040
Angle Bracket
100x40x2

FFHB4590
Joist Hanger
Bracket

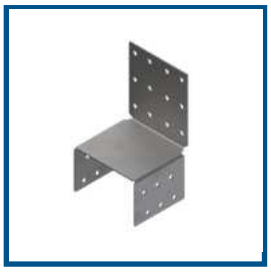
FFHB45140
Joist Hanger
Bracket



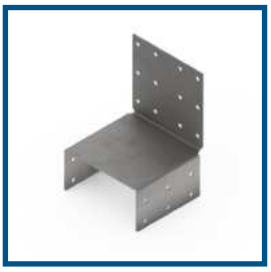
FFPB01
Pergola Bracket

FFPSB10045
Bearer to Post
Side Bracket

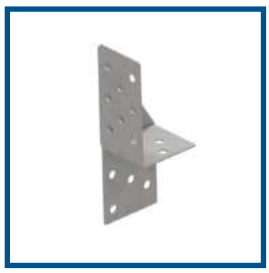
FFPSB10050
Bearer to Post
Side Bracket



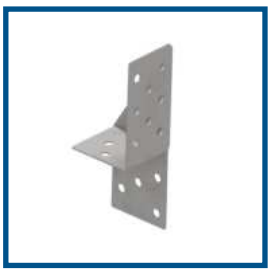
FFPTB76
Post Top Bracket
76



FFPTB100
Post Top Bracket
100



FFTGRH
Triple Grip
Right Hand



FFTGLH
Triple Grip
Left Hand

FFSP190100
Splice Plate
190 x 100

10Gx25-G410-W
Self Drilling Screw

3.0 CODES & STANDARDS

Fibre Frame system has been rigorously tested and adheres to relevant Australian Standards, guaranteeing quality and safety. These standards include:

AS 1170.0:2002 - *Structural design actions - Part 0: General principles*

AS/NZS 1170.1:2002 - *Structural design actions - Part 1: Permanent, imposed and other actions*

AS/NZS 1170.2:2011 - *Structural design actions - Part 2: Wind actions*

AS 4055:2012 - *Wind loads for housing*

AS 2156.1:2001 - *Walking Tracks, Part 1: Classification & Signage*

AS 2156.2-2001 - *Walking Tracks, Part 2: Infrastructure Design*

AS 1657:2018 - *Plastic molding's - Definitions and specifications (for relevant sections on GRP material speifications)*

4.0 WEATHERING

Fibre Frame GRP Joists, Bearers, and Posts have UV inhibitors to protect against UV light, but extended exposure will eventually damage the surface. To prolong the durability of GRP members exposed to direct sunlight, it is recommended to apply a protective coating.

5.0 FIRE PROPERTIES

All GRP Australia posts, bearers & joists contain alumina trihydrate fire retardants. Fire test results to AS1530.3 are shown in the table below.

	Range	Results
Spread of Flame index	(0-10)	2
Heat Evolved Index	(0-10)	5
Smoke developed Index	(0-10)	5
Ignitability Index	(0-20)	10

6.0 DESIGN LOAD CASES

The span / load tables contained in this document have been prepared for two live load cases:

» *2kPa and 1.8kN concentrated load. Typical for domestic residential decks, balconies and general areas.*

» *3 kPa and 2.7kN concentrated load.*

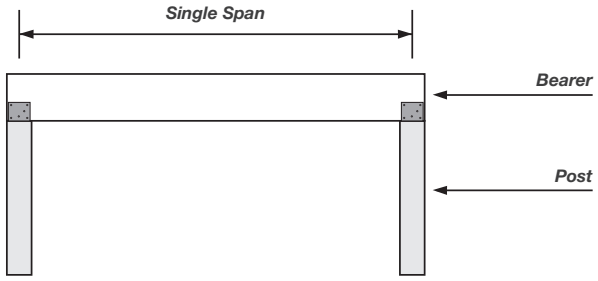
Both load cases assume dead loads of 20 kg/m² for deck and joists and 40 kg/m² for bearers which includes the deck, joists and bearer dead load.

While the provided span tables incorporate dead loads for joists and bearers, they do not encompass the structural integrity of existing or new foundations, connections to foundations or structures, or the overall structure's ability to handle additional floor or roof loads. It's the responsibility of the builder and or owner to obtain necessary structural engineering approvals to ensure the complete structure can handle the intended loads. Local authority requirements and government regulations must also be addressed. Additionally, any proprietary components used in conjunction with Fibre Frame decking should be installed according to the manufacturer's specifications.

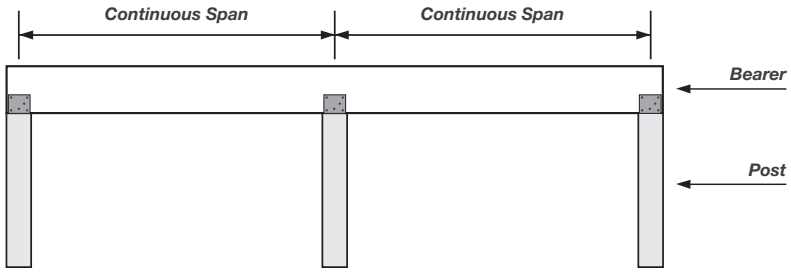
GRP AUSTRALIA - FIBRE FRAME SUB-STRUCTURE

7.0 SPAN OPTIONS & LOAD CONSIDERATIONS

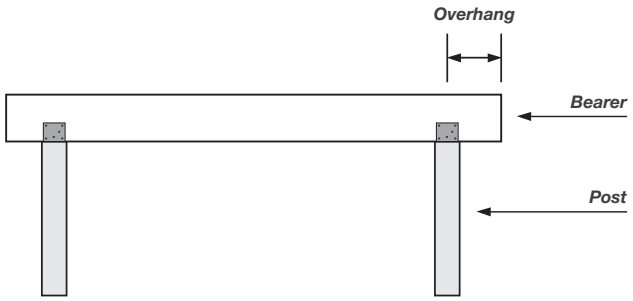
The joist span tables within this publication categorize spans into three main types:



Single Span: This refers to a joist supported on two ends only.



Continuous Span: This describes joists that are supported by more than two points along their length, creating a continuous load-bearing path.



Overhang: This section addresses joists that extend beyond their support beams, typically used for creating balconies or deck extensions.

The tables provide design information for joist spacings of 0.45 meters, 0.6 meters, and 0.9 meters. While most timber and composite decking boards are designed for 450mm joist spacing, GRP grating when used as decking, can span up to 900mm reducing the required number of joists.

7.1 SPAN & SPANCING

This section clarifies the difference between spans and spacings for joists and bearers in your deck design, along with the concept of load width.

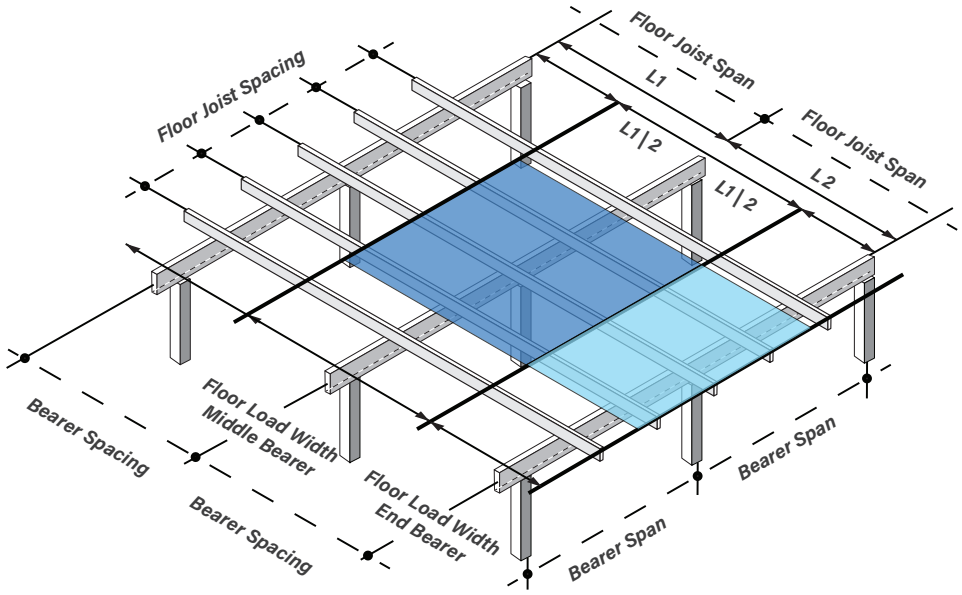


Figure: {diagram illustrating the points below}

Spans: The figure shows the distance between support points for a joist or bearer. In the example, the bearer span is the distance between the two posts (support points) that it rests on.

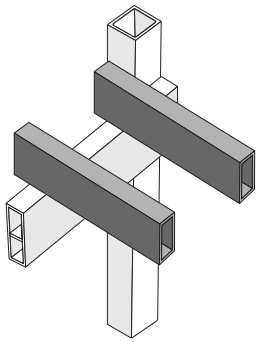
Spacings: This refers to the center-to-center distance between adjacent joists or bearers. In the figure, the joist spacing is the distance between the centerlines of two joists.

Load Width (FLW): This term is particularly relevant for the middle bearer. The load area it supports is calculated as (L1/2 + L2/2) x Bearer Span (illustrated by the blue area in the figure). This calculation considers half the bearer span to the left and half to the right of the middle support point, capturing the total load-bearing area of the bearer.

In simpler terms, the bearer "span" is how far it reaches between supports, while the "spacing" is the gap between adjacent bearers. The load width then defines the specific area of the deck that the middle bearer carries the weight of.

The Bearer spacing matches the joist spacing.

8.0 JOIST SPAN TABLES

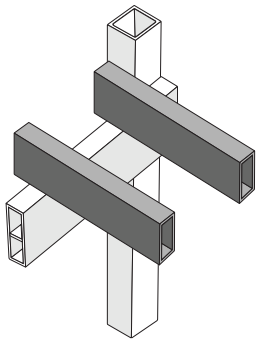


The following joist span tables offer detailed information on the allowable spans for different joist profiles, specifically designed for live loads of 2kPa and 3kPa, helping to guide proper selection for structural applications.

8.1 JOIST SPAN TABLES

2kPa LIVE LOAD

Fibre Frame Profile	Joist Spacing (mm)		
	450	600	900
	Maximum Single Span Joist (mm) Side Connection (SC)		
FF90x45	2305	2090	1820
FF120x45	3150	2860	2335
FF140x45	3625	3290	2770
FF200x50	5215	4335	3300
	Maximum Single Span Joist (mm) Top Connection (TCS)		
FF90x45	2305	2090	1820
FF120x45	3150	2860	2490
FF140x45	3625	3290	2865
FF200x50	5215	4730	3700
	Maximum Continous Span Joist (mm) Top Connection (TCC)		
FF90x45	2610	2370	2070
FF120x45	3565	3240	2645
FF140x45	4100	3705	2880
FF200x50	5420	4520	3465
	Maximum Joist Overhang (mm) (SC,TCS,TCC)		
FF90x45	0/600/570	0/545/520	0/480/455
FF120x45	0/820/780	0/745/710	0/650/635
FF140x45	0/940/895	0/855/815	0/750/700
FF200x50	0/1350/1330	0/1225/1100	0/1050/1100



8.2 JOIST SPAN TABLES

3kPa LIVE LOAD

Fibre Frame Profile	Joist Spacing (mm)		
	450	600	900
	Maximum Single Span Joist (mm) Side Connection (SC)		
FF90x45	2045	1850	1555
FF120x45	2790	2370	1790
FF140x45	3210	2815	2150
FF200x50	4075	3355	2520
	Maximum Single Span Joist (mm) Top Connection (TCS)		
FF90x45	2045	1850	1610
FF120x45	2790	2530	2200
FF140x45	3210	2910	2535
FF200x50	4620	3850	3170
	Maximum Continous Span Joist (mm) Top Connection (TCC)		
FF90x45	2315	2105	1755
FF120x45	3165	2685	2080
FF140x45	3500	2925	2250
FF200x50	4255	3525	2670
	Maximum Joist Overhang (mm) (SC,TCS,TCC)		
FF90x45	0/535/510	0/485/460	0/425/410
FF120x45	0/730/695	0/660/645	0/580/590
FF140x45	0/835/810	0/760/760	0/345/695
FF200x50	0/1050/1235	0/850/1150	0/250/850

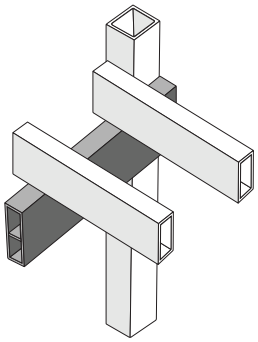
Notes: Above table based on the following Assumptions:

» **Joist Dead Load:** 20 kg/m² is assumed for joist and deck weight in the design calculations.

» **Ultimate load combination :** 1.2D+1.5L , Serviceability load combination: D+0.6L

9.0 BEARER SPAN TABLES

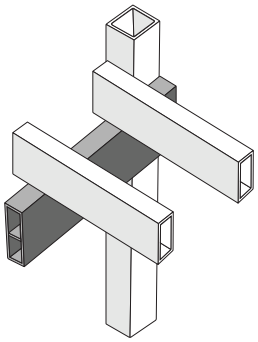
The following bearer span tables provide essential guidance on the maximum allowable spans for various bearer profiles, designed to support live loads of 2kPa and 3kPa, ensuring safe and reliable structural performance.



9.1 BEARER SPAN TABLES

2kPa

	Floor Load Width (mm)				Floor Load Width (mm)			
	1800	2400	3000	3600	1800	2400	3000	3600
	Maximum Bearer Single Span (mm) / Bearer at the side							
FF140x45	2025	1830	1690	1550				
FF200x50	2920	2645	2415	2150				
	Maximum Bearer Continous Span (mm) / Bearer at the side							
FF140x45	2245	1850	1580	1385				
FF200x50	3115	2580	2225	1965				
	Maximum Bearer Single Span (mm) / Bearer on the top				Double Maximum Bearer Single Span (mm) / Bearer on the top			
FF140x45	2025	1830	1690	1585	2575	2330	2155	2025
FF200x50	2920	2645	2445	2265	3705	3360	3110	2920
	Maximum Bearer Continous Span (mm) / Bearer on the top				Double Bearer Maximum Continous Span (mm) / Bearer on the top			
FF140x45	2325	2115	1850	1650	2930	2665	2470	2325
FF200x50	3255	2715	2355	2085	4210	3825	3550	3255
	Maximum Bearer Overhang Single Span (mm)				Double Bearer Maximum Overhang Single Span (mm)			
FF140x45	525	475	425	400	650	575	550	525
FF200x50	700	675	650	575	900	800	750	700



9.2 BEARER SPAN TABLES

3 kPa

	Floor Load Width (mm)				Floor Load Width (mm)			
	1800	2400	3000	3600	1800	2400	3000	3600
	Maximum Bearer Single Span (mm) / Bearer at the side							
FF140x45	1810	1625	1375	1195				
FF200x50	2615	2060	1765	1550				
	Maximum Bearer Continous Span (mm) / Bearer at the side							
FF140x45	1790	1460	1240	1080				
FF200x50	2615	2360	2055	1805				
	Maximum Bearer Single Span (mm) / Bearer on the top				Double Maximum Single Continous Span (mm) / Bearer on the top			
FF140x45	1810	1630	1505	1410	2305	2085	1930	1810
FF200x50	2615	2360	2055	1805	3320	3010	2785	2615
	Maximum Bearer Continous Span (mm) / Bearer on the top				Double Bearer Maximum Continous Span (mm) / Bearer on the top			
FF140x45	2075	1725	1490	1320	2635	2395	2220	2075
FF200x50	2640	2190	1885	1665	3785	3405	2960	2640
	Maximum Bearer Overhang Single Span (mm)				Double Bearer Maximum Overhang Single Span (mm)			
FF140x45	475	425	400	375	575	525	550	475
FF200x50	625	600	525	525	775	725	675	625

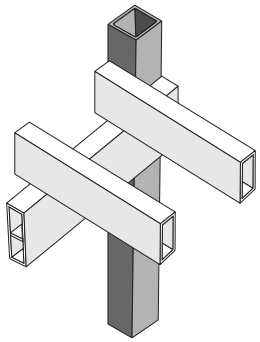
Notes: Above table based on the following Assumptions:

» **Bearer Dead Load:** 40 kg/m² is assumed in the design calculations.

» **Ultimate load combination:** 1.2D+1.5L , Serviceability load combination: D+0.6L

10.0 POSTS

The following post span tables detail the maximum allowable spans for various post sizes, specifically designed to support roofs and structures under 2kPa and 3kPa live loads, ensuring structural integrity and load-bearing safety.



10.1 GRP Fibre Frame Posts Supporting Roof and/or Floor Loads 2kPa

Floor Supported Area (m2)	5			10			15		
Roof Load Area (m2)	0	10	20	0	10	20	0	10	20
	Maximum Single Span Joist (mm)								
GRP SHS100x8 - Sheet Roofing	5800	5500	4550	4550	4400	3550	3550	3450	2900
GRP SHS100x8 - Tile Roofing	5800	5000	3950	3950	3800	3150	3150	3050	2600
GRP SHS76x6.4 - No Roofing	2600			1800			1500		

10.2 GRP Fibre Frame Posts Supporting Roof and/or Floor Loads 3kPa

Floor Supported Area (m2)	5			10			15		
Roof Load Area (m2)	0	10	20	0	10	20	0	10	20
	Maximum Single Span Joist (mm)								
GRP SHS100x8 - Sheet Roofing	5800	4750	4050	3800	3350	2950	2800	2500	2250
GRP SHS100x8 - Tile Roofing	5800	4400	3550	3550	3150	2650	2650	2400	2050
GRP SHS76x6.4 - No Roofing	2200			1550			1250		

11.0 BRACING

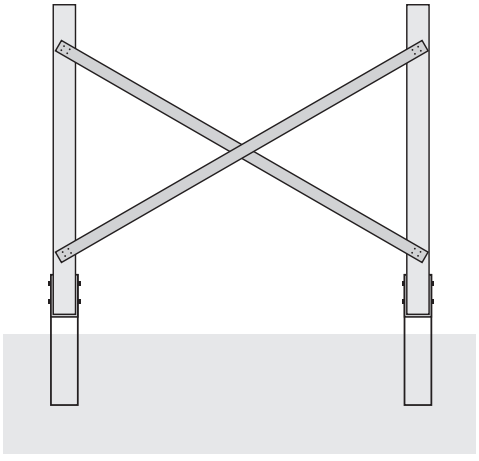
Bracing plays a crucial role in maintaining the structural integrity of above ground decks, particularly when it comes to lateral movement (sideways sway). Bracing helps distribute wind loads and other lateral forces effectively, enhancing the overall stability and safety of the deck.

The design of the deck's bracing system should adhere to the Building Code of Australia (BCA) and all relevant regulatory requirements. Fibre Frame offers two primary options for deck bracing:

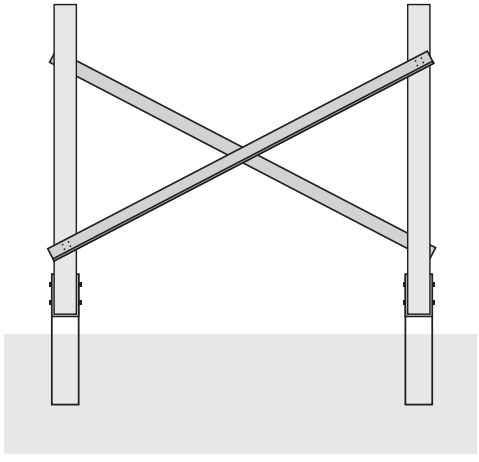
» Double Diagonal Flat GRP FS50x4 tension bracing: This option provides a flat profile for a more streamlined appearance.

» Double Diagonal GRP EA50x50x6.4 Tension Bracing: This option utilizes a thicker, equal angle profile providing more rigidity to bracing movement.

Bracing Type	Bracing Design Capacity (ØNJ)kN	No Screws (10Gx25) at each connection
GRP FS50x4	13	4
GRP EA50x6.4	14.2	4



FLAT STRIP BRACING

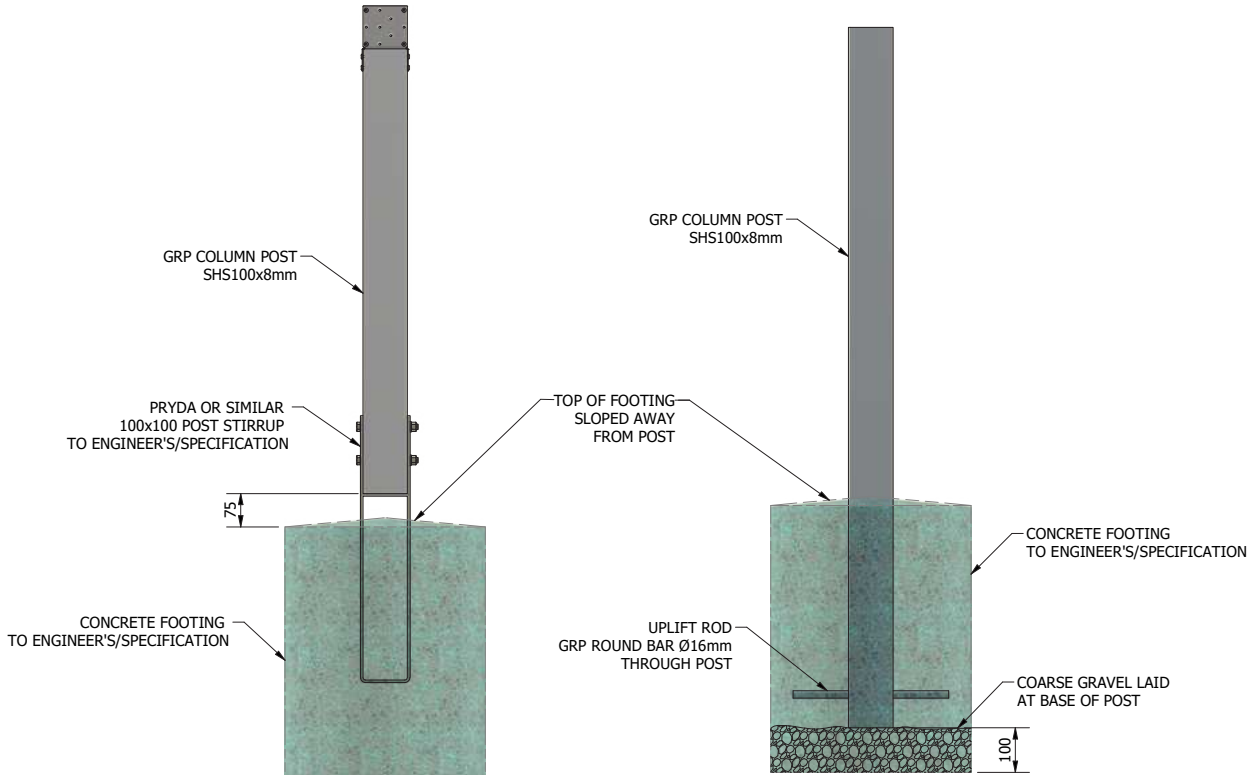


EQUAL ANGLE BRACING

Alternative bracing methods can be used provided careful consideration is given to the connection method to the GRP members. Please consult GRP Australia if in doubt.

12.0 POST SUPPORTS

GRP Fibre Frame posts are suitable for direct casting into concrete footings or connection to post support brackets such as saddle plates, post stirrups and bolt down saddle post brackets. More information on post supports can be found in the Fibre Frame Brackets and fastener brochure GRP-GU-08.



STIRRUP FOOTING

CAST-IN FOOTING

13.0 DECKING

The Fibre Frame Subframe decking system is suitable for a range of decking floor systems such as:

» Timber decking,

» Composite decking such as Modwood,

» FRP Moulded grating.

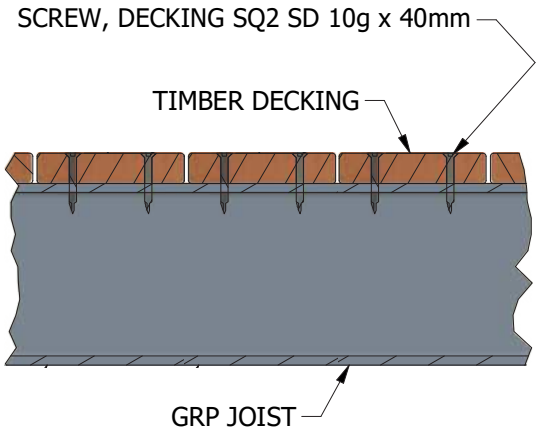
GRP Australia supply a range of GRP moulded grating suitable for the Fibre Frame substructure, which is ideal for outdoor use and provides a long lasting and versatile deck.

For more information please refer to Brochure GRP-BR-02- GRP Australia Moulded Grating Brochure which can be downloaded from our website www.grpaustralia.com.au.

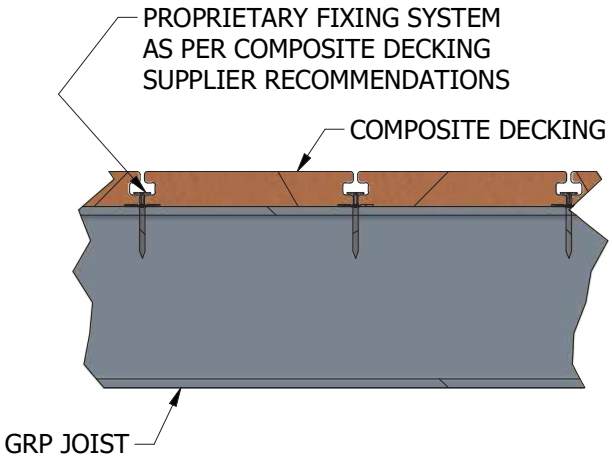
GRP AUSTRALIA - 13X13 HEEL GUARD MOULDED GRATING - SHOWN ON FIBRE FRAME STRUCTURE

14.1 FIXING OF TIMBER & COMPOSITE DECKING

In general screws design for fixing decking to metal substructure with around 12 to 16 TPI will be suitable for fixing to GRP joists. Typical timber decking screws with a type 17 drilling point can be used but may require predrilling.



TIMBER DECKING

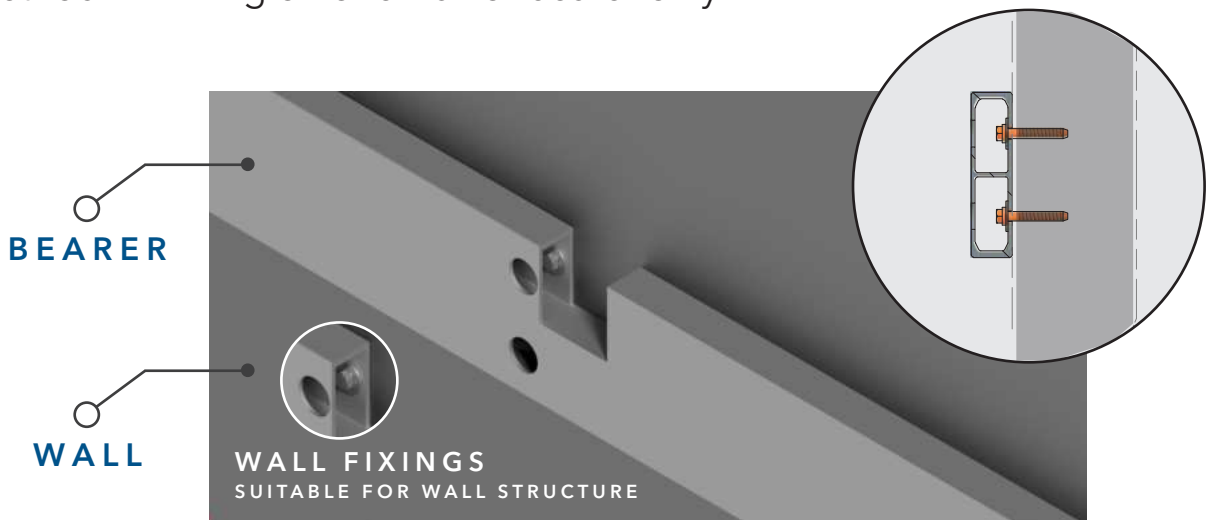


COMPOSITE DECKING

15.0 INSTALLING A GRP LEDGER BEAM

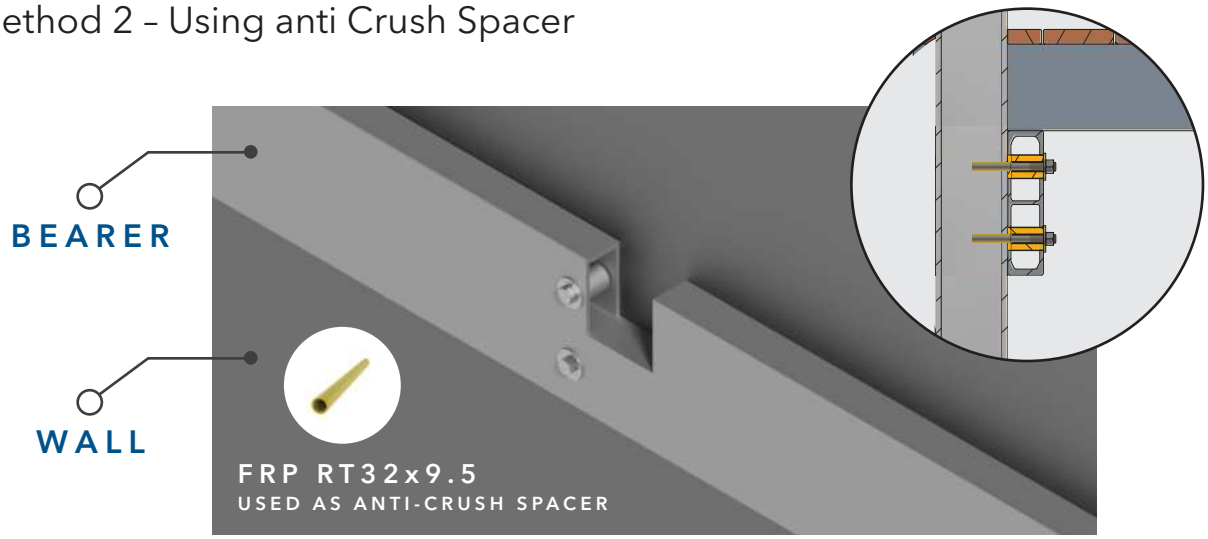
When installing bolts or concrete anchors through Fibre Frame beams, care must be taken to ensure the beam walls are not crushed. There are 2 main methods of achieving this.

Method 1 – Fixing on one wall of bearer only



LEDGER

Method 2 – Using anti Crush Spacer



BOLT THROUGH BEARER CONNECTION

16.0 INSTALLING A FIBRE FRAME SYSTEM

GRP Fibre Frame beams and posts can be cut and drilled using common electric and battery powered tools. It is recommended that all disks, blades and drill bits are diamond coated as GRP is very abrasive and will wear normal tools quickly.

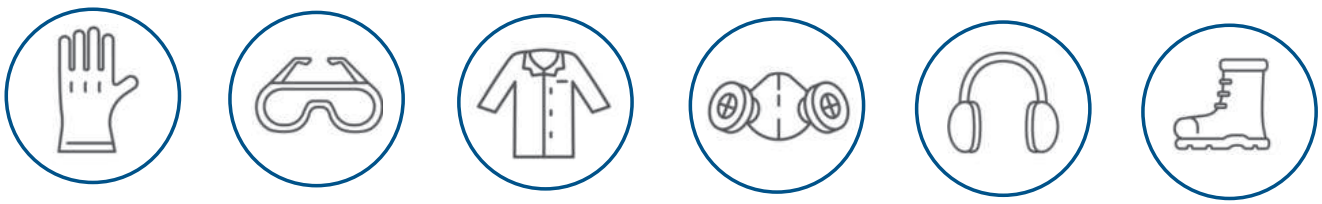
Section whcih have been cut or drilled should be sealed with a suitable resin such as epoxy, polyester or spray such as Rust-Oleum 2X Ultra Cover

PPE Requirements

Cutting, drilling or machining GRP produces a dust that can cause irritation to the eyes, skin, nose and throat. Workers should take steps to reduce their exposure to the dust by using suitable personal protective gear and working in well ventilated areas. Use dust extraction in poorly ventilated areas. It is recommended that the following PPE be worn:

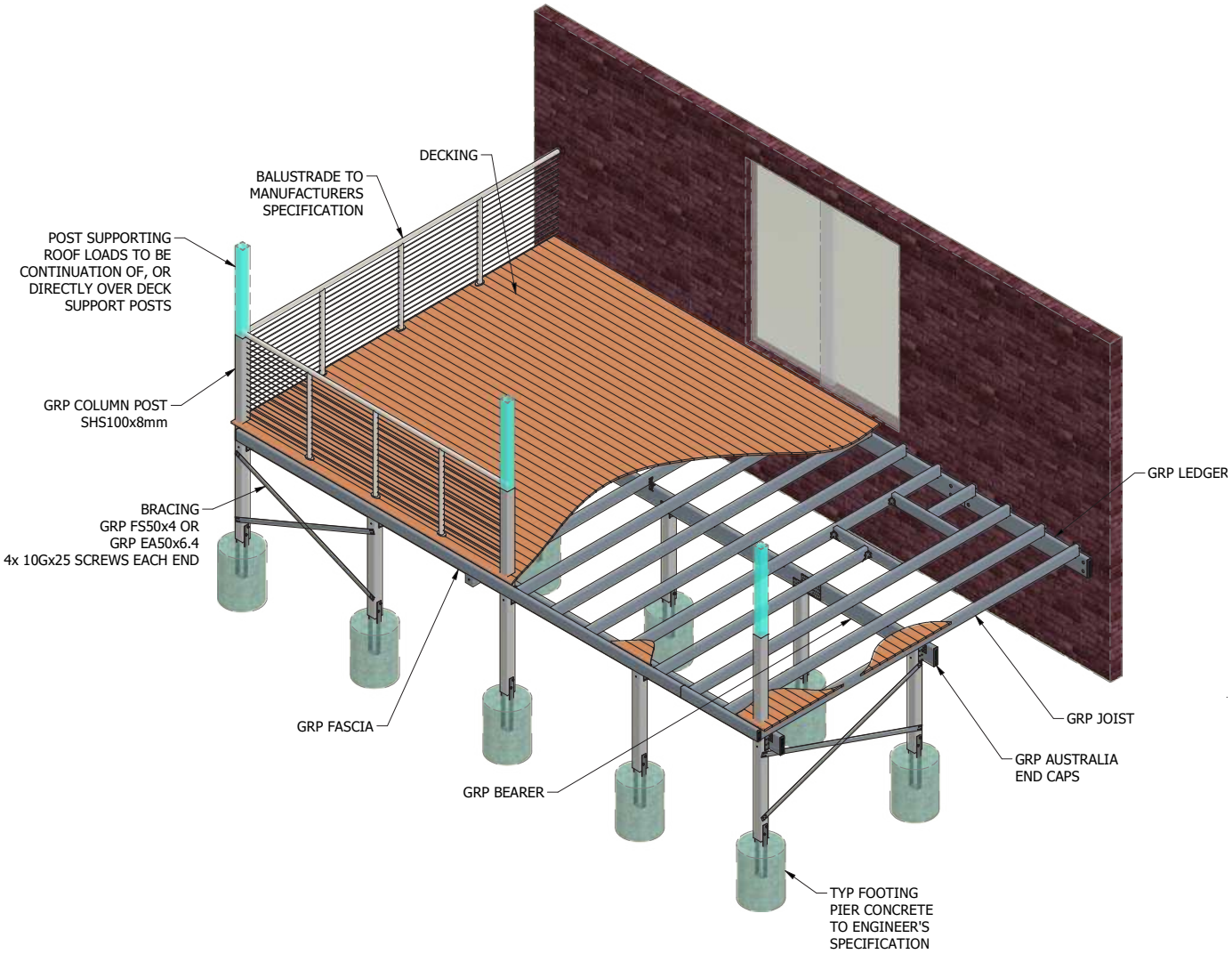
- **Gloves, long sleeve shirt with closed collar and long pants.**
- **Particulate respirator which complies with AS/NZ 1716:2012.**
- **Eye protection (safety glasses).**
- **Hearing protection when/if required.**
- **Protective footwear (safety toe)**

Use personal protection equipment to minimize skin, respiratory and eye exposure to dust and fumes when cutting or grinding product. Wash all exposed skin areas thoroughly after cutting or grinding. Any clothing worn while working with fiberglass should be laundered separately from other clothing items. You should also rinse the washing machine before washing other types of clothing.



Protective **Gloves** | Protective **Eye wear** | Long sleeve **Shirt** | Particulate **Respirator** | Hearing **Protection** | Protective **Footwear**

17.0 TYPICAL DECKING ARRANGEMENT



GRP AUSTRALIA
L: 25 Shannon Place, Virginia 4014
E: sales@grpaustralia.com.au
P: 07 3252 1244