Pioneer

DECKING INSTALLATION GUIDE

VERSION D1.0 | 20/01/2026

Before installing, please ensure you have downloaded the latest version of this installation guide by scanning this code

www.eva-last.com

A PRODUCT BY EVA-LAST®

INSPIRED BY NATURE, DESIGNED FOR LIFE.

Critical installation points

This summary of critical installation points in no way replaces the full Pioneer Installation Guide which is available for download on **www.eva-last.com.** It is recommended that you download and familiarise yourself with the full installation 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 applicable deck board profile.
- Use sister joists at half the required span at the edges of decks.
- 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** of the full Installation Guide), snow loads (See **section 4.3** for more information), or diagonal board laying patterns (See **section 4.4**).
- Please see **Appendix C** and **Appendix D** for additional information on Region specific load requirements.

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) of various profiles for the conditions outlined above and in Section 4.1. The profile's moment of inertia and elastic section modulus is also captured for convenience. Profile availability may differ per region, please refer to www.eva-last.com or contact your local distributor for more information. For additional information please refer to the Pioneer Technical Data Sheet (TDS).

Spans:

			Maximum span* in						
Profile code	Moment of inertia, I_x (mm⁴)	Elastic sectional modulus, S_x (mm³)	US approach		Eurocode (and similar) approach				EN 15334
					Residential (2 kPa)		Commercial (4 kPa)		
			Ultimate	Serviceability	Ultimate	Serviceability	Ultimate	Serviceability	
STFM101A 145 x 21.0	101 499 (0.24)	9 936 (0.61)	572 22.5		550 22.5		550 22.5		400 16
STFM102A 141 x 24.8	171 787 (0.41)	13 878 (0.85)							
STFM103A 141 x 24.6	159 826 (0.38)	13 293 (0.81)							
STFM104A 145 x 21.0	106 038 (0.35)	10 212 (0.84)							
STFM112A 170 x 21.0	129 839 (0.31)	12 343 (0.75)							
STFM113A 170 x 21.0	135 804 (0.33)	12 738 (0.77)			500 20		500 20		350 13.75
STFM105A 190 x 21.0	145 270 (0.26)	13 813 (0.62)							
STFM107A 190 x 21.0	145 570 (0.35)	13 853 (0.85)							

- Please note that the information is based on limited test data at present. Available test data for STFM101A and STFM105A have 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:

General Rules

- Use a minimum of two fasteners (hidden clips or top fixings) at every joist.
- Fasten boards at every joist to ensure loads are adequately distributed.
- Fasteners must be adequately distributed to avoid overloading individual fixings. Where required performance cannot be achieved, adjust board spans, substructure design, or fastening method accordingly (refer to relevant sections for guidance).
- Avoid top fixing wherever possible.

Hidden Fixing

- Hidden clip fixing is the preferred fastening method for Pioneer decking.
- Maintain a hidden clip fastening distance of 10 mm (0.38") minimum and 20 mm (0.79") maximum from the end of the board.

Top Fixing – Use Only Where Unavoidable

- Top fixing must be used only where hidden fixing is not possible (e.g. starter boards, fascias, breaker boards).
- Where top fixing is used in a location where it was avoidable, and this contributes to product damage or failure, such failure will not be covered under the Eva-Last warranty.
- Never force screws through the cap.
- When top fixing decking or fascia boards, maintain a minimum spacing of 30 mm (1.182") between fasteners and from any board edge.

Top Fixing – Star born Plug fasteners

- Starborn plug fastener systems are the recommended top-fixing method when top fixing is unavoidable.
- Install strictly in accordance with the Starborn plug system installation guide.

Top Fixing – Procedure (when not using Starborn)

- Procedure
  - Pre-drill holes slightly larger than the screw shank.
  - Countersink the fastener head slightly smaller than the fastener head to allow seating and reduce water ingress.
  - Drive fasteners using controlled torque only.
- Notes
  - Use sharp tools and drill bits at all times.
  - Heat generated from drilling, high RPM, or excessive torque can cause cap tearing, lifting, delamination, or material blowout.
  - Exercise additional care when drilling at low temperatures (below ±5 °C), where the cap material is harder and more susceptible to damage.

Tools & Torque Control

- Use a drill with adjustable torque settings.
- Set torque to less than 30% of the driver's maximum allowable torque.
- Do not force the screw through the cap.
- Do not overdrive screws.
- Do not use impact drivers.

Ripping and cutting:

- **Tool Selection:** Use sharp, clean carbide-tipped blades with TCG, M-TCG, or T-ATB tooth geometry and a 5–10° rake angle
- **Blade Speed Limits:** Do not exceed the manufacturer's maximum RPM for your saw size.

Blade Diameter	305 mm (12")	254 mm (10")	203 mm (8")	184 mm (7¼")	165 mm (6½")
Max RPM	3 250	3 900	4 900	5 400	6 000

- **Cutting Orientation:** Always cut with the cap face up and blade rotation pressing down into the surface.
- **Technique:**
  - Cut one board at a time using a steady feed — do not force the blade.
  - Fully support boards during cutting to prevent vibration or edge chipping.
  - Trim factory ends square before installation and removes loose fibres with a sharp knife.
- **Cut Quality:** Avoid uneven or ragged cuts — they can damage or lift the surface cap.
- **Post-Cut Handling:** Wipe surfaces clean with a soft cloth — do not use solvents or alcohol-based cleaners.
- **Avoid:** Hand saws, jigsaws, counter-rotating saws, or aggressive FTG wood blades.

Saw Blade Recommendations

- **Mitre Saw Blade (10")** - Freud LU94M010 , Teeth Count: 80T, Tooth Geometry: M-TCG, Carbide Tipped.
- **Track / Plunge Saw Blade (6-1/2")** - Makita A-99998, Teeth Count: 60T, Tooth Geometry: TCG, Carbide Tipped
- **Hand Saw Blade (7-1/4")** - Oshlun SBNF-072560, Teeth Count: 60T, Tooth Geometry: TCG, Carbide Tipped

Trim or Fascia:

- Always install your trim or fascia beneath the lip of the boarder 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, calculate the expected change in board length based on board length and anticipated temperature range (using a linear expansion coefficient of approximately 40×10^{-6} mm/mm/°C):
Change in board length = L x 0.04 x Change in Temperature.

The table below provides typical expansion gap values per metre of board for common temperature ranges and may be used to estimate required gaps on site.

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
Temperature change (°F)	41	50	59	68	77	86	95	104	113	122	131	140
Gap size per foot (in)*	1.002	0.004	0.006	0.008	0.01	0.012	0.014	0.016	0.018	0.020	0022	0024

Installation Rules

- Expansion gaps must be based on the full anticipated temperature range, including both expansion and contraction conditions.
- Where large temperature ranges are expected, consider lighter-coloured deck boards to reduce required expansion gaps.
- To further limit expansion gaps, boards may be installed in shorter lengths.
- Breaker boards must be used where boards are installed end-to-end to control movement.
- Use border boards around the perimeter of the installation to assist with expansion control.
- Do not use grooved decking boards for stairs, breakers, or border boards — use square-edge boards only.
- Failure to correctly manage expansion and contraction may affect warranty coverage.
- For worked examples and additional guidance, refer to Section 3.5.1 of the full Pioneer Installation Guide.

Environmental and Material Exposure Risks

- **Excessive and unusual heat sources** - Eva-Last products are 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.
- **Incompatible materials** - Avoid contact between deck surfaces and materials that may negatively affect the product—such as those containing plasticisers, including soft plastics, rubbers, foams, and synthetic composites. This includes, but is not limited to, items like garden hoses, rubber mats, plastic tarps, inflatable products, and protective coverings. These materials may cause staining, discolouration, or surface degradation. Consult the product's Technical Data Sheet (TDS) and relevant chemical compatibility data to assess potential risks. Users are responsible for confirming material suitability under actual use conditions.
- **Wind and acoustic consideration** - Account for environmental factors such as wind uplift and sound transmission. Proper board orientation, secure fastening methods, and strategic use of screens or vegetation can help mitigate wind loads and reduce acoustic impact on the deck and surrounding area

Pioneer

Contents

1.0 Introduction

Thank you for choosing an Eva-Last decking product. 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 an innovative photorealistic print technology which creates the most natural looking composite finish available in the Eva-Last range. See the list of profiles and corresponding fasteners captured in **Appendix A.**

2.0 Pre-installation

2.1 Standards

Legislation may differ between jurisdictions. Before installing any Eva-Last product, 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. For further product specification and information visit **www.eva-last.com**.

2.2 Safety

Refer to the applicable Material Safety Data Sheet (MSDS) for additional information. Please do not hesitate to contact Eva-Last should you require any additional assistance. Please see **Appendix H** 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:

- Ensure to comply with the local occupational health and safety legislation.
- Cutting (and similar processing activities) of The product 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.
- Inspect planks under good lighting before cutting or installation. Knowing installing boards with obvious defects may complicate any claim that arises in future.

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 depending on the length of the boards and the number of boards. Ensure the mass handled does not exceed safe limits as defined by applicable local legislation.
- When handling lengths of boards greater than 4 m (13 ft), ensure both ends are lifted simultaneously and evenly. Hold the boards 1 m (3 ft) 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.
- Store in a cool, dry environment.
- Avoid direct sunlight, high heat, or humidity.
- Keep away from sharp tools or materials that could cause scratches

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 for the selected material technology and profile. This will depend on the application as well as the loading class as defined by the local legislation. 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.

3.0 Cutting and fastening

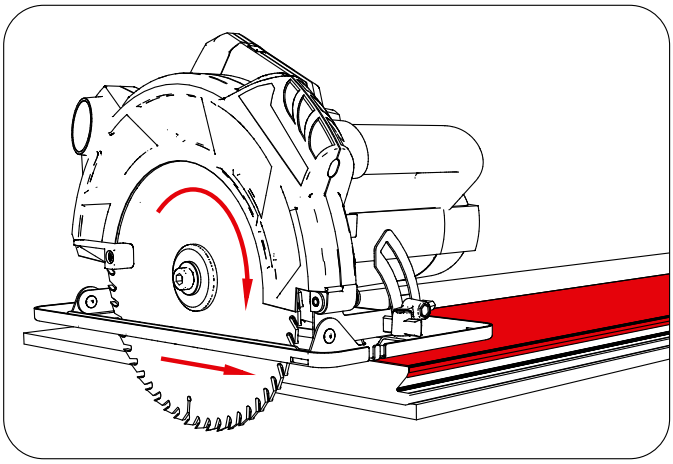
IMPORTANT: As detailed in **Section 2.2**, processing of Pioneer can produce fine particulate matter that contains glass fibres. Implement appropriate occupational health and safety guidelines and/or work procedures.

Follow these guidelines when cutting Pioneer composite materials to ensure clean edges and avoid surface damage.

- **Tool Selection:** Use sharp, clean carbide-tipped blades with TCG, M-TCG, or T-ATB tooth geometry and a 5–10° rake angle.
- **Blade Speed Limits:** Do not exceed the manufacturer's maximum RPM for your saw size.

Blade Diameter	305 mm (12")	254 mm (10")	203 mm (8")	184 mm (7¼")	165 mm (6½")
Max RPM	3 250	3 900	4 900	5 400	6 000

- **Cutting Orientation:** Always cut with the cap face up and blade rotation pressing down into the surface.



- **Technique:**
  - Cut one board at a time using a steady feed — do not force the blade.
  - Fully support boards during cutting to prevent vibration or edge chipping.
  - Trim factory ends square before installation and removes loose fibres with a sharp knife.

- **Cut Quality:** Avoid uneven or ragged cuts — they can damage or lift the surface cap.
- **Post-Cut Handling:** Wipe surfaces clean with a soft cloth — do not use solvents or alcohol-based cleaners.
- **Avoid:** Hand saws, jigsaws, counter-rotating saws, or aggressive FTG wood blades.

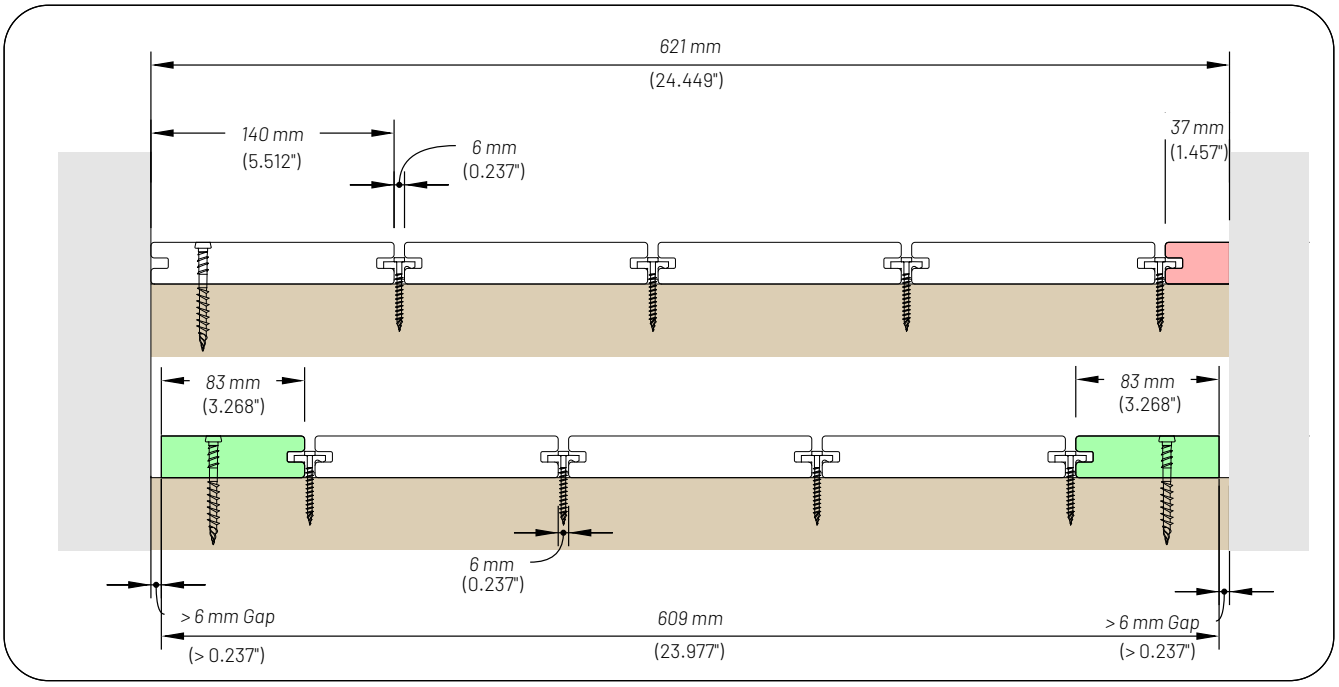
Saw Blade Recommendations

- **Mitre Saw Blade (10") -** Freud LU94M010 , Teeth Count: 80T, Tooth Geometry: M-TCG, Carbide Tipped.
- **Track / Plunge Saw Blade (6-1/2") -** Makita A-99998, Teeth Count: 60T, Tooth Geometry: TCG, Carbide Tipped
- **Hand Saw Blade (7-1/4") -** Oshlun SBNF-072560, Teeth Count: 60T, Tooth Geometry: TCG, Carbide Tipped

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 (2.113") for grooved boards or 90 mm (3.544") for square edged boards.
- In the case where it would be necessary to cut a board to less than 60 mm (2.113") wide, rip both the first and last board of the deck footprint to balance the required widths instead. Refer to below infographic for guidance.
- Ripped Pioneer boards are more prone to delamination, avoid ripping where possible.

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^2 ($10.7\ ft^2$) to match US Approach	Structure and notes
Metal deck screw	C1022	3.3	7	2.0 mm (14 ga) Guage steel
Composite deck screw	SS316	5.7	4	Pine with Specific gravity of 0.46
Metal clip screw and Chain collated deck clip	C1022	3.8	6	2.0 mm (14 ga) Guage 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 or 100 psf and the applicable:

Boards	Width mm (in)	Largest possible span rating based on USA requirements mm (in)	Clips/m² (Clips/10.7ft²) *	Load capacity of Chain collated clips per m² (10.7 ft²). kPa (psf)**	Requirement per US Approach with Safety factor of 3.0 kPa (psf)**
STTHM101A	145 (5.7)	572 (22.5)	7	26.6 (555)	21.6 (450)
STFM102A	141 (5.5)				
STFM103A	141 (5.5)				
STFM104A	145 (5.5)				
STFM112A	170 (6.69)		6	22.8 (476)	
STFM105A	190 (7.5)				
STFM170A	190 (7.5)				

* Calculated as the lowest integer of clips per m² 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.

Hulk top-fixing screws typically offer relatively higher withdrawal resistance as there are two fixings per board per joist. As a result, this data is not included here. If required, please refer to the relevant TDS section.

3.4 Fastening:

General Rules

- Use a minimum of two fasteners (hidden clips or top fixings) at every joist.
- Fasten boards at every joist to ensure loads are adequately distributed.
- Fasteners must be adequately distributed to avoid overloading individual fixings. Where required performance cannot be achieved, adjust board spans, substructure design, or fastening method accordingly (refer to relevant sections for guidance).
- Avoid top fixing wherever possible.

Hidden Fixing

- Hidden clip fixing is the preferred fastening method for Pioneer decking.
- Maintain a hidden clip fastening distance of 10 mm (0.38") minimum and 20 mm (0.79") maximum from the end of the board.

Top Fixing – Use Only Where Unavoidable

- Top fixing must be used only where hidden fixing is not possible (e.g. starter boards, fascias, breaker boards).
- Where top fixing is used in a location where it was avoidable, and this contributes to product damage or failure, such failure will not be covered under the Eva-Last warranty.
- Never force screws through the cap.
- When top fixing decking or fascia boards, maintain a minimum spacing of 30 mm (1.182") between fasteners and from any board edge.

Top Fixing – Star born Plug fasteners

- Starborn plug fastener systems are the recommended top-fixing method when top fixing is unavoidable.
- Install strictly in accordance with the **Starborn plug system** installation guide.

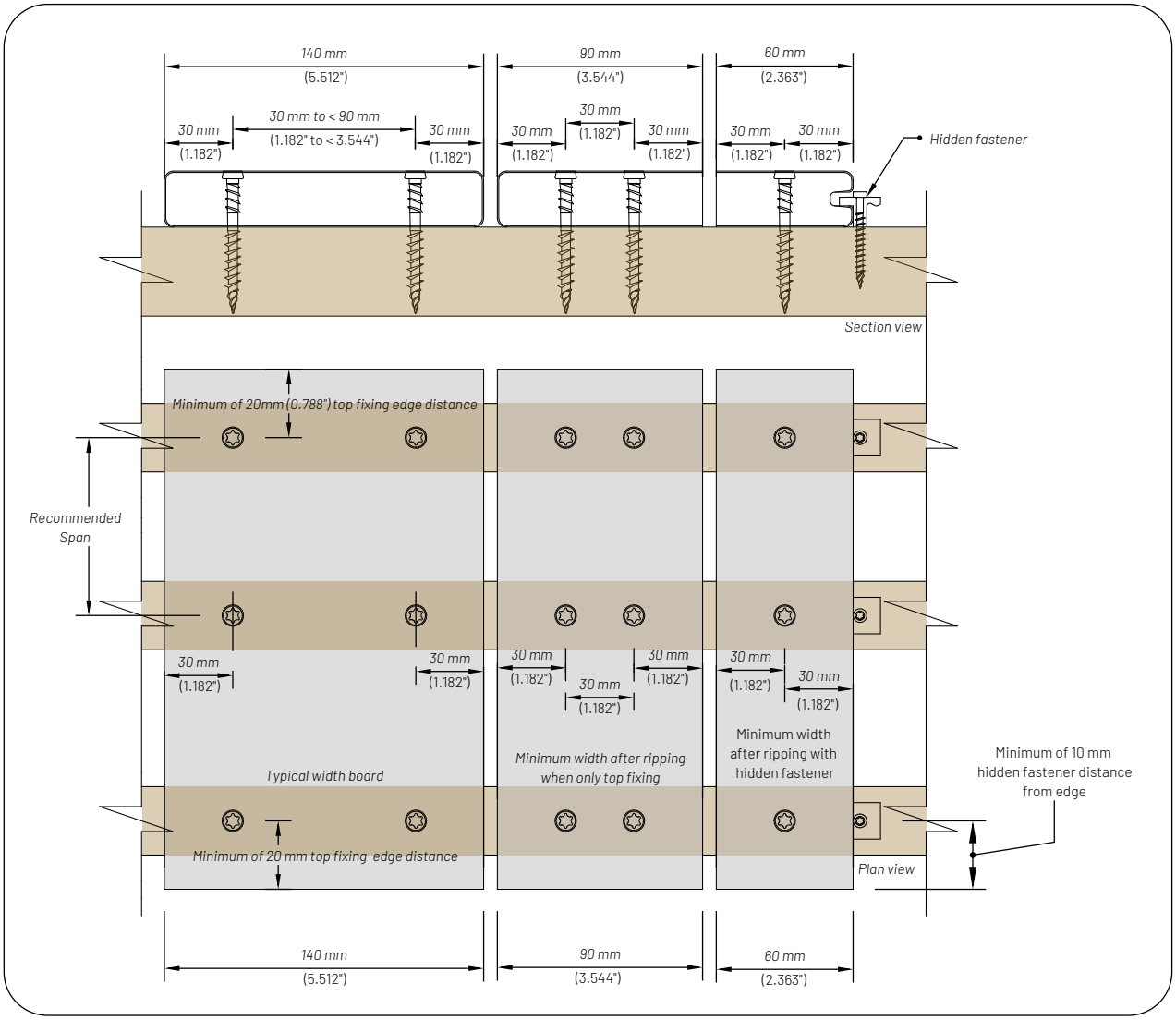
Top Fixing – Procedure (when not using Starborn)

- Procedure
  - Pre-drill holes slightly larger than the screw shank.
  - Countersink the fastener head slightly smaller than the fastener head to allow seating and reduce water ingress.
  - Drive fasteners using controlled torque only.
- Notes
  - Use sharp tools and drill bits at all times.
  - Heat generated from drilling, high RPM, or excessive torque can cause cap tearing, lifting, delamination, or material blowout.
  - Exercise additional care when drilling at low temperatures (below ±5 °C), where the cap material is harder and more susceptible to damage.

Tools & Torque Control

- Use a drill with adjustable torque settings.
- Set torque to less than 30% of the driver's maximum allowable torque.
- Do not force the screw through the cap.
- Do not overdrive screws.
- Do not use impact drivers.

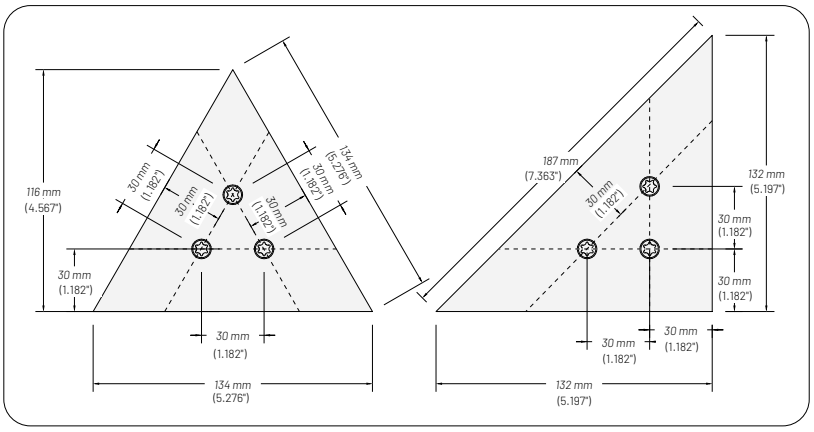
The following illustrations outline typical fastening principles for a top fixing application on the minimum ripped profile size as related to the recommended fastening edge distances, which can be implemented for profiles of any size.



3.5 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 (1.182") apart and must maintain 30 mm (1.182") 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.



3.6. 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.

3.6.1 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 x 10^{-6} mm/m/°C (0.0000185 "/"/°F). This means that a board of this material can expand, and contract, up to 0.04 millimetres per meter length (0.000022" inches per inch length), per degree change in temperature.
- To estimate an appropriate expansion gap **(ΔL)** per board, multiply the length of the board (L) by a coefficient of 0.04 (0.000022) (**α**) and by the maximum difference in temperature between the installation temperature and the possible temperature of the boards **(ΔT): ΔL = L x α x ΔT**
- 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 E** for convenience.

3.6.2 Steps to determining expansion and contraction gaps

1. **Research the site temperature extremes.**
   a. 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.
2. **Account for sunlight exposure.**
   a. Boards exposed to direct sunlight can often be 25 to 30°C (77 to 86°F) hotter than the air temperature.
   b. Add a buffer. A good rule of thumb is to use the difference between the installation temperature and the maximum site temperature as:
   Temperature buffer = (Maximum site temperature – Ambient temperature)
   c. Adjust the buffer for excessive exposure to account for reflective surfaces or extreme UV conditions.
3. **Determine Change in temperature.**
   a. Expansion gap temperature = Maximum site temperature – Ambient temperature + Buffer
   b. Contraction gap temperature = Ambient temperature – Minimum site temperature
4. **Calculate the Expansion and contraction.**
   a. Use a linear coefficient of expansion to estimate board movement. For Eclipse, this coefficient is +- 0.034 mm/m/°C. The formula to calculate the
   Required gap size = Length of the board in meters(inches) x 0.034 mm/m/°C or (0.0185 in/in/°F) x 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
Temperature change (°F)	41	50	59	68	77	86	95	104	113	122	131	140
Gap size per foot (in)*	1.002	0.004	0.006	0.008	0.01	0.012	0.014	0.016	0.018	0.020	0022	0024

*When using the table to determine imperial units add 32° to F to adjust the temperature scale

3.6.4 Example for Bloemfontein South Africa

- **Board Length:** 5 meters or 16.4 feet
- **Ambient installation temperature at time of installation:** 22°C (71.6°F)
- **Maximum temperature:** 58°C (40°C Record high + (40-22)) °C buffer) or 136°F (118.4°F + (118.4-71.6)) °F buffer)
- **Minimum temperature:** 14 °F (As it is unlikely the deck will be used below freezing temperatures and the aesthetic impact of the gaps will be minimal the lower temperature can be adjusted to 0°C. (32°F))

Temperature change example

- Max temperature change: 58°C - 22°C = 36°C
- Min temperature change: 22°C - (0°C) = 22°C

Calculation example using the expansion formula

- Total required gap size: 5m x 0.034 x 36°C = 6.12mm
- Potential gap increase: 5m x 0.034 x 22°C = 3.74mm
- Max potential gap possible:6.12 + 3.74 = 9.86mm

Temperature change example for direct conversion (IMPERIAL)

- Max temperature change: 136°F - 71.6°F = 64.4°C
- Min temperature change: 71.6°C - 32°F = 39.6°C

Calculation example using the expansion formula (IMPERIAL)

- Total required gap size: 196.85" x 0.0000185 x 64.4°F = 0.24"
- Potential gap increase: 196.85" x 0.0000185 x 39.6°F = 0.14"
- Max potential gap possible:0.24 + 0.14 = 0.39"

Calculation example from table

Max temperature change: 36°C - 40°C (round up)

- Max temperature change:1.4mm (from table)
- Min temperature change: 1.4mm/m x 5m = 7mm

Min temperature change: 22°C - (0°C) = 22°C - 25°C

- length change per meter:0.9mm (from table)
- Min temperature change: 0.9mm/m x 5m = 4.5mm

Max potential gap possible: 7 + 4.5 = 11.5mm

Calculation example from table (IMPERIAL)

Max temperature change: 96.8°F - 104°F (round up)

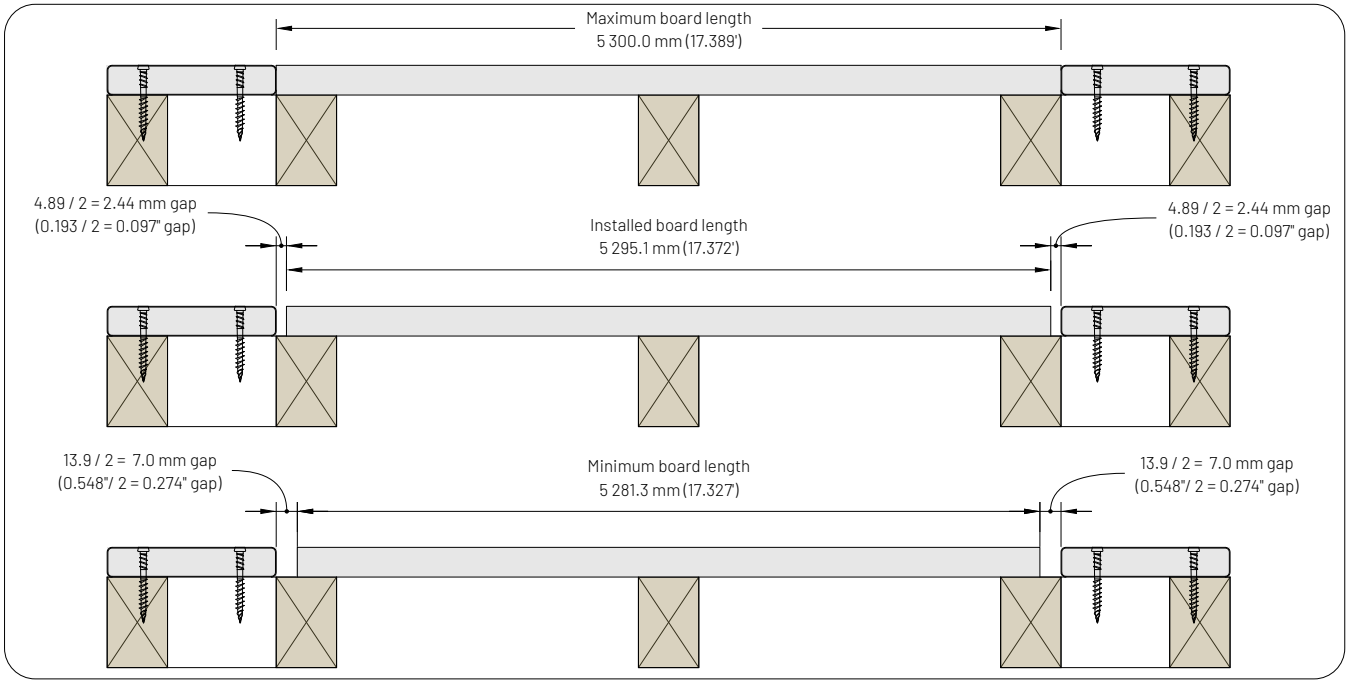
- Max temperature change:0.016" (from table)
- Min temperature change: 0.016" x 16.4ft = 0.26 inch

Min temperature change: 71.6°F - 77°F (round up)

- length change per meter:0.01" (from table)
- Min temperature change: 0.01 in/ft x 16.4 ft = 0.163"

Max potential gap possible: 0.263 + 0.164 = 0.424"

When using the table add 32° to F to adjust the temperature scale.



3.6.5 Implementing expansion gaps on site.

- Allow boards to acclimatise on site before installation to ensure uniform expansion.
- If the calculated maximum potential gap is 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 boarders 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.

4.0 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 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 applicable 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** below), snow loads (See **section 4.3** below), or diagonal board laying patterns (See **section 4.4**).
- Please see **Appendix C** and **Appendix D** for an additional information on Region specific load requirements

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) of various profiles for the conditions outlined above. The profile's moment of inertia and elastic section modulus is also captured for convenience. Profile availability may differ per region, please refer to www.eva-last.com or contact your local distributor for more information. For additional information please refer to the Pioneer Technical Data Sheet (TDS).

Maximum span* mm (in)									
Profile code	Moment of inertia, I_x (mm^4)	Elastic sectional modulus, S_x (mm^3)	US approach		Eurocode (and similar) approach				EN 15334
					Residential (2 kPa)		Commercial (4 kPa)		
			Ultimate	Serviceability	Ultimate	Serviceability	Ultimate	Serviceability	
STFM101A 145 x 21.0	101 499 (0.24)	9 936 (0.61)	572 22.5		550 22.5		550 22.5		400 16
STFM102A 141 x 24.8	171 787 (0.41)	13 878 (0.85)							
STFM103A 141 x 24.6	159 826 (0.38)	13 293 (0.81)							
STFM104A 145 x 21.0	106 038 (0.35)	10 212 (0.84)							
STFM112A 170 x 21.0	129 839 (0.31)	12 343 (0.75)							
STFM113A 170 x 21.3	135 804 (0.33)	12 738 (0.77)			500 20		500 20		350 13.75
STFM105A 190 x 21.0	145 270 (0.26)	13 813 (0.62)							
STFM107A 190 x 21.0	145 570 (0.35)	13 853 (0.85)							

*Please note that the information is based on limited test data at present. Available test data for STFM101A and STFM105A have 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.

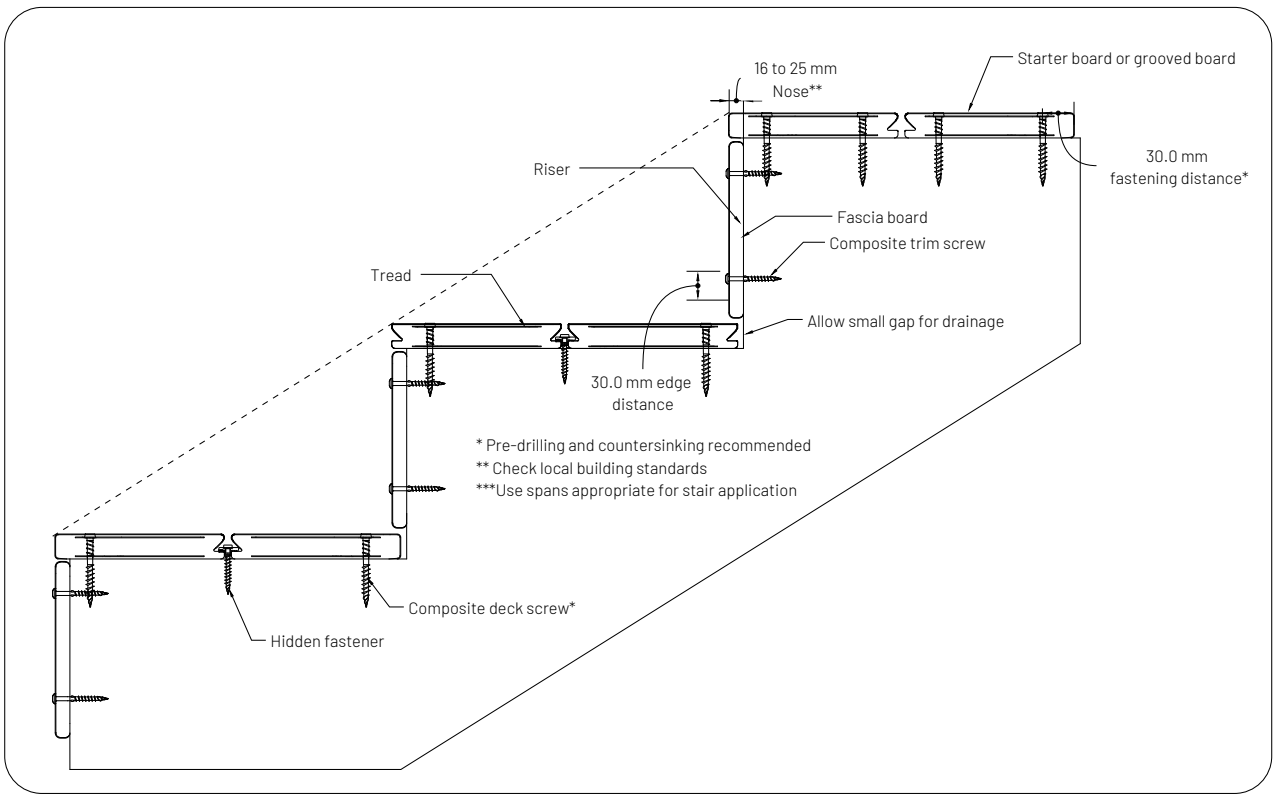
4.2 Stairs span requirements

The following profiles have been tested in accordance with CCRR requirements limiting deflection to 3.2mm (0.125 in) for a 1.3 kN (300 lbf) 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 code	Maximum span for stair applications (mm)
STFM101A 145 x 21.0	305 mm (12 ")
STFM104A 145 x 21.0	
STFM112A 145 x 21.0	
STFM113A 145 x 21.0	
STFM105A 190 x 21.0	
STFM107A 190 x 21.0	

It is assumed that the remaining profiles, which all have better sectional properties than the tested profiles above, will satisfy the same stair spans.

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 of each profile. Please refer to the relevant Technical Data Sheets (TDS) for specific profile and material properties and results. 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 (in))				
Profile Code	Board Width [mm (in)]	Board Height [mm (in)]	US Approach - Span [mm (in)]	4.78 kPa 100 PSF	9.6 kPa 200 PSF	14.4 kPa 300 PSF	19.2 kPa 400 PSF	23.9 kPa 500 PSF
STFM101A 145 x 21.0	145 (5.7)	21.0 (0.82)	572 (22.5)	572 (22.5)	406 (16)	355 (14)	305 (12)	305 (12)
STFM102A 141 x 24.8	141 (5.6)	24.8 (0.98)						
STFM103A 141 x 24.6	141 (5.6)	24.6 (0.96)						
STFM104A 145 x 21.0	145 (5.7)	21.0 (0.82)						
STFM112A 170 x 21.0	170 (6.7)	21.0 (0.82)						
STFM113A 170 x 21.3	170 (6.7)	21.3 (0.83)						
STFM105A 190 x 21.0	190 (7.5)	21.0 (0.82)						
STFM107A 190 x 21.0	190 (7.5)	21.0 0.82)						

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 for the applicable profile. This can be calculated as follows

- Adjusted Span = Original Span ×cos (ø)
- 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.
    - ø 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.

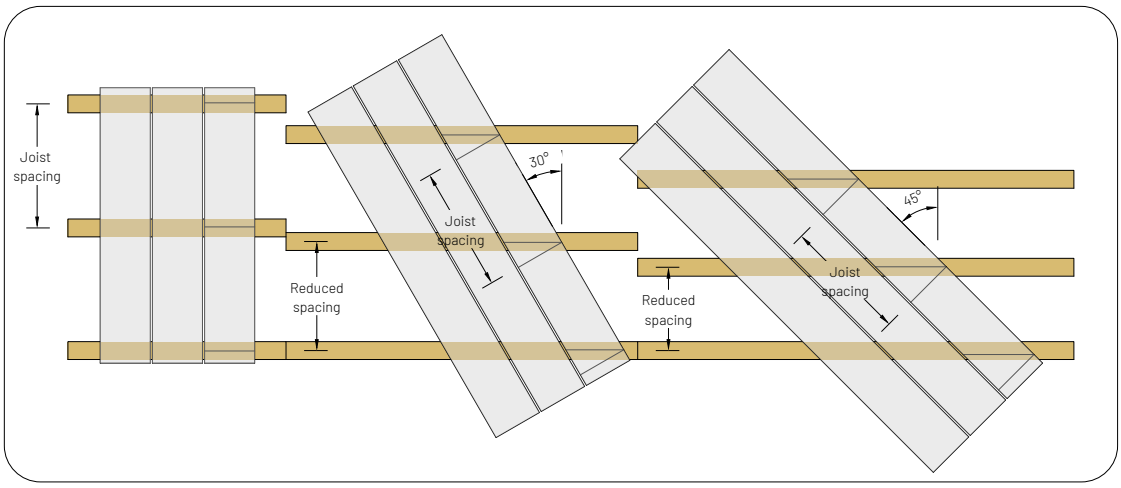
      Example: Adjusted Span = 457 mm x cos 45° or 18" x cos 45°

      = 318.2 mm or 12.7"

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 (20.5")	424 mm (16.7)
550 mm (22 ")	485 mm (21.8 ")	395 mm (15.56 ")
500 mm (20")	439 mm (17.3 ")	359 mm (14.1 ")
450 mm (18 ")	396 mm (15.4 ")	323 mm (12.7 ")
400 mm (16 ")	351 mm (13.8 ")	287.4 mm (11.3 ")
300 mm (12 ")	264 mm (10.3 ")	215 mm (8.5 ")

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



A reminder to:

- Support 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 required. The spans between noggins must not be greater than the maximum centre-to-centre span of the applicable profile.
- Use sister joists at half the required span at the edges of decks.
- Do not overhang boards by more than 20 mm (0.788") from a support edge.
- Allow for clearance between the ground and deck, and between the deck and other potential obstructions, such as doors opening out over the deck.
- Allow for drainage and water control. Consult a suitably qualified professional if required.
- Allow for railing where necessary. Consult a suitably qualified professional if required.

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 (0.237") to match that of the typical gap between boards installed parallel to each other.

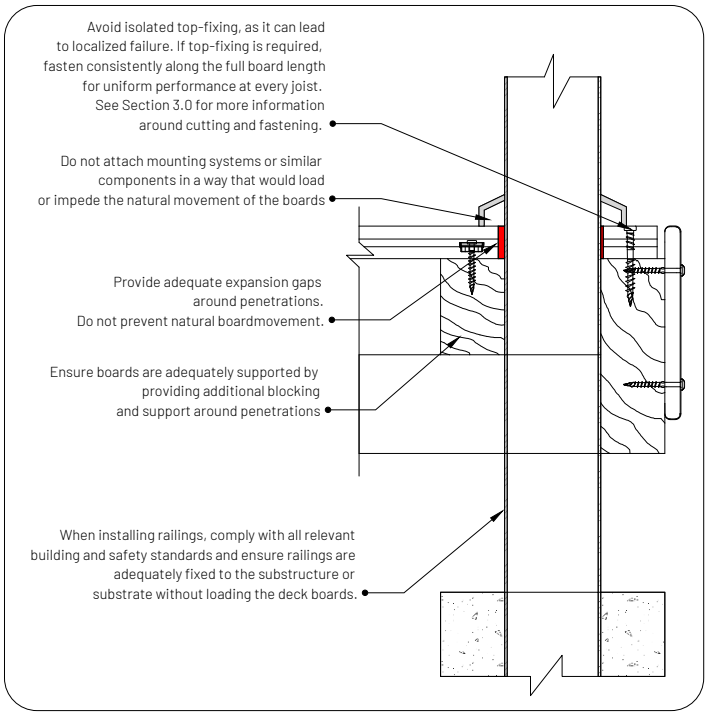
- Use breaker boards and boarder boards to provide an aesthetically pleasing finish whilst assisting in controlling expansion and contraction.
- Use multiple combinations of shorter boards with breaker boards to balance long runs against expansion and contraction limitations.
- Butt joints can be installed 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.

4.5.1 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 (1.5 ") 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.

4.5.2 Railing, bracket mounting and similar penetrations

- All railing installations must comply with relevant building and safety standards.
- Do not fix railing components directly to deck boards; fix appropriately to substructure or substrate ensuring that railing loads are transferred correctly and that applicable standards are satisfied. See Section 3.2 for more information.
- Frame and block around deck openings, posts, or fittings to ensure all board ends are appropriately supported.
- Avoid pinning, clamping, or compressing deck boards in a way that transfers railing loads to boards or restricts thermal movement, prevents drainage or creates any other stress points.
- Maintain clear drainage and expansion and contraction gaps around posts, brackets, and fixings.
- Glass railings and reflective surfaces can create localised heat buildup. Where this is likely, prevent deck boards from being exposed to temperatures exceeding their design limits. See section 4.5.4 for more information.



4.5.3 Environmental and Material Exposure Risks

- **Excessive and unusual heat sources :** Eva-Last products are 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.
- **Incompatible materials :** Avoid contact between deck surfaces and materials that may negatively affect the product—such as those containing plasticisers, including soft plastics, rubbers, foams, and synthetic composites. This includes, but is not limited to, items like garden hoses, rubber mats, plastic tarps, inflatable products, and protective coverings. These materials may cause staining, discolouration, or surface degradation. Consult the product's Technical Data Sheet (TDS) and relevant chemical compatibility data to assess potential risks. Users are responsible for confirming material suitability under actual use conditions.
- **Wind and acoustic consideration:** Account for environmental factors such as wind uplift and sound transmission. Proper board orientation, secure fastening methods, and strategic use of screens or vegetation can help mitigate wind loads and reduce acoustic impact on the deck and surrounding area.

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.

Below is an example that lays out the implementation of the steps suggested above. The same example deck discussed in **Section 3** is incorporated.

LOCATION AND MACRO ENVIRONMENTS

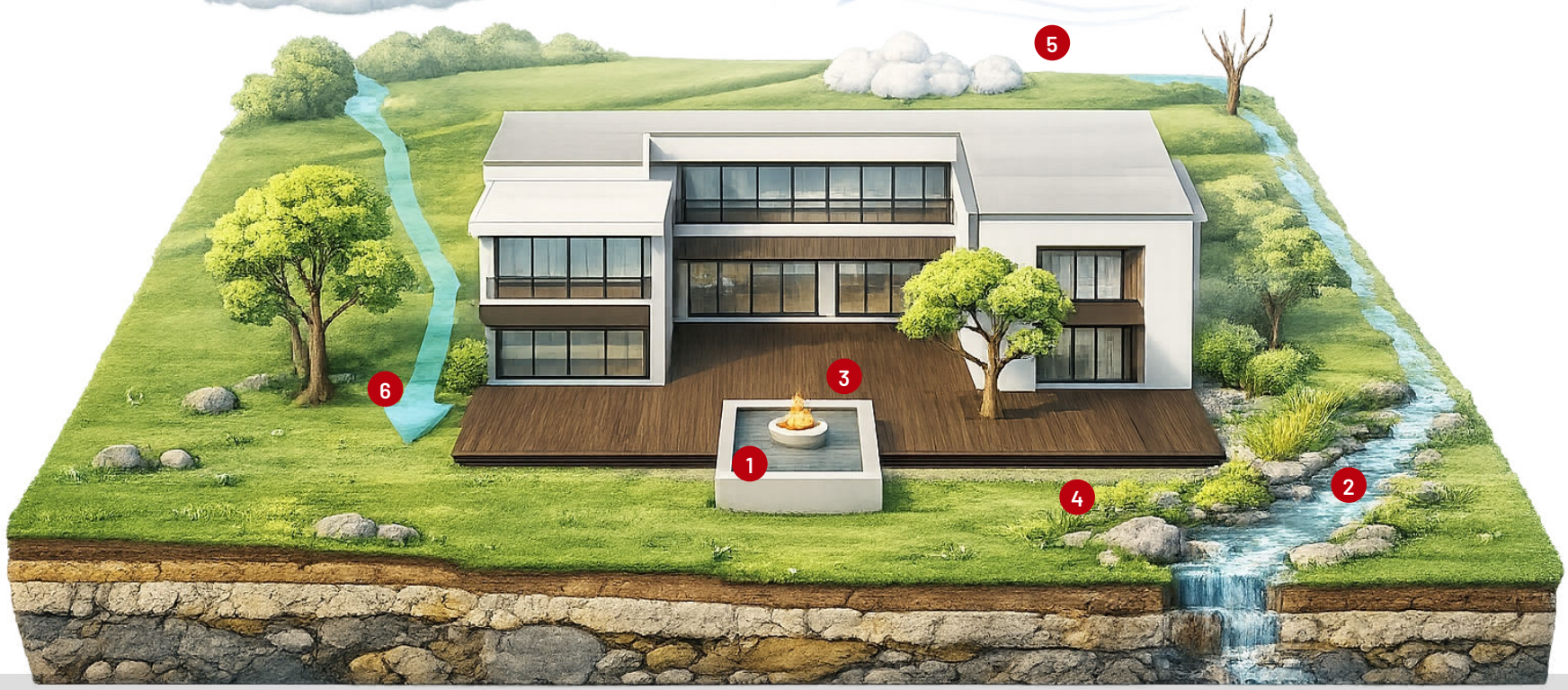
Illustrative site conditions and environmental factors informing deck system design

LOCATION
Bloemfontien , South Africa

CLIMATE
Semi Arid - High UV Index
Min recorded temperature 10 °C (14°F)
Max recorded temperature 0 °C (104°F)

CORROSION CATEGORY
External C3 Class (Moderate)
Low salinity, moderate pollution.

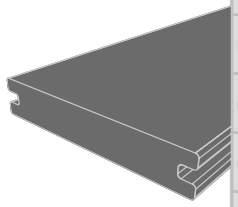
PROPERTY TYPE
Residential



SITE ASSESSMENT OF THE MICRO ENVIRONMENT

1	**Existing features**	An existing recessed Fire pit with a 450 mm (18") drop .
2	**Hydrological**	The deck requires no further intervention as water flows away from the deck to natural water catchment areas.
3	**Utilities**	There are no utilities running across the footprint of the deck.
4	**Vegetation**	A landscape fabric or plastic sheet should be applied beneath the deck to prevent vegetative growth beneath the deck.
5	**Wind and acoustic conciderations**	Design for environmental factors like wind, which can affect uplift and acoustic behavior. Proper fastening, board orientation, and the use of screens or vegetation can help reduce wind-induced effects.
6	**Topographical**	The ground has 2° slope resulting in a 900 mm (36") drop from the final required floor height.

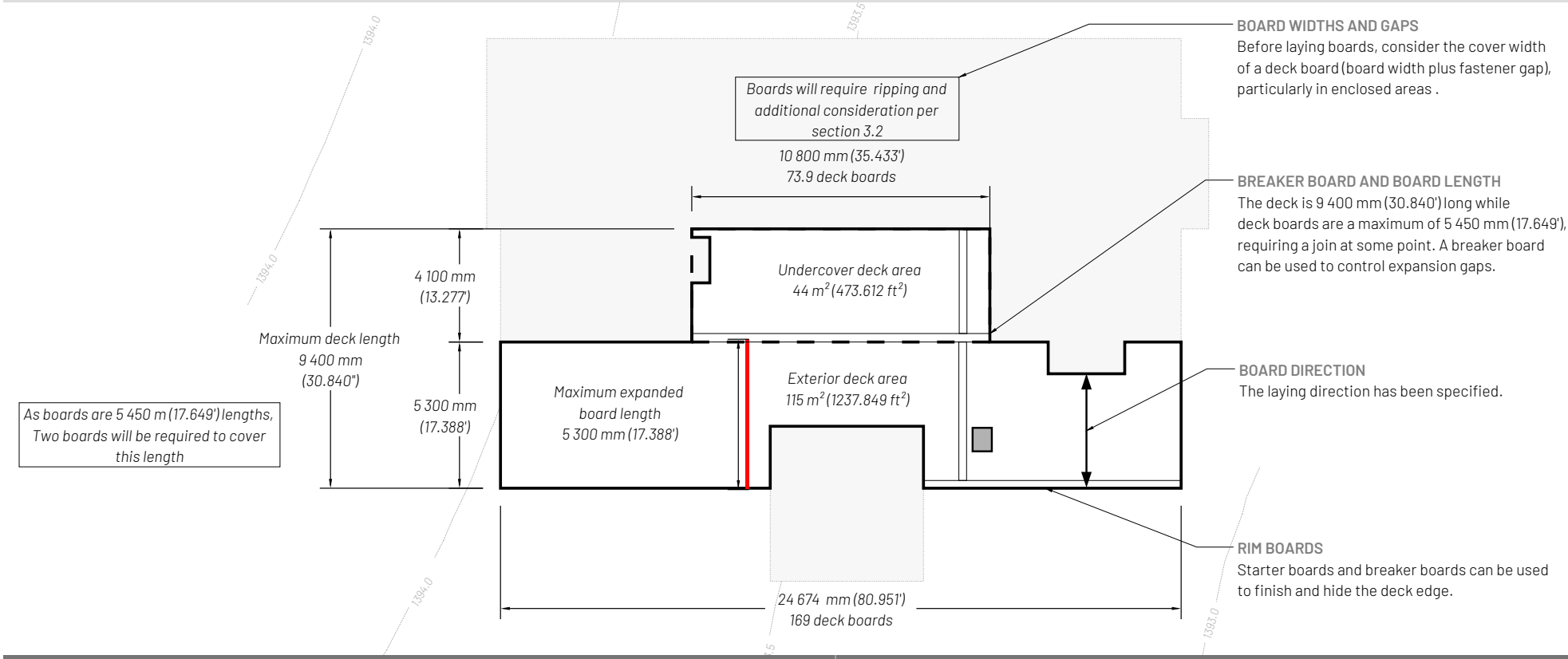
DECK SELECTION



Board type	Grooved deck board (project dependant)
Profile example	140 x 25.4 x 5 450 mm
Colour	Dark brown
Orientation	Board running perpendicularly away from the building
Fasteners	Hidden fasteners
Span	450 mm (Example only)

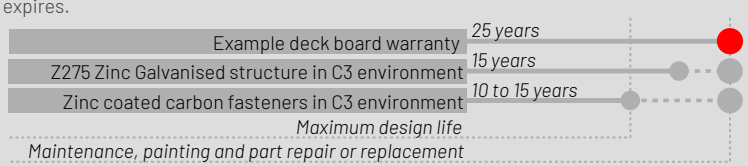
DECK ASSESSMENT

An appropriately qualified professional has specified the structure and fastener combination to meet the environmental and loading requirements for the deck. In this example the professional has specified a galvanised steel frame and composite to steel deck fastener, specific to this site. The footprint of the deck has been assessed in relation to the dimensions of the specified deck board.



LIFESPAN DESIGN

The design life of a deck system requires balancing the lifespans of the individual components, to the part with the lowest life span. The system life expectancy can be extended with proactive maintenance, painting, and replacing parts once the part expires.

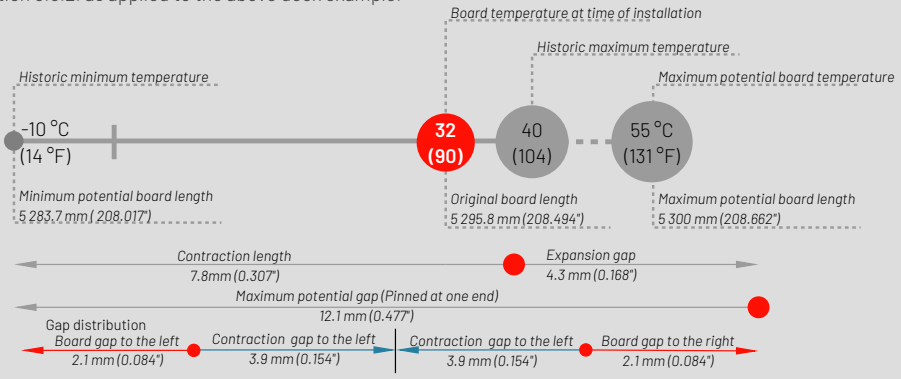


OTHER LAYOUT CONCIDERATIONS

1	Board direction can influence slip resistance, particularly in areas that are frequently wet or heavily trafficked.
2	Deck layout may affect drainage, especially at edges, thresholds, and where board direction or detailing changes.
3	High-traffic areas, including access points or zones exposed to abrasive footwear, may experience faster surface wear over time.
4	More complicated deck board patterns do influence the complexity of structural layout, potentially increasing the need for additional framing and joining, its important to look at a deck system holistically.

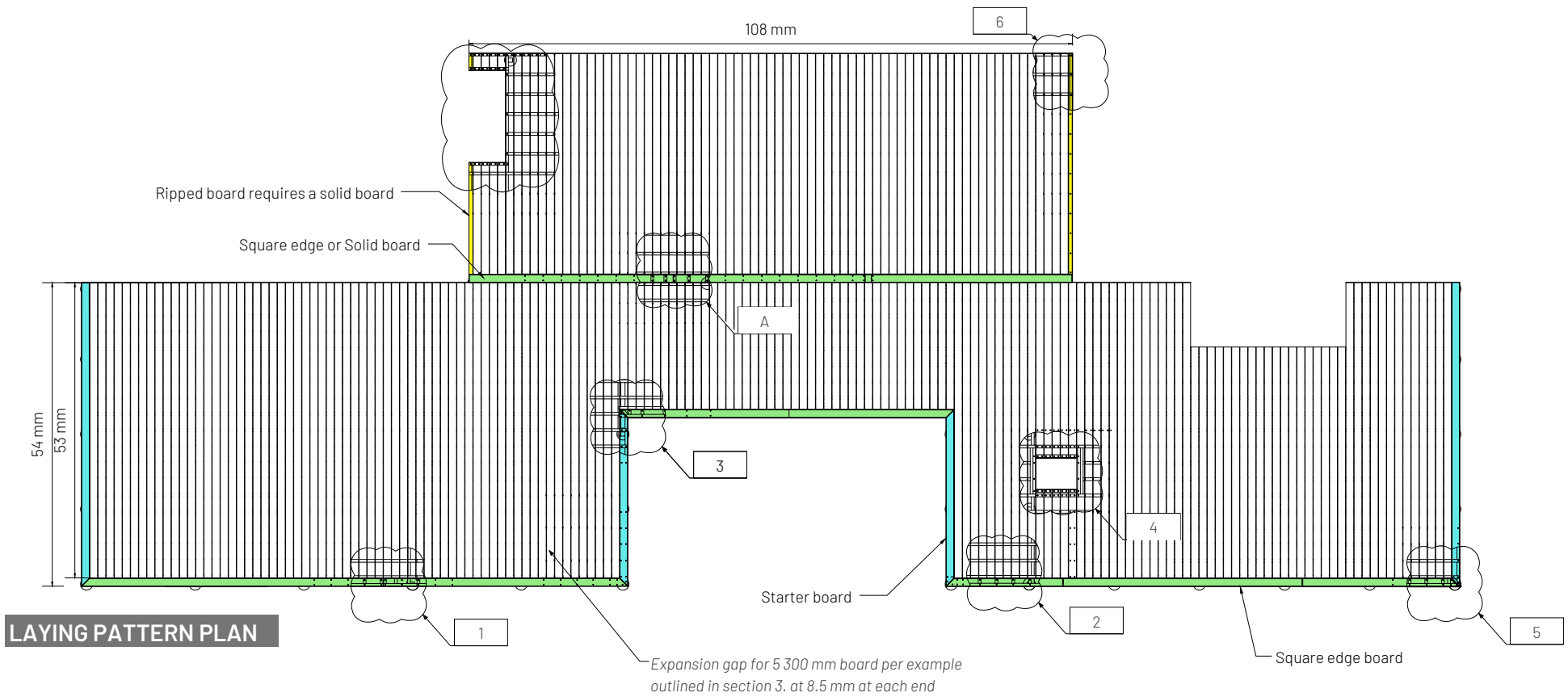
EXPANSION GAP

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. The below infographic provides a summary of the example provided in section 3.5.2. as applied to the above deck example.



DECK STRUCTURE AND LAYING PATTERN EXAMPLE

The deck laying pattern will impact the final design of the structure.



LAYING PATTERN PLAN

DECK SCHEDULE (EXAMPLE)

	Profile	Size	Board length	Profile
	Grooved	*140 x 24 mm*	*5 450 mm*	
	Starter	*140 x 24 mm*	*5 450 mm*	
	Square egde	*140 x 24 mm*	*5 450 mm*	

REFERENCE - BOARD RIP CALCULATION EXAMPLES

EXAMPLE (METRIC)

Determine ripped board sizes before installation -
10 804 mm / (136 board width + 6 mm gap) = 76.1 boards
76 boards x 142 mm= 10 792 mm
10 804 - 10 792 = 12 mm

Aesthetic requirement require that boards align.

Therefore split the boards 68 mm ripped grooved board either side .

EXAMPLE (METRIC)

Example (Imperial) -
Determine ripped board sizes before installation -
35.446' / (5.355" board width + 0.237" gap) = 76.1 boards
76 boards x 15.591' = 35.407'
35.446 - 35.407= 0.473"

Aesthetic requirement require that boards align.

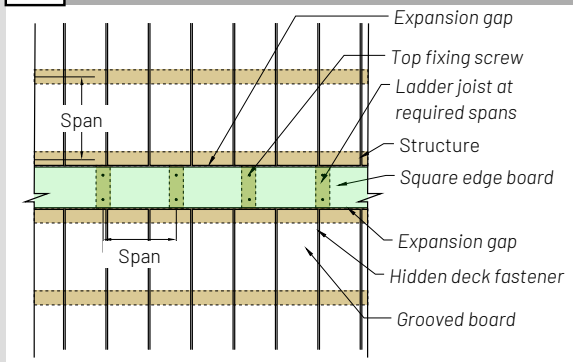
Therefore split the boards 2.678" ripped grooved board either side .

STRUCTURAL SUPPORT DETAILS (Reference Examples)

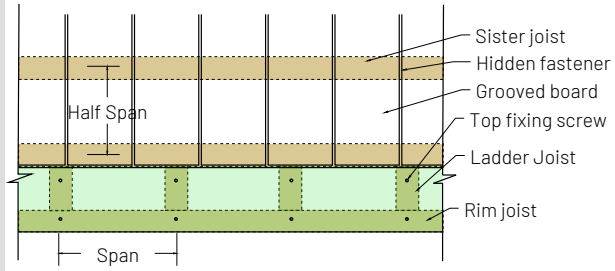
Typical structural support resulting from deck layout and board detailing

PRIMARY STRUCTGURAL CONDITIONS

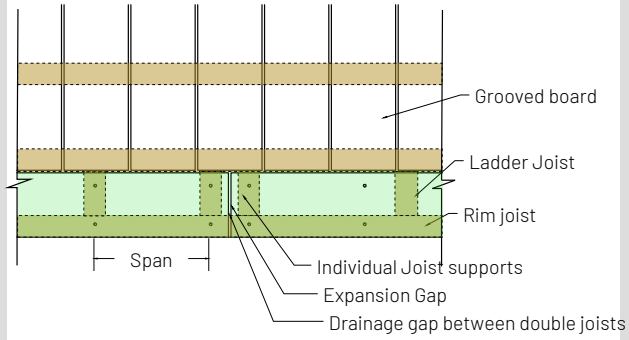
A BREAKER BOARD DETAIL



1 EDGE BREAKER BOARD DETAIL

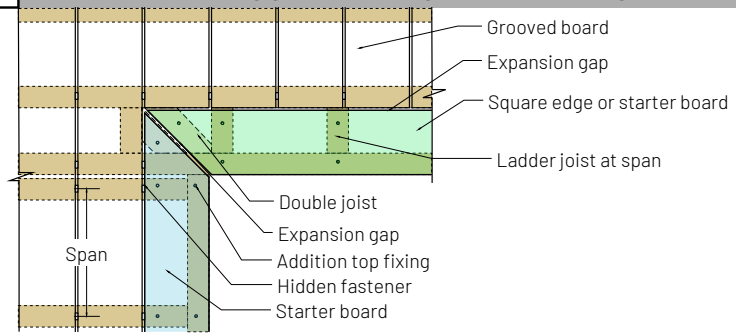


2 TYPICAL DOUBLE JOIST DETAIL

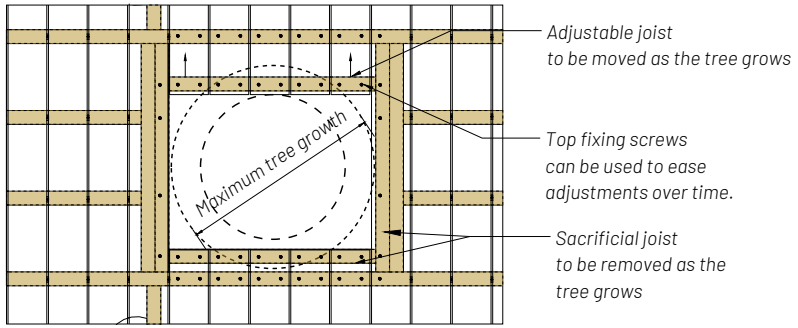


PENETRATIONS and EDGE CONDITIONS

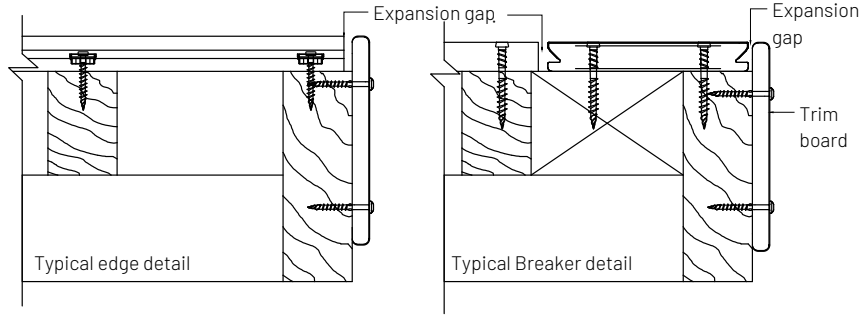
3 MITRE JOIN DETAIL ON BREAKER BOARD



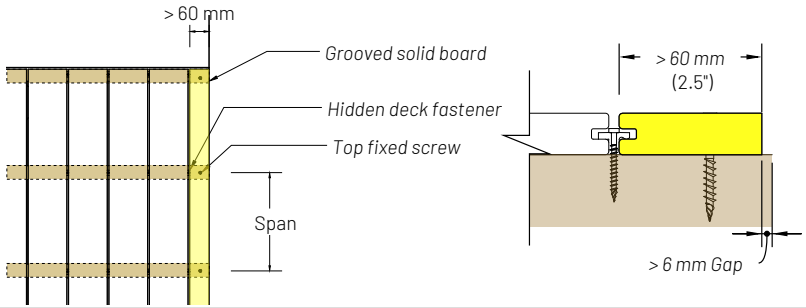
4 BOARD SUPPORT AROUND A TREE



5 TRIM DETAIL



6 RIPPED BOARD DETAIL



5. Disclaimer and copyright

5.1 Document disclaimer

The provided information is offered in good faith as accurate but without guarantee. Eva-Last makes no warranties or representations of any kind (express or implied) about the accuracy, adequacy, currency, or completeness of the information, or that it is necessarily suitable for the intended use.

Compliance with this document does not guarantee immunity from breach of any statutory requirements, building codes, or relevant standards. The final responsibility for the correct design and specification rests with the designer and, for its satisfactory execution, with the contractor. Appropriate warnings and safe handling procedures should be provided to handlers and users.

While most data have been compiled from research, case histories, experience, and testing, small changes in the environment can produce marked differences in performance. The decision to use a material, and in what manner, is made at your own risk. The use of a material and method may, therefore, need to be modified to its intended end use and environment.

Eva-Last, its directors, officers, or employees shall not be responsible for any direct, indirect, or special loss or damage arising from, or as a consequence of, use of, or reliance upon, any information contained in this document or other documents referenced herein. Eva-Last expressly disclaims any liability which is based on or arises out of the information or any errors, omissions, or misstatements herein.

5.2 Drawing disclaimer

All dimensions and specifications are offered in good faith as accurate but without guarantee. The information captured herein may not contain complete details. Eva-Last makes no warranties or representations of any kind (express or implied) about the accuracy, adequacy, currency, or completeness of the information, or that it is necessarily suitable for the intended use.

Compliance with this document does not guarantee immunity from breach of any statutory requirements, building codes or relevant standards. The final responsibility for the correct design and specification rests with the designer and, for its satisfactory execution, with the contractor.

5.3 Utilisation disclaimer

Legislation may differ between jurisdictions. Before installing any Eva-Last product, 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 manufacturers and building codes differ, revert to the building code requirements. Check that your choice of product is suitable for its intended application. For further product specification and information visit www.eva-last.com.

5.4 Copyright

If reprinted or reproduced or utilised in any form Eva-Last should be acknowledged as the source of the information.

Eva-Last periodically updates the information contained in this document as well as that of the Eva Last documents that have been referenced herein. Before using this document, please refer to the Eva-Last website (www.eva-last.com) for the most up-to-date documents.

Contact information
Eva-Last
Email: info@eva-last.com
Website: www.eva-last.com

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.

Profile ID	Application type	Board width (mm) (inch)	Thickness (mm) (inch)	Mass per meter (kg/m) (lb/ft)	Cover width (1) (mm) (inch)	Coverage (2) (m/m^2) (ft/ft^2)	Coverage mass (3) (kg/m^2) (lb/ft^2)
STFM101A	Deck board	145.0 (5.71)	21.0 (0.83)	2.2 (1.48)	151.0 (5.95)	6.7 (2.04)	14.1 (2.89)
STFM103A	Deck board	141.0 (5.55)	24.5 (0.97)	2.5 (1.68)	147.0 (5.79)	6.8 (2.07)	16.6 (3.40)
STFM104A	Deck board	145.0 (5.71)	21.3 (0.84)	2.3 (1.55)	151.0 (5.95)	6.6 (2.02)	15.5 (3.18)
STFM112A	Deck board	170.0 (6.69)	21.0 (0.83)	2.8 (1.88)	176.0 (6.93)	5.7 (1.77)	15.9 (3.26)
STFM113A	Deck board	170 (6.69)	21.3 (0.84)	2.8 (1.88)	176.0 (6.93)	5.7 (1.77)	15.9 (3.26)
STFM105A	Deck board	190.0 (7.49)	21.0 (0.83)	3.1 (2.09)	196.0 (7.72)	5.1 (1.56)	15.8 (3.24)
STFM107A	Deck board	190.0 (7.49)	21.0 (0.83)	3.1 (2.09)	196.0 (7.72)	5.1 (1.56)	15.8 (3.24)
STFM106	Fascia board	151.0 (5.95)	12.5 (0.49)	1.4 (0.94)	157.0 (6.18)	6.4 (1.95)	9.9 (2.03)

(1) Coverage width = Board width + an assumed typical gap of 6 mm. (0.24“)

(2) Coverage = 1000/Coverage width

(3) Coverage mass = Coverage x mass per meter (feet)

A.2 Compatible fasteners

Below is a summary of fasteners available for fixing the Pioneer family of profiles. Please refer to **www.eva-last.com** for profiles available to your region.

Fastener type	Size (mm) (inch or #)	Length (mm) (inch)	Material	Note
S6 decking clip	6.0 (0.237)	38 (1.497)	SS 430	Compatible with boards that have a 6 mm (0.237") groove height.
S9 decking clip	9.0 (0.335)	38 (1.497)	SS 430	Compatible with boards that have a 9 mm (0.354 ") groove height.
Chain Collated decking clip	6.0 (0.237)	19 (0.749)	SS 316 or SS 304	Compatible with boards that have a groove height of between 6 mm (0.237") and 12 mm (0.472"). To be used with hand tool.
Clip screw for timber substructure	M 4.2 (# 8)	40 (1.575)	C 1022 SS 316	Compatible with all listed clips. Two corrosion resistance options.
Clip screw for metal substructure	M 4.2 (# 8)	31 (1.221)	C 1022	Compatible with all listed clips.
Top fixing deck screw for timber	M 5.0 (# 10)	63 (2.481)	C 1022 SS 305	For 20 mm to 25 mm (0.787 to 0.984") thick boards into timber structures greater than 40 mm (1.575") thick. Two corrosion resistance options.
Top fixing deck screw for metal	M 5.0 (# 10)	45 (1.772)	C 1022	For 20 mm to 25 mm (0.787 to 0.984") thick boards into metal structures 0.8 mm to 2.0 mm (0.032 to 0.079") thick.
Top fixing trim screw for timber	M 5.5 (# 10)	48 (1.890)	10 B 21 SS 316	For 11 mm to 16 mm (0.433 to 0.629") thick boards into timber structures greater than 40 mm (1.575 ") thick. Two corrosion resistance options.
Top fixing trim screw for metal	M 5.5 (# 10)	35 (1.378)	10 B 21 SS 410 H	For 11 mm to 18 mm (0.433 to 0.709") thick boards into metal structures 0.8 mm to 2.0 mm (0.032 to 0.079") thick. Two corrosion resistance options.

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 details

Product code

STFM101A
STFM103A
STFM104A
STFM105A
STFM107A

Notes

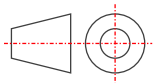
Drawing title

Generic - Grooved deck board - Pioneer

File name

Version 5.1 - Pioneer - IG - 2025

File details

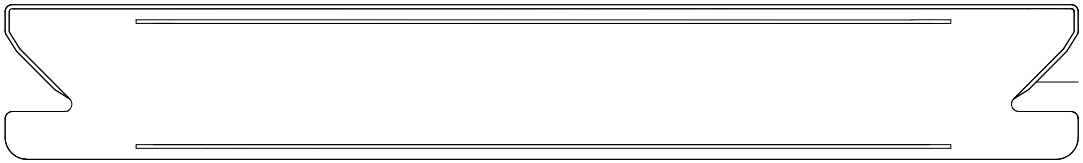


Drawing number	01
Date	May 22, 2025
Page	N/a
Scale	NTS

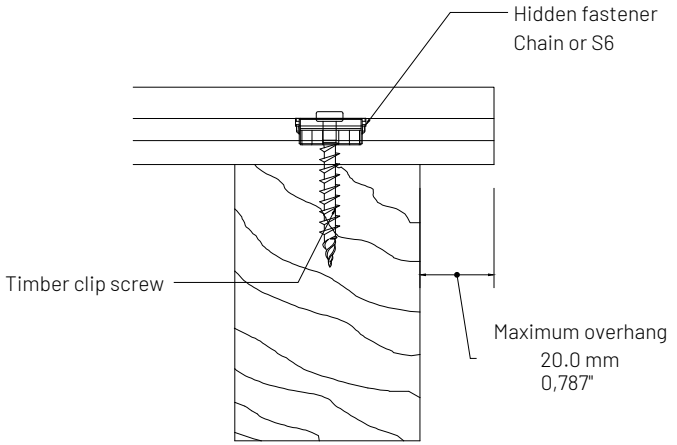
Unless otherwise specified all dimensions are in millimeters and inches.

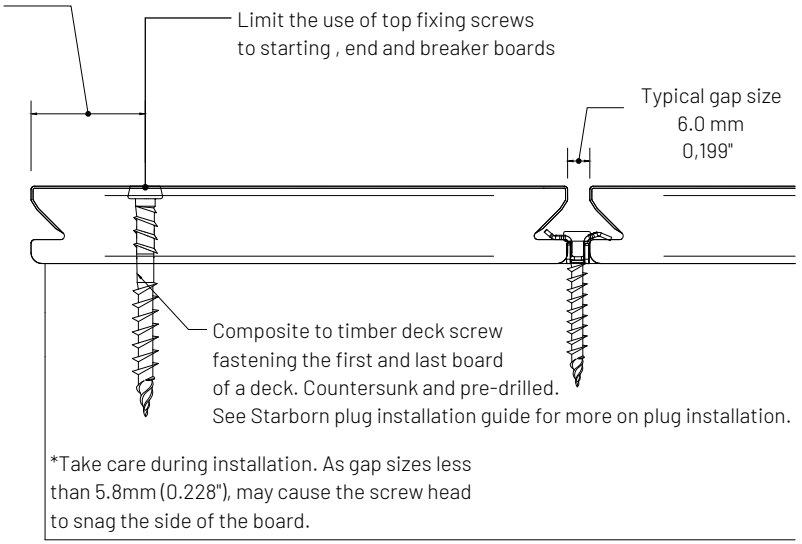
Issued for information. See supporting documentation for disclaimers and details.

Pioneer

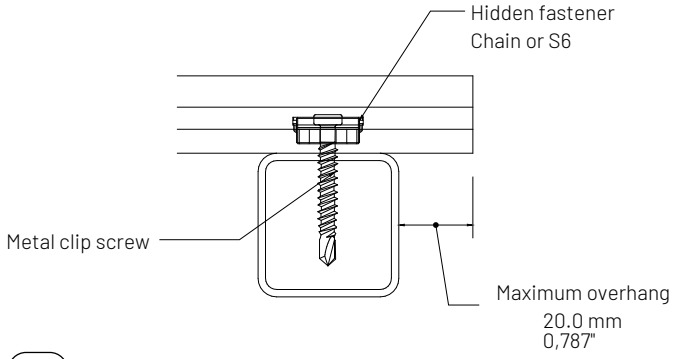


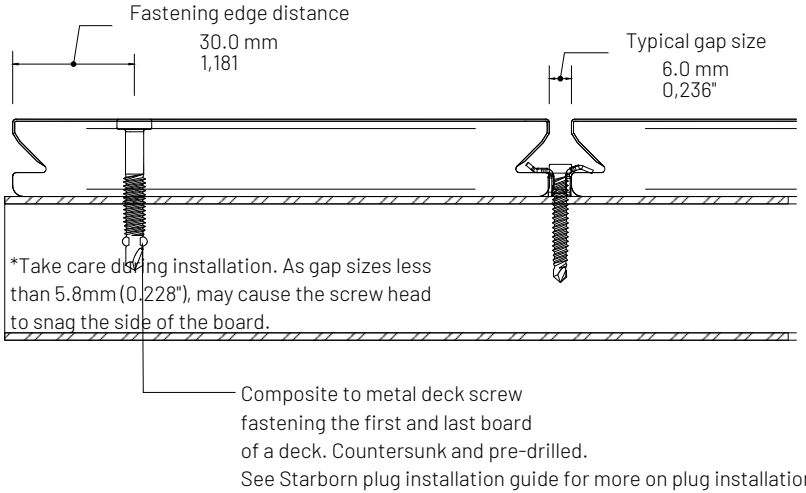
A Grooved deck board
Scale 1:1





B1 Grooved deck board in a Timber application
Scale 1:2





B2 Grooved deck board in a metal application
Scale 1:2

Profile details

Product code **STFM106**

Notes

Drawing title

Generic Fascia board - Timber structure - Pioneer

File name

Version 5.1 - Pioneer - IG - 2025

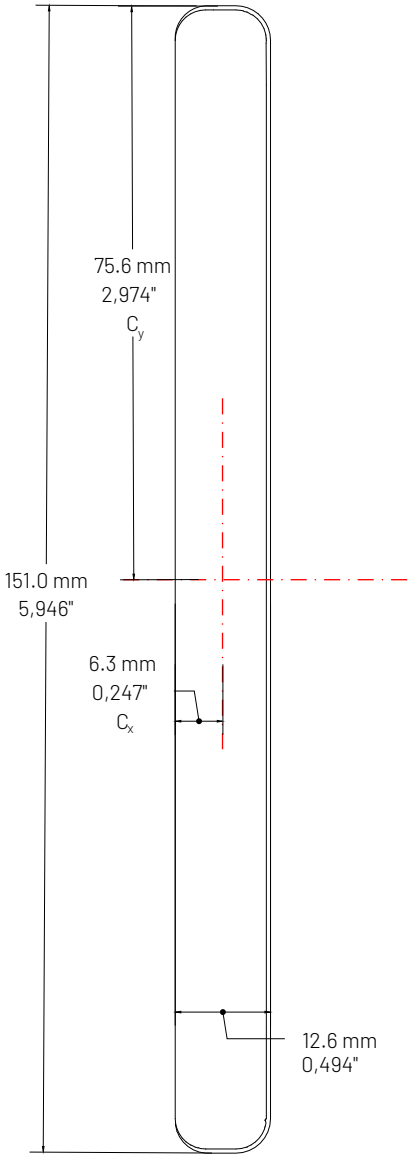
File details

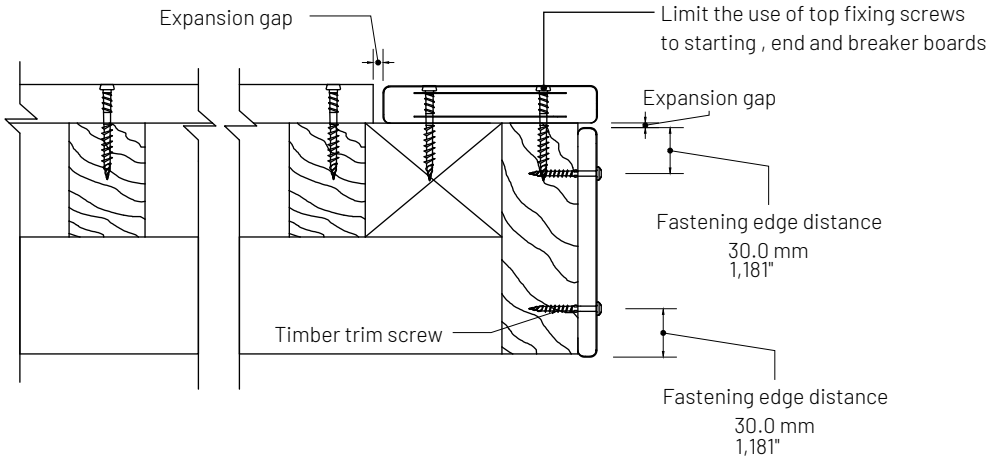
Drawing number	01
Date	May 22, 2025
Page	N/a
Scale	NTS

Unless otherwise specified all dimensions are in millimeters and inches.

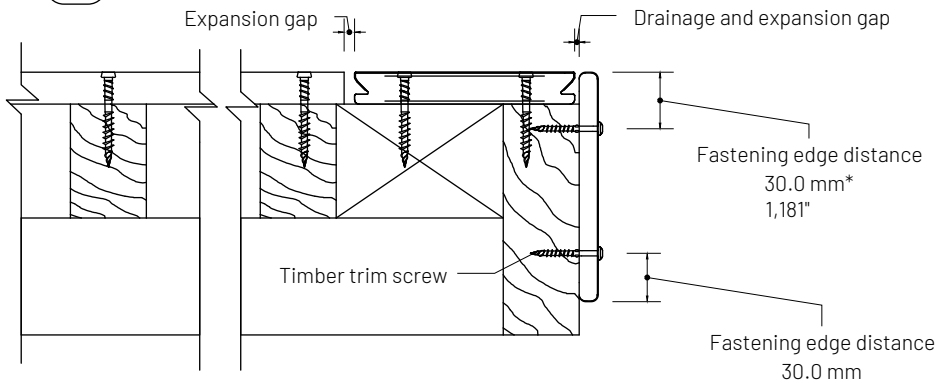
Issued for information. See supporting documentation for disclaimers and details.

Pioneer

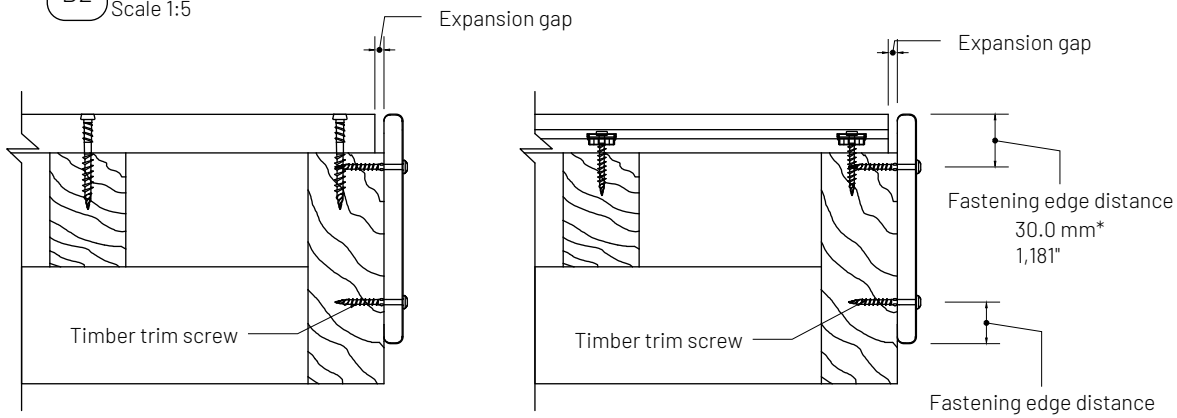




B1 STFM106. Grooved deck board in a Timber application beneath a breaker board
Scale 1:5



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 details

Product code **STFM106**

Notes

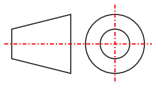
Drawing title

Generic Fascia board - Metal structure - Pioneer

File name

Version 5.1 - Pioneer - IG - 2025

File details

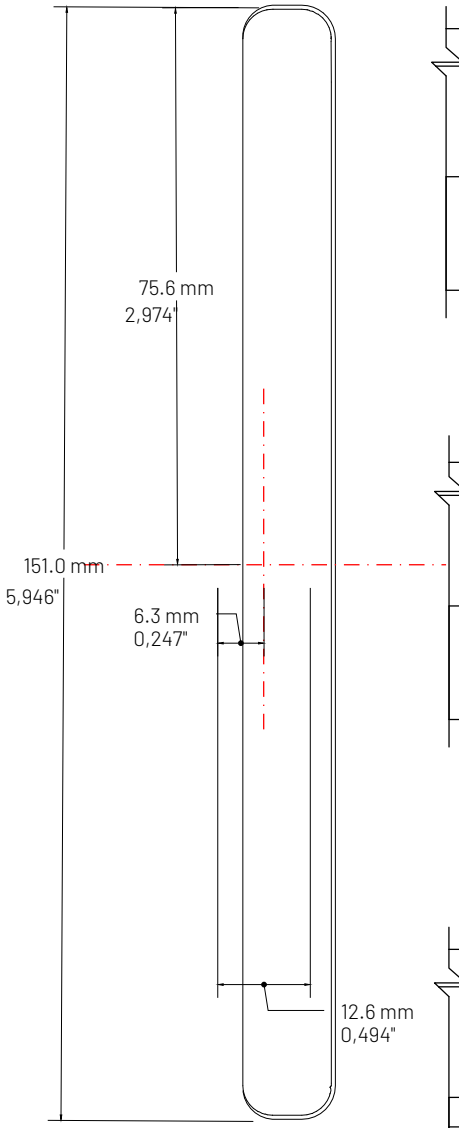


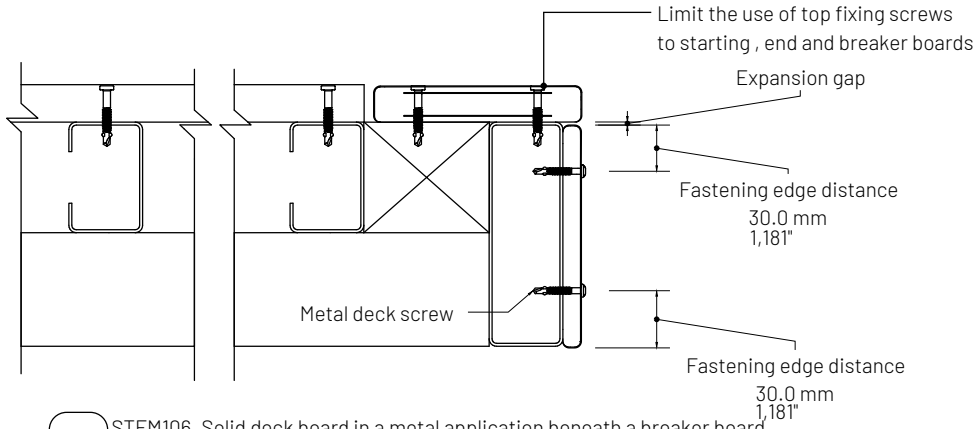
Drawing number	01
Date	May 22, 2025
Page	N/a
Scale	NTS

Unless otherwise specified all dimensions are in millimeters and inches.

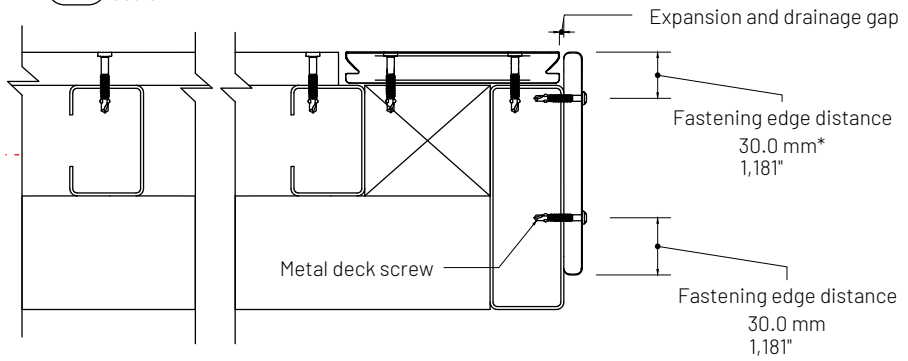
Issued for information. See supporting documentation for disclaimers and details.

Pioneer®

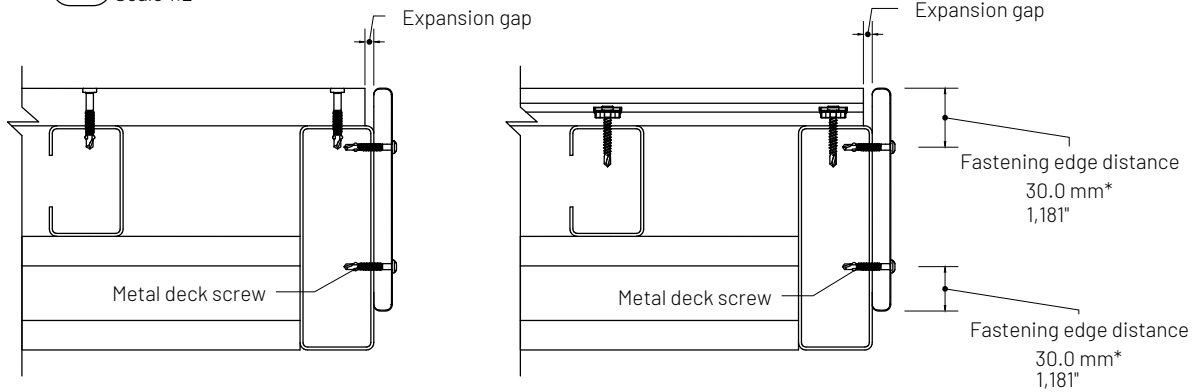




B1 STFM106. Solid deck board in a metal application beneath a breaker board
Scale 1:2



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

Appendix C

Design and Load tables per AS/NZS 1170.1 Table 3.1

Pioneer STFM101A 144.9 x 21.0 mm has been independently tested to assess structural performance under various international standards and engineering assumptions.

- The following tables are provided to inform designers, engineers, and relevant users of:
  - the maximum concentrated and uniformly distributed actions that Pioneer profiles can withstand based on laboratory testing; and
  - the typical span capabilities and mechanical performance of the boards under serviceability and ultimate load conditions for different markets, including the United States and Europe and do not apply to AS/NZS 1170.
- Performance values are based on full-profile testing using 4-point bending methods and reflect conservative assumptions as outlined in the installation and technical data documentation. These results do not represent code compliance in any single region but are intended to support design decisions and span optimization.

These load tables are based on the following assumptions:

- The structure is installed in accordance with the Installation guide.
  - 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 applicable 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.
  - 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) of various profiles for the conditions outlined above and in Section 4.1. The profile's moment of inertia and elastic section modulus is also captured for convenience. Profile availability may differ per region, please refer to www.eva-last.com or contact your local distributor for more information. For additional information please refer to the Infinity Technical Data Sheet (TDS).
- 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 meeting the requirements of the maximum concentrated load and UDL divided by 1.5.
- Serviceability load assessment is based on a deflection limit of L/180 and often dictates.
- A conservative gap of 5 mm between boards was assumed.

Pioneer STFM101A 144.9 x 21.0 mm have been independently tested and certified to meet NCC/BCA Deemed-to-Satisfy structural requirements for floor loadings to AS/NZS 1170.1 Table 3.1

The following tables are provided to inform designers, engineers and relevant users of:

- the maximum concentrated and uniformly distributed actions that Pioneer have been designed to withstand dependent on regions; and
- the applications for which the Pioneer STFM101A 144.9 x 21.0 are suitable using Table 3.1 in AS/NZS 1170.1 as the basis.

1 . Concentrated Actions

a. Pioneer maximum allowable punching strength is 15MPa and meets the requirements for Residential and Commercial application.
b. AS/NZS 1170.1 (Table 3.1) specifies the following reference values of concentrated floor actions:
   i. For residential applications, a concentrated action of 1.8kN applied to a minimum area of 350mm2.
   ii. For commercial and other applications, concentrated actions of 2.7kN or above (depending on the specific application) applied to a minimum area of 0.01m2 (100mm x 100mm).

In the context of AS/NZS 1170.1's requirements, TABLE 1 below reflects the maximum allowable concentrated actions to be applied to the 21mm STFM101A profiles

Table 1 : MAXIMUM ALLOWABLE CONCENTRATED ACTIONS - kN				
Profile Code	**Profile Thickness (mm)**	**Maximum Joist Spacing (mm)**	**Domestic and residential activities**	**Commercial Activities (min area of 0.01m)**
STFM101A	21.0	450	4.0	4.0
		350	4.4	5.9

Notes:

1. The maximum concentrated action of 1.8kN for domestic & residential activities shall be applied over a minimum area of 350mm2 for calculation of punching or crushing.
2. Concentrated Load Methodology:
   a. Calculated the stress from the specified concentrated load (e.g., 1.7 kN over 100 mm^2 = 17 MPa) and compared it to the material's punching shear capacity.
   b. Compared the ultimate load from the flexural test to the required concentrated load threshold.
   c. No serviceability check was performed for concentrated loads.

2 . Uniformly Distributed Actions

a. AS/NZS 1170.1 (Table 3.1) also specifies reference values of uniformly distributed floor actions which vary depending on the specific application.
b. In the context of AS/NZS 1170.1's requirements, TABLE 2 below reflects the maximum allowable uniformly distributed actions to be applied to the 21 mm STFM101A profile.

TABLE 2: MAXIMUM ALLOWABLE UNIFORMLY DISTRIBUTED LIVE ACTIONS - kPa			
Profile Code	**Profile Thickness (mm)**	**Maximum Joist Spacing (mm)**	**Load (KPa)**
STFM101A	21.0	450	4.3
		350	5.0

Notes:

Uniformly Distributed Load (UDL) methodology:

1. Calculated the UDL based on deflection at the L/180 serviceability limit.
2. Calculated the UDL from the ultimate flexural load.
3. Applied a safety factor of 1.5 to both values.
4. Selected the lower of the two factored UDLs.
5. Compared the final UDL to the applicable occupancy class requirement.

Regional Design and Load tables

US Approach						
Profile details	**Span [mm]**	**Max. failure load [kN]**	**Deflection at max. failure load [mm]**	**Load at L/180 deflection limit [kN]**	**Max. allowable distributed load [kPa]**	**Note**
STFM101A	572	5.74	N/A	0.43	5.93	Limiting case - Serviceability. Based on 4-point test at 22.5" of the STFM101A board per Intertek - 240229004SHF test report
STFM104A	572	5.74	N/A	0.43	5.93	Limiting case - Serviceability. Based on 4-point test at 22.5" of the STFM101A board per Intertek - 240229004SHF test report
STFM112A	572	5.74	N/A	0.43	5.93	Limiting case - Serviceability. Based on 4-point test at 22.5" of the STFM101A board per Intertek - 240229004SHF test report
STFM113A	572	5.74	N/A	0.43	5.93	Limiting case - Serviceability. Based on 4-point test at 22.5" of the STFM101A board per Intertek - 240229004SHF test report
STFM105A	508	9.00	77.04	0.53	6.20	Limiting case - Serviceability. Based on 4-point test at 20" of the STFM105A board per Internal CCRR-FM105A test report
STFM107A	508	9.00	77.04	0.53	6.20	Limiting case - Serviceability. Based on 4-point test at 20" of the STFM105A board per Internal CCRR-FM105A test report
STFM103A	572	5.74	N/A	0.43	5.93	Limiting case - Serviceability. Based on 4-point test at 22.5" of the STFM101A board per Intertek - 240229004SHF test report
STFM102A	572	5.74	N/A	0.43	5.93	Limiting case - Serviceability. Based on 4-point test at 22.5" of the STFM101A board per Intertek - 240229004SHF test report

Eurocode using Span(L)/180 deflection limit						
Profile details	**Span [mm]**	**Max. failure load [kN]**	**Deflection at max. failure load [mm]**	**Load at L/180 deflection limit [kN]**	**Max. allowable distributed load [kPa]**	**Note**
STFM101A	450	6.66	58.5	0.38	6.52	Limiting case - Serviceability. Based on 4-point test at 450 mm - standard calls for 3-point test of the STFM101A board per Intertek - 250228004SHF-001 test report
STFM104A	450	6.66	N/A	0.50	8.73	Limiting case - Serviceability. Based on 4-point test at 450 mm - standard calls for 3-point test of the STFM101A board per Intertek - 250228004SHF-001 test report
STFM112A	450	6.66	N/A	0.50	8.73	Limiting case - Serviceability. Based on 4-point test at 450 mm - standard calls for 3-point test of the STFM101A board per Intertek - 250228004SHF-001 test report
STFM113A	450	6.66	N/A	0.50	8.73	Limiting case - Serviceability. Based on 4-point test at 450 mm - standard calls for 3-point test of the STFM101A board per Intertek - 250228004SHF-001 test report
STFM105A	500	9.00	77.0	0.53	6.20	Limiting case - Serviceability. Based on 4-point test at 508 mm - standard calls for 3-point test of the STF-M105A board per Internal CCRR-FM105A test report
STFM107A	500	9.00	77.0	0.53	6.20	Limiting case - Serviceability. Based on 4-point test at 508 mm - standard calls for 3-point test of the STF-M105A board per Internal CCRR-FM105A test report
STFM103A	450	6.66	N/A	0.50	8.73	Limiting case - Serviceability. Based on 4-point test at 450 mm - standard calls for 3-point test of the STFM101A board per Intertek - 250228004SHF-001 test report
STFM102A	450	6.66	N/A	0.50	8.73	Limiting case - Serviceability. Based on 4-point test at 450 mm - standard calls for 3-point test of the STFM101A board per Intertek - 250228004SHF-001 test report

Eurocode using span (L)/300 deflection limit						
Profile details	**Span [mm]**	**Max. failure load [kN]**	**Deflection at max. failure load [mm]**	**Load at L/180 deflection limit [kN]**	**Max. allowable distributed load [kPa]**	**Note**
STFM101A	400	8.81	46.9	0.38	7.31	Limiting case - Serviceability. Based on 4-point test at 16" - standard calls for 3-point test of the STFM101A board per Internal - CCRR-1 test report
STFM104A	400	8.81	46.9	0.38	7.31	Limiting case - Serviceability. Based on 4-point test at 16" - standard calls for 3-point test of the STFM101A board per Internal - CCRR-1 test report
STFM112A	400	8.81	46.9	0.38	7.31	Limiting case - Serviceability. Based on 4-point test at 16" - standard calls for 3-point test of the STFM101A board per Internal - CCRR-1 test report
STFM113A	400	8.81	46.9	0.38	7.31	Limiting case - Serviceability. Based on 4-point test at 16" - standard calls for 3-point test of the STFM101A board per Internal - CCRR-1 test report
STFM105A	500	9.00	77.0	0.29	3.43	Limiting case - Serviceability. Based on 4-point test at 508 mm - standard calls for 3-point test of the STF-M105A board per Internal - CCRR-FM105A test report
STFM107A	500	9.00	77.0	0.29	3.43	Limiting case - Serviceability. Based on 4-point test at 508 mm - standard calls for 3-point test of the STF-M105A board per Internal - CCRR-FM105A test report
STFM103A	400	8.81	46.9	0.38	7.31	Limiting case - Serviceability. Based on 4-point test at 16" - standard calls for 3-point test of the STFM101A board per Internal - CCRR-1 test report
STFM102A	400	8.81	46.9	0.38	7.31	Limiting case - Serviceability. Based on 4-point test at 16" - standard calls for 3-point test of the STFM101A board per Internal - CCRR-1 test report

EN15534						
Profile details	**Span [mm]**	**Max. failure load [kN]**	**Deflection at max. failure load [mm]**	**Load at L/180 deflection limit [kN]**	**Max. allowable distributed load [kPa]**	**Note**
STFM101A	400	8.81	46.9	1.80	Yes	Limiting case - Serviceability. Based on 4-point test at 16" - standard calls for 3-point test of the STFM101A board per Internal - CCRR-1 test report
STFM104A	400	8.81	46.9	1.80	Yes	Limiting case - Serviceability. Based on 4-point test at 16" - standard calls for 3-point test of the STFM101A board per Internal - CCRR-1 test report
STFM112A	400	8.81	46.9	1.80	Yes	Limiting case - Serviceability. Based on 4-point test at 16" - standard calls for 3-point test of the STFM101A board per Internal - CCRR-1 test report
STFM113A	400	8.81	46.9	1.80	Yes	Limiting case - Serviceability. Based on 4-point test at 16" - standard calls for 3-point test of the STFM101A board per Internal - CCRR-1 test report
STFM105A	350	9.00	77.0	N/A	N/A	Limiting case - N/A. Based on No deflection data, 4-point test at 336 mm of the STFM105A board per Internal - CCRR-FM105A test report
STFM107A	350	9.00	77.0	N/A	N/A	Limiting case - N/A. Based on No deflection data, 4-point test at 336 mm of the STFM105A board per Internal - CCRR-FM105A test report
STFM103A	400	8.81	46.9	1.80	Yes	Limiting case - Serviceability. Based on 4-point test at 16" - standard calls for 3-point test of the STFM101A board per Internal - CCRR-1 test report
STFM102A	400	8.81	46.9	1.80	Yes	Limiting case - Serviceability. Based on 4-point test at 16" - standard calls for 3-point test of the STFM101A board per Internal - CCRR-1 test report

Appendix D

Design tables for Activity/ Occupancy for part of building or structure.

The table below summarizes typical minimum uniformly distributed floor load requirements for residential and commercial buildings across key international markets. These values are based on relevant national or regional building codes and represent baseline design criteria for structural floor systems.

This information is intended to support engineers, designers, and compliance teams in aligning product performance — such as that of the Pioneer STFM101A profile — with regional regulatory expectations when assessing suitability for structural decking or flooring applications.

Note:

This summary is for reference only and does not replace consultation of the full applicable standards. Always verify requirements with the official code in your region.

Floor load requirements by region			
Region	**Residential Load (kN/m^2) (psf)**	**Commercial Load (kN/m^2) (psf)**	**Referenced Standard**
Australia	1.5 – 2.7	2.5 – 5.0	AS/NZS 1170.1:2002, Table 3.1 – Imposed actions
USA	1.92 (40)	2.4 – 4.8 (50–100)	IBC 2021, Table 1607.1 – Uniform live loads
Canada	1.92 (40)	2.4 – 4.8 (50–100)	NBCC 2020, Table 4.1.5.3 – Live loads
Europe	1.5 – 2.0	3.0 – 5.0	EN 1991-1-1 (Eurocode 1), Table 6.2 – Imposed loads
South Africa	1.5 – 2.0	3.0 – 5.0	SANS 10160-2:2011, Table 3 – Imposed floor actions
United Kingdom	1.5 – 2.0	2.5 – 5.0	BS EN 1991-1-1 (Eurocode 1) + UK National Annex

- Code-Specific Interpretation: All values reflect minimum required live (imposed) actions and exclude additional considerations such as concentrated loads, snow, seismic, or vibration performance, which may also apply depending on the project context.
- Use Class Variance: Commercial categories vary significantly by use (e.g., office vs. gymnasium). Refer to the full table in each cited code for accurate classification.
- Concentrated Load Requirements: Some codes (e.g., AS/NZS 1170.1) also stipulate minimum concentrated actions (e.g., 1.8 kN over 350 mm^2) that must be met in addition to distributed loads. See Tabel 3.1 for further information.
- Serviceability vs. Ultimate: This table addresses service load design values. Actual system design should consider safety factors, long-term creep, and deflection limits in line with the full standard requirements.
- National Annexes May Apply: For Eurocode-aligned regions (e.g., UK, EU), national annexes may modify default load categories or introduce additional criteria.
- Assumed Occupancy: The data assumes standard floor use (Category A: domestic, Category B: office, etc.). Specialized occupancies (e.g., assembly, retail) require separate review.

Applications for which the Pioneer are suitable using Table 3.1 in AS/NZS 1170.1 as the basis

This summary is for reference only and does not replace consultation of the full applicable standards. Always verify requirements with the official code in your region.

Pioneer STFM101A (21.0 mm thick) has been independently tested and assessed against the structural loading requirements specified in Table 3.1 of AS/NZS 1170.1, which governs minimum floor loading criteria for various occupancy classes in Australia and New Zealand.

The table below outlines the applications for which Pioneer STFM101A is deemed suitable, based on the board's performance under specified uniformly distributed and concentrated actions. This suitability is determined with respect to maximum joist spacings of 450 mm (L/180) and 400 mm (L/300), reflecting both ultimate and serviceability deflection limits used in engineering practice.

✓ = suitable

X = not suitable

Note: are not suitable for any applications not reflected in the below table.

Type of activity / occupancy for part of building or structure	Specific uses	Uniformly distributed actions (kPa)	Concentrated actions (kN)	STFM101A	
				21.0 mm family	
				Maximum Joist Spacing (mm)	
				450	350
A: Domestic & residential activity (see also Cat C)					
A1 Self-contained dwellings	General areas, private kitchens and laundries in self-contained dwellings.	1.5	1.8	✓	✓
	Balconies used for floor type activities in self-contained dwellings:	1.5	1.5kN/m run along edge	✓	✓
	(Less than 1m above ground level Ther)	2.0	1.8	✓	✓
	Stairs(2) and landings in self- contained dwellings.	2.0	2.7	✓	✓
	Non-habitable roof spaces in self-contained dwellings	0.5	1.4	✓	✓
A2 Other	General areas, bedrooms, hospital wards, hotel rooms, toilet areas.	2.0	1.8	✓	✓
	Communal kitchens	3.0	2.7	✓	✓
	Balconies used for floor-type activities with community access	Same as areas providing access but not less than 4.0	1.8	✓	✓
B Offices & work areas not covered elsewhere					
	Work rooms (light industrial) without storage.	3.0	3.5	✓	✓
	Offices for general use	3.0	2.7	✓	✓
	Communal kitchens	3.0	2.7	✓	✓
	Balconies used for floor-type activities.	Same as areas providing access but not less than 4.0	1.8	✓	✓
C Areas where people may congregate					
C1 Areas with tables	Public, institutional & communal dining rooms & lounges, cafes & restaurants			✓	✓
	Classrooms			✓	✓
	Institutional assembly areas such as classrooms, lecture theatres & similar			✓	✓
	Public assembly areas such as public halls, theatres, courts of law, auditoria, conference centres & similar			✓	✓
	Places of worship			✓	✓
C3 Areas without obstacles for moving people	Balconies used for floor-type activities	Same as areas providing access but not less than 4.0	1.8	✓	✓

C4 Areas with possible physical activities	Dance halls and studios, gymnasia	5.0	3.6	x	✓
C5 Areas susceptible to overcrowding	Assembly areas without fixed seating (concert halls, bars, vestibules, public lounges, places of worship, shopping malls) and grandstands.			x	✓
	D Shopping areas				
Shop floors for the sale and display of merchandise.		4.0	3.6	✓	✓

Notes:

1. The maximum concentrated action of 1.8kN for domestic & residential activities shall be applied over a minimum area of 350mm2 for calculation of punching or crushing. Note: All other concentrated actions are applied over a minimum area of 100mm x 100mm (0.01m^2)
2. Where a stair tread or landing is structurally independent of the adjoining elements, it shall be capable of withstanding a line load of 2.2kN/m of span of tread or landing. Pioneer boards shall be fully supported at stair treads or landings.
3. A concentrated action of 6.7 kN shall be used where a general allowance for safes is made.
4. N/A
5. Where these same areas may be subjected to actions due to physical activities or overcrowding (for example a hotel dining room used as a dance floor), imposed actions shall be based on occupancy C4 or C5, as appropriate.
6. Fixed seating is seating where the removal of the seating and the use of the space for other purposes is not likely.

Appendix E

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)	Expansion coefficient (inch/inch/°F)
Infinity (HDPE)	40.1×10^{-6}	22.3×10^{-6}
Altitude (HDPE)	40.1×10^{-6}	22.3×10^{-6}
Eva-tech (HDPE)	45.3×10^{-6}	25.2×10^{-6}
Apex (PVC)	70.0×10^{-6}	38.9×10^{-6}
Apex PLUS (PVC + GFR)	33.4×10^{-6}	18.5×10^{-6}
Eclipse (PVC + GFR)	33.4×10^{-6}	18.5×10^{-6}
Pioneer (PVC + GFR + PMMA Cap)	33.4×10^{-6}	18.5×10^{-6}
Lifespan (Aluminium)	24.0×10^{-6}	13.3×10^{-6}
Galvanised steel	12.5×10^{-6}	6.9×10^{-6}

Note: When converting Expansion coefficients to imperial. Account for non-linear temperature changes in the conversion between °C to °F. In temperature differentials this requires adjustment for + or – 32° dependant on the conversion.

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

Pioneer

Below is a summary matrix of estimated expansion gaps for Pioneer material technology, converted to inches using a conversion factor of 0.556 from mm/mm/°C. These values are rounded to two decimal places and are calculated for various board lengths and different temperature increases relative to the installation temperature.

Coefficient	**Required expansion gap (inches) estimate per increase in temperature relative to the installation temperature (°F)**												
0.000018	**34**	**41**	**50**	**59**	**68**	**77**	**86**	**95**	**104**	**113**	**122**	**131**	**140**
Board length (ft)	**°F**	**°F**	**°F**	**°F**	**°F**	**°F**	**°F**	**°F**	**°F**	**°F**	**°F**	**°F**	**°F**
3.2 ft	0.00	0.01	0.01	0.02	0.03	0.03	0.04	0.05	0.05	0.06	0.07	0.07	0.08
6.5 ft	0.00	0.01	0.03	0.04	0.05	0.07	0.08	0.09	0.11	0.12	0.13	0.14	0.16
9.8 ft	0.00	0.02	0.04	0.06	0.08	0.10	0.12	0.14	0.16	0.18	0.20	0.22	0.24
13.4 ft	0.01	0.03	0.05	0.08	0.11	0.13	0.16	0.18	0.21	0.24	0.26	0.29	0.32
16.4 ft	0.01	0.03	0.07	0.10	0.13	0.16	0.20	0.23	0.26	0.30	0.33	0.36	0.39
17.9 ft	0.01	0.04	0.07	0.11	0.14	0.18	0.21	0.25	0.29	0.32	0.36	0.39	0.43
19 ft	0.01	0.04	0.08	0.11	0.15	0.19	0.23	0.27	0.31	0.34	0.38	0.42	0.46

Appendix F

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 corrosion rate	0.7 to 2.1 (µm/annum)	2.1 to 4.2 (µm/annum)	4.2 to 8.4 (µm/annum)	8.4 to 25 (µm/annum)
			Coating Thickness	Expected lifespan of fastener coatings (years)			
Carbon clip screws	C1022	Magni 599 (full coat)	20 µm	10 to 28	5 to 10	2 to 5	< 1 to 2
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 (µm / 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 (µm/annum) of constituents in different corrosion zones					
	ISO 9223 corrosion category	**C3**	**C4**	**C5**	**C5+**	**Note**
	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 to1.3	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	
Stainless steel	SS410	✓	x	x	x	Per ASKzn website. Unrelated to ISO 9223
	SS430	✓	✓	0.0381	0.0406	
	SS316	✓	✓	0.0051	0.0076	
Plastics	Polypropylene (PP)	✓	✓		4.6 to 7.5	Per online sources. Unrelated to ISO 9223
	Polypropylene (PE)	✓	✓		4.3 to 9.5	

Appendix G

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.
Stands 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 H

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: _____