TEST REPORT

Lucideon Reference:	UK232940 (QT-71924/1/JB)/Ref. 1/Supp1
Project Title:	Cyclic Wind Load Testing of Variations of Ryno Ltd's TerraSmart Raised Decking System
Client:	Ryno Ltd Castle Point Castle Way Ellon Aberdeenshire AB41 9RG
For the Attention of:	Mr Amos Whiteside
Author(s):	Mr Justin Fryer
Report Date:	20 December, 2023
Purchase Order No.:	12233

This report supersedes the report issued on 15.11.23 and was re-issued following clarification at client's request.

Miss Lisa Cobden
Testing Team
Reviewer

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CONTENTS

1 INTRODUCTION

Ryno Ltd supply Raised Decking Systems and required a program of testing to establish the resistivity to wind uplift of four of their systems when used in conjunction with visual or hidden wind uplift countermeasures.

Ryno Ltd provided four systems to be tested and the systems were as follows: -

- TerraSmart Vitrified Composite.
- TerraSmart pedestal with Visual Wind Uplift.
- TerraSmart Rail with Hidden Wind Uplift.
- TerraSmart Rail with Visual Wind Uplift.

Installation took place on 7 and 8 November 2023 with testing completed on 9 November 2023 in Lucideon Limited’s Structures Laboratory, Queens Road, Stoke-on-Trent, ST4 7LQ.

Installation was completed by representatives from Ryno Ltd, assisted by representatives from Lucideon Limited.

2 SAMPLE CONSTRUCTION

The sample was constructed such that each system had an equal proportion (1800 mm x 1500 mm approximately) of the test area as detailed in Figure 1 below.

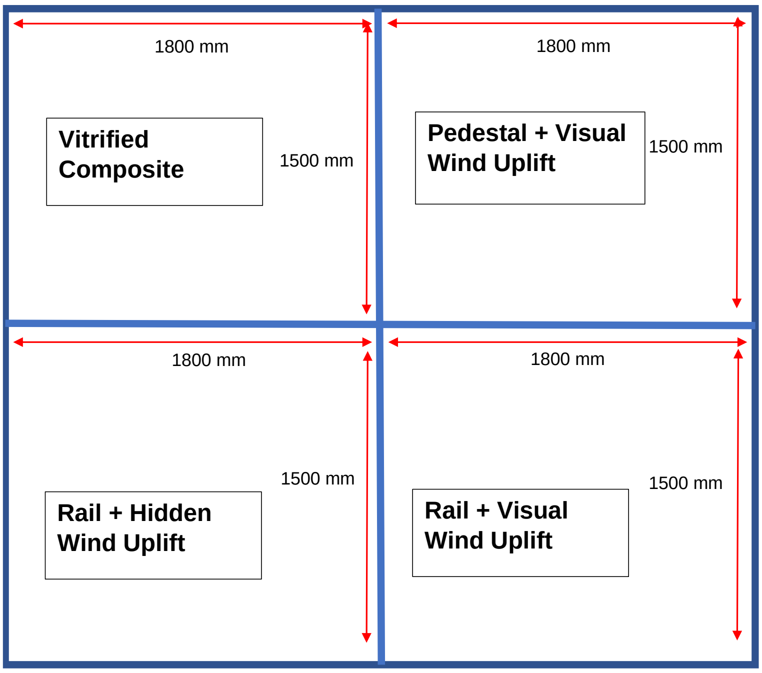


Figure 1 − Sample Construction Layout

Each sample consisted of the following components: -

2.1 TerraSmart Vitrified Composite

- Vitrified Composite Boards.
- DS50 Joists.
- EPDM Strip.
- VCT Clips.
- VC Starter Clips.
- 30 mm Screws.
- RD-FR-3 Joist Support Pedestals.

2.2 TerraSmart Pedestal with Visual Wind Uplift

- 600 mm x 600 mm x 20 mm Porcelain Tiles.
- 300 mm x 600 mm x 20 mm Porcelain Tiles.
- RP-FR-4 with M4 Tapped Head Steel Pedestals.
- HRSP Moulded Rubber Shock Pads.
- M4 Socket Flange 30 mm Screws.
- M4 20 mm Washers.

2.3 TerraSmart Rail with Hidden Wind Uplift

- 600 mm x 600 mm x 20 mm Porcelain Tiles with Kerf (slit).
- 300 mm x 600 mm x 20 mm Porcelain Tiles with Kerf (slit).
- RST27 Rails.
- DS50 Joists.
- RD-FR-1 Joist Support Pedestals.
- WU Fixings with 4 mm Cross Spacers.
- WU Fixings with 4 mm Straight Spacers.
- WU End Stops.
- 13 mm Screws.

2.4 TerraSmart Rail with Visual Wind Uplift

- 600 mm x 600 mm x 20 mm Porcelain Tiles.
- 300 mm x 600 mm x 20 mm Porcelain Tiles.
- RST27 Rails.
- DS50 Joists.
- RD-FR-1 Joist Support Pedestals.
- M4 Tapped Washer for Rail Insert.

- M4 Socket Flanged Screws.
- M4 20 mm Washers.
- 4 mm Cross Spacers.
- 13 mm Screws.

Each System was installed per Ryno Ltd.'s installation instructions which can be seen in Appendix A.

Linear Voltage Displacement Transducers (LVDT's) were positioned below the tiles to measure the deflection of the tiles during testing per Figure 2 below: -

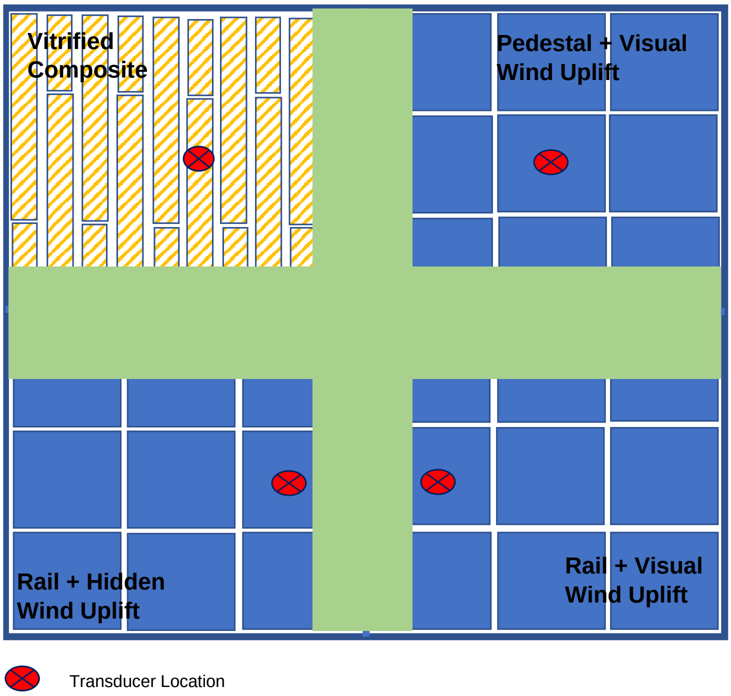


Figure 2 − Transducer Positions

A manometer was positioned within the test rig to measure the air pressure during testing.

The LVDT's and manometer were connected to a Data Logger and laptop to record data during testing at a frequency of 1 Hz.

3 TEST PROGRAMME

A cyclic loading based upon EOTA Technical Report TR005:2003 Determination of the resistance to wind loads of partially bonded roof waterproofing membranes, with the section highlighted blanked off blocking free air movement below the tiles.

4 TEST METHOD

4.1 Cyclic Wind Loading

All samples were subjected to a number of proportional sequential loading cycles in accordance with Table 1 of EOTA TR 005:2003.

All cycles were in accordance with EOTA TR 005:2003 Figure 2 – Proportional Array of Suction Pressures, which can be seen in Figure 3 below: -

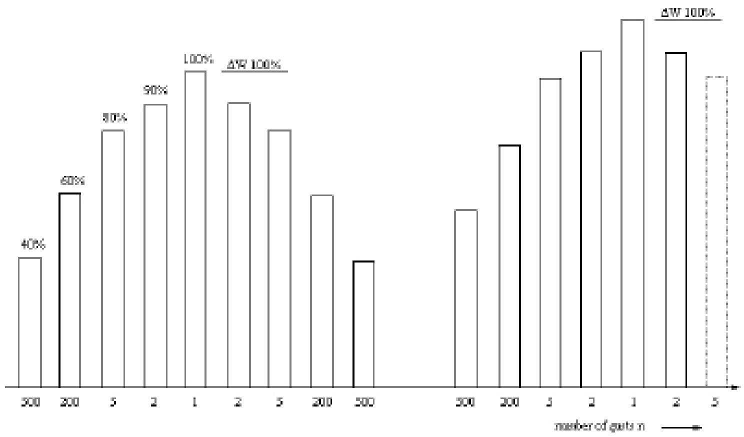


Figure 2 – Proportional array of suction pressures

Figure 3 – EOTA TR 005:2003 Figure 2 – Proportional Array of Suction Pressures

The lapse time for each suction pressure was in accordance with EOTA TR 005:2003 Figure 5 − Time/Suction Pressure Diagram of as seen in Figure 4 below: -

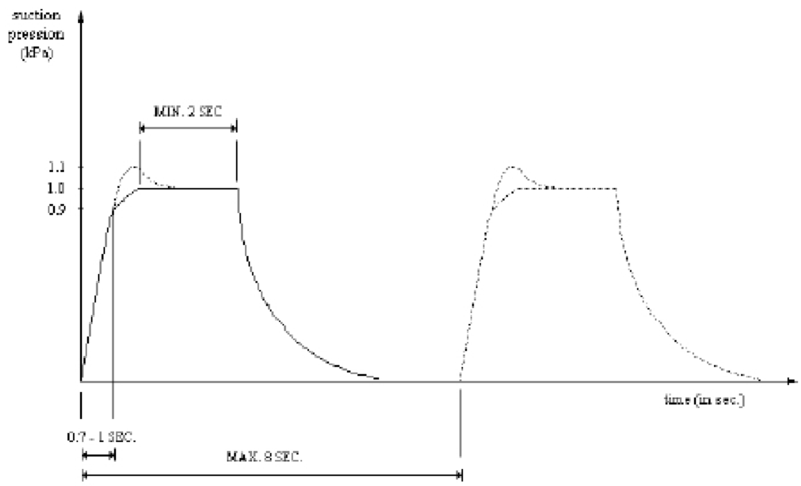


Figure 5 – Time/suction pressure diagram (trapezium)

Figure 4 – EOTA TR 005:2003 Figure 5 – Time/Suction Pressure Diagram

The behaviour of the sample was observed during each cycle.

The loading was set at 6000 Pascals maximum giving the following pulses for the cyclic loading: -

Table 1 − Cyclic Wind Loading Pulses

Load %	Load (Pa)	No. of Pulses
40	2400	500
60	3600	200
80	4800	5
90	5400	2
100	6000	1

The system was monitored continuously throughout this testing with deflection and pressure measurements being taken per Section 2 of this report.

As stated within Section 3 of this report, the section highlighted in Figure 2 was blanked off for Part 2 of the test programme and left open for Part 3. The testing was identical for both parts aside from this alteration to the test sample.

Photographs of the test set-up can be seen in the plates section of this report.

5 RESULTS

5.1 Cyclic Wind Loading

The samples were taken to a maximum of 6000 Pascals in pulsed cycles as described within Section 4 of this report.

There were found to be no detrimental effects to any of the systems and no failures were observed during testing.

Table 2 – Deflection of Systems During Cyclic Wind Load Testing

System	Deflection (mm) @ Load (Pa)					
	2400	**3600**	**4800**	**5400**	**6000**	**Residual**
TerraSmart Vitrified Composite	0.25	0.32	0.69	0.71	0.79	0.31
TerraSmart pedestal with Visual Wind Uplift	11.11	11.79	11.94	11.98	12.04	12.00
TerraSmart Rail with Hidden Wind Uplift	1.85	2.83	3.46	3.89	4.06	3.78
TerraSmart Rail with Visual Wind Uplift	6.22	12.29	13.88	14.33	14.66	13.58

From the deflections we can see that the hidden wind uplift countermeasures performed better than the visual countermeasures.

Chart 1 shows the load against time for testing whilst Chart 2 shows the deflections against time for each of the systems.

From Chart 2 we can see that at around 8 minutes there appears to be a steep increase in deflection of the TerraSmart Pedestal with Visual Wind Uplift System, upon deconstruction it was noted that some of the visual wind uplift countermeasures had worked themselves loose and were not retaining the tiles as previously.

Whilst this caused an additional deflection during testing there was no point when the tiles were unrestrained by the countermeasures and had become a safety issue.

The TerraSmart Rail with Visual Wind Uplift System steadily increased in deflection during the entirety of the test with an increased rate at the higher loads.

Upon deconstruction, again it was noted that some of the countermeasures had worked themselves loose and were not retaining the tiles as previously.

Another observation during deconstruction, which would have added to the deflection of the system, was that a couple of the joist support pedestals had worked themselves loose, with one having the top and bottom sections completely separated.

In normal installation situations engineers would have access to pedestals with varying height adjustments, however, for this installation only pedestals with a maximum adjustment of 10 mm from a height of 25 mm to 35 mm were utilised. At points within the test rig this meant that some pedestals had limited thread holding the top and bottom sections together.

Whilst this caused an additional deflection during testing at no point did the tiles become unrestrained by the countermeasures and become a safety issue.

6 DISCUSSION

Wind can approach a building from any direction. It will hit a side elevation, causing it to be directed upwards and accelerated.

Once it reaches the top of the building it can return to its normal course, however, it leaves a void before settling back down over the roof.

This void is an area of negative pressure – which has the effect of trying to pull or suck the roof coverings off the remaining structure.

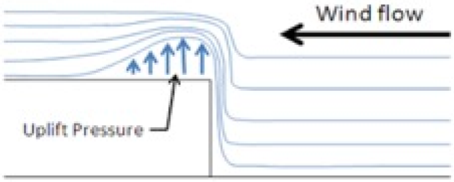


Figure 5 − Edge Zone of a Roof

You can see from Figure 5 above that the edge zone of a roof is the most likely to be affected by wind uplift.

As the wind can come from any direction, all corner and perimeter zones require a greater resistance to the effects of wind load when being secured.

The effect can be worsened if the edges of flat roofs are not correctly fixed, which can allow air to get underneath the roof covering.

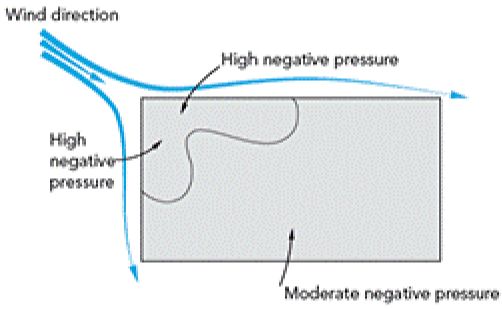


Figure 6 − Wind Striking an Object

When wind strikes a building, it is deflected to generate a positive pressure on the windward face. As it accelerates around the side of the building and over the roof, it creates a reduced or negative pressure in its trail.

The greatest pressures are experienced at the windward corners and edges of the roof, where the negative pressure exerted on the roof, can be several times that experienced in the central areas.

It is also important to consider the location and exposure of the building to determine the effect of Wind Uplift. Northern England, Scotland & Northern Ireland typically will have much higher average wind speeds than those experienced in the South & Southeast.

Wind speed will also be higher in exposed areas such as on the coast and in open, rural, or hilly areas. Tall buildings with no surrounding protection would be more at risk; buildings that are sheltered in a town centre less so.

How does this apply to raised flooring on a roof?

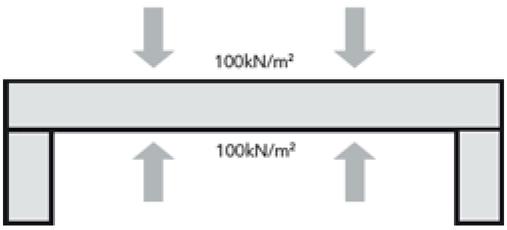


Figure 7 − Pressures in Normal Situations

When there is no wind, the air pressure on the upper surface of a roof system is the same as that on the underside. Wind changes this equilibrium by reducing the atmospheric pressure on the surface of the roof system.

The atmospheric pressure acting on the underside of the roof will remain the same or may be increased if windows or doors are open on the windward side of the building.

The result is a net upward push acting on the underside of the roof. This upward thrust will be exerted on the lowest air impermeable layer in the roof construction, which will be required to stop air flowing further into the system (the diaphragm).

In most roof constructions there is one layer that provides the dominant barrier against the upward thrusting flow of air, and this is referred to as the critical layer.

In roof constructions where the deck is continuous (e.g. screeded concrete) it will be deemed to be the critical layer, but for **air permeable decks (i.e. those with joints)** the critical layer will occur somewhere in the roof system itself, this is because the gaps within the air permeable layer allow the air pressure to equalise below and above and hence not act as a diaphragm.

This pressure equalisation isn't instant, however, there can be a time of a few seconds, dependant on the air flow rate of the air permeable deck, where the pressure differential will act upon the deck itself until pressure equalisation occurs.

It is for this reason, that any surface that is added to the upper face of a flat roof, should be tested for uplift resistance, to establish that under extreme pressures it has the ability to pressure equalise, prior to the wind uplift force causing a failure of that layer, wind uplift prevention systems would need to be implemented should this be the case, however, they would not be required for systems that allow a sufficient air flow rate between them to pressure equalise prior to any failure.

To give some context to the results obtained during testing: -

It has been recorded that, gusts of up to 100 mph (44.70 ms^{-1}) occur in the UK on average once every 50 years and as such it was deemed prudent to test beyond this maximum potential wind speed.

Wind Pressure (Nm^{-2}) = ½ x Air Density (kgm^{-3}) x Wind Speed² (ms^{-1}) x Drag Coefficient.

The Air Density was taken as 1.25 kgm^{-3}.

The Wind Speed = 44.70 ms^{-1}.

The Drag Coefficient (taken as 1.0).

This gave a pressure of 1225.73 Nm^{-2} (1.23 kilopascals).

In any particular situation, the wind load, dependant on the basic wind speed (the value of wind speed for a 3 second gust), which varies across the country, the height above ground, the degree of protection from other buildings and also geographic features (e.g. escarpments.) is determined in accordance with BS EN 1991-1-4:2005 +A1:2010 and this is, of course, very specific to the building, its location orientation etc.

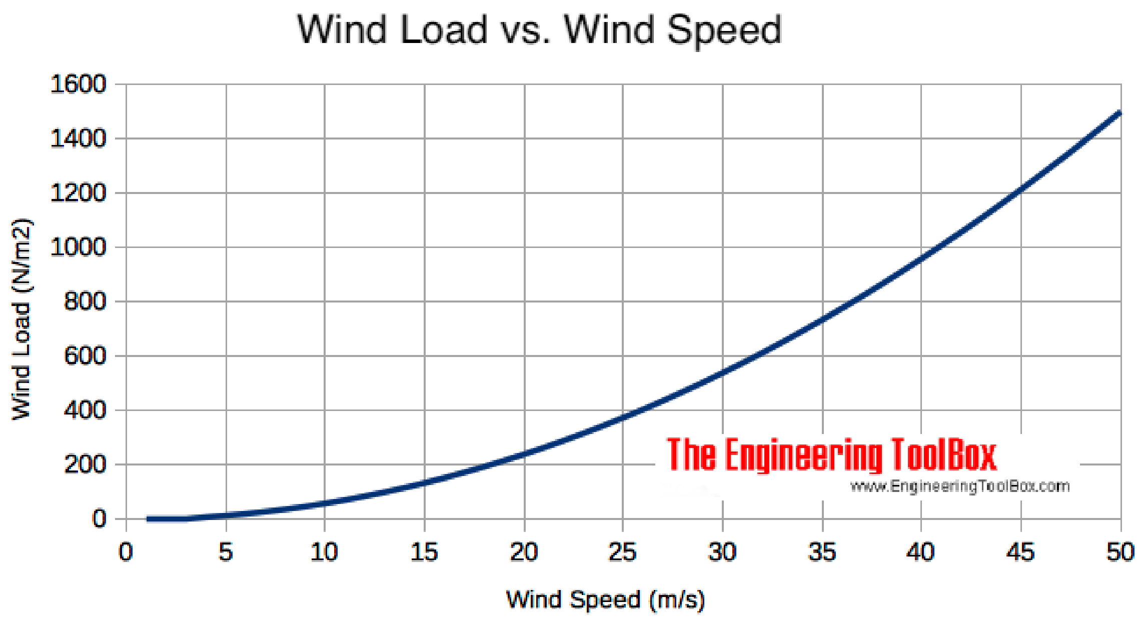
To give a feel for this, the pressure from a 3 second gust at 10 m above the ground, would range from around 0.6 kNm^{-2} in a city centre anywhere in England, to 1.4 kNm^{-2} in open country.

To this wind load is applied a partial safety factor which is taken from BS EN 1990, which covers the Basis of Structural Design. These factors can also be complicated to select but a common number used is 1.5. Thus, the wind load for which an element must be designed is defined.

For a basic approximation of wind speeds to cause uplift pressures please see Table 3 below, however, please note, that this is the simplest form of calculation and is used for approximations only, in reality when completing wind calculations in accordance with Eurocode 1 there are a number of additional factors to be taken into account such as building density, height above sea level etc.

Table 3 − Approximate Wind Speeds at Different Pressures

Pressure (Pa)	Wind Speed	
	m/s	mph
0	0.00	0.00
1000	40.00	89.60
2000	56.57	126.71
3000	69.28	155.19
4000	80.00	179.20
5000	89.44	200.35
6000	97.98	219.47



7 CONCLUSION

Ryno Ltd contracted Lucideon Limited to provide a Test Programme for their Raised Decking Systems such that they could demonstrate the safety of each system under wind uplift conditions.

Systems with joists and/or rails performed better when compared with those of pedestals only.

Hidden wind uplift countermeasures proved better than visual countermeasures by between 3 and 12 times when compared at a maximum load of 6 kPa.

The Joist support pedestals supplied were possibly unsuited for the application they were used in, again a greater choice of pedestals with varying height adjustments would be available for engineers installing in real life situations, and contributed greatly to the increased deflection seen on some of the systems.

None of the systems became unsafe during the testing which was completed at an extreme condition.

NOTE: The results given in this report apply only to the samples that have been tested.

END OF REPORT

PLATES

Plate 1 − RP-FR-4 with M4 Tapped Head Steel Pedestal

Plate 2 − Joist Support Pedestal

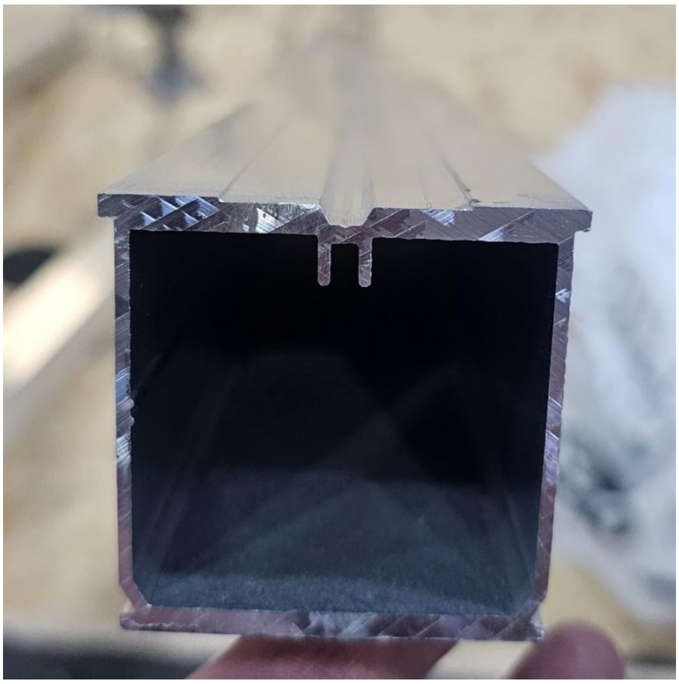


Plate 3 – DS50 Joists

Plate 4 – RST27 Rail

Plate 5 – 13 mm Screws

Plate 6 – 30 mm Screws

Plate 7 − WU End Stops

Plate 8 – Setting out Joists for Vitrified Composite Decking System

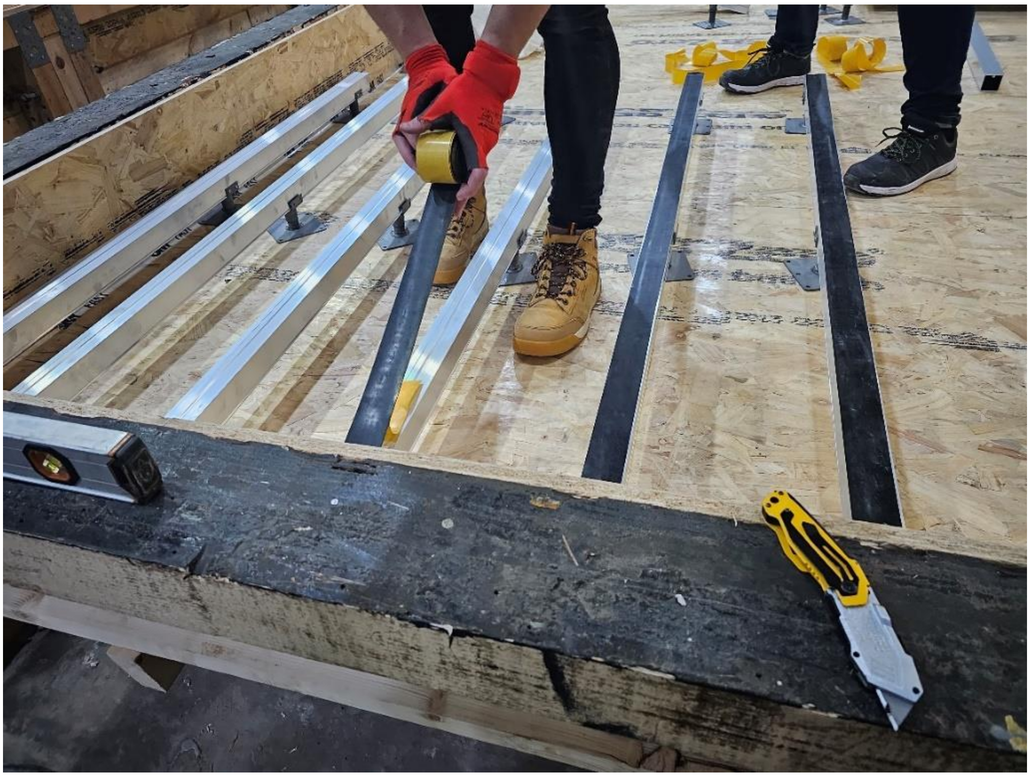


Plate 9 – EPDM Applied to Joists

Plate 10 – Pedestals Screwed to Joists

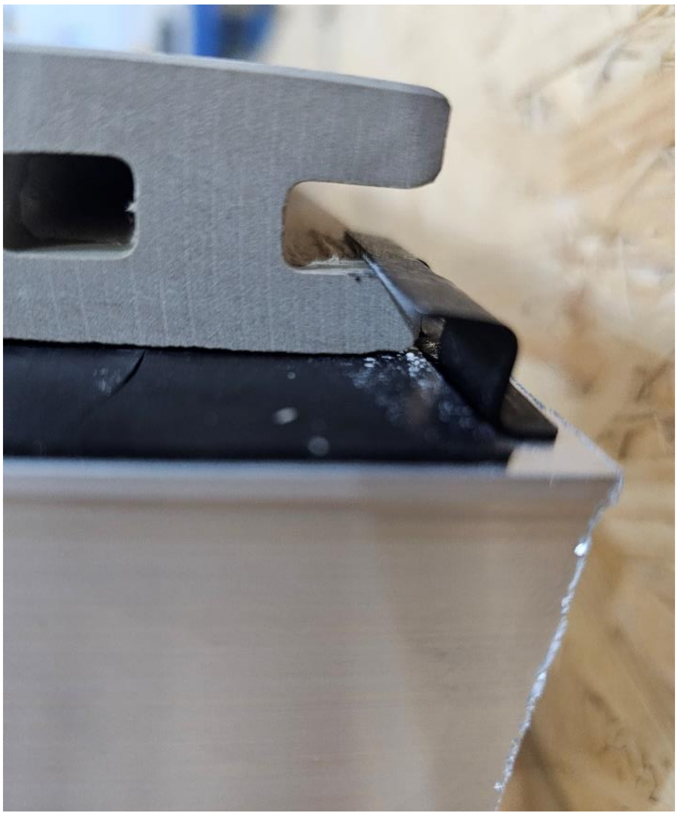


Plate 11 – Composite Boards Fixed

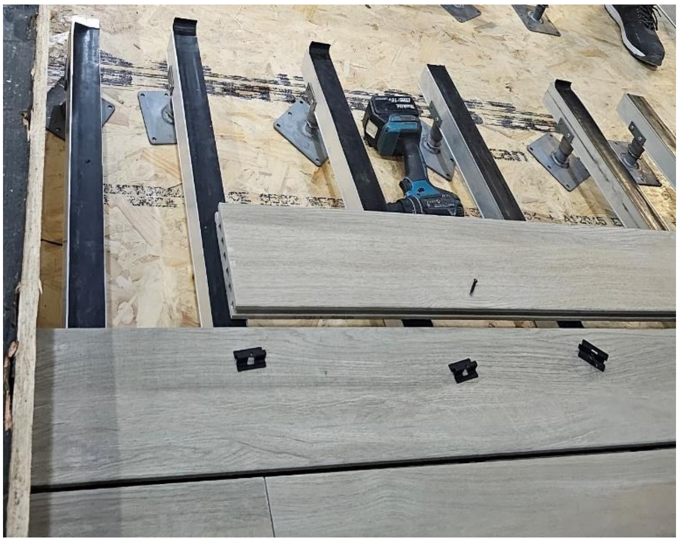


Plate 12 – Boards Fixed with Secret Fix Clips

Plate 13 – Vitrified Composite Sample Complete

Plate 14 – Pedestal System Installed

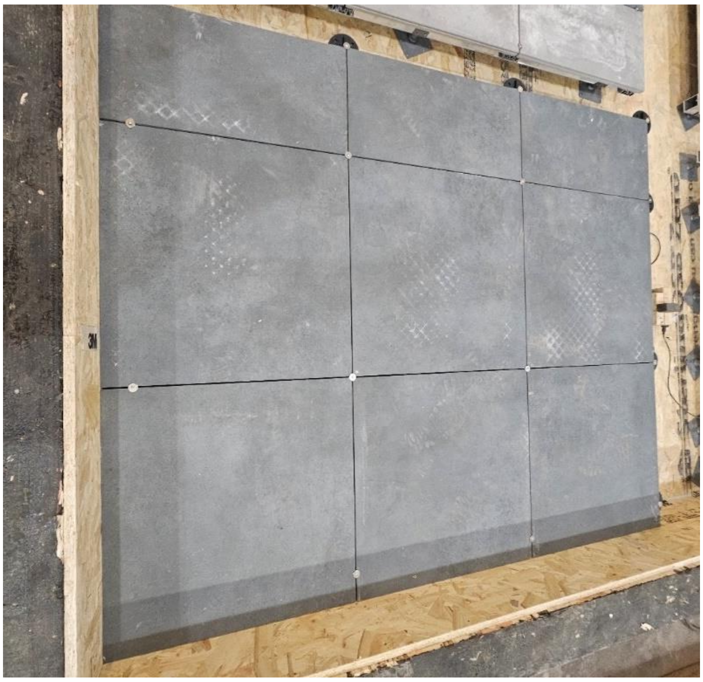


Plate 15 − Completed Test Sample

Plate 16 – Visual Fix for Pedestal Test Sample

Plate 17 – Joists Set Out Ready for Rails

Plate 18 – Rails Attached with a Screw into Each Joist

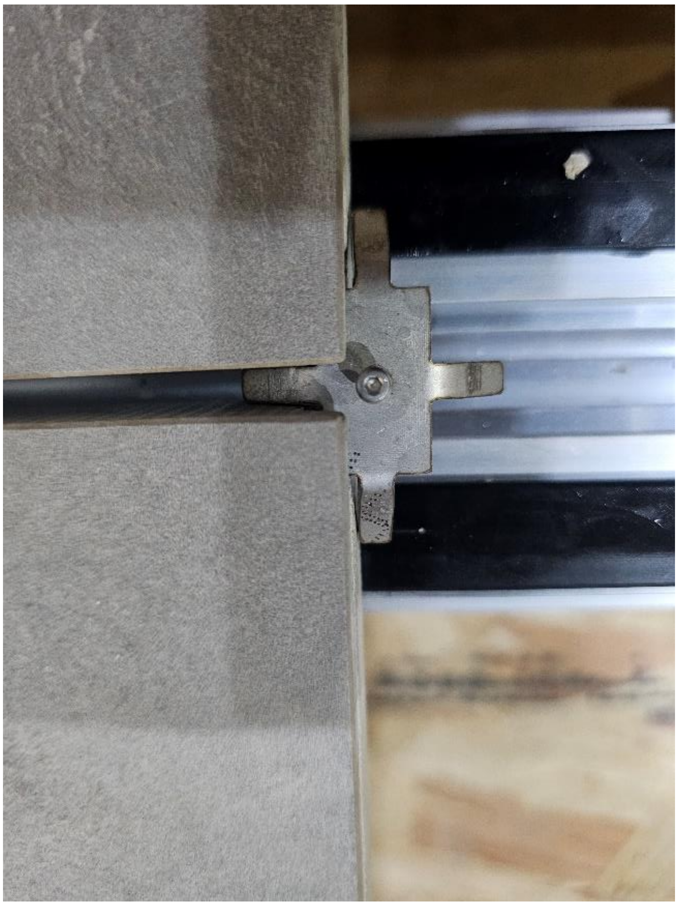


Plate 19 – Secret Fix for Slitted (Kerfed) Tiles

Plate 20 – Rail and Hidden Fix Sample Completed

Plate 21 – Rails and Visual Fix Test Sample Fixed in Place

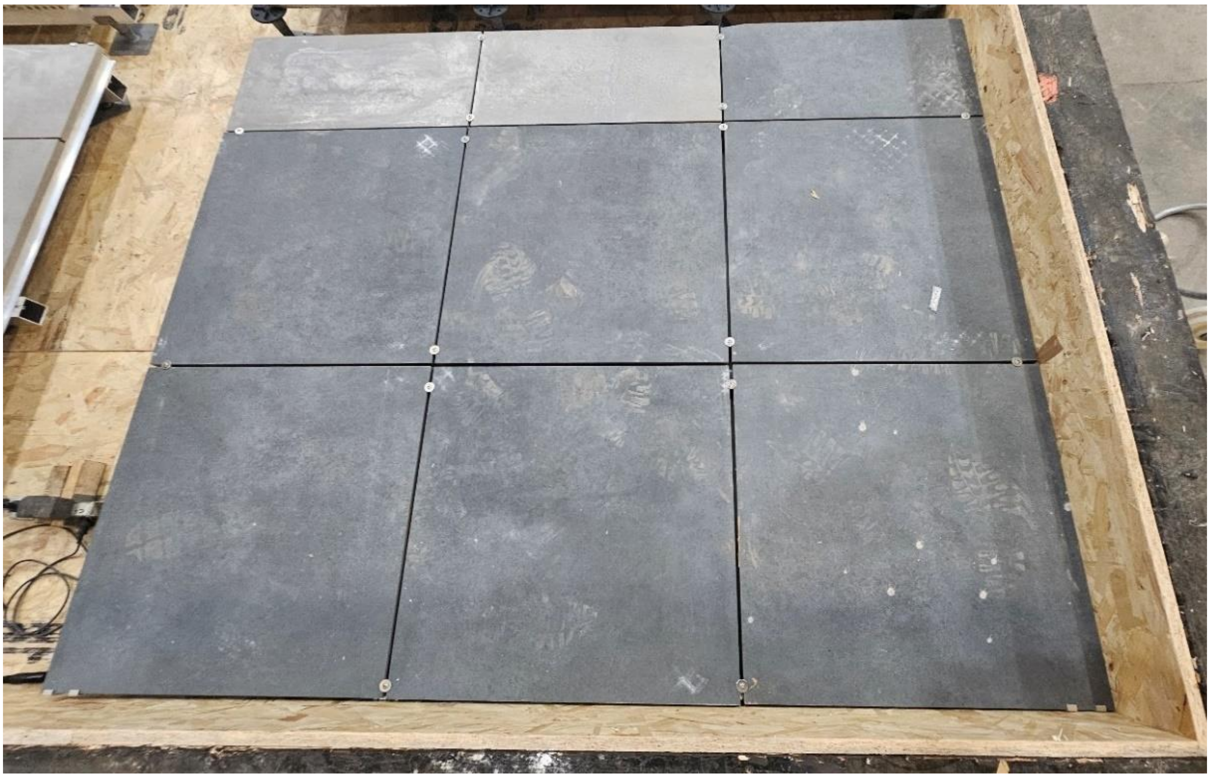


Plate 22 – Rails and Visual Fix Test Sample Completed

Plate 23 – Completed Samples Within the Rig

Plate 24 – Completed Samples with the Spaces Blanked

Plate 25 – Completed Samples Under Test

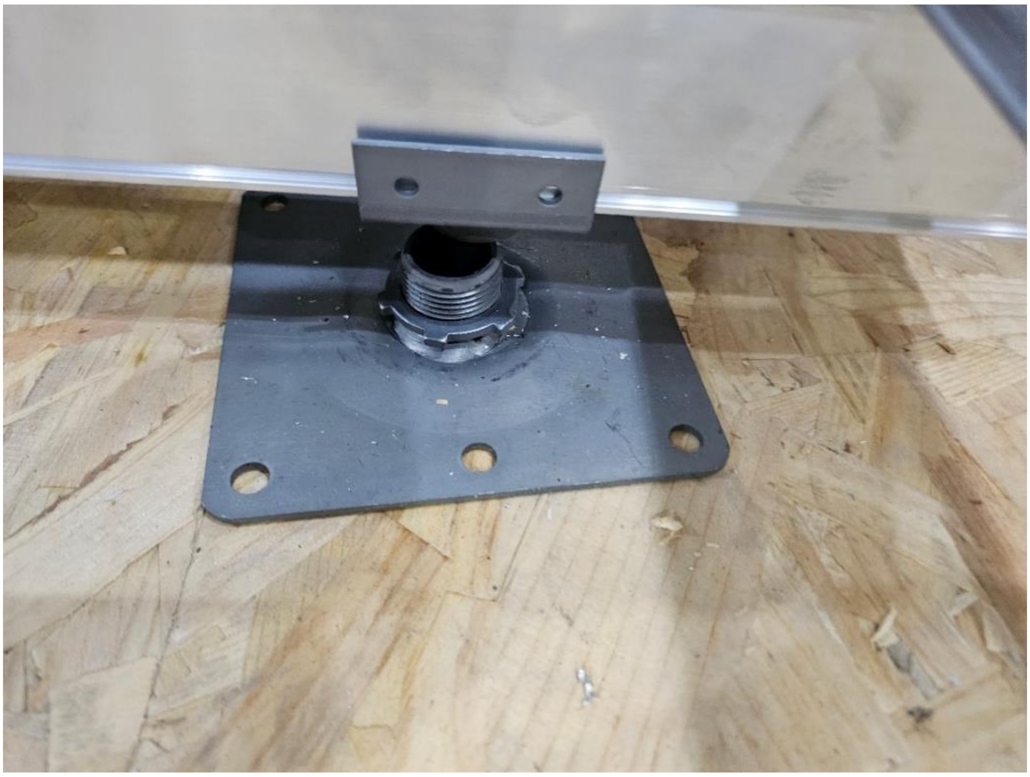


Plate 26 – A Pedestal that had Worked Loose During Testing

Chart 1 - Load Against Time Chart for Cyclic Load Testing of Ryno Ltd's

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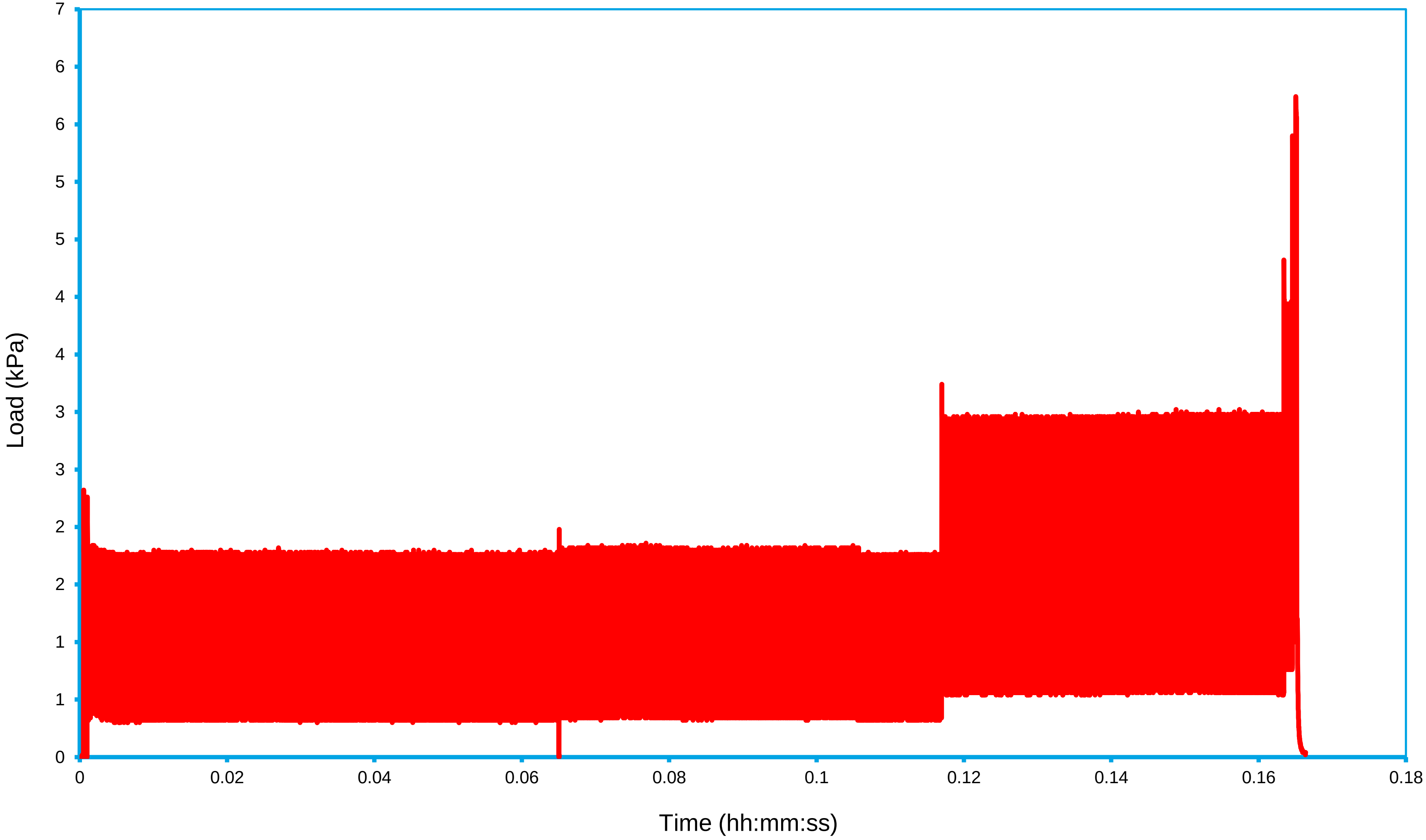

Chart 2 - Deflection Against Time Chart for Cyclic Load Testing of Ryno Ltd's

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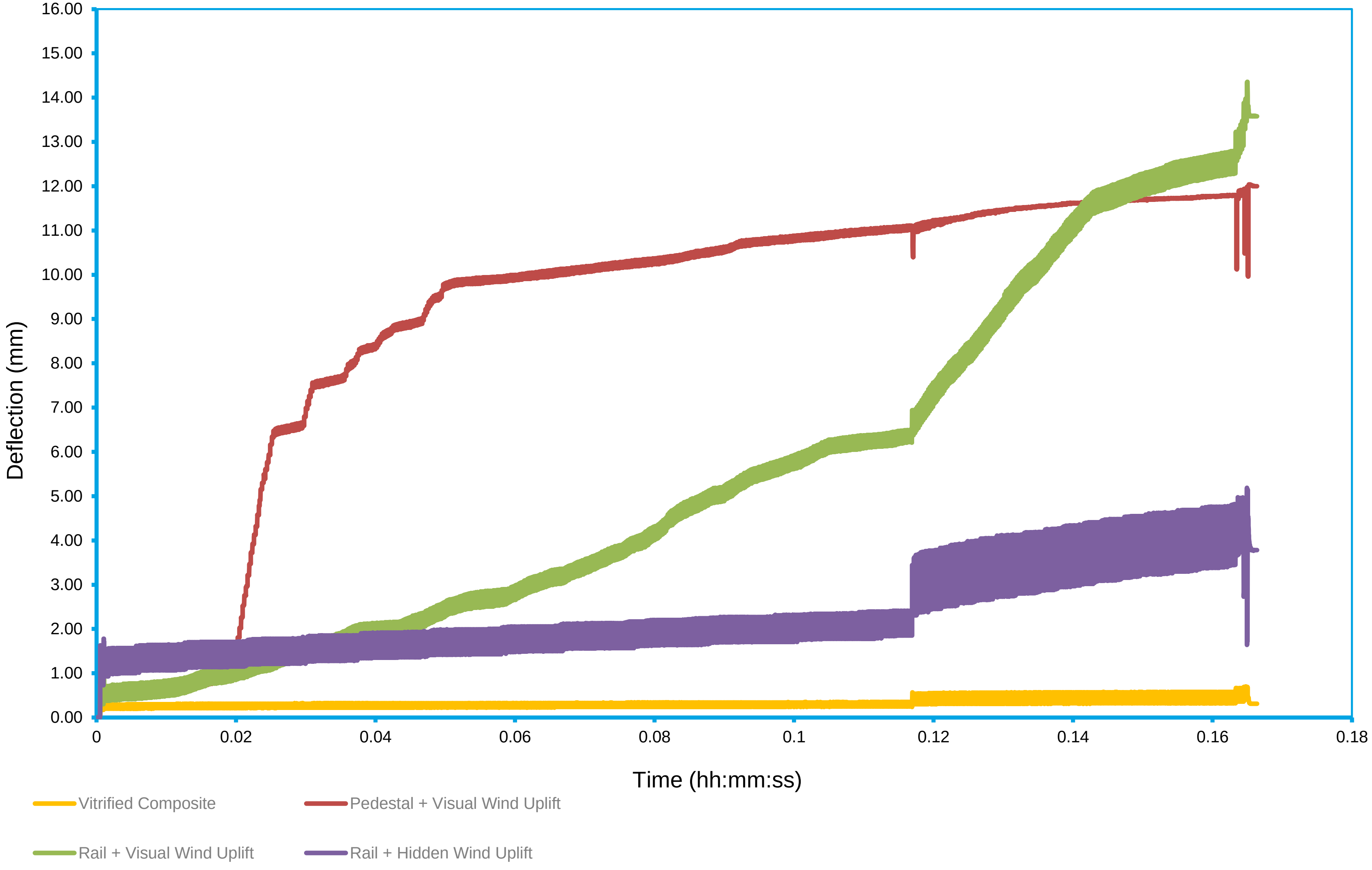


RYNO TerracePave™

INSTALL GUIDE

Porcelain Cutting Guide

IGNO® NON-COMBUSTIBLE INNOVATION

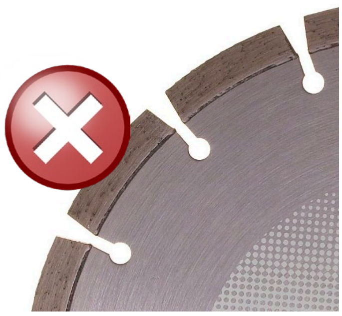
The high strength of porcelain means it is occasionally challenging to cut.
Issues can be overcome by employing the techniques below.

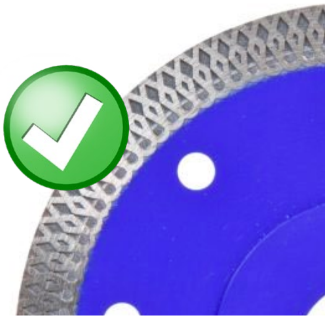
SAFETY

Before starting, ensure full risk assessment has been undertaken and appropriate PPE is worn, including (but not limited to) gloves, ear and eye protection.

CUTTING EQUIPMENT

Porcelain must be cut with a 'porcelain blade', rather than a standard masonry blade. Porcelain blades are manufactured with diamond, specifically to be used with porcelain. They feature a continuous rim which ensures a precise cut, as opposed to a large segment blade which can cause chipping and cracking.





OTHER EQUIPMENT

We recommend using a cutting bench saw if possible. This will offer consistent power and help give a nice straight edge. If this isn't possible, an electric grinder is a good alternative (as opposed to a petrol saw). Ensure you use plenty of water when cutting to keep the blade cool and sharp.

ADVICE

1. Ensure the tile is on a flat surface to reduce vibration during the cut
2. Score your cut line first with a blade: particularly when cutting curves
3. Cut a small section into the tile (4-5cm), full depth at each end to reduce cracking and splintering at the end of the cut
4. Cut slowly. Moving the tile too quickly will create more vibration, leading to breakages

RYNO® TERRACE
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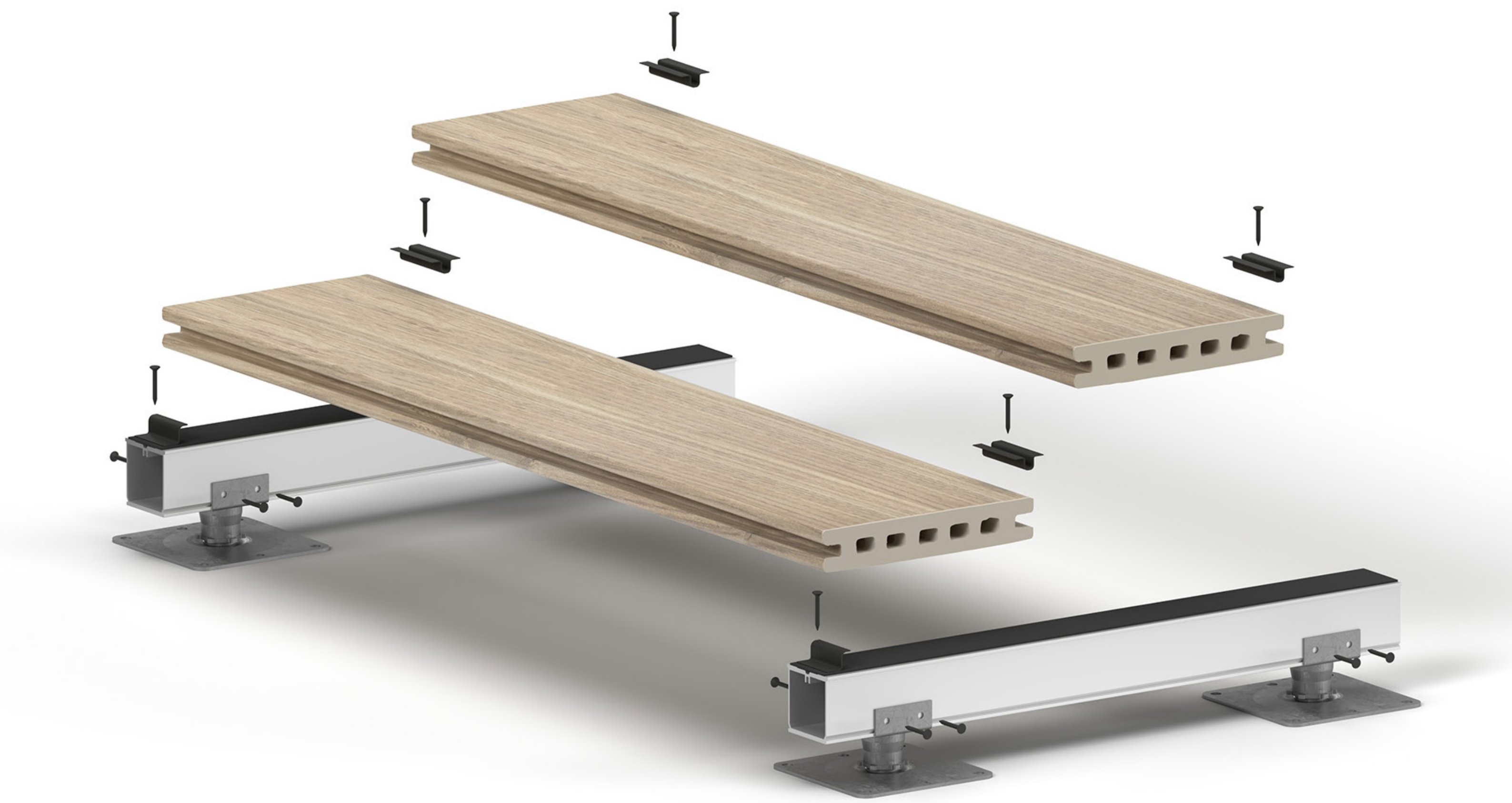
TerraSmart® Vitrified Composite

Issue 1.0 - September 2023

Installation Guide



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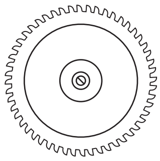
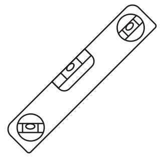
Equipment

Porcelain Bridge Saw



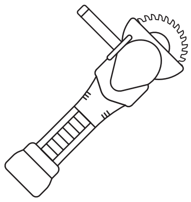
Level

Rotating laser level plus a standard level are recommended



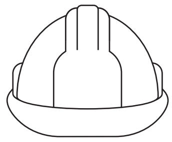
Angle Grinder

Best for accurate cuts - circular saw will work



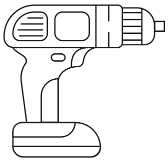
Site PPE

Adhere to all relevant site regulations



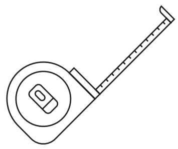
Cordless Drill

With appropriate attachments and bits



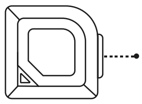
Tape Measure

Measure twice, cut once and repeat

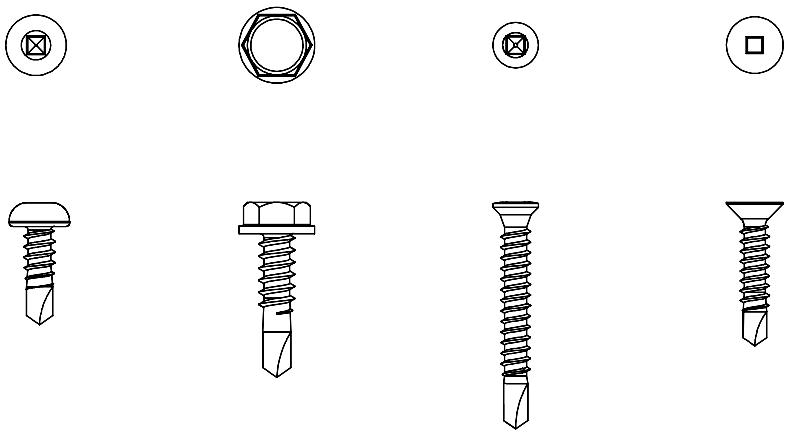


Laser Level

For exact measuring and accurate alignment



Fastener Guide



Self Drill 4.2x13mm	Self Drill 4.8x19mm	Self Drill 3.9x30mm	Self Drill 3.9x19mm

General Notes

– Gaps between board ends are optional and depend on the desired look – there is no expansion gap required.

– Note: NHBC schemes require a 10mm gap around perimeter edge of area for drainage; the VC starter clip provides this on clipped sides of your area, but keep this in mind when setting out your substructure.

– Due to the specialist manufacturing process of vitrified composite, there may be slight variations in the shape from board to board including slight curvature along the length. A laser guide tool or similar is essential to keep each row of boards aligned throughout the installation. This means you may need to adjust the gap width +/- 1.5mm (7mm nominal) between the boards slightly to ensure the boards are aligned.

- Use offcuts of material where possible, to minimise waste.

- Where joists are to be butted end-on-end, ensure there is a pedestal support underneath connecting the two joists.

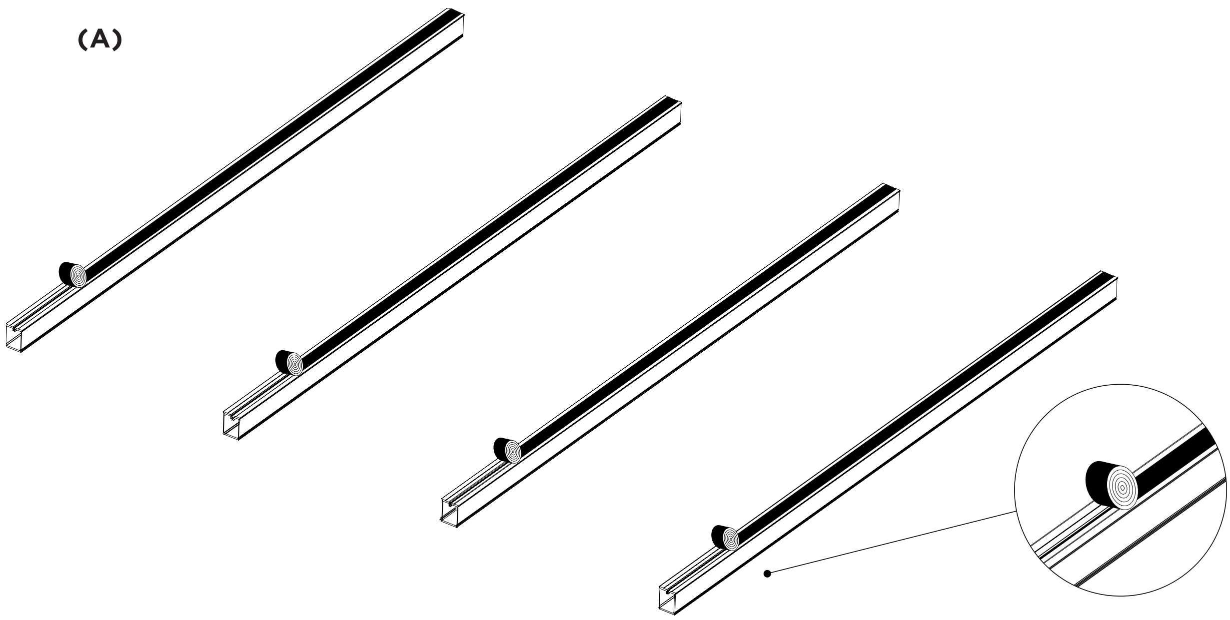
- Always use appropriate torque setting on cordless screwdrivers to reduce the possibility of overtightening.

- Always use correct PPE throughout installation.

1. Determine decking direction.

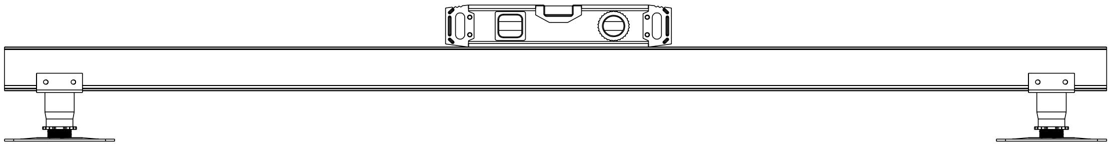
2. Lay the joists out on the substrate perpendicular to the decking direction, at the 305mm centres (as per board span, see datasheet). Apply the self-adhesive backed EPDM strip to the top surface of the joists. **Fig A.**

(A)

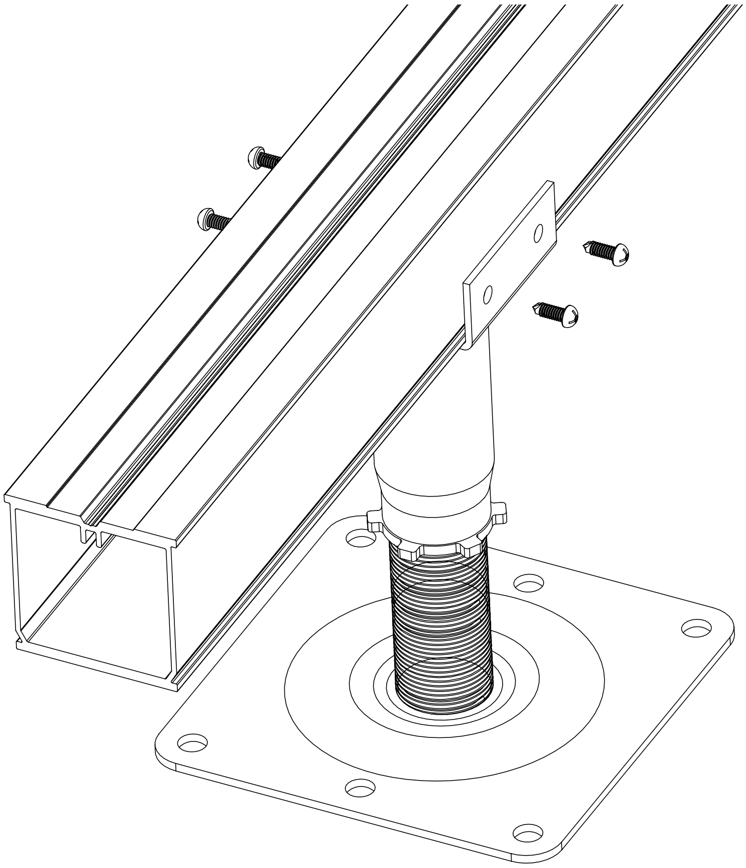


3. Lift the joists onto the supports, which should be placed at each end of the joist, and level up to the required height (FFL minus board depth). **Fig B.**

(B)

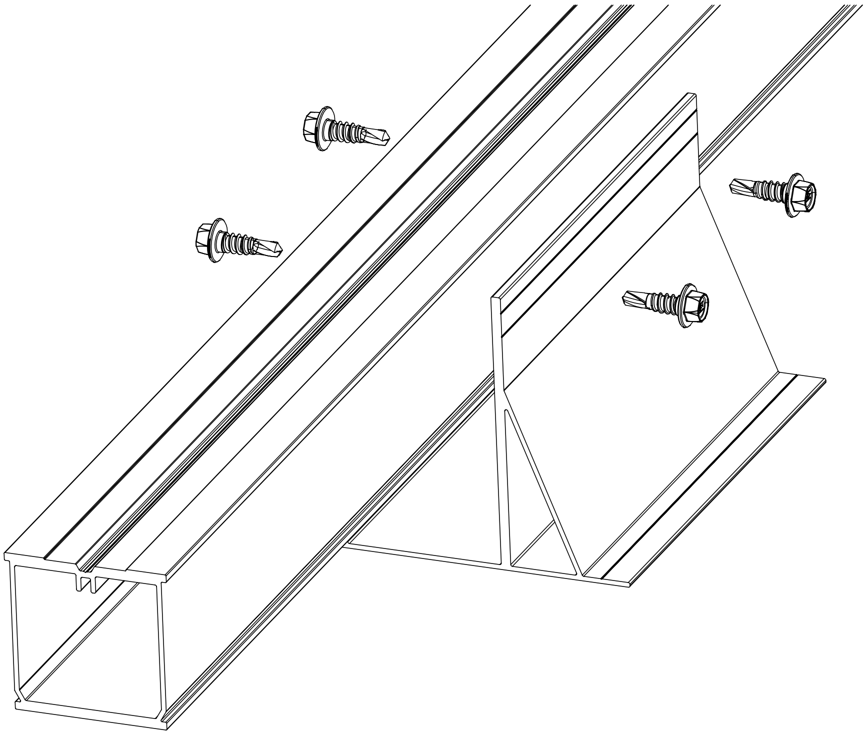


(C)



3a. If using adjustable pedestal supports, fasten the joist to the pedestal head using 13mm self-drill screws and tighten the locking nut on the pedestal to secure it at the required height. **Fig C.**

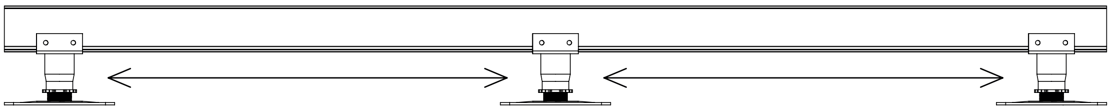
(D)



3b. OR; if using cleat supports, use the 4.8x19mm hex head self-drill screws to secure the joist at the required height. Note: in some scenarios, using packers to build up to the required height can be helpful. If the packers are not non-combustible, remove them after the screws have been installed. **Fig D.**

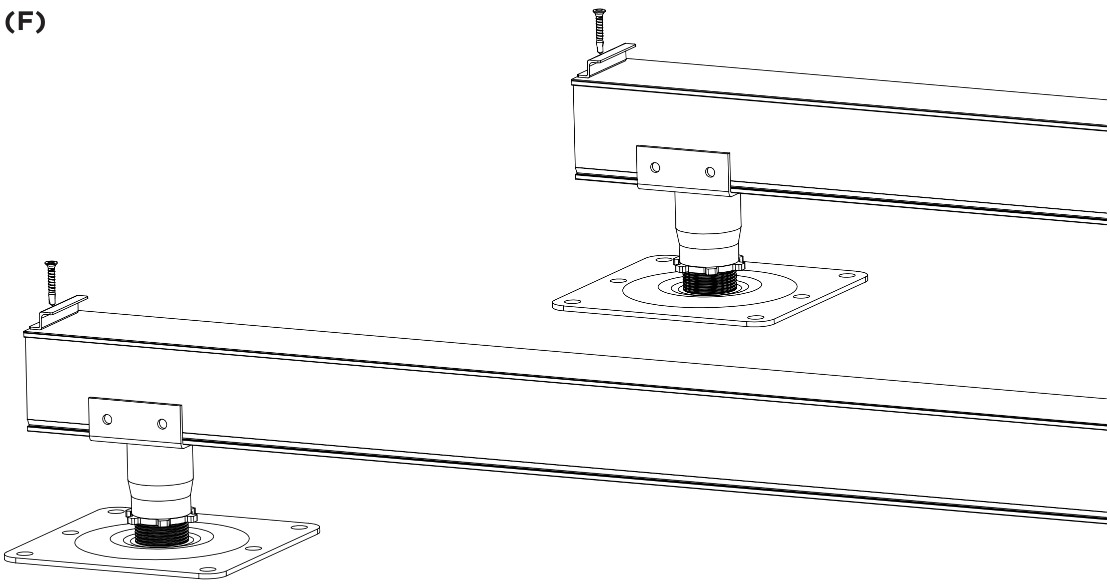
4. Add the intermediate supports at the required centres along the joist (as per the joist span, see datasheet). **Fig E.**

(E)



5. Once all joists are level and fully supported, establish where the first board will be laid, and install the VC Starter/End Clip along the ends of the joist ready for the first row of boards. **Fig F.**

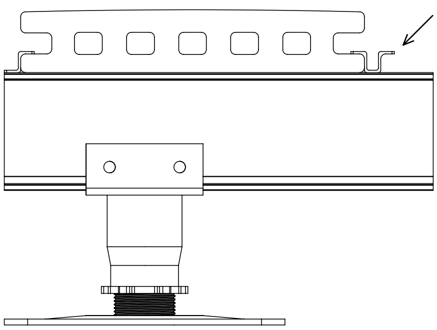
(F)



6. Push the first row of decking boards into the starter/end clips.

7. Apply the VC T-clips along inside edge of the first row of decking, above each joist. **Fig G.**

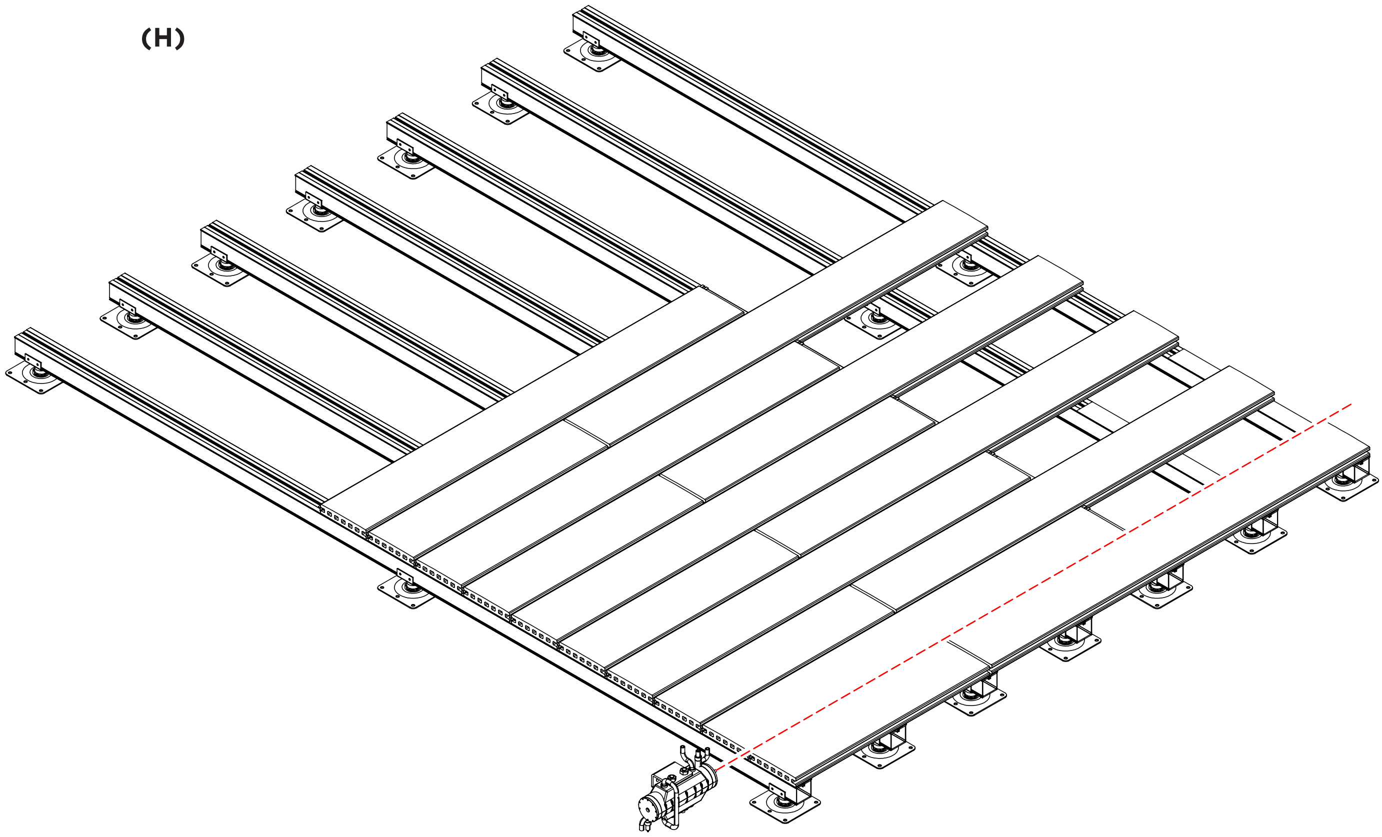
(G)



8. Slide the second row of decking boards into place, ensuring the overall length of board run is aligned with your laser guide to keep board runs straight.

a. ****Important Note** - Due to the specialist manufacturing process of vitrified composite, there may be slight variations in the shape from board to board including slight curvature along the length. A laser guide tool or similar is essential to keep each row of boards aligned throughout the installation. This means you may need to adjust the gap width +/- 1mm (7mm nominal) between the boards slightly to ensure the boards are aligned.****. Fig H.**

(H)



9. Repeat step 8 one board row at a time, until you reach the second-to-last board.

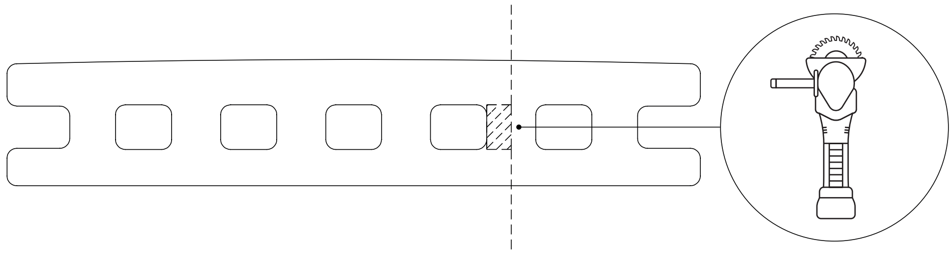
10. Fitting the last board:

a. Loose-lay the second-to-last last board run and measure the remaining space, remembering to account for the width of the VC-T clip and Starter/End clip

i. If a full board width fits perfectly, go straight to step 10.b. and continue from there.

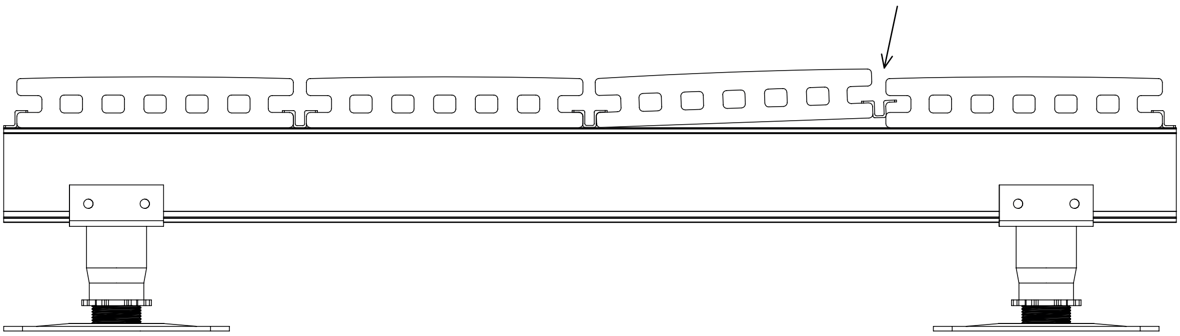
ii. If the last gap is smaller than the board width, you will need to cut the board down to the required width. Note that once width is cut down, this removes the fixing channel, so you may need to modify the cut side of the board using a grinder to receive the VC starter/end clip. **Fig I.**

(I)

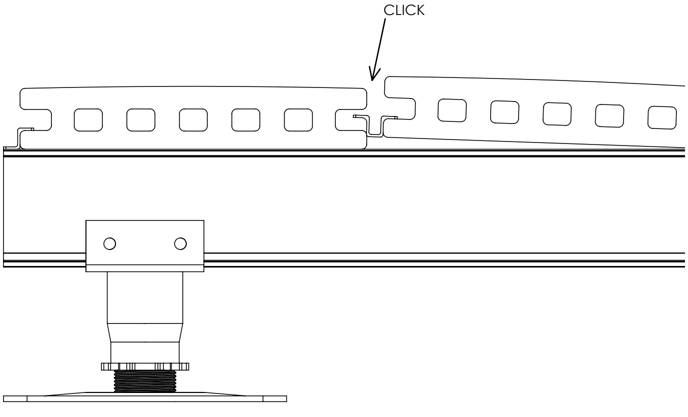


b. Affix VC Starter/End clip to the outside end of the joists
c. Place the last row of boards on the joists and push firmly onto the VC starter/end clip
d. Lift the second-to-last board up at a slight angle, to enable you to slide a VC T-clip into the fixing grooves. **Fig J.**

(J)



e. Still holding this board up at an angle, use a screwdriver or your cordless drill to slide the VC T clip along the groove until it's over the joist, repeating until there is a clip over each joist. When released, the board should be held up at a slight angle by the clips (if not, your board gap will be larger than planned).
f. Use gentle pressure to pivot the raised board down onto the joists; it should 'click' into place as it pushes the clips in tight. **Fig K.**



11. Fasten the clips down using the screws provided, stand back and admire!

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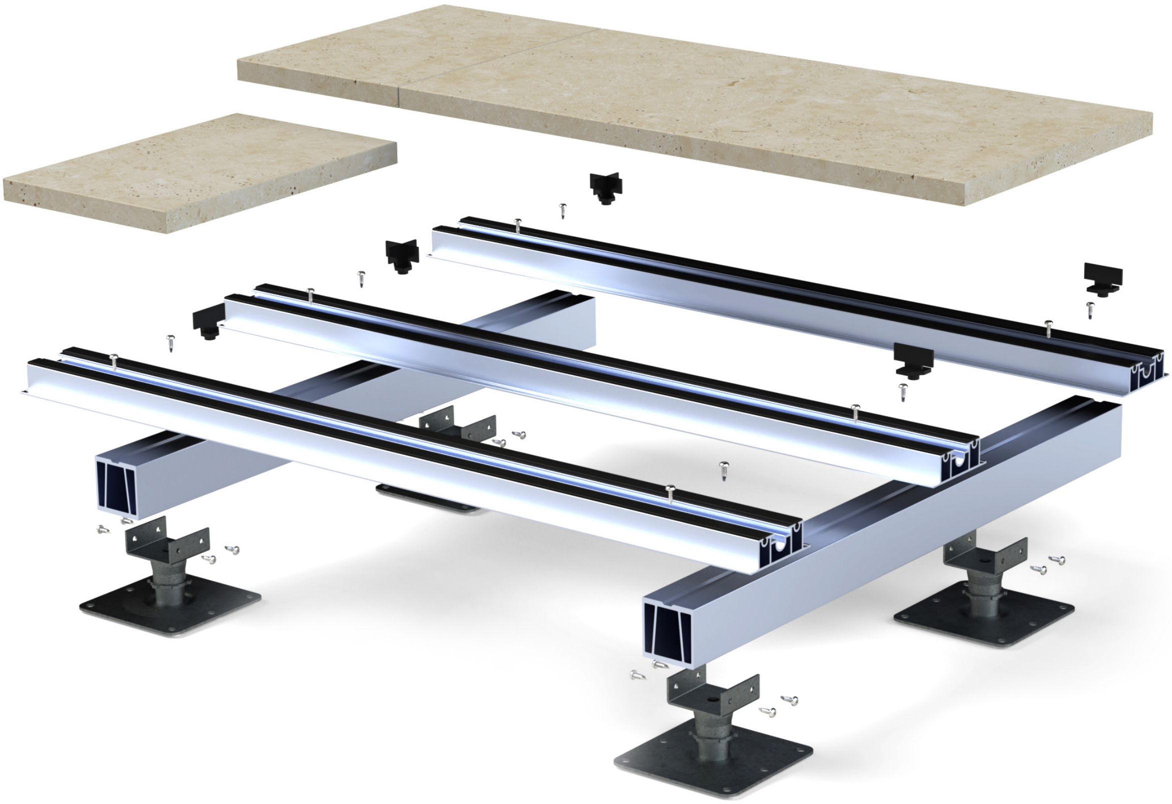
TerraSmart™ Rail

Installation Guide

RN-P-2001-ISG-01 - Issue 1.0
September 2022



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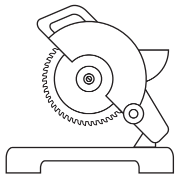
Equipment

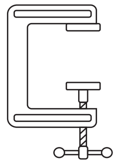
Mitre saw

Equipped with a suitable blade for cutting aluminium



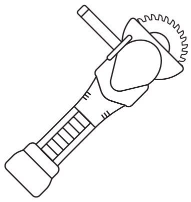
G-Clamp

Once you have used A through F clamps



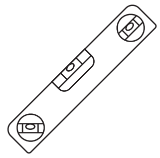
Angle Grinder

Best for accuracte cuts, but a circular saw will work



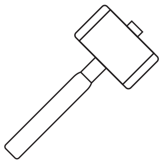
Levels

Rotating laser level plus a standard level is recommended



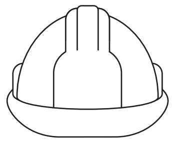
Rubber Mallet

However a standard hammer is fine



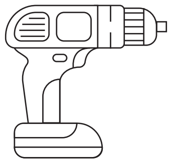
Site PPE

Adhere to all relevant site regulations



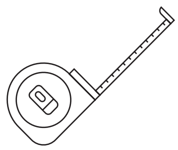
Cordless Drill

With appropriate attachments and bits



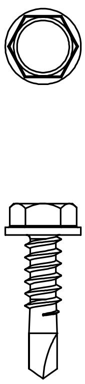
Tape Measure

Measure twice cut once and repeat



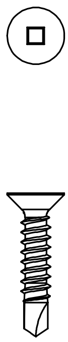
Fastener Guide

Self Drill
4.2x13mm



Self Drill
4.8x19mm

Self Drill
3.9x30mm



Self Drill
3.9x19mm

General Notes

- Leave 3mm gap between board ends when butted end on end
- Some schemes require a 10mm gap around perimeter edge of area
- Use offcuts of material wherever possible to minimise waste
- Where joists are to be butted end-on-end, ensure there is a support under the join connecting the two joists
- Always use appropriate torque setting on cordless screwdriver for screws
- Always use correct PPE throughout installation

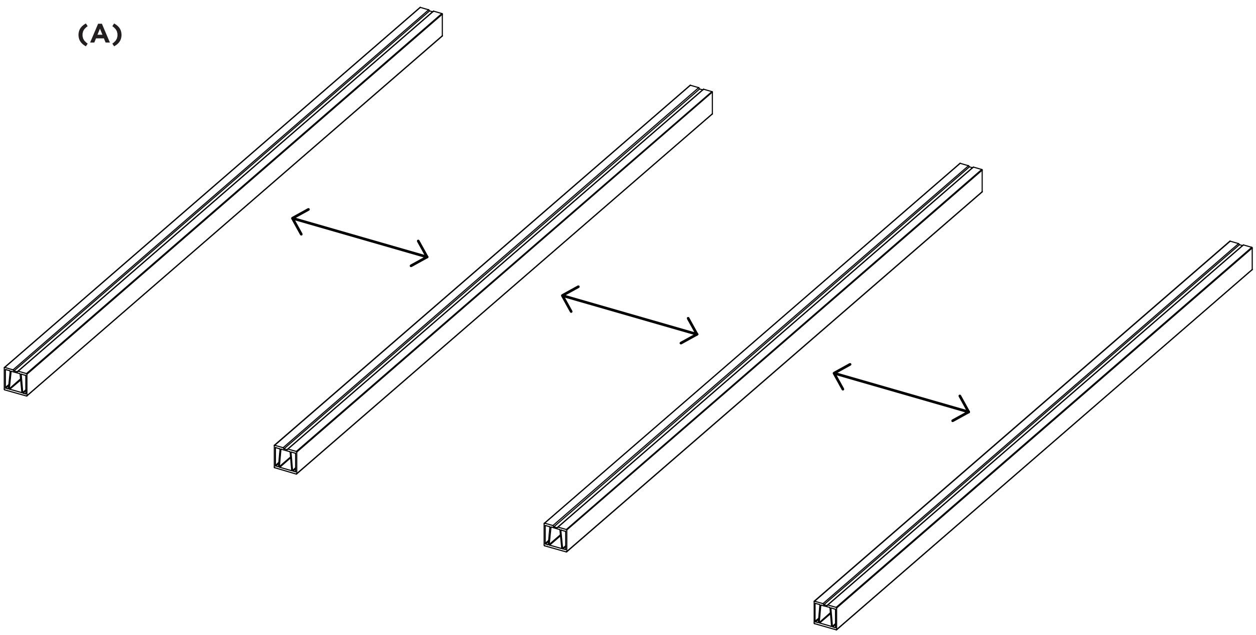
1. Determine the direction of the primary joists and top rails:

a. If square paving is being used and the area is rectangular, it's best to lay the primary joists in the long direction.

b. If rectangular paving is being used, the direction of the paving will need to be established and the primary joists laid in the opposite direction to this so that the top rail runs in the same direction.

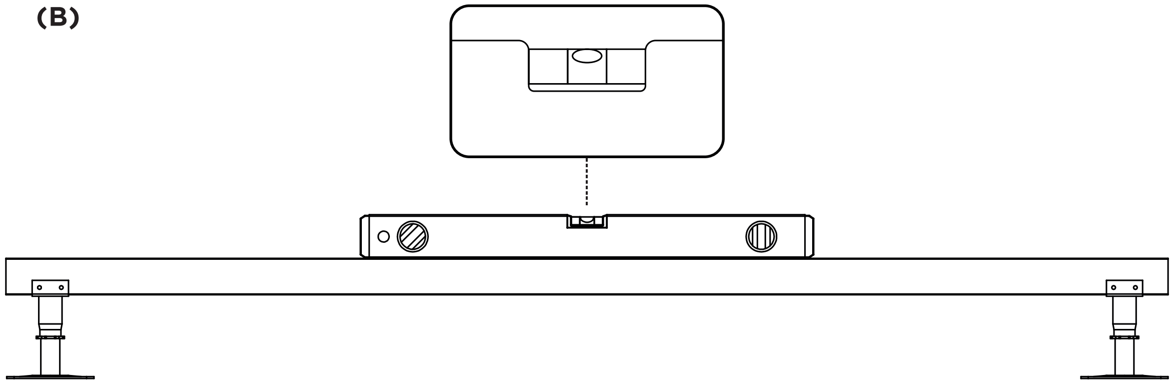
2. Lay the primary joists at required centres (see RST Aluminium Paving Support Top Rail datasheet for span capabilities) **Fig A.**

(A)



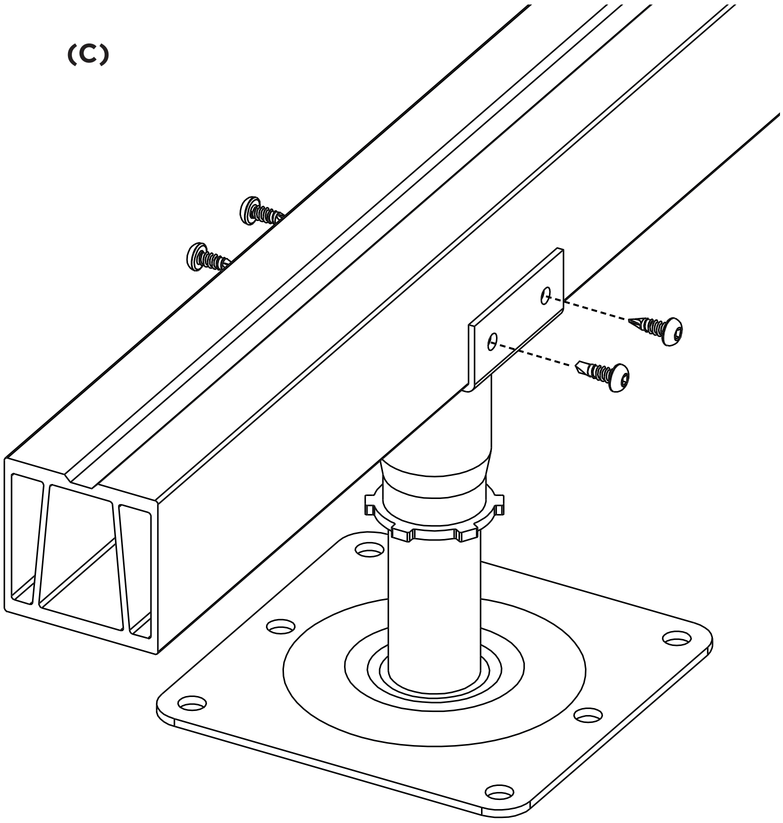
3. Place the primary joists onto supports (one at each end) and level up using a laser level to the required height (FFL minus top rail and surface thickness). It's very important that care is taken at this stage to ensure that the primary joists are all 'in-plane' to avoid any rocking paving. **Fig B.**

(B)



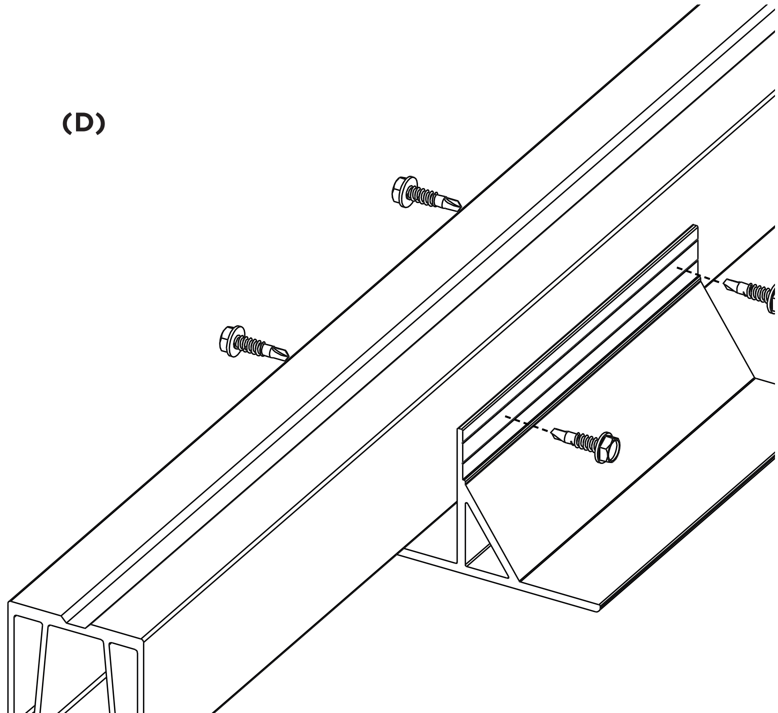
4. Where primary joists are butted end-to-end, place support under the join to connect the joists.

(C)



5a. If using adjustable pedestal supports, fasten the joist to the pedestal head using 13mm self-drill screws and tighten the locking nut on the pedestal to secure it at the required height. **Fig C.**

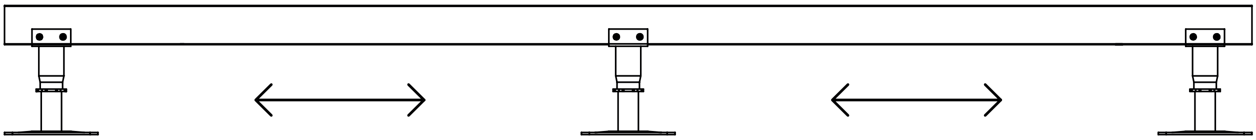
(D)



5a. OR; if you're using cleat supports, use the 4.8x19mm hex head self-drill screws to secure the joist at the required height. Note: in some scenarios, using packers to build up to the required height can be helpful. If the packers are not non-combustible, remove them after the screws have been installed. **Fig D.**

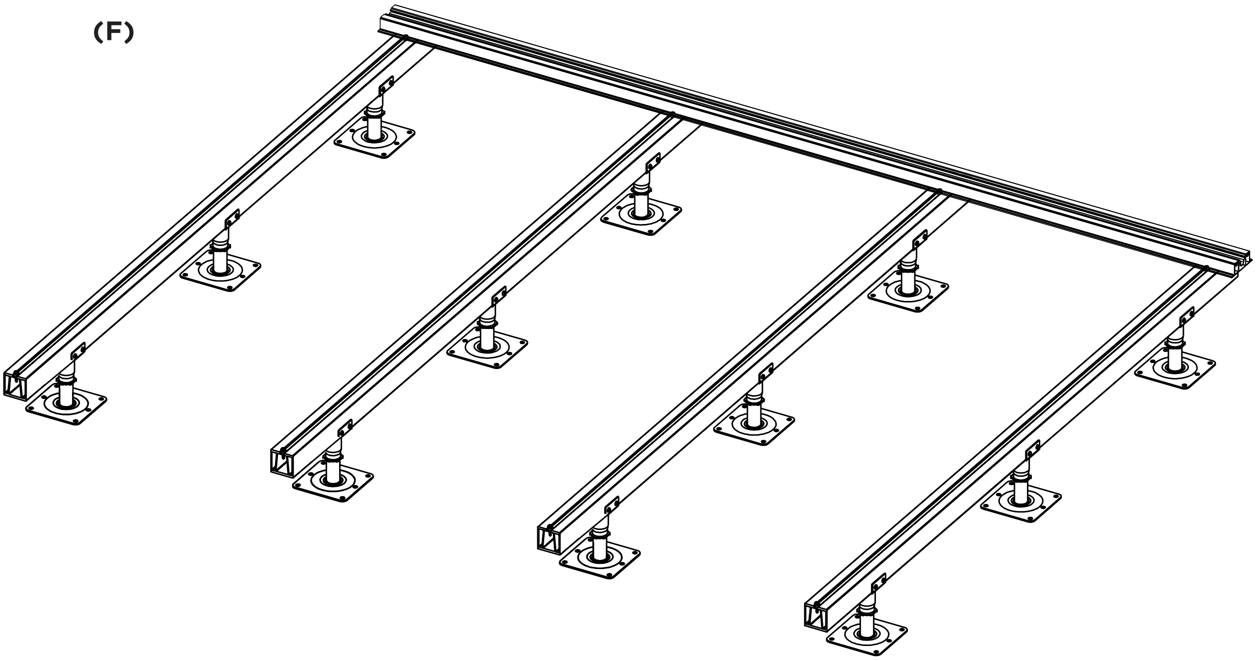
6. Add intermediate supports at the required intervals along the primary joists (see RS Aluminium Primary Joist Support Rail datasheet)

(E)

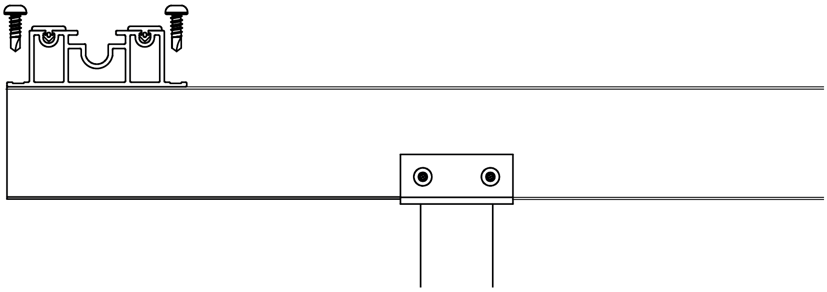


7. Once all the primary joists are all fully supported at the correct level, lay the first row of top rails at 90 degrees to the primary joists, ensuring that they are perfectly in line, and fix with the 13mm self-drill screws. **Fig. F - G**

(F)

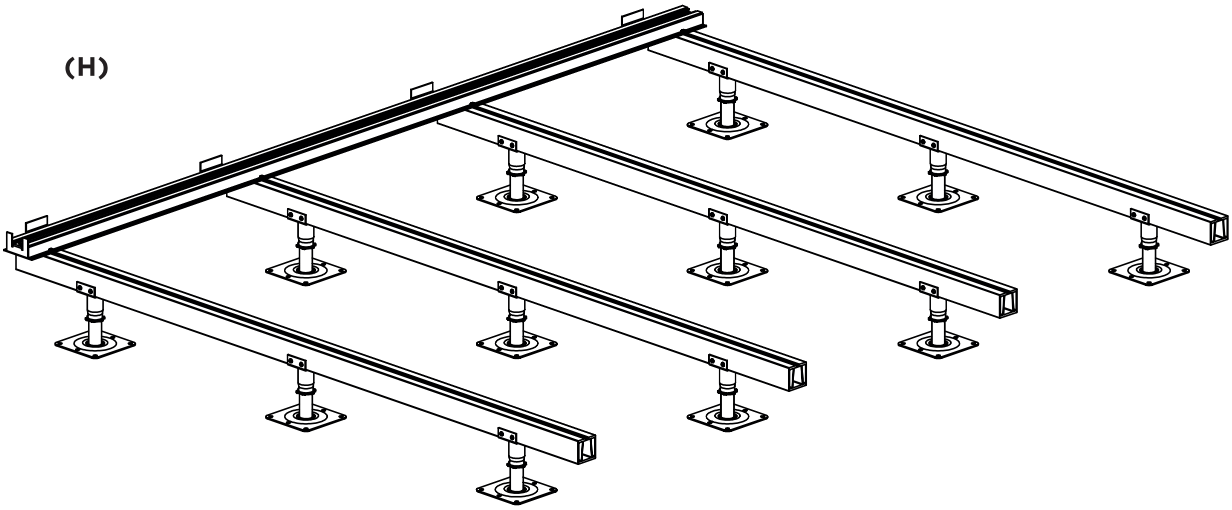


(G)

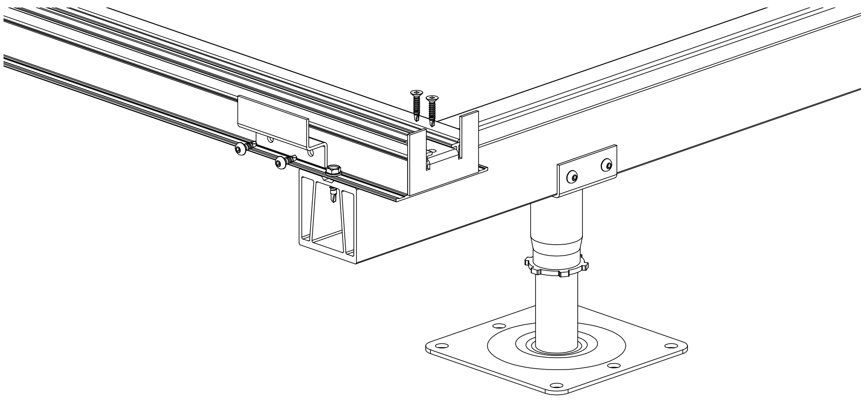


8. Now fit side-stop backets along the edge to catch the edge of the paving. One bracket can be used to restrain the corner of two tiles. **Fig H - I.**

(H)

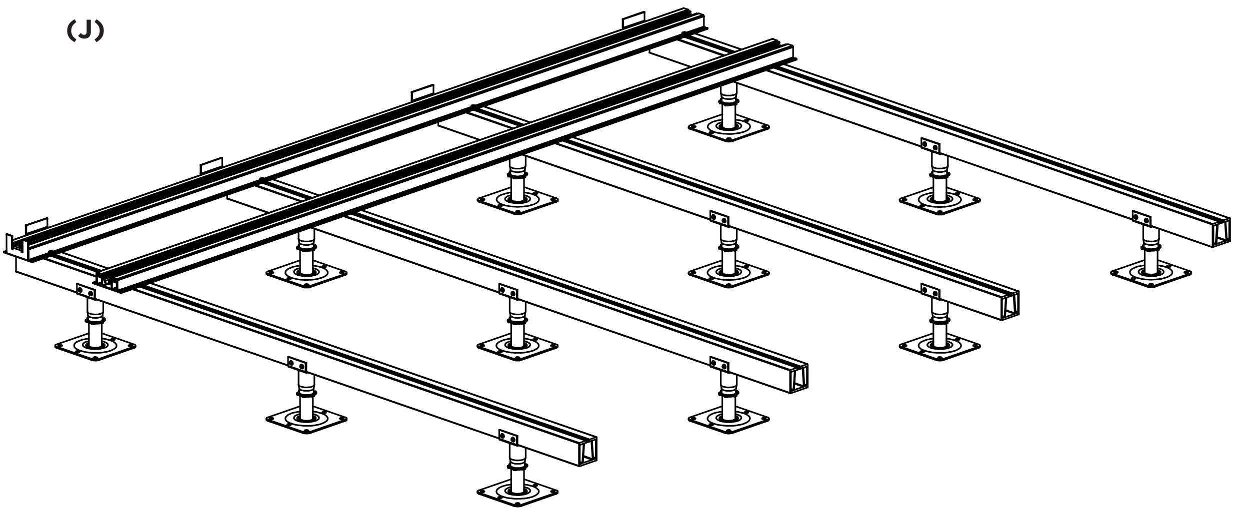


(I)



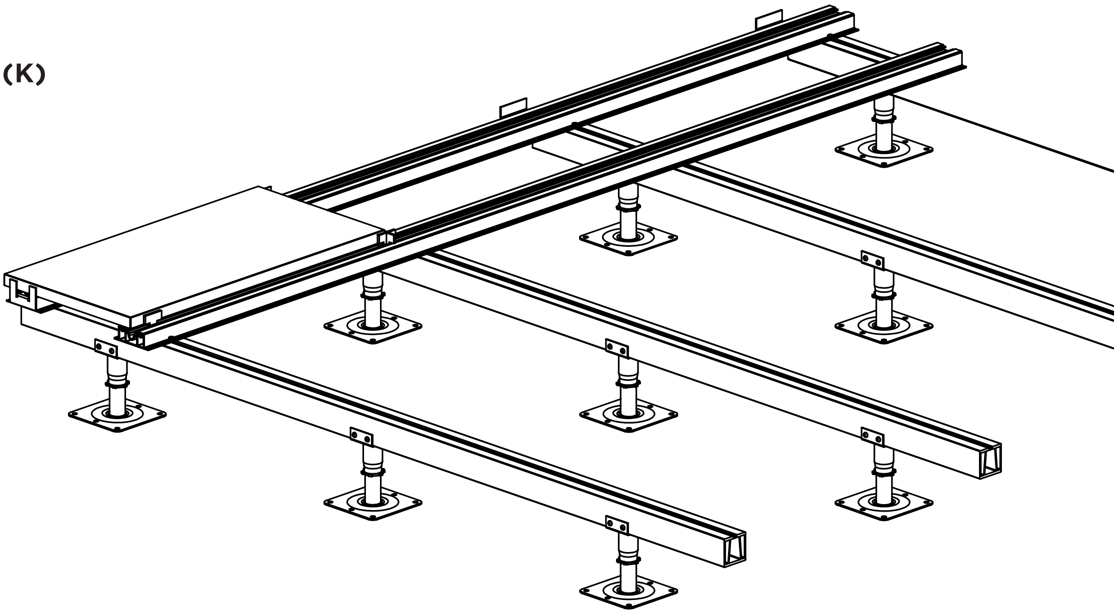
9. Lay the next row of top rails in roughly the right position to support the first row of paving but do not fix yet. **Fig J.**

(J)



10. Place the first row of paving along the first two rails and against the side-stop backets. Insert the spacers provided between each slab ensuring that the slabs are pushed firmly together. Also, check that that slabs are fully supported by the rails and they don't rock at all. **Fig K.**

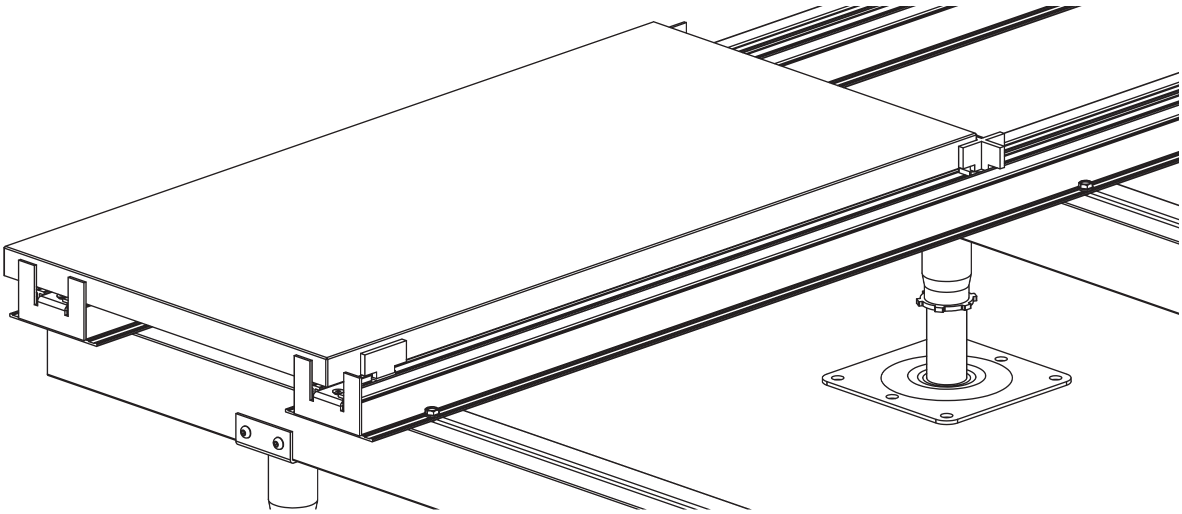
(K)



11. Inserting the spacers will locate the second top rail which can then be fixed using the 13mm self-drill screws. **Fig L.**

12. End-stop brackets can be fitted at each end to hold the first and last slabs in place.

(L)



13. Steps 9-12 can now be repeated for subsequent rows of paving

14. Once the final row of paving has been laid, the final row of side-stop brackets can be fitted to restrain them

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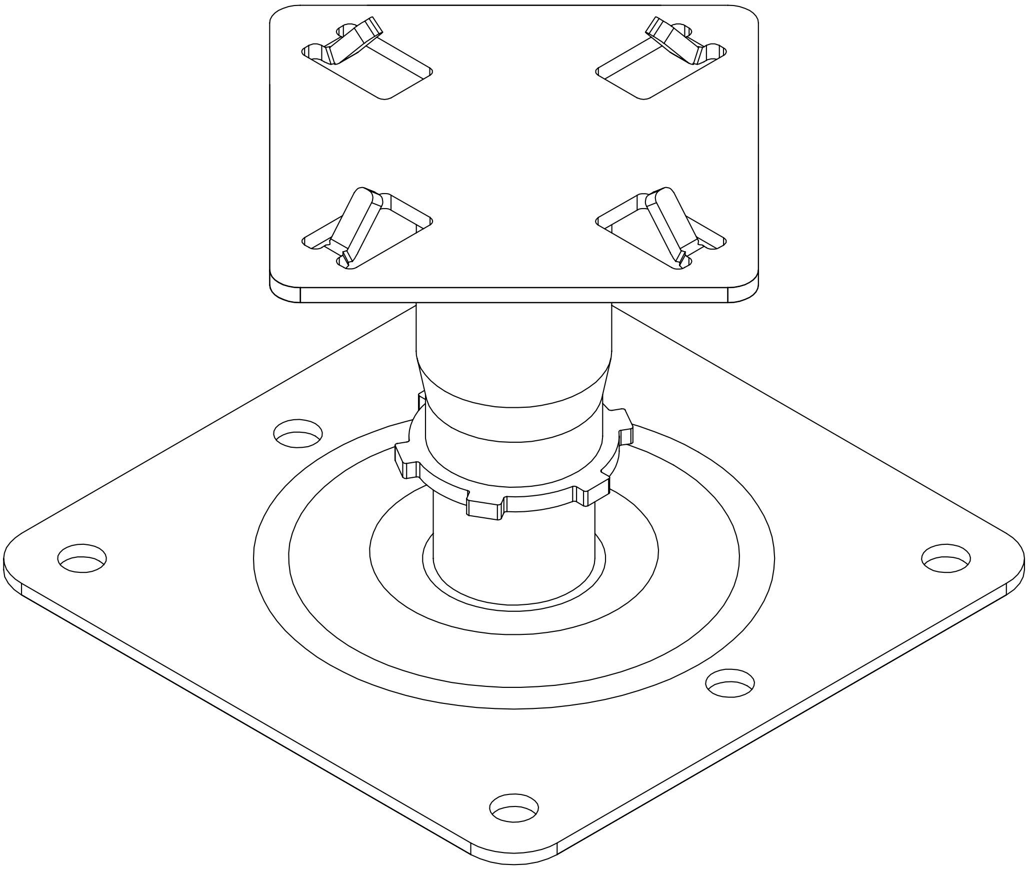
TerraSmart® Pedestal

Installation Guide

RN-P-1009-ISG-01 - Issue 1.0
September 2022

RP - FR



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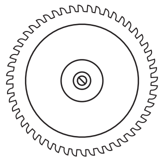
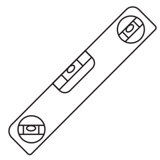
Equipment

Porcelain Bridge Saw



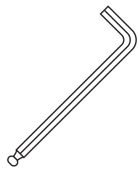
Levels

Rotating laser level
plus a standard level
is recommended



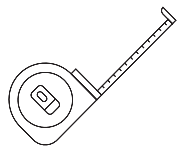
Ball ended hex key

Available from RYNO



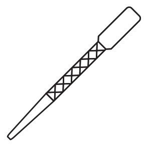
Tape Measure

Measure twice cut
once and repeat



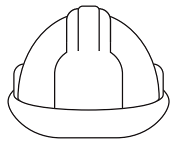
Nail Punch Set

Available from RYNO



Site PPE

Adhere to all relevant
site regulations



General Notes

- On delivery, all products should be inspected. If there are any issues with our products, please report them immediately and do not commence installation

- Safe working practise should be observed at all times during the installation process and all necessary Personal Protective Equipment (PPE) should be worn

- Cutting porcelain should be carried out using a water and dust suppressed diamond tipped power saw

- Always use appropriate torque setting on cordless screwdriver for screws

- Always use correct PPE throughout installation

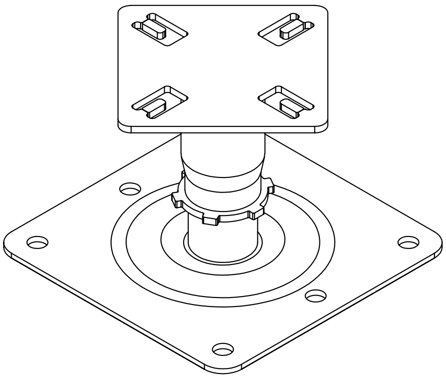
1. Determine the desired slab layout:

- **a.** Full slab starting in the corner of the area with cut slabs at the end
- **b.** Full slab starting in the centre of the area with cut slabs around the perimeter

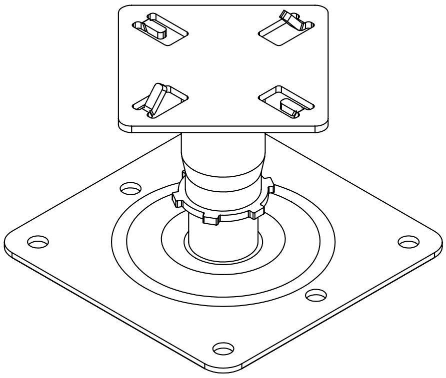
2. Use a nail punch and hammer to fold down spacer tabs on the pedestals:

- **a.** All 4 spacer tabs for edge support. **Fig A.**
- **b.** Two aligning spacer tabs for edge support. **Fig B.**

(A)

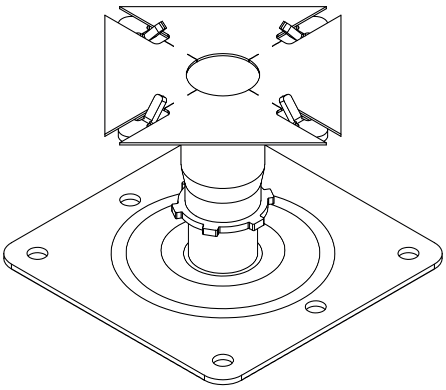


(B)



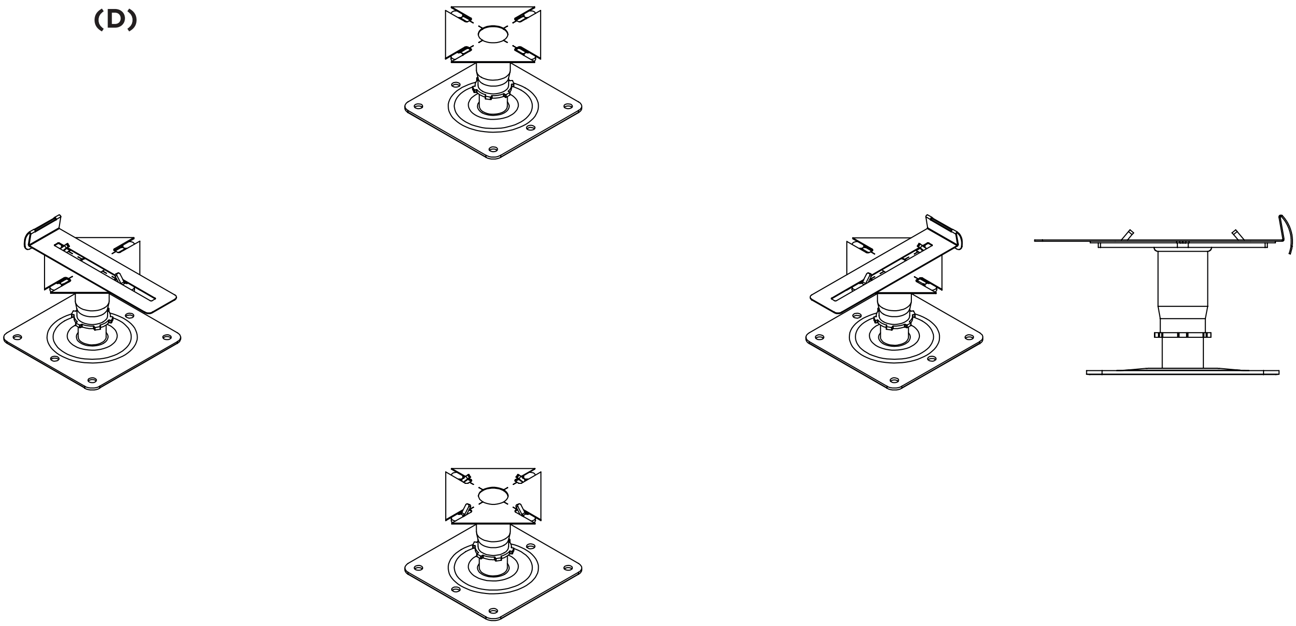
3. Place head rubber shockpads on top of pedestals. **Fig C.**

(C)



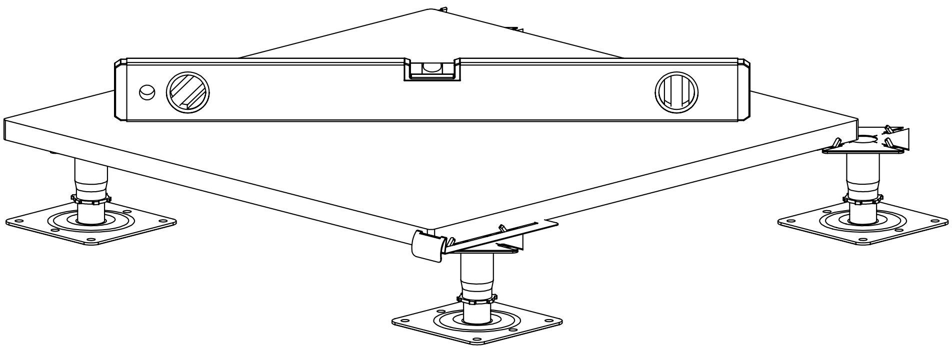
4. Place the first 4 pedestals in the desired area. When positioning pedestals along the perimeter of an area, ensure edge spring clips are used to create uniform spacing along these edges. **Fig D.**

(D)



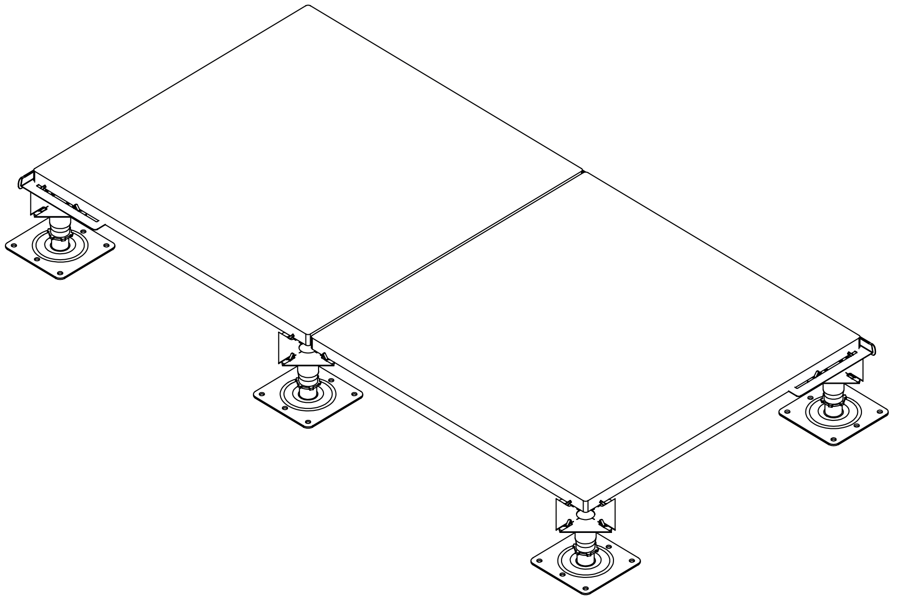
5. Lay slab on top of pedestals. Set the height of the slab and pedestals by placing a spirit level diagonally on the slab and twisting the pedestal upper shaft clockwise (down) or anti-clockwise (up). Tighten the locking nut to lock the pedestal height. **Fig E.**

(E)



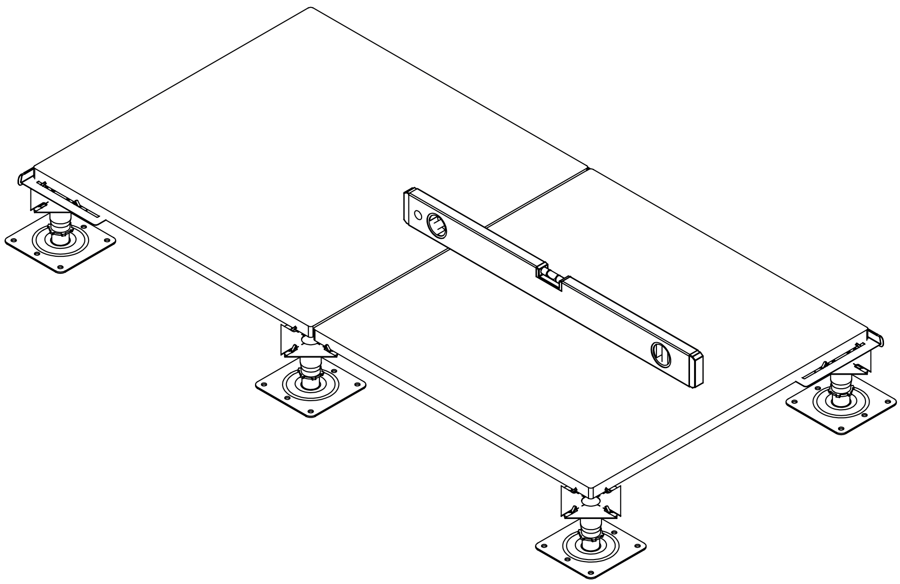
6. Position the next set of pedestals in place and lay slab on top. **Fig F.**

(F)



7. Level the slab with the previous by using a spirit level and raising/lowering the pedestals as described in point 5. If necessary, you can make minor adjustments to finished surface level by adding sections of head rubber shockpads beneath the tiles. **Fig G.**

(G)



8. Repeat steps 5-7 until the area completed.

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