



INSTALLATION MANUAL

Rombus Grid is an innovative “Modular Pavement Technology” with outstanding capabilities. It has been engineered for use in a wide range of applications as a cheaper and more sustainable substitution for even the thickest of concrete slabs

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INTRODUCTION

The Rombus flexible pavement solution is a dust free gravel free, wearing course that serves the same function as asphalt only with superior wearing and strength properties. It is the first flexible pavement system with a hard concrete surface.

Designed and manufactured in Australia using locally sourced recycled plastic this new innovative technology also allows for in situ placement and filling of the grid saving considerable time and hassle of full depth repairs.

At only 40mm thick and using Australian recycled plastic, Rombus flexible pavement solutions are stronger, faster, cheaper, and greener to use.

- Stronger than traditional concrete.
- Cheaper than alternative options.
- Faster to install.
- Greener using 100% Australian recycled plastic & reduced carbon emissions by 60% on traditional concrete.

100%

AUSTRALIAN DESIGNED, MANUFACTURED & OWNED



EARTHWORKS

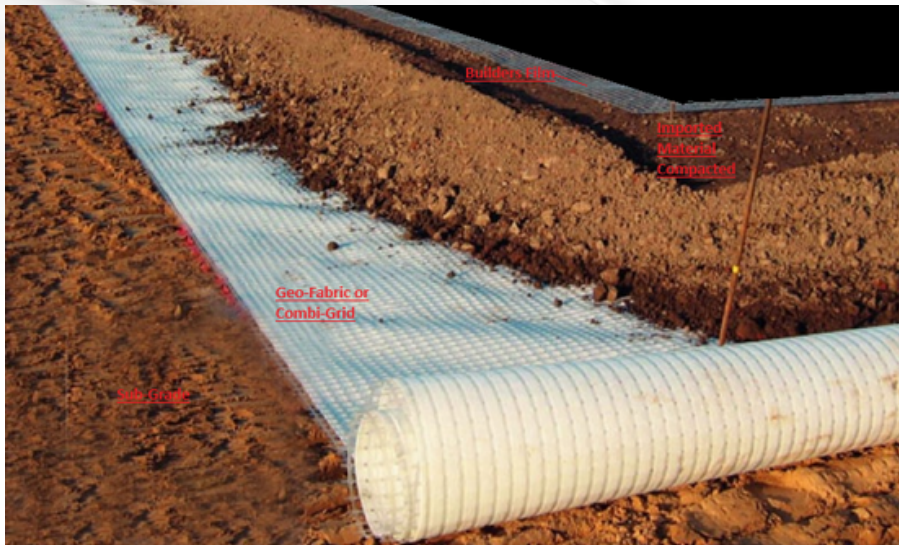


Earthworks & Ground Preparation. (This is also required when doing traditional concrete slabs) The ground preparation is extremely important and will make the rest of the installation a lot easier.

- Determine the required base thickness. (*This will depend on the application, traffic, and Soil Type - See Base Guide below as a guide only)
- Excavate to a depth equal to (Base Thickness + 40mm) to allow for the grid thickness, this will ensure the finished product is level with the surrounding ground level.
- Condition and compact the existing subgrade to a minimum of 98%MMDD.
- If thickening beams are required to leading edges, contact your Rombus Rep.
- Import base material, the base material should be installed and compacted in lifts suited to the size of the compactor available and a maximum of 300mm.
- If GPS/Laser levelling is not available Import cracker dust or sand screed level (a maximum of 30mm in any given area)

+40 mm
Base Thickness

EARTHWORKS



In situations where there is highly reactive soil a Geo-fabric or even Combi-Grid should be considered. These products are installed on the subgrade with 200mm overlap at the joints, before importing material to build the sub-base. (See below above))



PREPARATION



NOTE: If GPS/Laser levelling is not utilised or viable due to pavement area size, import cracker dust or screed sand to dress over sub grade and finish to final level as required. Screed materials are only to be used to trim up any undulations in sub grade, and are not intended to substitute compacted base material

Complete final compaction over screed material back to prepared base with a minimum 85kg plate compactor. We recommend application of surface water to aid in compaction.

98% MMDD

COMPACTION MINIMUM

SUB GRADE GUIDE

APPLICATION	BASE DEPTH	BASE MATERIAL	COMPACTION REQUIRMENTS
Footpaths and Cycle paths with no vehicle access	0-50 mm	Road Base	Basic compaction to sub grade with 80kg plate compactor, no required testing
Residential Driveways	0-100 mm	Road Base	As above with a 300kg plate compactor
Commercial Driveways, Industrial & Mining Applications	100-250 mm	Road Base	95% - 98%

Note: This is a guide only and based on areas with Non-Reactive Soils. Contact the team at Rombus Industries for assistance if you do not have a design.

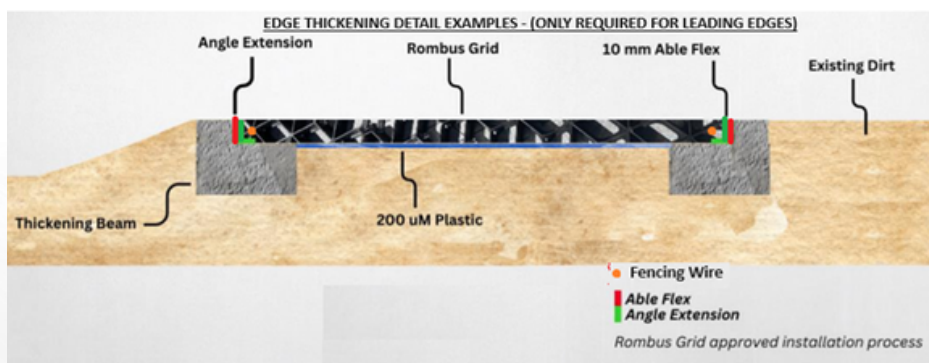
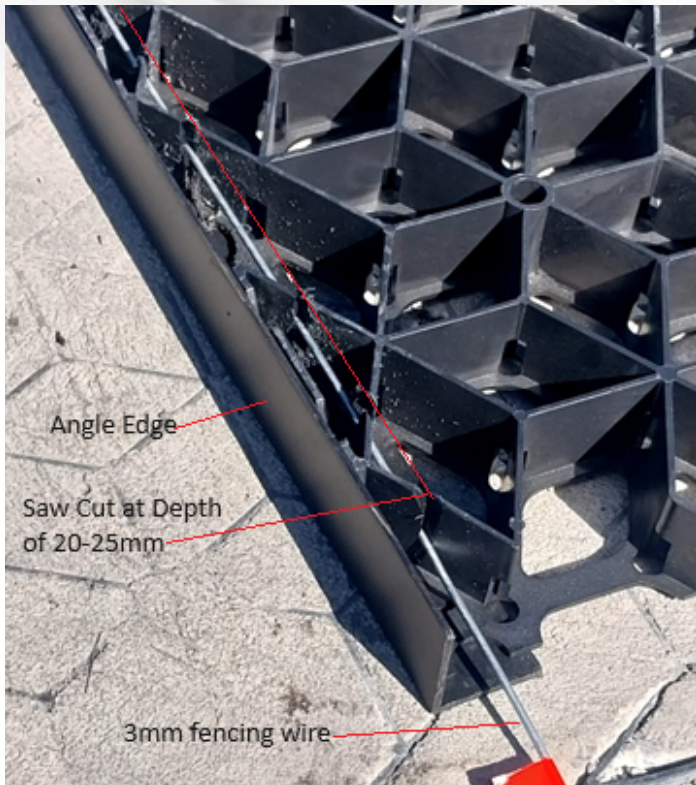


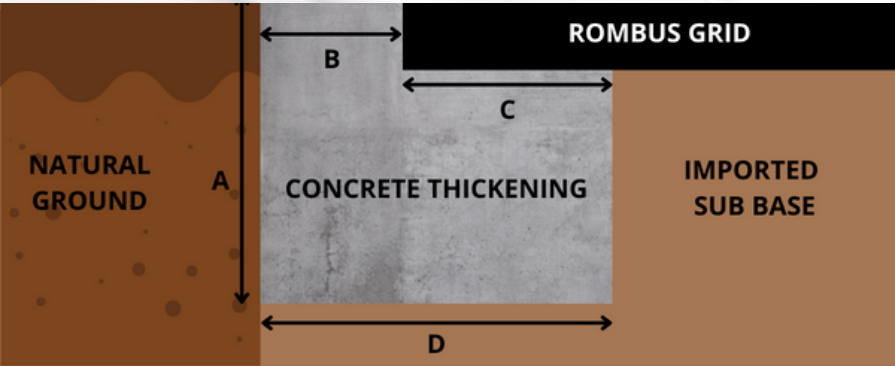
Diagram 1a

SUB GRADE GUIDE



3 mm Fencing wire as per diagram 1a on page 7 indicated by the orange dot.

EDGE THICKENING



- Lay the grid on the ground clipping the sheets together, ensure that enough pressure is applied above the clips to ensure they are clipped into position.
- Leading edges that are subject to vehicular loads should have edge thickenings, refer to the below diagram and table to determine your requirements.

Vehicle Loads	A	B	C
Light Vehicles	150 mm	75 mm	150 mm
Medium Vehicles	200 mm	100 mm	200 mm
Heavy Vehicles	250 mm	125 mm	250 mm
Edge Thickening in mm			

LAYING THE GRID



- Install a layer of 200uM builders film with 200mm overlaps at the joins
- Lay the grid on the ground clipping the sheets together, ensuring that enough pressure is applied above the clips to ensure they are clipped into position.
- Laying of the grid should be set out in the correct configuration to ensure each grid section can simply be placed over the previously installed grid sections and locked into place with the Rombus clip system.
- While laying it is recommended to place all of your grid sheets behind your immediate work area and work off the completed sections of pavement to ensure minimal disturbance to completed sub grade.
- Once Rombus pavement system is installed installers will be able to mechanically load and place sheets utilising forklift, truck telehandler etc (Rombus grid is fully trafficable once installed on sub grade even prior to any in fill works being completed) Avoid wheel screwing on the empty grid
- To ensure integrity of edges and closeout concrete cells along edges you must install Rombus edging to all exposed edges. Where there is a risk of a vehicle inadvertently driving off the edge it is recommended that 3mm galvanised fencing wire is installed as shown in the above photo
- There are two types of edging, one that slides over the male clips (or there are adapters for use on the female edge) The other one is a 40x40 angle and this is fixed in place using galvanized self-tapping timber screws.

FILL AND FINISH

- Order the concrete, Fillable volume of the grid is $\sim 0.0328\text{m}^3$ per square meter, but we recommend ordering 0.038m^3 per m^2 . Don't forget to order additional if edge thickenings are required
- The concrete mix design should use 58% 10mm Coarse Aggregate to 42% Sand, and the amount of cement will depend on the application and the required strength. 100 to 120 slump low shrinkage mix is recommended. In various heavy-duty applications or applications with steep inclines the addition of recycled polypropylene fibres at a length of 20-30mm and an add rate of 2.5-4kg per m^3 should be considered. Discuss mix designs with your Rombus Representative if you have any issues.
- Start pouring the concrete in a location that allows you to work your way back. Mechanical aid is recommended for large areas.
- Use a Concrete Rake to move the concrete around and get as close to the top of the grid as practicable. A red handled rake with a Makita battery vibrator installed down the handle is a handy tip, although not essential.
- Use the vibrating screed to complete one pass, (the vibrating screed sometimes works better when you walk forward as opposed to backwards.)
- Do one pass immediately after vibration using a power trowel, on a slow speed, with the blades set flat.
- Use a Rubber squeegee to scrape the slurry right back so the grid is exposed and put the slurry into a bucket just in case there are any holes that need filling later. Use a tennis court squeegee for large areas as it is more efficient and does not leave slurry lines behind. Do not be concerned if it looks like you have raked back too much, the trowel machine will fill any holes.

32/100/10

Recommended concrete mix
32 Mpa, 100 slump, 10mm aggregate.

FILL AND FINISH

- Immediately after removing the excess with a squeegee, complete one more pass using the trowel machine at a slow speed with the blades set flat. Ensure that all holes and depressions have been filled. (Note* Do not use the trowel machine while bleed water is present, if bleed water is present wait for it to be absorbed prior to using the trowel machine)
- It is now a waiting game and timing is essential. If you push your thumb into the concrete and it leaves a slight depression, then it is ready for the final finish. For a trowel finish ensure the blades are wound up enough so that it scrapes the excess off. If it is flicking rocks the blades have been wound too high. If you can feel the blades scraping plastic, it's a good sign you are exactly where you should be. Aliphatic alcohol should be used as opposed to water when required for finishing.
- In circumstances where you are starting to lose the concrete it is recommended to have a trowel machine with a pan attachment being closely followed by a trowel machine with finishing blades.
- **Caution: It is advised that water is not added to the concrete on site, the concrete should always be ordered and arrive on site at the desired slump.**

CURING

Curing is essential and failure to cure the concrete will prevent the concrete from hydrating and reaching the desired compressive strength. There are several methods used to cure concrete, below is 2 options.

Option 1- Pond Curing

Once the concrete is hard enough to walk on without leaving a mark sand will need to be piled around the outside of the slab to create a bund. The area then needs to be flooded with water and remain submerged in water for 3 days. This is not always practical, however is the most effective and fastest way to cure concrete.

Option 2-Curing Compound

Once the concrete is hard enough to walk on without leaving a mark a curing compound needs to be applied to the surface. A water-based membrane curing compound conforming to AS3799 is recommended. This can be applied using an industrial heavy-duty sprayer.

PROCESS

1



Start pouring the concrete in a location that allows you to work your way back

2



For direct laying from the truck shoot, begin in the top left corner and move to the right, progressing forward. One truck can handle up to a 6.0m pass. If needed, bring in a second truck alongside for a continuous sequence

3



Once you have completed first vibration pass, rake concrete back level with the grid as best as practicable

4



Once surface is completed the concrete infill should be trowelled down to the surface so that you can visibly see each and every individual cell

EXPANSION & CONTRACTION

When the grid is empty it can expand and contract up to 10mm per sheet. In situations where the grid is being installed in the heat of the day ready for a concrete pour the following morning, the last row of sheets should not be cut and installed until the morning of the concrete pour.

When the grid has been installed with concrete the expansion and contraction will vary depending on the temperature changes. Installations under cover are not subject to as much expansion and contraction as installations in direct sunlight.

As a rule of thumb, we say expansion joints should be installed every 20 meters. This can be pushed out under certain conditions; however, this should be discussed with Rombus technical support.

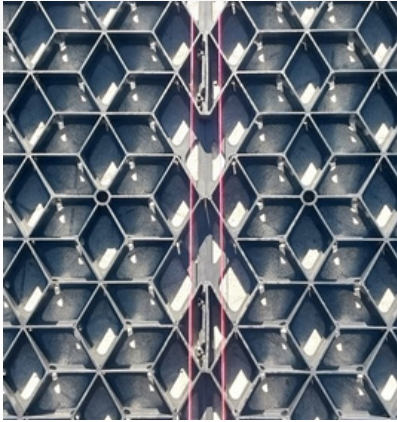
Any installations that are installed against hard surfaces such as walls or existing concrete slabs should have 10mm able flex installed first.

Expansion Joint Detail

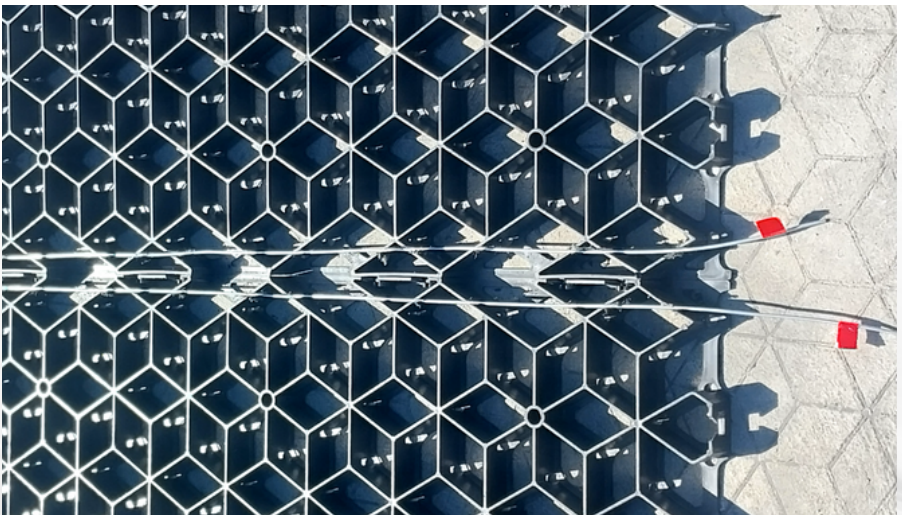
There are several ways to install expansion joints, this method requires the expansion joint to be cut once the concrete has been installed using a demolition saw.

1. Identify and mark out the locations where the expansion joints are required. In all cases optimum compaction must be achieved and in heavy duty applications a thickening should be installed at the location of the expansion joint prior to installation of the grid.
2. Once the grid has been installed make a saw cut either side of where the expansion joint will later be installed. This saw cut needs to be at a depth of no less than 20mm and no more than 25mm. The pink string lines in the below image on the left indicate the location of the saw cuts. Note—all expansion joints should be installed where two sheets join as far as practicable. The picture below on the right is the demo saw used to perform the cuts.

EXPANSION & CONTRACTION

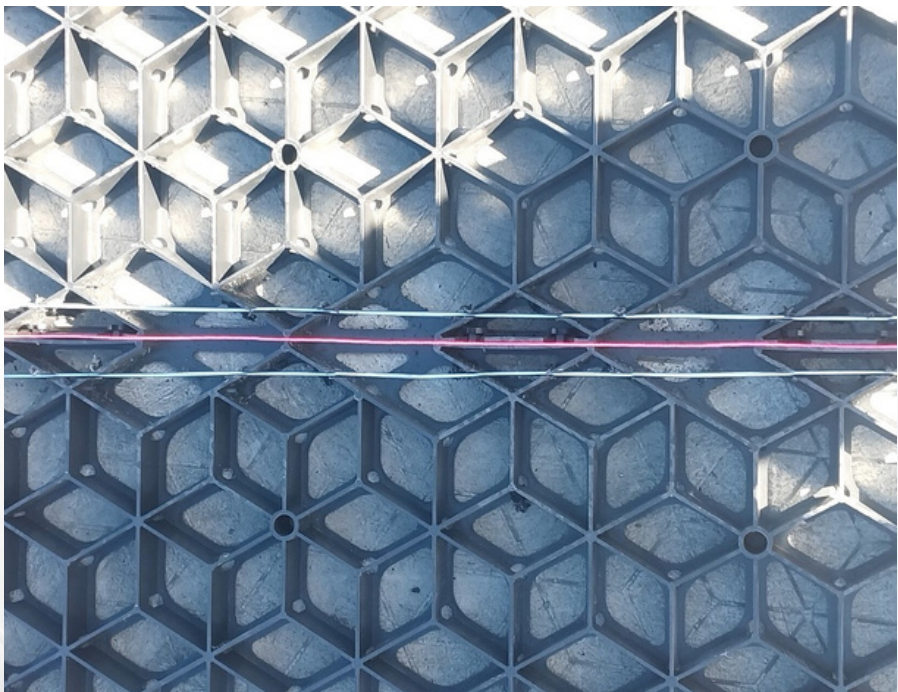


3. Once the saw cuts have been completed at the correct depth install galvanized fencing wire in each side as shown in the picture below. If you leave short tags (as marked with red tape in the below pics) it will be easy to identify where the saw cut needs to be installed for the expansion joint. (3mm fencing wire was used in our trials)



EXPANSION & CONTRACTION

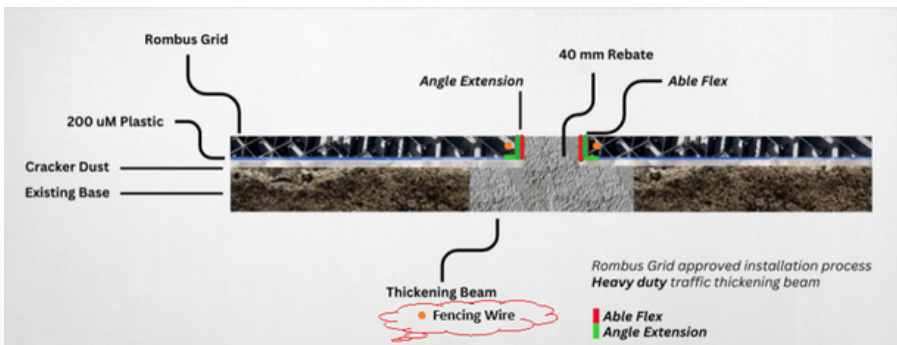
4. Once the fencing wire has been installed concrete can be placed and finished. Ensure the fencing wire does not come out during the concrete installation and insure it is embedded in the concrete.
5. The saw cut for the expansion joint should be completed the following day after concrete, where the two sheets join, between the two runs of fencing wire and needs to go all the way through the grid. This should be completed in the hottest part of the day.
6. As the temperature starts to decrease the saw cut will start to open. The following morning, when it is cool, and the gap has opened, it should be sealed with a product best suited for the application. The pink string line in the below picture shows where the saw cut should be made for the expansion joint.



EXPANSION & CONTRACTION

Notes

1. The concrete needs to be cured before exposing the joint to any traffic.
2. In heavy-duty applications the addition of 30mm, polypropylene, and Barchip fibres should be considered in the concrete mix design at a rate of 3-5kg per m³ (to be determined by engineers)
3. Deflection and settlement need to be taken into consideration at the design stage and where this could cause issues a thickening should be installed under the location of the expansion joint.
4. For applications where fewer expansion joints are required or for heavy-duty applications the below design may need to be implemented. Note: The angled edge may not be required depending on the application.



EXPANSION & CONTRACTION

Edging Details

Utilizing fencing wire has also proven to add strength to edges and should be considered in various applications.

1. Figure 1 below shows a method that may be used on non-trafficable edges if there are concerns that a light vehicle may inadvertently drive off the edge. The same method may also be used at leading edges with thickening beams as shown in figure 2 below, this will prevent the cells from coming loose over time.



Figure 1

EXPANSION & CONTRACTION

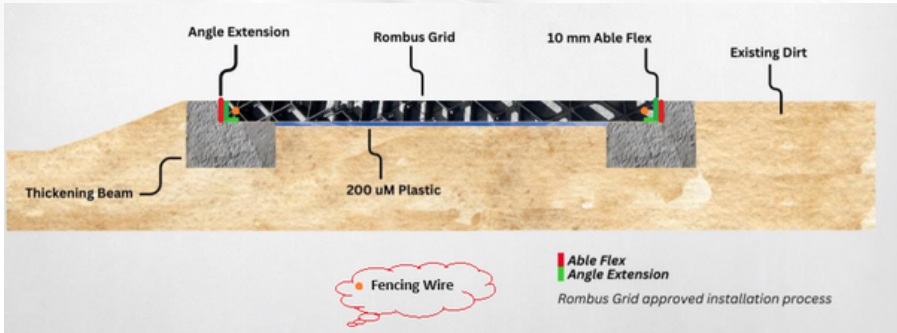


Figure 2

3. Figure 3 below shows a method that may be used on non-trafficable edges if there are concerns that a heavy vehicle may inadvertently drive off the edge.



Figure 3

DO'S & DONT'S

Please Pay Careful Attention

Any pavement designs shall be completed in line with the *Technical specification for ground preparation and lay of Rombus*.

The installation shall be in line with the *Installation Manual*.

Always contact your Rombus Rep if you are unsure of something.

Never add water to the concrete on site

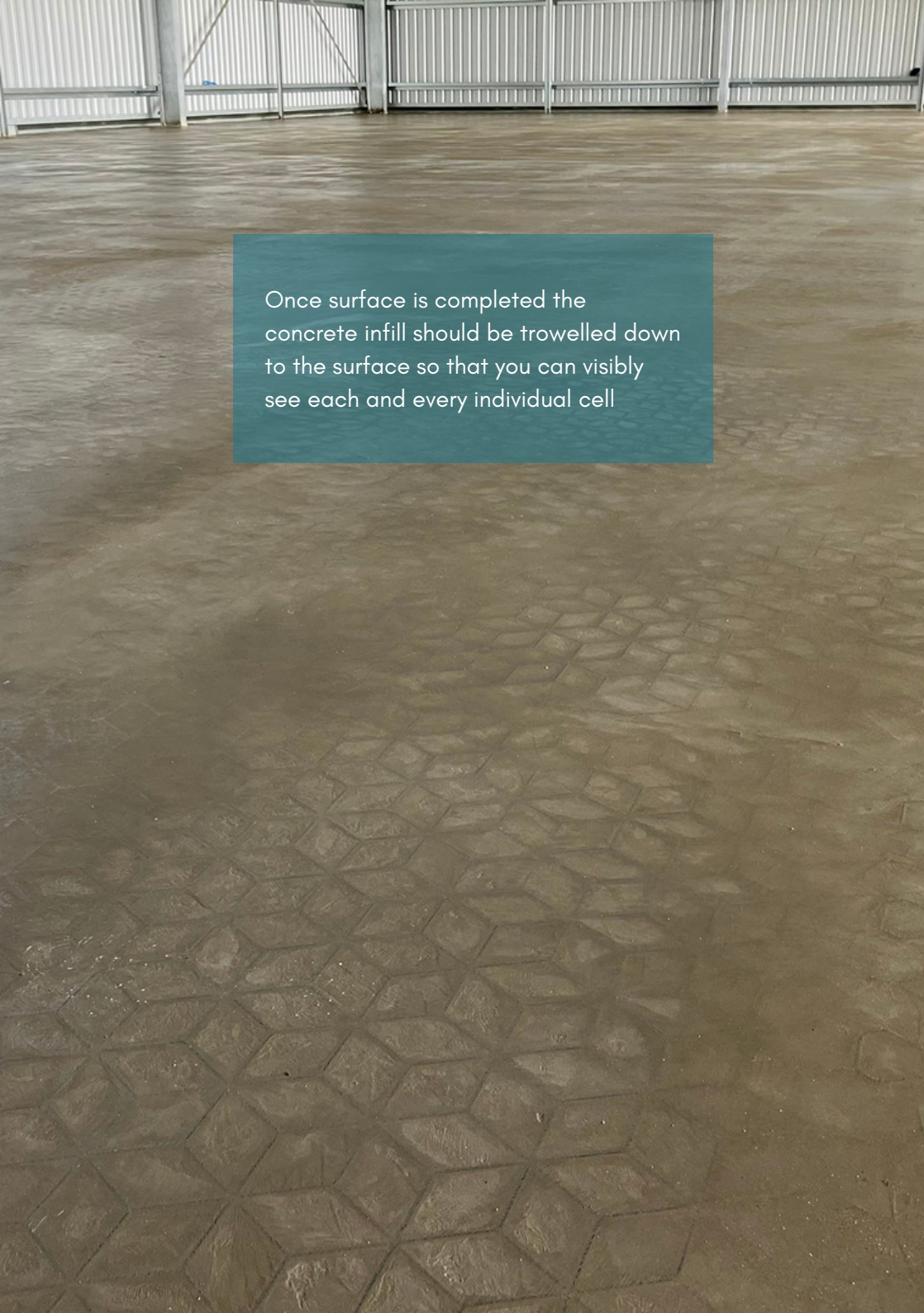
Always make sure the finished edges are level with surrounding ground and that the base under the edges is very well compacted.

Concrete Mix Designs

Concrete mix designs are very important and vary significantly from place to place. Contact your Rombus Rep to organise the best mix design which will be based on the following.

- Available aggregates, sands, and mixtures.
- Weather conditions on the day the concrete is being installed.
- Skill level of the installers.
- The type of application.

ZERO WATER

The image shows a vast, empty industrial interior. The floor is a light brown color and features a prominent pattern of interlocking hexagons, likely created by a stamping process. In the background, there are several large, white, corrugated metal structures, possibly storage containers or parts of a building's exterior. A semi-transparent teal rectangular box is positioned in the upper left quadrant of the image, containing white text.

Once surface is completed the
concrete infill should be trowelled down
to the surface so that you can visibly
see each and every individual cell

TOOLS & EQUIPMENT NEEDED

Concrete Place & Finish Labour Requirements

As a guide 1 person per 100m²/day - (Example: if you were planning on completing 1,000m² in 1 day then you would need 10 people unless mechanical aid was utilised for concrete placement and ride-on trowel machines were used for finishing operations.



Pointed Trowel

1 per person



Mag Float

1 per person



Vibrating Screed

1 per 200 m² per day



Trowel Machine

1 Per 200m² per Day Ride on Trowel
Machine = 3 x Faster than the above

TOOLS & EQUIPMENT NEEDED



Slurry Bucket
With Lid



Concrete Broom
Only required for a broom finish



Tennis Court Squeegee
(Wheels may need replacing with skis)



Ride on Trowel Machine
for finishing much larger areas.



Surface Cure

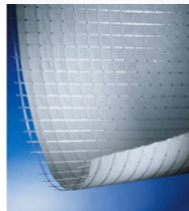


Heavy Duty Industrial Sprayer

TOOLS & EQUIPMENT NEEDED



200uM Builders Film



Combi-Grid

<https://globalsynthetics.com.au/geogrids/combigrid-multi-functional-geogrid/>



Geo-Fabric

<https://globalsynthetics.com.au/geotextiles/profab-nonwoven-geotextiles/>



Concrete Rake
with Makita Battery Vibrator

SUCCESS DEMANDS THE RIGHT TOOLS



ABOUT

Imagine a future where construction is both swift and environmentally conscious. Rombus Grid embodies this vision with a streamlined installation process, boasting a 40% efficiency boost, using only 1 cubic meter of concrete per 25 square meters. Proudly 100% Australian Made, it incorporates locally sourced recycled plastic to minimize waste. Say goodbye to extensive earthworks, control joints, and the need for pump trucks, formwork, or steel structures.

No requirement to remove the existing wearing course makes it a seamless upgrade. Rombus Grid's versatility extends to non-destructive sub-grade repairs, offering durable, sustainable solutions for both the environment and your budget.



Rombus Grid

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