

# Pioneer

## DECKING INSTALLATION GUIDE

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## Introduction

Thank you for choosing Pioneer Decking. This guide aims to provide the essential information needed to successfully install a Pioneer deck. It is assumed, however, that the user of this document has a basic understanding of deck building practices and pertinent building codes. Compliance with the requirements captured herein must be met for full warranty coverage. The information provided herein is indicative, however, and all applications should also be assessed and/or designed by a competent professional. Pioneer products are made from a foamed mineral-polymer composite core, with innovative high-definition imaging technology which creates one of the most natural looking composite finishes available in the Talasey range. See the list of profiles and corresponding fasteners captured in **Appendix A**.

## 1. Critical installation points

This summary of critical installation points in no way replaces the full Pioneer Installation in sections 2 to 4 in this guide.

### Substructure:

- Plan your substructure to align with the intended deck layout and ensure support of the boards along all cut edges.
- Use double joists at all butts joins so that both board edges are fully supported.
- Use noggins between joists where breaker boards are used. The spans between noggins must not be greater than the maximum centre-to-centre span of the 500mm deck board profile.
- Ensure the substructure members are appropriately sized for the requisite spans.
- Ensure the installation thereof is sound and level. Ensure suitable connections are utilised between members and between the substructure and the applicable substrate. Consult an appropriately qualified professional wherever necessary.
- Use appropriate spans. This will depend on regional legislative requirements. Most regions require the satisfaction of both ultimate and serviceability conditions.
- Spans may need to be adjusted for stair spans (See section 4.2), snow loads (See section 4.3 for more information), or diagonal board laying patterns (See section 4.4).
- See Section 4 for full information.

The table below summarises typical achievable spans. The profile's moment of inertia and elastic section modulus is also captured for convenience. For additional information please refer to the Pioneer Technical Data Sheet (TDS).

Maximum span* in									
Profile	Moment of inertia, I <sub>x</sub> (mm <sup>4</sup> )	Elastic sectional modulus, S <sub>x</sub> (mm <sup>3</sup> )	US approach		Eurocode (and similar) approach				EN 15334
					Residential (2 kPa)		Commercial (4 kPa)		
			Ultimate	Serviceability	Ultimate	Serviceability	Ultimate	Serviceability	
170x21 Grooved Deck Board 170 x 21.0	129 839	12 343							
			500		500		500	350	
Starter Deck Board 170 x 21.0	135 804	12 738							

- Please note that the information is based on limited test data at present. Available test data has been used to infer the results of similar profiles.

### Note:

- The full end-use adjustment factor was used.
- The duration of load and creep was not included in the analyses.
- The calculation for spans is based on the lesser of a factor of safety of 2.5 for the average test results and 2.1 for the minimum test results.

- Serviceability span assessment is based on a deflection limit of L/180 and often dictates.
- A conservative gap of 5 mm between boards was assumed.

## Fastening:

- Chain Collated Clips must be used when installing Pioneer. The manufacturer cannot guarantee a successful install using other clips which could then affect the product warranty.
- Use two fasteners (hidden clips or top fixings) at every joist.
- Do not over-tighten any fasteners. The torque setting of your driver must be less than 30% of the maximum allowable.
- When top fixing boards (decking and fascia), ensure a spacing of 30 mm between fasteners and from any board edge.
  - It is advisable to use the appropriate Starborn plug system or a countersinking bit. The countersunk head must drill a hole slightly smaller than the screw head diameter.
- Maintain a hidden clip fastening distance of between 10 mm (minimum) and 20 mm (maximum) from the end of the board.
- To ensure individual fasteners are not overloaded, it is important to have an adequate distribution of fasteners. Individual clip screws and Chain collated clips have been tested to withstand withdrawal forces of up to 3.8 kN per unit. The Chain collated clip is expected to match or exceed this performance when using a 6.0 mm board gap. To meet a minimum of 7.2 kPa, ensure that the board application allows for at least six clips per square meter. If the withdrawal resistance is insufficient for the intended application, consider reducing the deck board span, using alternative substructure or opting for top-fixing screws instead or in addition to hidden fasteners. For further details, please refer to Section 3.3 of this Installation Guide and/or the relevant appendix in the Pioneer TDS.

## Ripping and Cutting:

- Do not rip solid groove boards narrower than 60 mm or square edged boards narrower than 90 mm.

## Trim or Fascia:

- Always install your trim or fascia beneath the lip of the starter deck board.

## Expansion:

- Pioneer can expand and contract up to similar rates experienced with typical wood-plastic composite materials.
- To allow for an appropriate expansion gap per board, multiply the length of the board (L) by 0.04 (0.000022) and by the difference between the installation temperature and the possible maximum temperature of the boards (Change in Temp.):

Change in board length =  $L \times 0.04 \times \text{Change in Temp.}$

Example: Change in board length =  $4.80\text{m} \times 0.04 \times (36 - 18)$

Change in board length = 3.456mm

Expansion gap =  $3.456\text{mm} / 2$

Expansion gap = 1.728mm (either end of the board)

Please refer to the Section 3.5.1 for more information on this topic.

- Use the same method to estimate maximum gap size (when boards are fully contracted) to ensure this is suitable for the project.
- Where the expected temperature range is high consider using lighter coloured deck boards to reduce the required expansion gap.
- To further reduce the expansion gap, boards can be cut to shorter lengths.
- Breaker boards must be used between boards that are installed end-to-end to assist in controlling expansion and contraction.
- Use starter deck boards around the perimeter of an installation to further assist in controlling expansion and contraction.
- Do not use grooved decking boards for stairs, breakers, and/or boarder boards; only use square edge boards.
- If the expansion and contraction is not managed appropriately, the warranty may be affected.

## Excessive and unusual heat sources:

- Pioneer is designed for typical exterior installations but are not covered under warranty for damage caused by excessive heat, including as a result of concentrated sunlight reflected from Low-E glass or other reflective surfaces, which can damage the product's surface, cause immoderate movement, and affect its flexural properties both in the short and long term. If the intended site could result in such exposure, consult the Low-E glass manufacturer for solutions to reduce the reflection/concentration from such surfaces and resultant impacts before installation. Consider using screens, glass treatments/layers, or obstructions, such as vegetation, to block/diffuse sunlight (before and/or after reflection) to help mitigate impact of such scenarios.

## 2. Pre-installation

### 2.1 Standards

Before installation, ensure that the application is rational and complies with the local regulations and building codes. Wherever necessary, consult a suitably qualified professional. Be sure to comply with material manufacturer specifications. Where manufacturer's specifications and building codes differ, revert to the building code requirements. Check that your choice of product is suitable for its intended application.

### 2.2 Safety

Refer to the Material Safety Data Sheet (MSDS) for additional information. Please do not hesitate to contact Talasey should you require any additional assistance. Please see Appendix D for a Safe Work Procedures (SWP) when working with Pioneer and other glass fibre-reinforced products.

Always wear appropriate Personal Protective Equipment (PPE) for the various activities involved in installing a decking system. This includes, but is not limited to, equipment such as safety glasses, helmets (where necessary), gloves, and boots, masks when cutting or similar, and harness systems when working at heights or similar, as dictated by the local occupational health and safety legislation.

#### Be mindful of the following:

- Cutting (and similar processing activities) of Pioneer can produce fine particulate matter that contains glass fibres and wood dust, as a result, ensure to:
  - Work in well-ventilated areas.
  - Use tools with vacuum attachments.
  - Avoid contact where possible with dust that contains glass fibres as the material may cause skin and eye irritation.
  - Wear safety goggles that provide an adequate seal around the eyes when disposing and processing the material, particularly during cutting.
  - Wear gloves, long sleeved shirts, long trousers, and/or overalls during disposal and processing of the material, particularly during cutting. Where possible or necessary, seal shirt and trouser cuffs.
  - Wear suitable masks when disposing and processing the material, particularly during cutting. Use masks with adequate seals around the nose and mouth. Use mask with respirators and appropriate filters, especially if regularly exposed to dust of this nature.
  - After exposure to dust of this nature, wash with soap and running water. In addition, wash any equipment and clothing separately.
  - Do not rub affected areas that feel irritated. Instead, wash these areas with soap and running water. Contact an appropriate medical professional for further advice and/or when experiencing any symptoms related to exposure.
  - Clean workspace thoroughly. Wet-wipe, mop, or vacuum surfaces. Do not dry sweep as this can disperse the dust. Use of drop sheets may assist.
  - Do not eat, drink, or smoke when using this product. Always wash hands after handling the product.

- Store and dispose of off-cuts, dust, and/or contaminated materials appropriately.
- Cut boards may have sharp edges (particularly mitered cuts).
- Inform any parties necessary of the above when handling and installing this material, in the vicinity where this is required, or as users of the installed product.

## 2.3 Storage and handling

Note the following:

- Individual boards are lighter than typical wood-plastic composites (WPC) and can be more easily handled. Boards are, however, bundled for convenience which can be heavy. Take care when lifting, placing on to, or removing from raised pallets. More than one person may be required for lifting. Ensure the mass handled does not exceed safe limits as defined by applicable local legislation.
- When handling lengths of boards greater than 4 m, ensure both ends are lifted simultaneously and evenly. Hold the boards 1 m from each end to provide better control.
- Handle the boards carefully. Dropping the boards (and all high impact loads in general) can result in damage to the profiles.
- During transportation use corner protectors where strapping is required.
- All components should be stored completely under cover.
- When storing boards, a pallet or flat surface should be used to support the full length of each component.
- All components should be securely stored.
- No component should sit in water or similar.
- Avoid over-stacking and/or eccentric stacking.
- Keep boards strapped until they are needed for installation.
- Avoid cutting boards until they are needed for installation.

## 2.4 Planning and site preparation

- Consult an appropriately qualified professional whenever necessary to ensure the product, this document, and the intended application comply with all applicable legislation for that region.
- Assess the environment of the site and ensure the product is suitable for the intended application.
- Identify aspects such as the corrosion category, loading class, etc. of the site and project that may influence the selection of the products or the application thereof.
- Determine appropriate spans, suggested spans are provided for typical residential scenarios (refer to Section 4).
- Develop a maintenance plan to ensure the longevity of the system. This should consider aspects such as drainage, corrosion, vegetation growth, cleaning, etc.
  - With respect to drainage, ensure pooling water and/or erosion below and around the deck footprint is prevented.
  - With respect to corrosion, ensure any exposed metals are coated whilst accessible. In areas of high corrosion classes, add additional coating layers and regularly check for signs of corrosion.
  - With respect to vegetation below the deck footprint, ensure all vegetation has been removed prior to installing the deck. Install a suitable geotextile or plastic membrane to prevent further regrowth. Ensure the geotextile/membrane is fixed in place and protected from weathering.
- Decking at certain heights will require railing. Refer to the local legislation or consult a suitably qualified professional for guidance as to the required height and the other railing requirements thereof.

## 3. Cutting and fastening

**IMPORTANT:** As detailed in Section 2.2, processing of Pioneer can produce fine particulate matter that contains glass fibres. Implement appropriate occupational health and safety guidelines and/or work procedures.

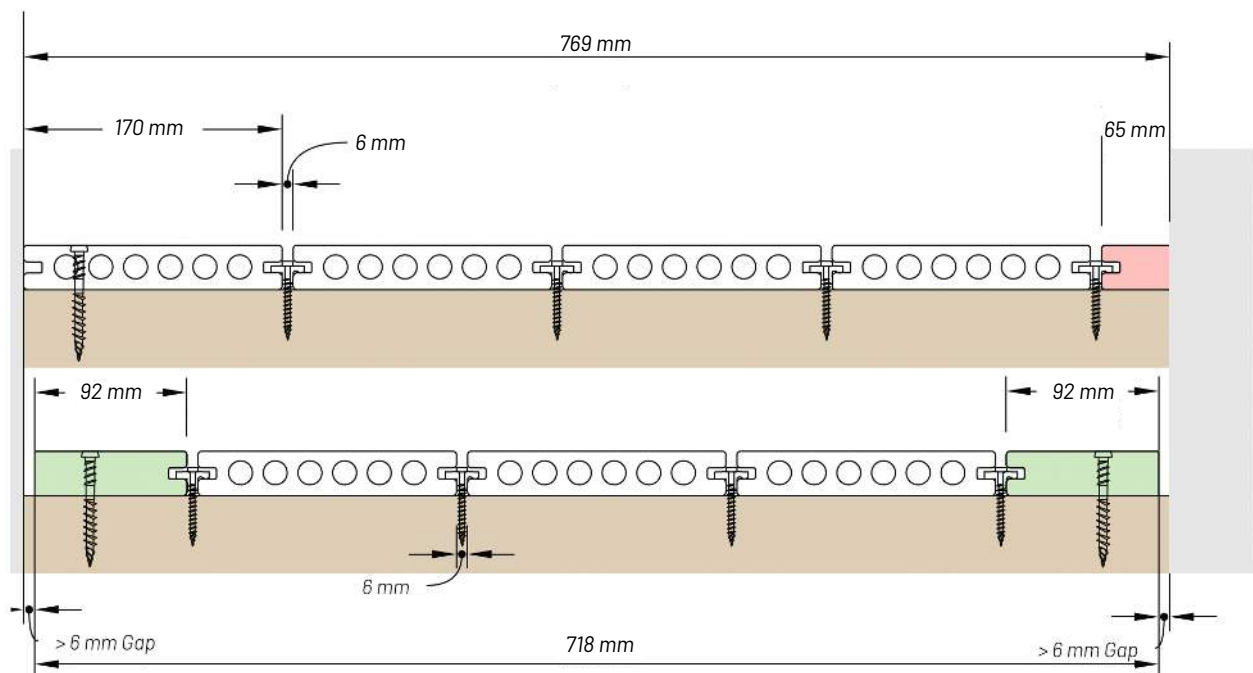
## 3.1 Cross cutting

- Please ensure that the appropriate PPE and safety precautions are adhered to whilst cutting glass-fibre reinforced materials.
- Use a fine toothed, carbide tipped blade to cut Pioneer material.
- Use an 80-tooth or finer, 260 mm diameter, cross-cut blade.
- Avoid using blunt blades, which may cause cap separation.
- Use slow speeds when cutting through the pioneer cap.
- Ensure the saw blade engages with the cap of the board in a downward rotating direction rather than in an interaction that would result in the cap being pushed away from the core.
- Pioneer boards are provided as factory cut. Ends should be trimmed to carpentry cut.
- Boards can be mitred; angles less than 30° are to be avoided.
- Do not router Pioneer boards.
- Avoid cutting boards until they are needed for installation.
- Cut edges may expose loose strands of glass fibre that can be removed and disposed of with a sharp blade in accordance with Section 2.2. Health and safety guidelines.

## 3.2 Ripping

- For best results when ripping composite boards use a table saw or ripping jig.
- Cutting boards will expose the foamed core of the board. Plan the board layout/install appropriately to limit the visibility of these edges so as not to negatively impact the aesthetics of the install.
- Do not rip boards thinner than 60 mm for grooved boards or 90 mm for square edged boards.
- In the case where it would be necessary to cut a board to less than 60 mm wide, rip both the first and last board of the deck footprint to balance the required widths instead. Refer to below infographic for guidance.

The following illustration outlines typical installation principles for ripping a deck board, which can be used for boards of any size. By following the above principles, you can ensure a successful installation.



## 3.3 Fixing frequency

Wider profiles and larger spans increase the load per fixing. It is important to use enough fasteners to meet the individual load requirements per fixing. In cases where this does not occur, it is necessary to reduce the board span, upgrade the substructure or add/switch to top-fixing screws instead of hidden fasteners. Please refer to the relevant appendix in the Pioneer TDS.

The following table provides a summary of withdrawal results for the different screws for reference.

Screw	Material	Withdrawal resistance (kN)	Minimum number of clips per m <sup>2</sup> to match US Approach	Structure and notes
Metal clip screw and Chain collated deck clip	C1022	3.8	6	2.0 mm (14 ga) Gauge steel
Timber clip screw and Chain collated deck clip	SS316	3.8	6	Pine with Specific gravity of 0.46
Chain collated deck clip	SS304	3.4 to 5.0	6	Normal performance at 6.0 mm groove. Worst case at 8.9mm groove.

The following table provides a quick overview of the number clips required per square meter based on the profile width and span for distributed loads of 4.79 kPa and the applicable substructure:

Boards	Width mm (in)	Largest possible span rating based on USA requirements mm	Clips/m <sup>2</sup>	Load capacity of Chain collated clips per m <sup>2</sup> **	Requirement per US Approach with Safety factor of 3.0 kPa**
STFM112A	170 (6.69)	500	6	22.8	21.6

\* Calculated as the lowest integer of clips per m<sup>2</sup> for the applicable board width at the allowable span.

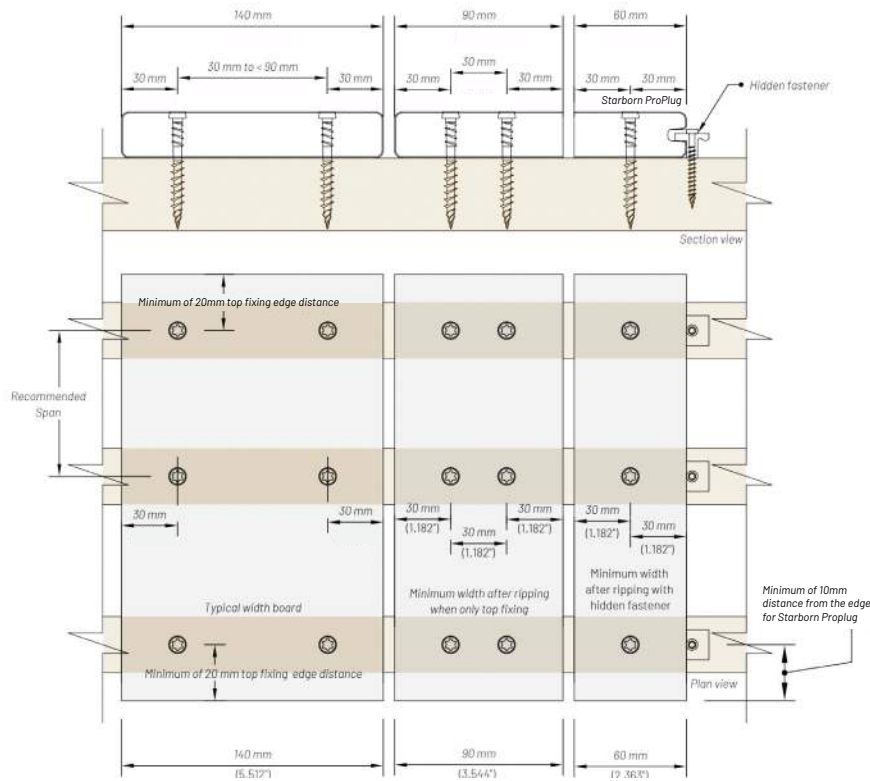
\*\*These values are based on extrapolations of test results of the individual fixings the in the respective substrates from the previous table.

## 3.4 Top fixing

- Fasten the boards 30 mm from any edge of the board.
- The distance to adjacent screws should be at least 30 mm.
- When top fixing boards (decking and fascia), ensure a spacing of 30 mm between fasteners and from any board edge.
  - It is advisable to use the appropriate Starborn plug system or a countersinking bit. The countersunk head must drill a hole slightly smaller than the screw head diameter.
- Fasten at every joist and use a minimum of two fasteners per joist.
  - When pre-drilling composite in temperatures below 5°C, hole sizes should be equal to the minor diameter of the screw.
  - Use high quality fasteners suitable for the lifespan of the deck and the atmospheric conditions of the site. Consider the corrosion category of the site relative to the corrosion protection offered by the fastener. Consult with a suitably qualified professional where necessary.
- A drill with adjustable torque settings is recommended. Set the torque settings to less than 30% of the maximum allowable torque of the driver. Do not overdrive the screw. Do not use an impact driver.



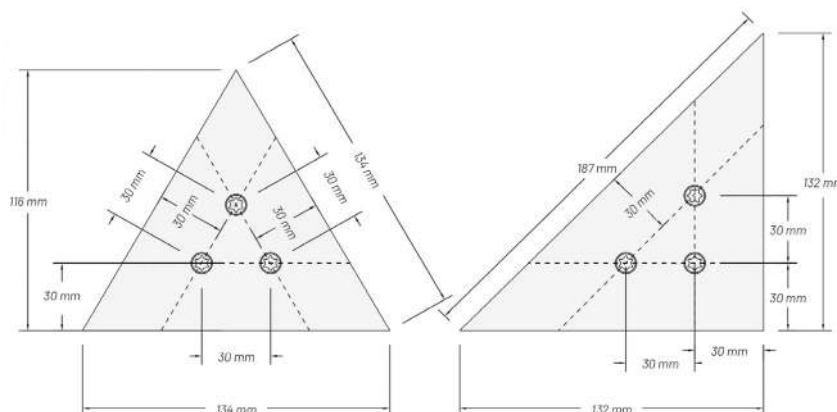
The following illustrations outline typical fastening principles for a top fixing application on the minimum ripped profile size as related to the recommended fastening edge distances, which can be implemented for profiles of any size.



### 3.4 Cutting and fastening triangular pieces

- Where deck boards are cut to odd shapes, additional fasteners may be required.
- All three edges of a triangular piece should be supported. All three corners of a triangular piece should be fastened.
- Spacing between fasteners should be at least 30 mm apart and must maintain 30 mm from any edge.
- Geometry of triangular pieces are limited by the fastening and edge distance. Below infographics provide an indication of minimum allowable sizes of different theoretical triangular pieces.
- Cutting the edges of a Pioneer board will expose the edges and glass fibres, creating sharp edges that may be more visible, avoid cutting all 3 edges of the profile.

The following illustrations outline typical fastening principles for small triangular deck pieces, which can be used for profiles of any size.



## 3.5. Cutting length

Before boards are laid, the final cut length of a board must take into consideration the possible changes in length of the board due to thermal expansion and contraction. Appropriate expansion gaps must always be maintained between boards and/or between boards and other obstacles for full warranty coverage.

### 3.5.1 Fundamentals of expansion and contraction

- The expansion, and contraction, of a board is influenced by:
  - The material of the board,
  - The length of the board, and
  - The change in temperature the board experiences relative to the temperature of the board at installation.
- The linear coefficient of expansion for the Pioneer material technology is up to  $33.4 \times 10^{-6} \text{ mm/m/}^{\circ}\text{C}$ . This means that a board of this material can expand, and contract, up to 0.04 millimetres per meter length, per degree change in temperature.
- To estimate an appropriate expansion gap ( $\Delta L$ ) per board, multiply the length of the board (L) by a coefficient of 0.04 (0.000022) ( $\alpha$ ) and by the maximum difference in temperature between the installation temperature and the possible temperature of the boards ( $\Delta T$ ):  

$$\Delta L = L \times \alpha \times \Delta T$$
- The temperature change of the board will be influenced by the colour of the board. Darker board colours will result in board temperatures higher than the ambient temperature of the site.
- A summary matrix of expansion gaps for different temperature and length conditions is captured in **Appendix C** for convenience.

### 3.5.2 Steps to determining expansion and contraction gaps

- Research the site temperature extremes.**
  - Find the record high and low temperatures for the site. Weather forecast websites usually provide historical data for specific areas, which helps indicate the most extreme temperatures the deck will experience.
- Account for sunlight exposure.**
  - Boards exposed to direct sunlight can often be 25 to 30°C hotter than the air temperature.
  - Add a buffer. A good rule of thumb is to use the difference between the installation temperature and the maximum site temperature as:  

$$\text{Temperature buffer} = (\text{Maximum site temperature} - \text{Ambient temperature})$$
  - Adjust the buffer for excessive exposure to account for reflective surfaces or extreme UV conditions.
- Determine Change in temperature.**
  - Expansion gap temperature = Maximum site temperature - Ambient temperature + Buffer
  - Contraction gap temperature = Ambient temperature - Minimum site temperature
- Calculate the Expansion and contraction.**
  - Use a linear coefficient of expansion to estimate board movement. For Pioneer, this coefficient is  $\pm 0.04 \text{ mm/m/}^{\circ}\text{C}$ . The formula to calculate the  

$$\text{Required gap size} = \text{Length of the board in meters} \times 0.04 \text{ mm/m/}^{\circ}\text{C} \times \text{change in temperature}$$

Alternatively use this table to find the expected gap size based on temperature change. Multiply the gap size per meter by the length of your board in meters to get the required gap size. Remember to add the buffer..

Gap size per meter of board per temperature change (gap size (mm) /m/°C)												
Temperature change (°C)	5	10	15	20	25	30	35	40	45	50	55	60
Gap size per meter (mm)	0.2	0.4	0.5	0.7	0.9	1.0	1.2	1.4	1.5	1.7	1.9	2.0

### 3.5.4 Example

Change in board length =  $L \times 0.04 \times \text{Change in Temp.}$

Example: Change in board length =  $4.80\text{m} \times 0.04 \times (36 - 18)$

Change in board length = 3.456mm

Expansion gap =  $3.456\text{mm} / 2$

Expansion gap = 1.728mm (either end of the board)

### 3.5.5 Implementing expansion gaps on site.

- Allow boards to acclimatise on site before installation to ensure uniform expansion.
- If the calculated maximum potential gap sizes are larger than desired, the boards can be cut to shorter lengths to reduce the expansion gap. You may need to adjust the structural layout, accordingly, as detailed in section 4.0.
- Use starter deck boards and breaker boards to create line breaks between boards, allowing them to be cut to the same length. This approach ensures that the expansion of acclimatized boards is more uniform and manageable than in a staggered pattern of different lengths.
  - If the boards are laid in an accessible straight line, the board edges can be cut after laying, though this is considered an advanced technique, and care must be taken not to damage the structure.
- When cutting the boards to length, remember to account for the final length needed to allow for expansion gaps based on the temperature at time of installation.
- When laying the boards, leave the expansion gap between the boards as calculated. You may need to adjust the gap size if the temperatures vary over the course of the installation.
  - Shims and spacers matching the required gap size can be used to automatically create the gaps.
  - Remember to leave a gap between the building and the deck.

## 4. Planning and installation

### 4.1 Substructure

- Plan your substructure to align with the intended deck layout and ensure support of the boards along all cut edges.
- Use double joists at all butt joints so that both board edges are fully supported.
- Use noggins between joists where breaker boards are used. The spans between noggins must not be greater than the maximum centre-to-centre span of the deck board profile.
- Ensure the substructure members are appropriately sized for the requisite spans. Ensure the installation thereof is sound and level. Ensure suitable connections are utilised between members and between the substructure and the applicable substrate. Consult an appropriately qualified professional wherever necessary.
- Use appropriate spans.
- Spans may need to be adjusted for stair spans (See section 4.2 below), snow loads (See section 4.3 below), or diagonal board laying patterns (See section 4.4).

The table below summarises typical achievable spans (excluding stair applications and/or snow loads, please refer to the appropriate section for more information regarding these scenarios). The profile's moment of inertia and elastic section modulus is also captured for convenience. For additional information please refer to the Pioneer Technical Data Sheet (TDS).

Maximum span* mm									
Profile	Moment of inertia, I <sub>x</sub> (mm <sup>4</sup> )	Elastic sectional modulus, S <sub>x</sub> (mm <sup>3</sup> )	US approach		Eurocode (and similar) approach				EN 15334
					Residential (2 kPa)		Commercial (4 kPa)		
			Ultimate	Serviceability	Ultimate	Serviceability	Ultimate	Serviceability	
Grooved Deck Board	129 839	12 343	500		500		500		350
Starter Deck Board	135 804	12 738							

\*Please note that the information is based on limited test data at present. Available test data has been used to infer the results of similar profiles.

## Note:

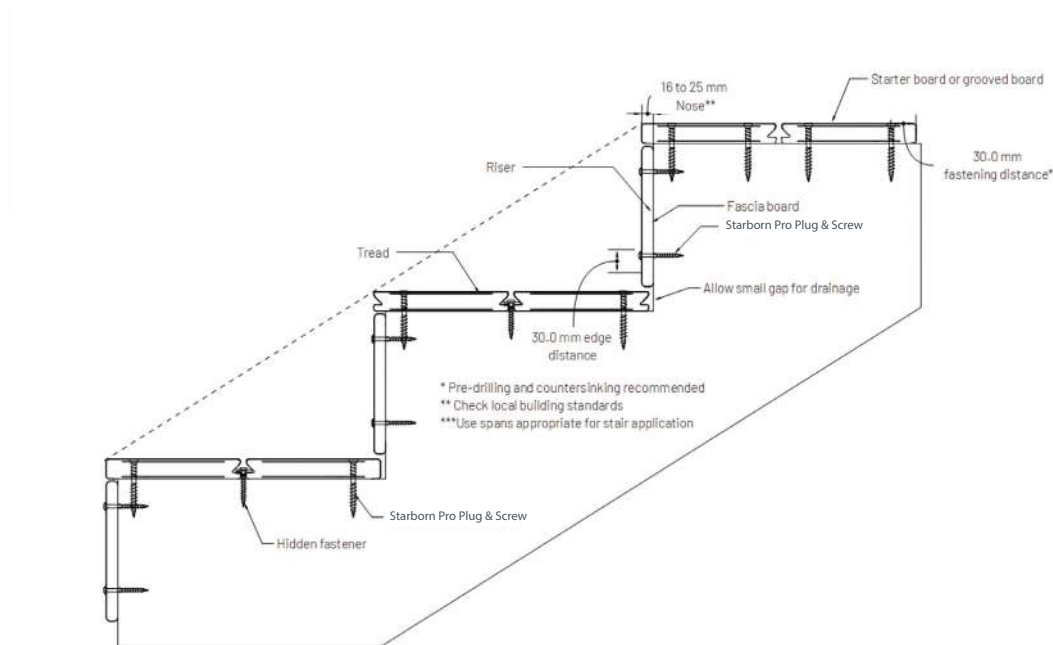
- The full end-use adjustment factor was used.
- The duration of load and creep was not included in the analyses.
- The calculation for spans is based on the lesser of a factor of safety of 2.5 for the average test results and 2.1 for the minimum test results.
- Serviceability span assessment is based on a deflection limit of  $L/180$  and often dictates.
- A conservative gap of 5 mm between boards was assumed.

## 4.2 Stairs span requirements

The following profiles have been tested in accordance with CCRR requirements limiting deflection to 3.2mm for a 1.3 kN point load and appropriate factor of safety. Please see the Mechanical section of the applicable TDS for more information. Please also see **Appendix B** for further installation details.

Profile	Maximum span for stair applications (mm)
Grooved Deck Board 170 x 21.0	305 mm
Starter Deck Board 170 x 21.3	

The following illustration outlines typical principles for stair applications.



## 4.3 Snow load spanning capacity per ICC-ES AC174

The following snow load span calculations for deck boards are based on the ICC-ES AC174 Acceptance Criteria for Deck Board Span Ratings and Guardrail Systems (Guards and Handrails). These calculations utilise flexural test data obtained from internal and external testing sources. The analysis focuses on calculating the allowable spans for various snow load conditions, considering the specific material properties and configurations. Please refer to the Technical Data Sheets (TDS). These calculations have not been reviewed by a third-party certified engineer and must be assessed by a competent professional before installation.

Profile details			Adjusted snow load span (mm)	
Profile	Board Width [mm]	Board Height [mm]	US Approach - Span [mm]	4.78 kPa
Grooved Deck Board 170 x 21.0	170	21.0	508	508
Starter Deck Board 170 x 21.3	170	21.3		

## Note:

- The full end-use adjustment factor was used.
- The duration of load and creep was not included in the analyses.
- The calculation for spans is based on the lesser of a factor of safety of 2.5 for the average test results and 2.1 for the minimum test results.
- Serviceability span assessment is based on a deflection limit of L/180 and often dictates.
- A conservative gap of 5 mm between boards was assumed.

## 4.4 Span adjustments for Diagonal laying patterns

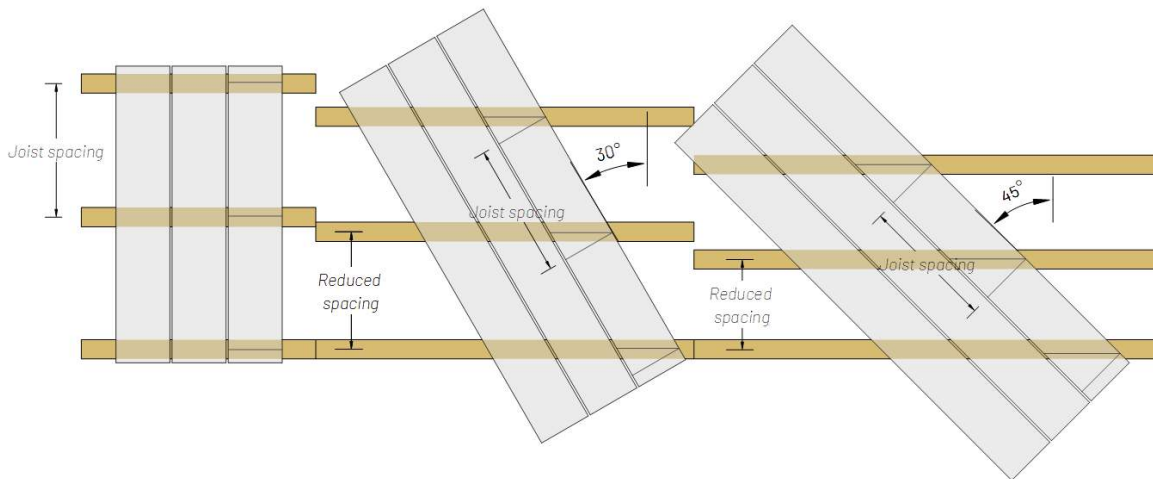
Where boards are not installed perpendicularly to joists, the joist spacing must be modified to ensure that the board spans do not exceed that specified. This can be calculated as follows

- Adjusted Span = Original Span  $\times \cos(\theta)$
  - Where:
    - Adjusted Span refers to the new (reduced) perpendicular distance between the joists.
    - Original Span refers to the intended/unadjusted span of the actual deck board. This span is in principle maintained by adjusting the span.
    - $\theta$  is the intended angle (in degrees) of the board direction relative to the joist layout. As the figure below indicates, it is specifically the angle from the previous (perpendicular) board position to the new intended board position.
- Example: Adjusted Span = 457 mm  $\times \cos 45^\circ$   
= 318.2 mm

The below table provides a quick summary of typical spans at common angles:

Typical joist spacing millimetres (inches)	Reduced span at different board angles	
	30 °	45°
600 mm (24")	519.6 mm	424 mm
550 mm (22 ")	485 mm	395 mm
500 mm (20")	439 mm	359 mm
450 mm (18 ")	396 mm	323 mm
400 mm (16 ")	351 mm	287.4 mm
300 mm (12 ")	264 mm	215 mm

The following illustration outlines the basic principles of adjusted spans in relation to the original joist span and example board angles.



## 4.5 Decking planning and installation

Below are guidelines to consider during the planning and installation of decking:

- The layout of a deck is often dictated by existing geometrical constraints on site. Best practice involves optimisation between the standard dimensions and constraints of the deck boards supplied with the desired aesthetics of the layout.
- Attempt to keep layouts symmetrical. As a result, where it is necessary to rip boards, rip both the first and last board of the deck footprint equally to balance the required widths. Where possible, avoid ripping boards at all.
- An ideal expansion gap size at maximum contraction would be 6 mm to match that of the typical gap between boards installed parallel to each other.
- Use breaker boards and starter deck boards to provide an aesthetically pleasing finish whilst assisting in controlling expansion and contraction.
- Use multiple combinations of shorter boards with breaker boards to balance long runs against expansion and contraction limitations.
- Where boards meet end to end they can be installed so they align or are staggered. Both options have advantages and limitations with respect to aesthetics and installation practicality.
- Consider the orientation of the boards relative to typical foot traffic direction as well as the site layout. Typical approaches are to install deck boards parallel with the longest dimension of the site layout. In areas where better slip resistance is required, most composite textures have better slip resistance with the boards orientated perpendicular to common foot traffic direction. In general, Pioneer deck boards have good slip resistance characteristics in all board orientations (please refer to the Pioneer TDS for further information). Additionally, consider the length of the available space in relation to the lengths and widths of the boards available. In some cases, certain orientations can be very efficient from a material perspective. Finally, consider existing obstructions and their straightness; it is easier to cut board ends than it is to rip along board lengths to match uneven surfaces such as poorly built walls, flower beds, etc.

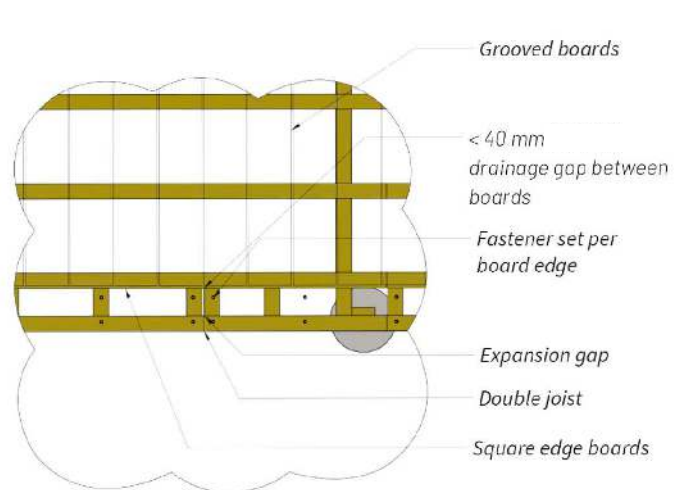
### Deck clearances and ventilation

- To prevent damage to boards, substructure, and adjacent structure, ensure the following:
  - At least 50% ventilation/ airflow in confined or low-clearance areas. Adequate drainage and surface water control beneath the deck.
  - The substructure is suitably durable for the application and has adequate drainage.
- A minimum 38 mm deck clearance for suitable substrates. Consult local building codes for any specific deck clearance requirements related to the type of structure and durability classes.
- Ensure the deck setup and clearance accommodates access for maintenance and pest control.

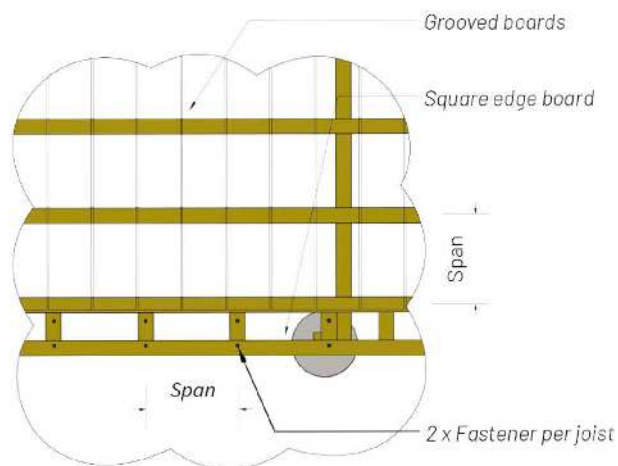
## 4.6 Decking planning and installation

Below is a brief set of steps to assist with optimising a layout so that the site and environmental influences, client requirements, and material impacts are taken into consideration.

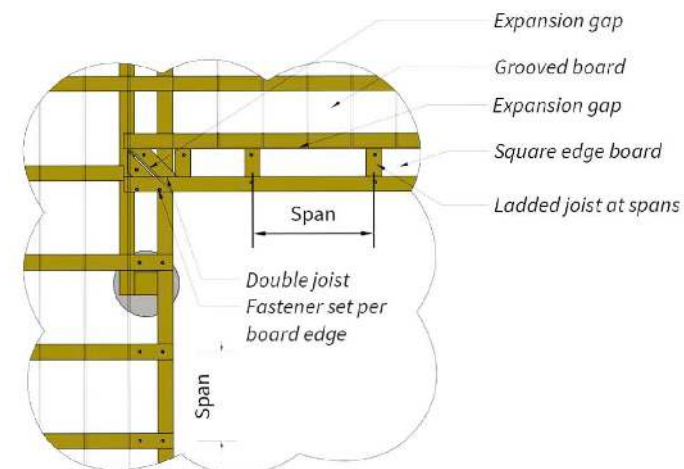
1. **Layout and environment:** Determine site layout/footprint and establish any critical environmental parameters that may influence the installation or performance of the installation. Particular aspects to consider include extreme temperature ranges, high corrosion classes, large catchment areas, steep slopes, etc.
2. **Optimisation:** Optimise deck layout relative to the site layout and the deck board dimensions. Incorporate allowances for the established critical environmental aspects in Step 1. Cater for additional factors that may influence the layout such as expansion and contraction, preferred aesthetics, foot traffic, existing obstructions, clearances, railing, etc. This step may take several iterations. Establish the primary board orientation first, then incorporate supporting elements, such as breaker boards, perimeter boards, etc., where necessary. Once finalised, the quantity of deck boards can be determined.
3. **Substructure, fasteners and ancillaries:** With a layout finalised, the substructure can be outlined based on the required supports and spans. Aspects such as supports for railing, pergolas, etc. must be allowed for at this stage. Once established, the deck board and substructure layout will allow the type and number of fasteners required to be calculated. Ancillary items, such as railing, pergola, etc., can then be quantified.



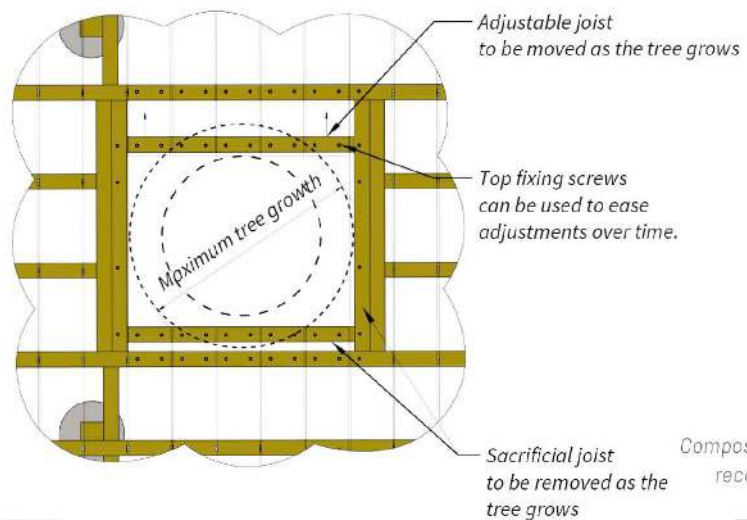
1 Double joist on abutting boards



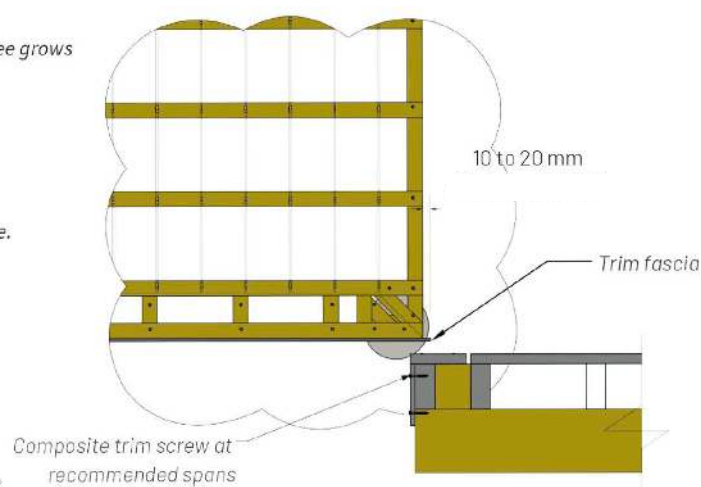
2 Ladder joist for breaker boards



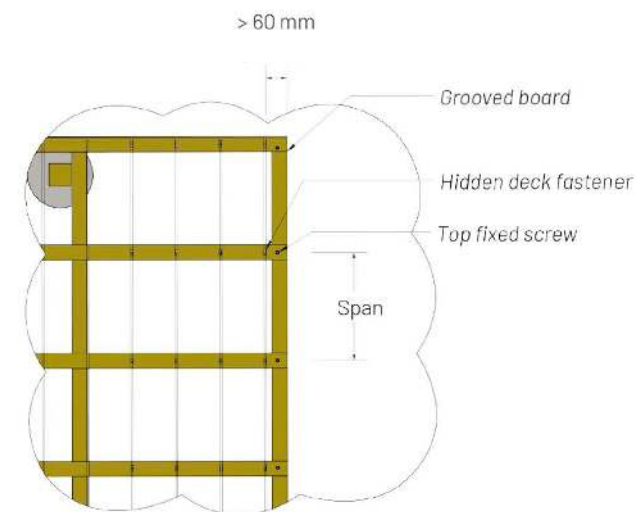
3 Mitre join detail on breaker boards



4 Board support around a tree



5 Trim detail



6 Ripped board detail



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### 5.1 Document disclaimer

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## Appendix A

### Profiles and compatible fasteners

See TDS for additional information where required.

## A.1 Pioneer profile family

Below is a summary of profiles available in the Pioneer material technology.

Application type	Board width (mm)	Thickness (mm)	Mass per meter (kg/m)	Cover width <sup>(1)</sup> (mm)	Coverage <sup>(2)</sup> (m/m <sup>2</sup> )	Coverage mass <sup>(3)</sup> (kg/m <sup>2</sup> )
Grooved Deck Board	170.0	21.0	2.8	176.0	5.7	15.9
Starter Deck Board	170	21.3	2.8	176.0	5.7	15.9
Fascia board	151.0	12.5	1.4	157.0	6.4	9.9

(1) Coverage width = Board width + an assumed typical gap of 6 mm.

(2) Coverage = 1000/Coverage width

(3) Coverage mass = Coverage x mass per meter

## A.2 Compatible fasteners

Below is a summary of fasteners available for fixing the profiles.

Fastener type	Size (mm) (or #)	Length (mm)	Material	Note
Chain Collated decking clip	6.0	19	SS 316 or SS 304	Compatible with boards that have a groove height of between 6 mm and 12 mm. To be used with hand tool.
Top fixing deck screw for timber	M 5.0 (# 10)	63	C 1022	For 20 mm to 25 mm thick boards into timber structures greater than 40 mm thick. Two corrosion resistance options.
			SS 305	
Top fixing deck screw for metal	M 5.0 (# 10)	45	C 1022	For 20 mm to 25 mm thick boards into metal structures 0.8 mm to 2.0 mm thick.
Top fixing trim screw for timber	M 5.5 (# 10)	48	10 B 21	For 11 mm to 16 mm thick boards into timber structures greater than 40 mm thick. Two corrosion resistance options.
			SS 316	
Top fixing trim screw for metal	M 5.5 (# 10)	35	10 B 21	For 11 mm to 18 mm thick boards into metal structures 0.8 mm to 2.0 mm thick. Two corrosion resistance options.
			SS 410 H	

Appropriate fasteners must be employed relative to applicable legislation, the intended application, and the conditions present. Particular attention should be paid to the corrosion conditions of the site and the state of the substrate available. Applications should adhere to any applicable standards. All timber profiles should be treated appropriately, and all metal profiles should be coated appropriately. Movement of materials within the system can degrade connections over time, and it is prudent that this is avoided or reduced to an acceptable limit where possible. Coatings can degrade over time and regular, proactive maintenance should be employed.

## Appendix B

### Installation

Profile properties	
Product code	<b>STFM112A</b>
Sectional area (mm <sup>2</sup> )	3 465
Approximate mass (kg/m)	2.8

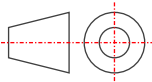


Sectional properties in typical orientation	
I <sub>x</sub> (mm <sup>4</sup> )	129 839
I <sub>y</sub> (mm <sup>4</sup> )	7 894 711
C <sub>x</sub> (mm)	85.0
C <sub>y</sub> (mm)	10.4
S <sub>x</sub> (mm <sup>3</sup> )	12 343
S <sub>y</sub> (mm <sup>3</sup> )	92 835

Drawing title	
STFM112A - Grooved deck board 170 mm	

File name	
2023-11-17 - Pioneer - TDS - Version 5.0	

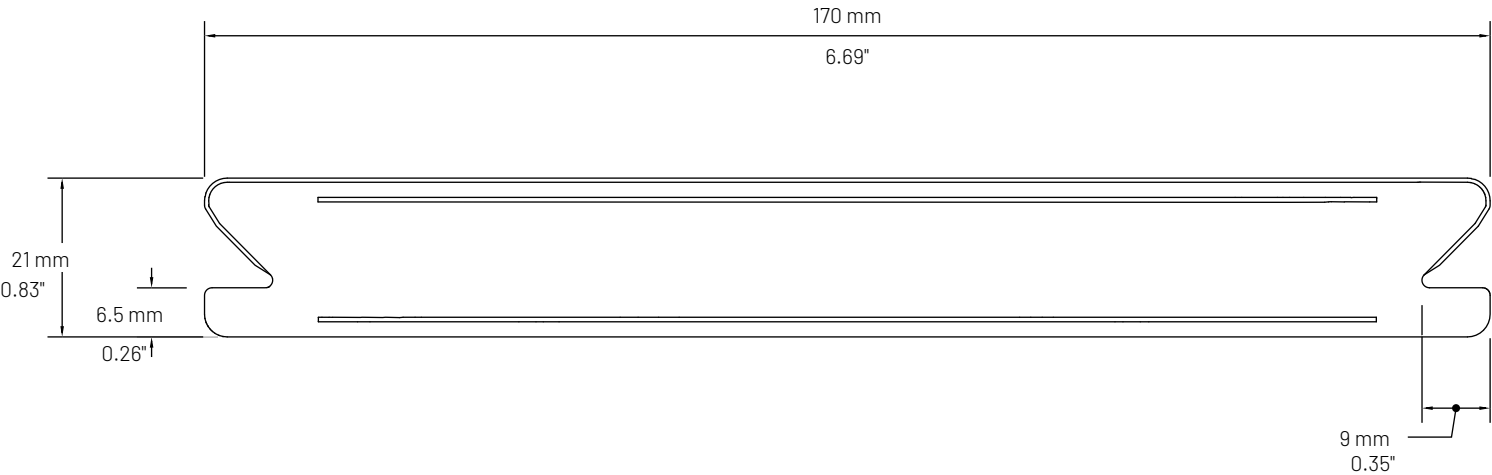
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Date	March 6, 2025
Page	N/a
Scale	NTS

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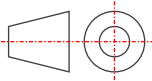
Profile properties	
Product code	<b>STFM113A</b>
Sectional area (mm <sup>2</sup> )	3 465
Approximate mass (kg/m)	2.8



Sectional properties in typical orientation	
I <sub>x</sub> (mm <sup>4</sup> )	135 804
I <sub>y</sub> (mm <sup>4</sup> )	8 336 050
C <sub>x</sub> (mm)	86.1
C <sub>y</sub> (mm)	10.6
S <sub>x</sub> (mm <sup>3</sup> )	12 738
S <sub>y</sub> (mm <sup>3</sup> )	96 806
Drawing title	
STFM113A - Starter board 170 mm	

File name	
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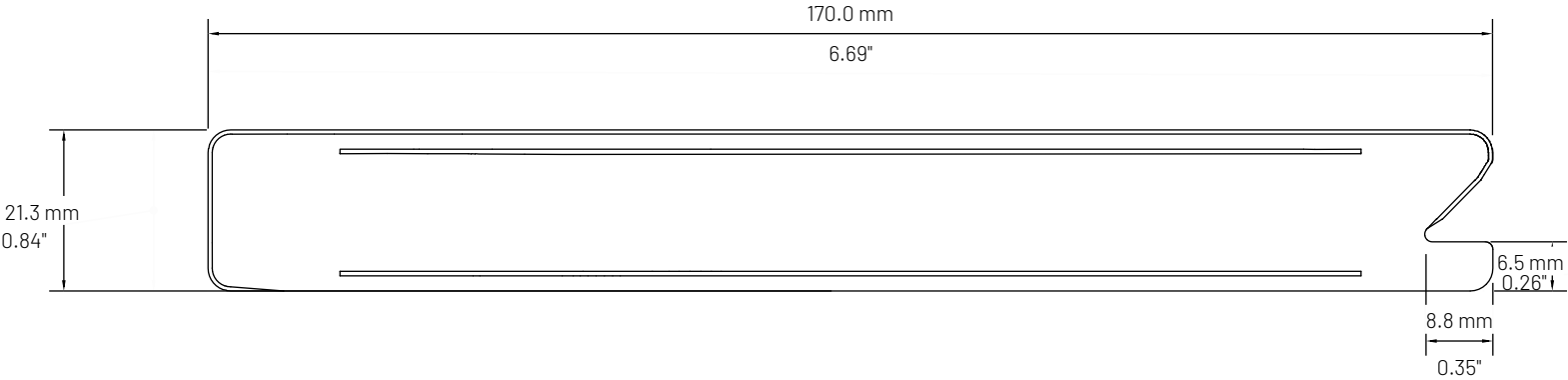
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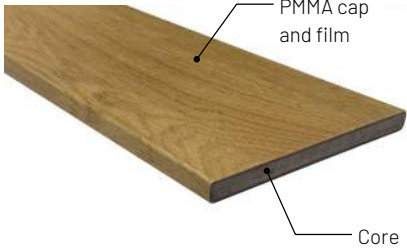
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#### Profile properties

Product code	STFM106
Sectional area (mm <sup>2</sup> )	1879
Approximate mass (kg/m)	1.4



#### Sectional properties in typical orientation

$I_x$ (mm <sup>4</sup> )	3 513 737
$I_y$ (mm <sup>4</sup> )	24 405
$C_x$ (mm)	6.3
$C_y$ (mm)	75.6
$S_x$ (mm <sup>3</sup> )	46 505
$S_y$ (mm <sup>3</sup> )	3 887

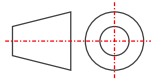
#### Drawing title

STFM106 - Fascia board - Timber structure - Pioneer

#### File name

2023-11-17 - Pioneer - IG

#### File details

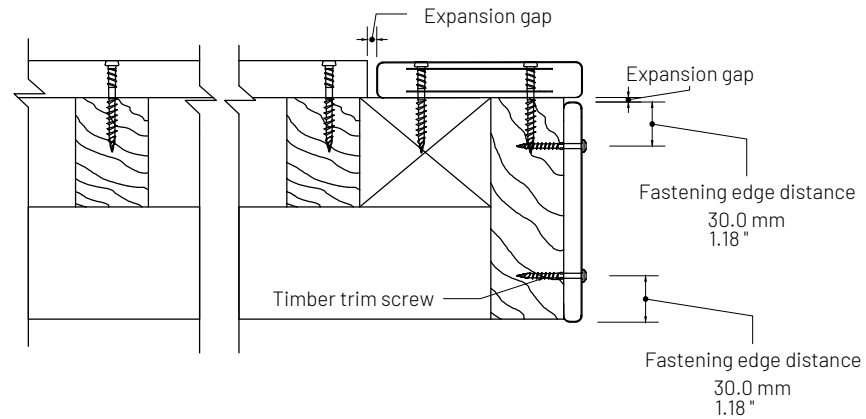
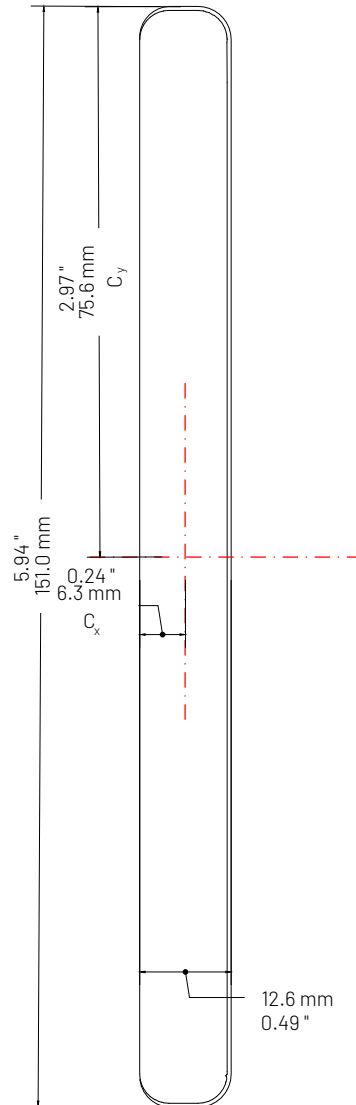


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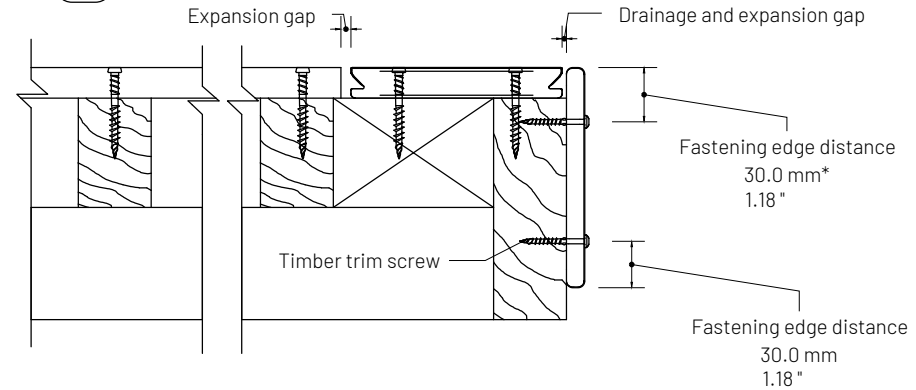
# Pioneer



B1

STFM106. Grooved deck board in a Timber application beneath a breaker board

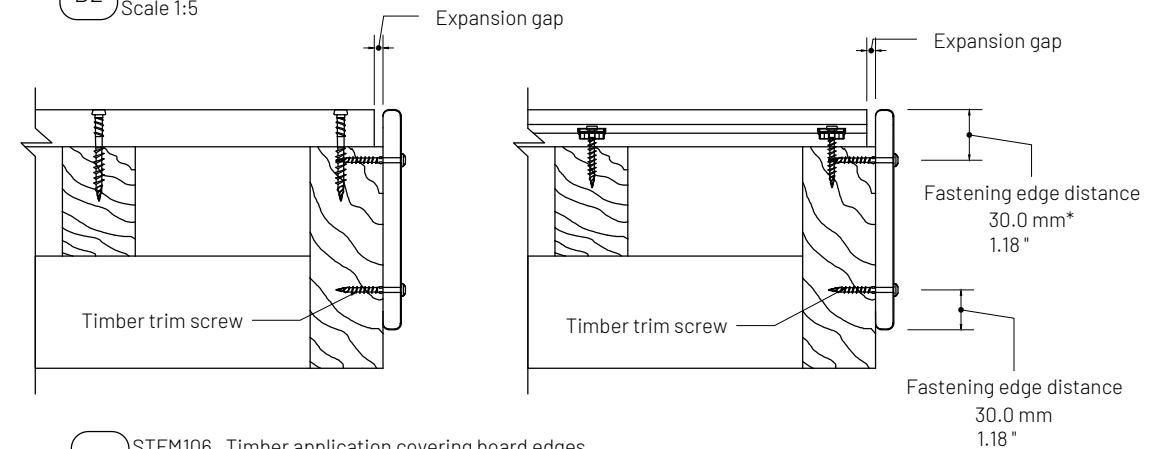
Scale 1:5



B2

STFM106. Grooved deck board in a timber application covering a grooved board edge

Scale 1:5



B3

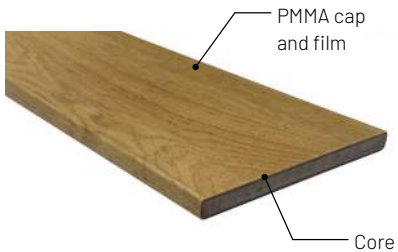
STFM106. Timber application covering board edges

Scale 1:5



#### Profile properties

Product code	STFM106
Sectional area (mm <sup>2</sup> )	1879
Approximate mass (kg/m)	1.4



#### Sectional properties in typical orientation

$I_x$ (mm <sup>4</sup> )	3 513 737
$I_y$ (mm <sup>4</sup> )	24 405
$C_x$ (mm)	6.3
$C_y$ (mm)	75.6
$S_x$ (mm <sup>3</sup> )	46 505
$S_y$ (mm <sup>3</sup> )	3 887

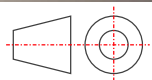
#### Drawing title

STFM106 - Fascia board - Metal structure - Pioneer

#### File name

2023-11-17 - Pioneer - IG

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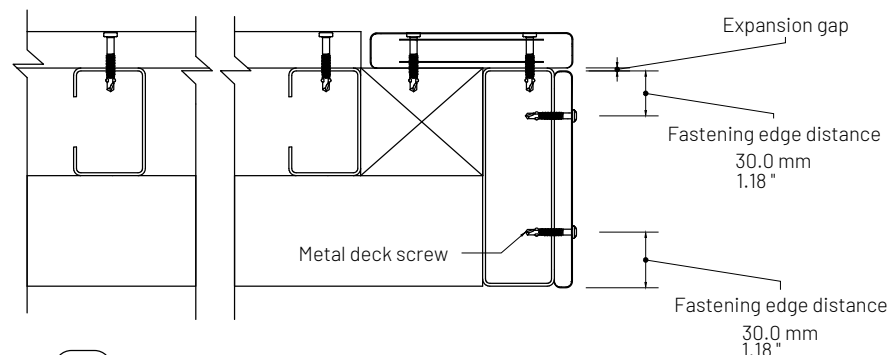
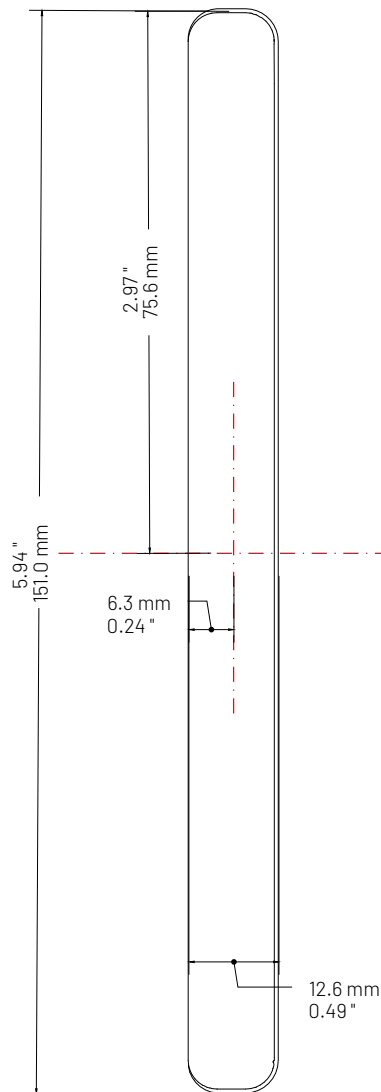


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Unless otherwise specified all dimensions are in millimeters.

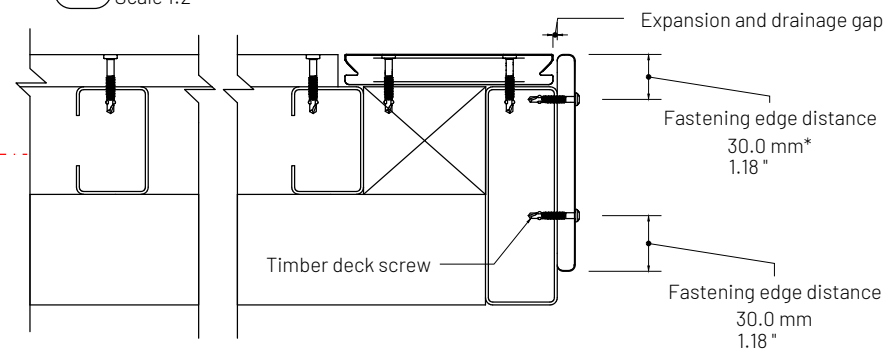
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# Pioneer®



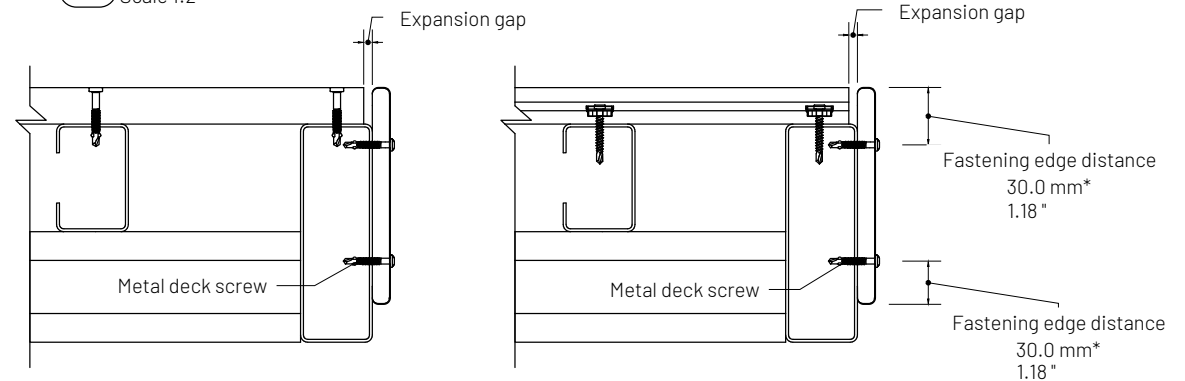
B1

STFM106. Grooved deck board in a metal application beneath a breaker board  
Scale 1:2



B2

STFM106. Grooved deck board in a metal application covering a grooved board edge  
Scale 1:2



B3

STFM106. Metal application covering board edges  
Scale 1:2

Profile properties	
Product code	<b>STFM106</b>
Sectional area (mm <sup>2</sup> )	1 879
Approximate mass (kg/m)	1.4

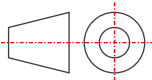


Sectional properties in typical orientation	
I <sub>x</sub> (mm <sup>4</sup> )	3 513 737
I <sub>y</sub> (mm <sup>4</sup> )	24 405
C <sub>x</sub> (mm)	6.3
C <sub>y</sub> (mm)	75.6
S <sub>x</sub> (mm <sup>3</sup> )	46 505
S <sub>y</sub> (mm <sup>3</sup> )	3 887

Drawing title	
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File name	
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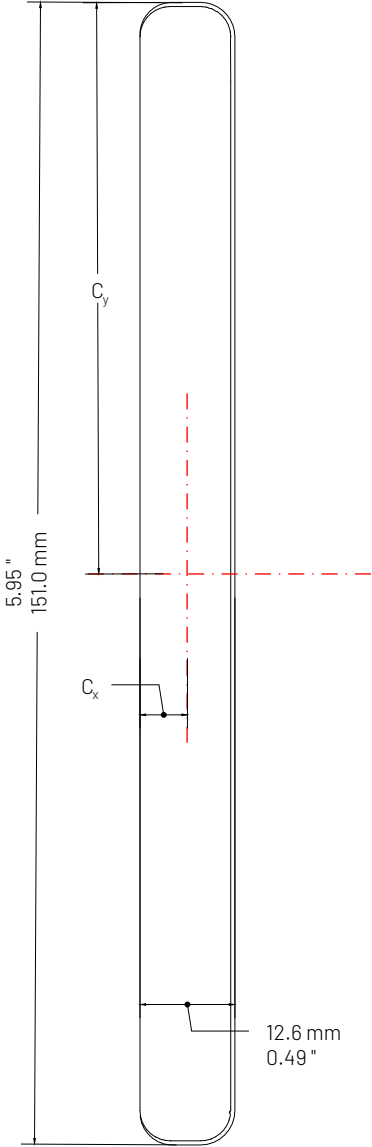
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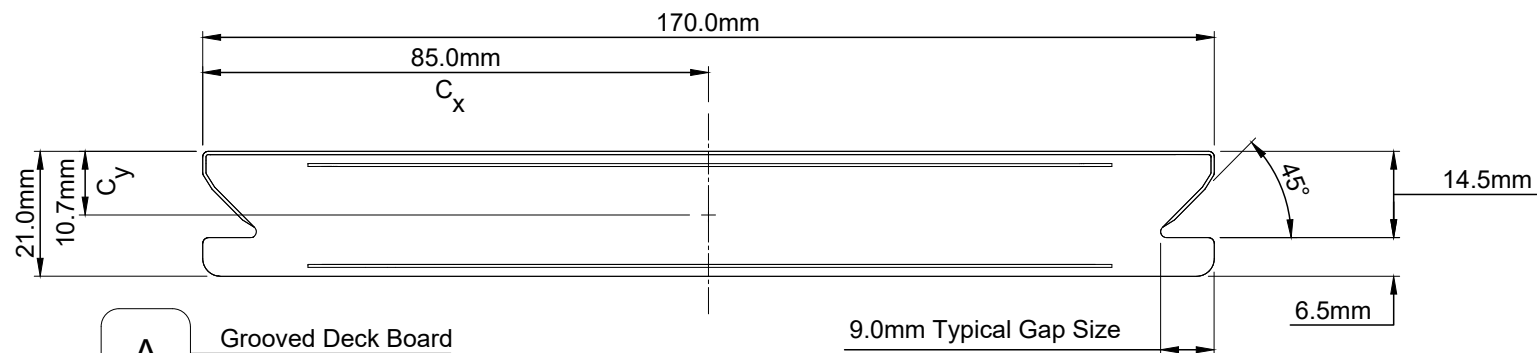


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Page	N/a
Scale	NTS

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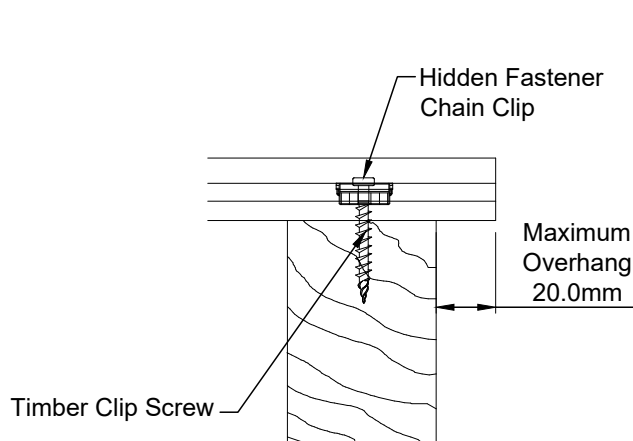




A

Grooved Deck Board

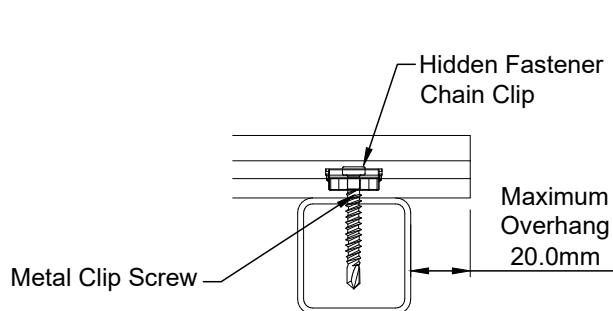
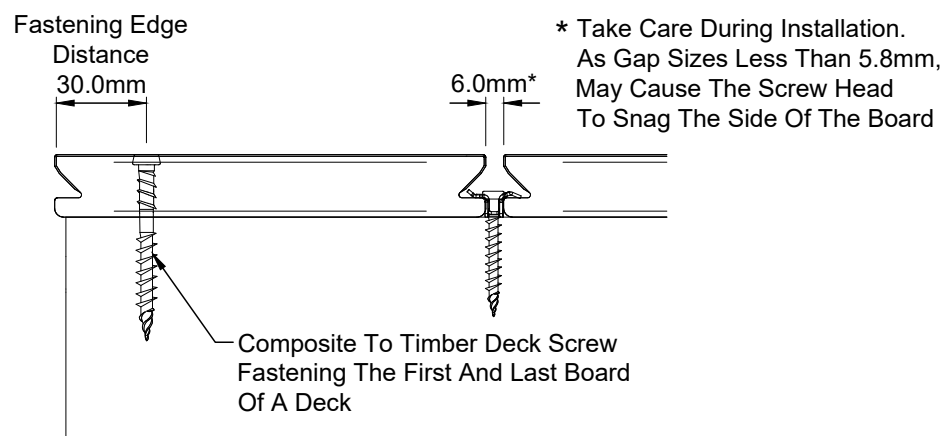
Scale 1:1



B1

Grooved Deck Board In A Timber Application

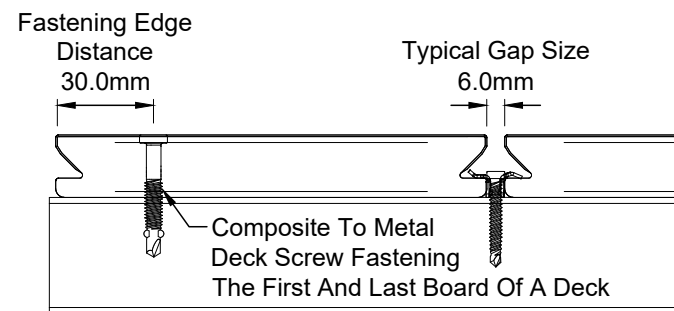
Scale 1:2

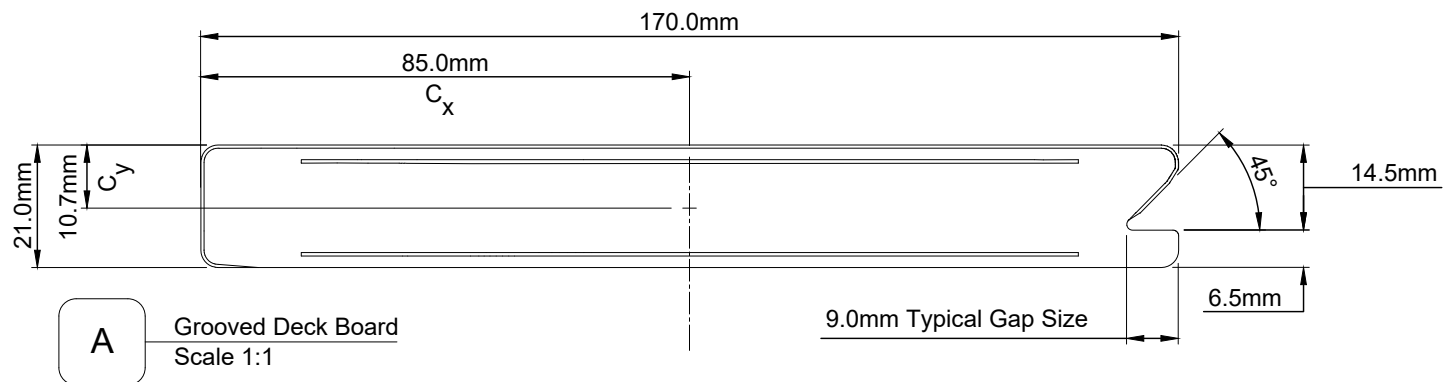


B2

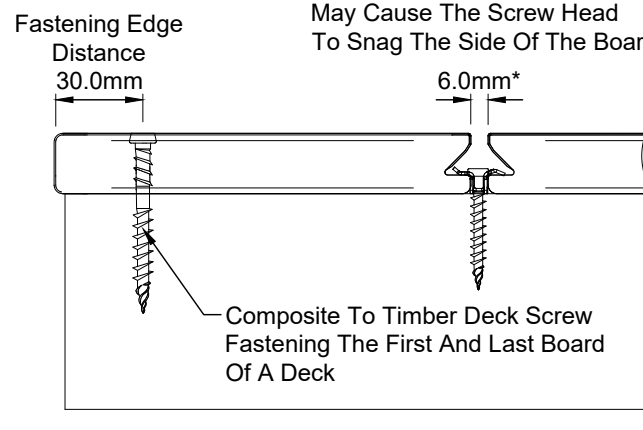
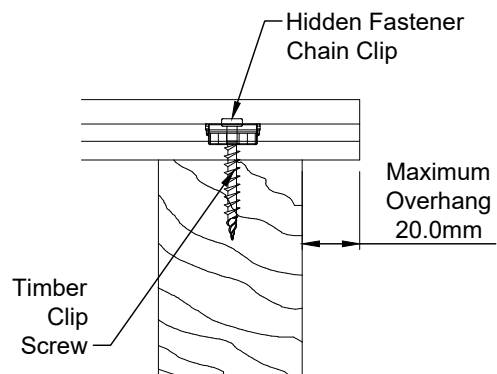
Grooved Deck Board In A Metal Application

Scale 1:2

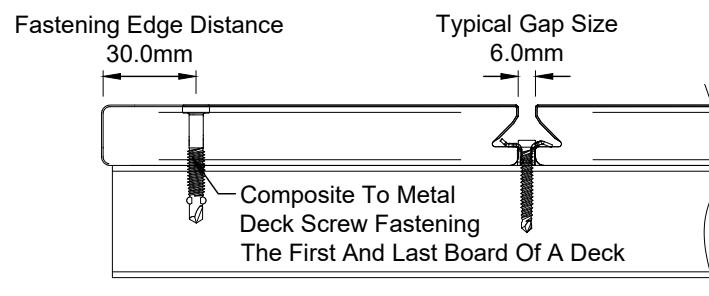
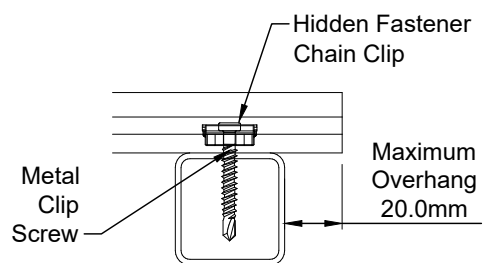




\* Take Care During Installation.  
As Gap Sizes Less Than 5.8mm,  
May Cause The Screw Head  
To Snag The Side Of The Board



**B1** Grooved Deck Board In A Timber Application  
Scale 1:2



**B2** Grooved Deck Board In A Metal Application  
Scale 1:2

## Appendix C

Summary matrix of expansion gaps for different conditions

## Expansion coefficients

In Section 3 material length changes in direct proportion to temperature changes. The table below, provided for information and convenience, displays common materials' expansion coefficients.

Material	Expansion coefficient (mm/mm/°C)
Pioneer (PVC + GFR + PMMA Cap)	$33.4 \times 10^{-6}$

## Pioneer

Summary matrix of estimated expansion gaps (to the nearest 0.5 mm) for Pioneer material technology at different board lengths and different increases in board temperature relative to the installation temperature.

Coefficient	Required expansion gap (mm) estimate per increase in temperature relative to the installation temperature (°C)												
0.0000334	1	5	10	15	20	25	30	35	40	45	50	55	60
Board length (m)	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C
1.0 m	0.0	0.2	0.3	0.5	0.7	0.8	1.0	1.2	1.3	1.5	1.7	1.8	2.0
2.0 m	0.1	0.3	0.7	1.0	1.3	1.7	2.0	2.3	2.7	3.0	3.3	3.7	4.0
3.0 m	0.1	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0
4.0 m	0.1	0.7	1.3	2.0	2.7	3.3	4.0	4.7	5.3	6.0	6.7	7.3	8.0
5.0 m	0.2	0.8	1.7	2.5	3.3	4.2	5.0	5.8	6.7	7.5	8.4	9.2	10.0
5.45 m	0.2	0.9	1.8	2.7	3.6	4.6	5.5	6.4	7.3	8.2	9.1	10.0	10.9
5.8 m	0.2	1.0	1.9	2.9	3.9	4.8	5.8	6.8	7.7	8.7	9.7	10.7	11.6

## **Appendix D**

### Corrosion references

## Fastener Life expectancy

### Screw corrosion classification

The following table provides a summary of typical fasteners, their coating thicknesses, and respective lifespans in different corrosion zones. In all cases consult an appropriately qualified professional.

Red – the fastener is not suitable

Orange – The protective coating is suitable for some composite product systems. See appropriate TDS document for more information.

Green – The coating is suitable for the given environment and most composite systems

Tick (✓) – The material itself is suitable for the given environment and most composite systems

Fastener category	ISO 9223 corrosion category			C3	C4	C5	C5+		
	Material	Coating	Zinc	0.7 to 2.1	2.1 to 4.2	4.2 to 8.4	8.4 to 25		
			corrosion rate	(µm/annum)	(µm/annum)	(µm/annum)	(µm/annum)		
			Coating Thickness	Expected lifespan of fastener coatings (years)					
Carbon clip screws	C1022	Magni 599 (full coat)	20 µm	10 to 28					
Carbon deck screws									
Carbon frame screws									
Carbon trim screws	10B21		20 µm	10 to 28	5 to 10	2 to 5	< 1 to 2		
Tek screw	C1022	Class 3	25 µm	12 to 35	6 to 12	3 to 6	1 to 3		
		Class 4	50 µm	24 to 72	12 to 24	6 to 12	2 to 6		
		Zinc plated	8 µm						
Stainless steel S clips	SS430	Enamel		✓	✓				
Stainless clip screw	SS316	Magni 599 (full coat)	20 µm	10 to 28 + ✓	5 to 10 + ✓			2 to 5 + ✓	< 1 to 2 + ✓
Stainless deck screw		Enamel head coating	N/a	✓	✓			✓	✓
Stainless trim screw									
Stainless chain clip	SS316	Polypropylene (PP)	600 µm	✓	✓	63 to 130 ✓	✓		



## Material corrosion rates

The following table provides typical corrosion rates ( $\mu\text{m} / \text{annum}$ ) for common materials seen in composite building systems. Not all materials are published in relation to ISO 9223 corrosion rates but are indicated by source material as suitable for certain environments. It has been assumed that references to a marine environment would be equivalent to a C5 environment.

Material Category	Corrosion rates ( $\mu\text{m}/\text{annum}$ ) of constituents in different corrosion zones					Note
	ISO 9223 corrosion category	C3	C4	C5	C5+	
	Equivalent category	Rural	Urban	Marine	Marine Industrial	
Zinc		0.7 to 2.1	2.1 to 4.2	4.2 to 8.4	8.4 to 25	Per published ISO 9223 rates
Copper		0.6 to 1.3	1.3 to 2.8	2.8 to 5.6	5.6 to 10	
Aluminium		Negligible				
Steel	Carbon	25 to 50	50 to 80	80 to 200	200 to 700	Per ASKzn website. Unrelated to ISO 9223
Stainless steel	SS410	✓	x	x	x	
	SS430	✓	✓	0.0381	0.0406	
	SS316	✓	✓	0.0051	0.0076	Per online sources. Unrelated to ISO 9223
Plastics	Polypropylene (PP)	✓	✓		4.6 to 7.5	
	Polypropylene (PE)	✓	✓		4.3 to 9.5	

## Appendix E

### Troubleshooting

Common complaints	Typical issues	Potential solution
Deck is bouncy or springy.	Inappropriate spans.	Reduce spans and/or provide additional supports.
Deck boards sag between joists.	Inappropriate spans.	Reduce spans and/or provide additional supports.
Deck board ends lift or tent.	Inappropriate fastening distance from edge of the board and/or overhang.	Fasten board down closer to the board edge. Ensure board support and substructure are adequate. Ensure appropriate overhang distance.
Expansion gap is too large.	The installed gap did not consider potential minimum board temperatures for the site.	Refit using appropriate expansion gaps. Make use of shorter boards and/or breaker boards.
Ends of the deck boards are no longer even.	Boards were not left to acclimatise before installation and/or boards were installed at different temperatures without allowing for this.	Now that the boards have acclimatised, cut the boards to the same lengths. Ensure this is done at a consistent temperature to avoid similar problems in the future.
Boards 'tent' at butt joints.	Inappropriate expansion gaps.	Calculate correct expansion gap for site and cut board ends to satisfy. Make use of breaker boards and similar where possible.
Board end sags under load.	Inappropriate board overhang.	Ensure board end is adequately supported within 20 mm of board end.
Screws snapping.	Inappropriate number of fasteners per board and/or over-tightening/over-torquing of screws and/or incorrect fastener utilised for the application.	Ensure appropriate fastener is used. Ensure two fasteners (hidden clips or top fixings) are used at every joist. Ensure appropriate torque settings are utilised.
Boards are cracking at board edges in vicinity of top-fixing screws.	Inappropriate fastening edge distance and/or pre-drilling.	Replace board and ensure top fixing to edge distances are correct. Pre-drill in low-temperature installations.
'Mushrooming' occurring at top-fixings.	Over-tightening/over-torquing of screws and/or high deck board temperatures during installation.	Ensure appropriate torque settings are utilised. Avoid installations at particularly high site temperatures. Pre-drill the fastening holes.
Deck is squeaky.	Board-clip-substructure interaction is producing a noise when loaded.	Replace hidden fastener with a smaller fastener and/or a fastener with a suitable polymer coating.
Strands of glass fiber of visible after cutting	Blades used to cut the board are not sharp or fast enough	Trim the strands with a sharp blade and dispose of the strands in accordance with health and safety requirements.

## Appendix F

Glass reinforced material range Safe Work Procedure (SWP)

## GLASS FIBRE REINFORCED AND/OR CELLULOSE MATERIALS RANGES

### SAFE WORK PROCEDURE (SWP)

SWP JOB TITLE OR TASK: GLASS FIBRE REINFORCED AND CELLULOSE MATERIAL RANGES

DATE: JANUARY 2023

Potential Hazards	Personal Protective Equipment	Training required
Hazardous Substances	Safety Glasses	MSDS
Dust and Fibre particles	Respiratory Protection	Health and Safety Induction
Flying particles	Overalls	First Aid
Unsafe use of equipment	Gloves	Health and Safety Induction
Unsafe use of tools	Other (as per installer's risk assessment)	Other (as per Installers risk assessment)
Incompetent operators/workers		

**Note: Properly installed, the Glass Fiber Reinforced Material Range are not considered to pose a health risk. It is only during installation, or when these materials are disturbed or broken (e.g. during renovations) that you need to be concerned.**

1. The material contains glass fibre reinforcement, cellulose fibres, and other potentially hazardous substances. When the final product is processed (cutting mainly), fine dust is released. Installers are obligated to inform their employees, subcontractors, any other parties on-site, and the client of the potential risks when handling and installing this material.
2. Installers must provide appropriate personal protective equipment to help employees protect themselves from glass fibre and dust exposure. Safety glasses or goggles will prevent the fibres from entering the eyes.
3. Selecting the right clothes can help minimize contact with the fibers, reducing the risk for irritation and injury. Workers should wear pants and long-sleeve shirts when working with this material. The fabric will prevent glass fiber dust from irritating the skin and reduce the risk of fibers becoming embedded in the skin. Keep your employer's dress code in mind when selecting the clothing you will wear when handling glass fiber. You can use duct tape to close the gap at the end of long sleeves and trousers.
4. Wearing gloves reduces skin contact with the glass fiber and may prevent irritation.
5. Workers regularly exposed to this type of dust should wear masks with respirators, which contain filters that prevent dust and other particles from entering the mouth and respiratory system. Masks that cover the nose and mouth can prevent workers from inhaling or swallowing the fibers.
6. Fumes from resins and other substances used in this product and installation should be avoided as much as possible, because they may cause respiratory problems such as tight chest, shortness of breath and wheezing. Other possible symptoms may include eye and nose irritation, headache, dizziness, and nausea.
7. Don't rub your skin or eyes if they feel itchy or irritated.
8. After working, wash with soap and running water (a shower is best). Wash your work clothes separately. Separate working clothes from town clothes. Contaminated work clothing should not be allowed out of the workplace. Wash contaminated clothing before reuse.
9. Wash hands and other exposed areas with mild soap and water before eating, drinking, or smoking and when leaving work. Do not eat, drink, or smoke when using this product. Always wash hands after handling the product.
10. Keep your workspace clean, and wet-wipe or mop surfaces after working. Vacuuming is also good, but don't sweep - this spreads dust around. Vacuum attachments for cutting equipment should be utilised to mitigate risk.
11. Keep glass fiber materials properly stored and dispose of any scrap.
12. Material Safety Data Sheets (MSDS) of all materials to be used must be made available at the workplace.
13. You should seek prompt medical advice, ideally from an occupational physician or specialist, if you experience any symptoms related to exposure to any of the products and substances mentioned above.
14. Installers must ensure compliance with their country's Health and Safety Obligations and Laws.
15. The client is obligated to inform anyone necessary of the potential risk when handling and installing this material.
16. Omissions from the above responsibilities do not relieve the employer from any of these or other obligations and does not transfer any risk to the product supplier.

Received by: \_\_\_\_\_

Signature: \_\_\_\_\_

Date: \_\_\_\_\_