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Strength. Performance. Passion.

Geostone™ Best Practice Placement Guide

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Plan ahead. Hire a professional. Enjoy the results

Thank you for choosing our Geostone™ range of decorative concrete.

This Best Practice Placement Guide aims to assist you primarily with exposed aggregate concrete projects, but is also relevant to other decorative concrete projects.

Make sure you check with your Geostone installer who will be placing your concrete, that your concrete is placed in accordance with these "Best Practice" guidelines.

Placing your Geostone architectural concrete is mostly a straightforward task, but be aware there may be additional factors to take into consideration such as adequate preparation of the site. We encourage you to read through this information and check any items with your installer and our Geostone sales staff.

Holcim and its subsidiaries, Excel and Broadway & Frame, strictly control the quality of their concrete products, but be aware there are many factors that you should consider in planning any paving project. This leaflet is intended as a general guide to assist you with your Geostone project and ensure that your decorative concrete looks great for years to come.

Preparation is the key

It is common practice for concrete projects to be engineer designed and at the outset you may choose to consult a structural engineer to specify and design your project.

Then, the first step is to ensure the area where you will lay your Geostone concrete has been graded and compacted. Be especially aware that areas that have been excavated alongside buildings, retaining walls and pipework are often poorly compacted. Poor compaction may result in movement in settling and water action in and around these areas which can cause cracking and other issues associated with water ingress.

That is why it is always a good idea to call in a professional to check compaction for any type of paving job. Apart from issuing a compaction certificate, you'll have peace of mind that your site will not be subject to settlement.

It is recommended that any area to be concreted, unless a water vapour barrier (typically a plastic or poly sheet) is placed in the area where the concrete will be installed, be well watered prior to your installer coming on site.

In simple terms... a better prepared site will result in a better finished job.

Reinforcement

Concrete has very high compressive strength, but relatively poor tensile strength. Therefore, it is essential to use steel reinforcing to give concrete additional strength in tension. Steel reinforcing also assists in the control and movement of cracks.

Your installer must use bar chairs designed to hold the steel reinforcement above the ground when placing the steel mesh. It is essential to use commercial bar chairs, as they will hold the reinforcing mesh in the upper part of the concrete, where it best assists in crack control. It is not acceptable for concreters to lift or "hook up" the reinforcing mesh as this may cause visual defects in your concrete.

The reinforcing mesh should be a minimum 25mm from any concrete surface so it is not in contact with the atmosphere. Concrete is highly alkaline and steel will not rust in concrete, provided that it is fully encased by the concrete. To ensure that the edges of concrete paving have no air holes, it is useful for the installer to compact paving edges simply by tamping along these areas prior to floating or trowelling the surface.

In honed or exposed aggregate Geostone projects, we recommend that you use SL62 or higher, reinforcing mesh.

If you are using Polished or Honed Concept concrete as your house slab or suspended slab, please ensure your structural engineer, architect or designer are aware of your choice. We recommend the use of SL82 or heavier slab mesh in all polished or Geostone internal ground slabs.

Note that reinforcing mesh in any concrete ground slab assists in transferring loads from both expansion and contraction (due to heating and cooling), as well as direct loads placed on the concrete. It also reduces crack widths in a house slab. Vertical mechanical vibration is required for Polished Geostone floors but should be avoided for Exposed Aggregate or Honed projects.

Cracking

Be aware that cracking (although undesirable) may occur in concrete products and this can in turn affect the appearance of your Geostone project. There are many factors which may cause cracking, but this can be minimised by strictly adhering to the Best Practice placement methods outlined in this leaflet.

If you pour concrete on hot, dry or windy days, the concrete may be subject to cracking.

Protecting the concrete surface from drying out will assist in preventing this type of cracking and we recommend that installers apply an evaporation retardant to the concrete surface after initial levelling or smoothing surface (screeding or floating) the concrete. The evaporation retardant applies a thin film surface membrane to your concrete and will slow the evaporation rate and keep moisture within the concrete at optimal levels. It should be reapplied each and every time the concrete is "worked" and in accordance with the manufacturer's data sheet. If it's windy, erect wind barriers around the project.

If possible, it is better to avoid pouring Geostone concrete on days of high temperature or high wind.

However, if it is critical to pour concrete on such days, it is essential to ensure that you take steps to prevent rapid drying of your Geostone concrete.

On warm to hot days, your concrete is prone to rapid drying after final placement. Normal "pond" curing (immersion of the finished concrete in water held in by a sand or earth bund) not suitable for either polished floors or exposed aggregate projects. In such circumstances, it may be necessary to apply a single coat of solvent-diluted acrylic sealer (sometimes referred to as same day sealer) to your finished concrete.

Using a water vapour barrier (typically a plastic or poly sheet) under the concrete can help avoid cracking. It also assists in reducing movement restraint due to friction between the concrete and the sub-grade (or soil) below your concrete. Additionally, it will also help in protecting your concrete from possible discolouration from underground water, dampness or waterlogging.

Adding excess water to the mix should be strictly avoided, as this practice will alter the colour, finish and strength of your concrete. Geostone concrete is designed to be installed at a slump (a test that measures the workability of concrete) of 80mm and adding water onsite may increase the slump beyond this range and therefore alter the design specification of the concrete mix.

Sprinkling water on the surface during or after finishing should also be avoided.

For further information on cracking you can visit the Cement Concrete and Aggregates Australia website at **www.concrete.net.au**.

Control Joints

As concrete loses moisture over time it shrinks. If the concrete is restrained from shrinking by such things as footings or existing walls, then internal tensile forces will be created in the concrete which can cause the concrete to crack. This type of cracking can be reduced by strengthening the concrete to resist the tensile forces (by the additional of adequate reinforcement) and removal of restraints on the concrete (allowing it to move) by the use of control and isolation joints. The plastic or "poly" covering the ground also reduces these restraining forces.

Control joints are purposely created planes of weakness in concrete to ensure that anticipated cracking due to shrinkage will take place at predetermined and aesthetically appropriate areas. To be effective, control joints need to be deep enough so that it is the weakest part of the surrounding concrete.

Assuming the depth of your Geostone concrete is 100mm, we recommend that control joints be no further spaced than 2.5 metres and at an absolute maximum 3 metres. When planning your project with your installer, you should aim to achieve square rather than elongated shapes with your control joints.

Control joints should run from all hard corners such as brick piers, soak well covers or the corner of a building. If there is a rectangular cut-out in your paving, such as a garden bed, control joints should run from each of the four corners. Additionally, if your Geostone concrete is going to meet an existing hard surface, such as the wall of an existing building or other concrete, your installer should create an expansion joint using a foam joint filler.

Any circular cut-out shape in your paving should also have four separate control joints radiating from the shape.

In the case of curves or garden beds, control joints should take the shortest path from the curve to the closest wall or pier.

Should you be laying Geostone alongside an existing concrete project such as a kerb, please ensure that any existing control joints continue through to your newly laid concrete.

Put simply, if there is a line (joint) in the kerb, make sure that the line continues through your paving. Try to avoid sharp triangular shapes as concrete may crack across narrow shapes.

When laying concrete with a random pattern finish, continue to observe the normal rules relating to control joints. Remember, a joint will encourage your concrete to crack at this point. If a joint stops in a random pattern, the concrete may crack beyond the point at which the random pattern stops. So it is important to utilise full-length or full-width control joints even in random pattern finishes.

It is important to plan the location of control joints prior to placing concrete as the reinforcing mesh should be partially cut at these points so as to enhance the plane of weakness. Installers should cut out two of every three squares of mesh along the control joint location.

It is recommended that all joints be cut to a minimum 25% of the concrete depth. These joints may be cut by trowel and jointing tool whilst the concrete is plastic or by saw, no later than 18 hours after the concrete is laid. Saw cut joints can introduce unwanted moisture into your concrete which can later produce a milky colour on sealed concrete.

Be aware that saw cut joints can allow for foreign material such as sand to deposit in the joints, which when weeds grow in this material, can cause the concrete edges to crack. Commercial coloured seals are available to cover saw cut joints and prevent these issues. Alternatively, your installer may supply one of several commercial jointing products.

As already noted, concrete will crack if it is restrained from moving by bonding with hard surfaces such as brick walls, existing concrete surfaces, columns and plumbing fittings.

It is essential to construct filled isolation joints around and along hard surfaces and we recommend the use of a commercial foam joint.

Colour

Be aware that environmental conditions can affect the colour and finish of concrete. Concrete placed in shaded areas can appear different to concrete placed in direct sunlight. Concrete placed in cold conditions can appear different to concrete placed in warm conditions. The same is true of placing concrete on wet and dry days, inconsistent exposure levels, types of sealer and the moisture content of the concrete.

To reduce variation, it is recommended that Geostone concrete be poured under the same environmental conditions and if possible on the same day.

Concrete finished inconsistently can also result in colour variation, due to light reflecting differently from the surface, changing the apparent colour and tone.

Many factors can impact on the final appearance and serviceability of your Geostone project including natural variation, placement methods, contamination and the condition of your sub-grade.

For example, sub-grade areas containing mud, standing water, or soils with uneven absorptive properties can cause surface discolouration and cracking.

Geostone has a comprehensive quality system in accordance with Australian Standards, which includes extensive raw material testing and strict control over batching and mixing procedures. However, the materials used in the manufacture of your Geostone product are subject to natural variation of colour, texture, shape and size. Such variations can influence the overall colour and appearance of your finished project.

We take every care to ensure you receive a quality product, but please be aware that our Geostone range is a natural product and we cannot guarantee your project will be an exact match to sample panels, previous projects or existing concrete.

Remember, site preparation, environmental conditions (including sunlight, temperature, wind and shade) as well as placing, finishing, curing and sealing, all play a part in your Geostone project.

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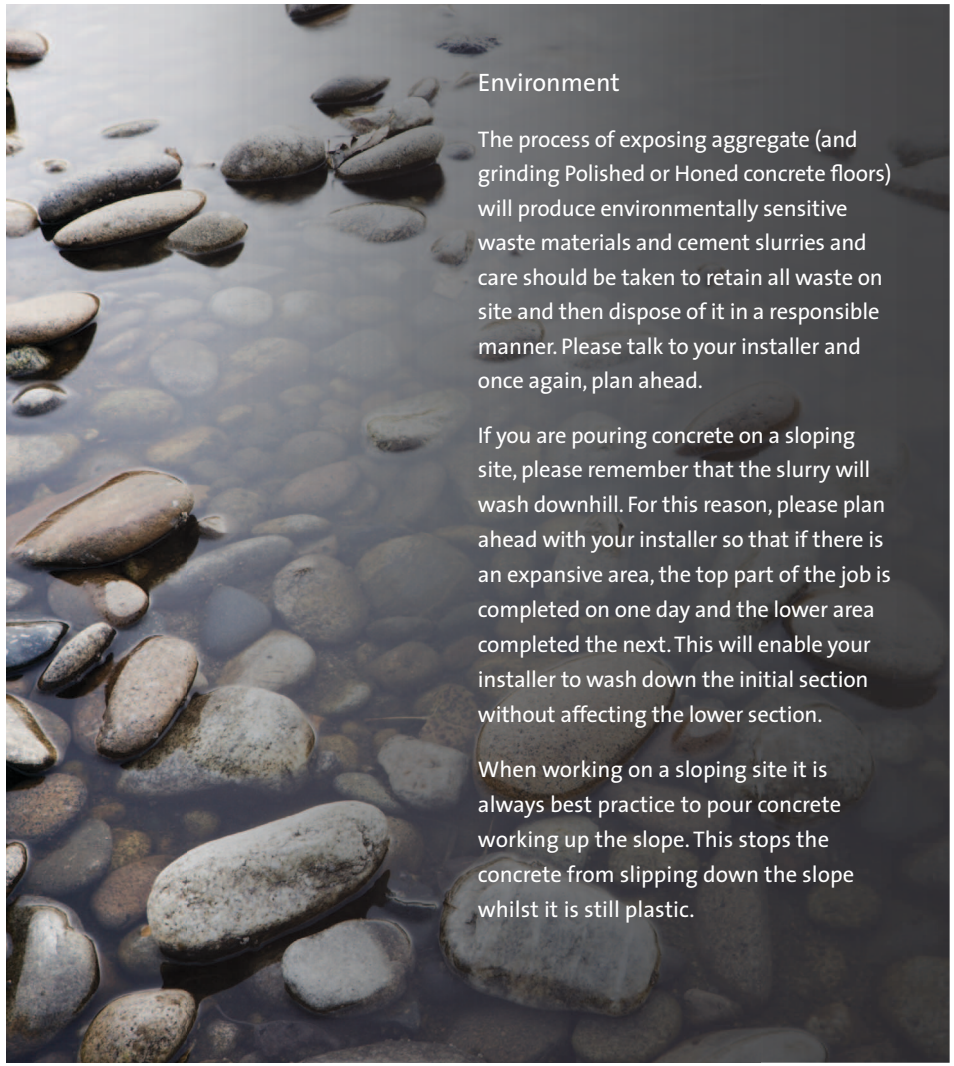

Environment

The process of exposing aggregate (and grinding Polished or Honed concrete floors) will produce environmentally sensitive waste materials and cement slurries and care should be taken to retain all waste on site and then dispose of it in a responsible manner. Please talk to your installer and once again, plan ahead.

If you are pouring concrete on a sloping site, please remember that the slurry will wash downhill. For this reason, please plan ahead with your installer so that if there is an expansive area, the top part of the job is completed on one day and the lower area completed the next. This will enable your installer to wash down the initial section without affecting the lower section.

When working on a sloping site it is always best practice to pour concrete working up the slope. This stops the concrete from slipping down the slope whilst it is still plastic.

Playing it Safe

Care needs to be taken to avoid on-site contamination, which may result from other concrete products, site materials walked on to the concrete, windblown materials, wildlife and pedestrians.

Importantly, ensure your installer uses only commercially available retarders when exposing the aggregate in your concrete. Sugar, whilst it will retard the chemical reaction of the concrete, is not recommended to provide consistent retarding of the concrete across your project and should not be used for any exposed aggregate project. Your installer should include the cost of retarders in their quote or contracted price. Always ensure a commercial retarder and not sugar, is being used on your exposed aggregate project.

The retarder is applied to slow the chemical bonding of the concrete at the surface level and is "hosed" off to reveal or expose the top portion of the concrete aggregates (or stones). Some installers may vary the time of retardant exposure or even use different retardant products to purposely create varying textures, patterns or stencil effects in your Geostone project.

The Final Touch

Your installer may or may not provide an outdoor sealer to protect you Geostone concrete. Please check with your installer as it is recommended that 2 coats of sealer be applied after the concrete has sufficiently dried, usually after a few days. It is also recommended to re-seal your Geostone concrete every 2 years or even sooner if required.

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Checklist

To achieve the best from your project, we recommend that only reputable, experienced installers place and finish our Geostone architectural concrete range. To achieve the best result from your project, contract only an experienced Geostone installer who follows all Best Practice recommendations, including the use of a commercial retarder, foam jointing and provides predetermined control joints in accordance with Best Practice principles.

Whilst we do everything within our control to ensure the consistency and quality of the Geostone range, please remember that many factors such as colour variation, cracking and other issues associated with installing the Geostone product can affect the final quality of your project and will always be out of our direct control. We also do not take responsibility for the product where water or other additives are added to the mix after the Geostone concrete product leaves our plant.

So please read this leaflet carefully. If you plan your project carefully, you will be informed and aware of these factors... and be able to enjoy the many benefits of Geostone project for years to come.

To assist you in planning your project or selecting a quality installer, please utilise the following checklist.

- ☐ Is the site graded, compacted and free of any debris or organic material?
- ☐ Is my Installer experienced and do they guarantee Best Practice guidelines are always followed?
- ☐ Is a polythene membrane being laid over the entire project area, prior to concrete being poured?
- ☐ Is reinforcing mesh being installed in all outdoor areas?
- ☐ Does the reinforcing mesh meet the requirements of this guide or engineering drawings if applicable?
- ☐ Is reinforcing mesh being held in the concrete at the correct height by bar chairs?
- ☐ Is my installer using a quality, commercial retarder to expose the concrete?
- ☐ Has my installer explained the location of all control joints and is this in accordance with Best Practice guidelines?
- ☐ If my installer is saw cutting these control joints, have they guaranteed that these joints will be cut within 18 hours of the concrete being laid?
- ☐ Is my installer utilising foam joint fillers against all hard surfaces, including plumbing pipes and steel posts?
- ☐ Have I ensured my concrete is not being laid on especially hot or windy days?
- ☐ Have I made adequate preparation to ensure that my project does not impact on the surrounding environment?
- ☐ Is my installer acid cleaning and sealing my concrete?
- ☐ Does my installer have a copy of the Best Practice Placement Guide?

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Contact your local Holcim representative on 13 11 88

www.geostone.com.au