

# Product Test Data.

*All tips and guidelines should be taken as general advice and should be used in addition to the relevant Australian standards. These tips and advice are given in good faith. In no way do these replace the service of professional contractors / consultants.*

# Stone Products and Testing Report

Prepared by: RMS Traders

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## Introduction

This document provides a comprehensive overview of stone products, including detailed testing results and performance evaluations. The report covers various aspects such as water absorption, slip resistance, strength testing, salt resistance, weathering/exposure, and fire rating. The information is based on data from multiple sources and adheres to relevant Australian Standards to ensure accuracy and reliability.

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## Disclaimer

**The information provided in this document is based on data from various sources. The values and specifications are indicative and should be used as a general guide only. Actual results may vary depending on specific conditions and testing methods. We do not guarantee the accuracy or completeness of the information provided and are not legally liable for any discrepancies or issues that may arise from its use. Users are advised to conduct their own tests and evaluations to ensure the suitability of the products for their specific applications.**

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## Water Absorption

The water absorption of a stone serves as a crucial indicator of its porosity and overall durability. A lower water absorption rate is generally preferred, as it signifies a higher resistance to stains. Stones with increased water absorption are more prone to absorbing stains.

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## Slip Resistance

The slip resistance of a stone is influenced by various factors, including density, porosity, grain size, surface roughness, and the level of finish. In general, stones with rougher and more porous surfaces tend to offer greater slip resistance. Surfaces with an exfoliated finish typically provide superior resistance compared to honed or polished finishes.

## The Wet Pendulum (BPN Test)

The wet pendulum test, conducted according to AS 4586, is a valuable method for assessing slip resistance. Results are communicated as a British Pendulum Number (P value) or Skid Resistance Value (SRV). The classifications include:

- **P5:** Suitable for external ramps steeper than 1:14, such as loading docks, commercial kitchens, swimming pool ramps, and stairs.
- **P4:** Appropriate for external walkways, including pedestrian crossings, driveways, verandahs, balconies, serving areas, cold stores, and swimming pool surrounds.
- **P3:** Recommended for locations like shopping centers (food courts, fresh food areas), entries and access areas in public buildings (wet), bathrooms in hospitals and aged care facilities, and toilet facilities in public buildings.
- **P2:** Suited for entries and access areas in public buildings (transitional), hotel bathrooms, ensuites, toilets, hotel kitchens, laundries, wards, corridors in hospitals, and aged care facilities.
- **P1:** Suitable for entries and access areas in public buildings (dry), such as supermarket aisles (except fresh food areas).

These classifications offer guidance for selecting stones with the appropriate slip resistance based on specific locations and environmental conditions.

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## **Strength Testing**

The assessment of a material's robustness involves the examination of two crucial aspects: Modulus of Rupture (MoR) and Flexural Strength. Measured in MegaPascals (MPa), these metrics gauge the material's ability to withstand direct tension and bending forces. The provided values, based on a standardized size (typically 200x100x20mm or 4"x8"x3/4") per area (one square meter or 10.7639 square feet), offer a broad understanding and facilitate comparisons between materials. However, for a precise evaluation of a material's behavior at specific sizes and thicknesses, a more detailed analysis is recommended. This should be conducted by materials testing specialists who can factor in installation conditions and apply a specific formula.

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## **Salt Resistance Testing**

Assessing a material's resistance to salt attack involves subjecting sample units to cycles of full immersion in a sodium sulphate or sodium chloride solution followed by overnight drying. The mean % weight loss, determined after multiple cycles, provides insights into the material's durability, pore strength, and dimensional stability. The ability to resist salt crystallization is directly correlated with the material's capacity to endure freeze/thaw cycling. The testing methodology adheres to AS/NZS 4586 Method.

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## **Weathering/Exposure ASTM D5722**

- **Exposure Type:** EMMAQUA SOAK/FREEZE/THAW
- **Radiant Energy:** 13,755 MJ/m<sup>2</sup> (Total); 328,752 Langleys
- **Soak/Freeze/Thaw Days:** 82 (operable days)
- **UV:** 360 MJ/m<sup>2</sup> (equivalent to 1 year of accelerated outdoor exposure)

## **Visual Measurements and Evaluations**

Visual assessments, conducted initially and at 90 MJ UV intervals (up to a total of 360 MJ UV), encompass evaluations based on three criteria:

- **Cracking** (ASTM D661-93, 2019)
- **Erosion** (ASTM D662-93, 2019)
- **General Appearance** (STM RATING SCALE)

These tests provide holistic insights into a material's performance, durability, and visual aesthetics across diverse environmental conditions. Cracking and erosion are assessed using the ASTM scale, which ranges from 10 (indicating none) to 0 (indicating failure).

### **ASTM Scale**

- 10 = None
- 8 = Trace
- 6 = Slight
- 4 = Moderate
- 2 = Severe
- 0 = Failure

### **Checking Type (Cracking)**

- A = Long Line
- B = Irregular
- C = Short Parallel
- D = Short Random
- E = Crowsfoot
- F = Switch
- G = Sigmoid
- H = Shrinkage
- J = Mosaic

### **Cracking Type**

- A = Long Line
- B = Irregular
- G = Sigmoid

General visual evaluations are conducted based on client instructions. Specimens inspected indoors are illuminated with overhead lighting simulating average daylight, creating a neutral grey field for inspection.

## General Appearance Scale

- 10 = As Received
  - 8 = Very Good
  - 6 = Good
  - 4 = Fair
  - 2 = Poor
  - 0 = Very Poor
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## Fire Rating of Natural Stone

**Prepared by: RMS Traders**

### Introduction

Natural stone is widely recognized for its durability, aesthetic appeal, and fire-resistant properties. As a non-combustible material, natural stone is an excellent choice for residential and commercial applications where fire safety is a priority. This report outlines the fire rating of natural stone based on Australian Standards and its performance in fire conditions.

### Fire Resistance of Natural Stone

Natural stone materials, including granite, bluestone, limestone, and sandstone, exhibit high resistance to fire and heat. Unlike synthetic materials, natural stone does not burn, emit toxic fumes, or contribute to fire spread. The fire performance of natural stone depends on its mineral composition and density. Some stones, such as granite, have a higher resistance to heat, while limestone and sandstone may experience surface changes at extreme temperatures.

### Australian Fire Standards for Natural Stone

In Australia, building materials must comply with relevant fire safety standards to ensure they meet regulatory requirements. The key standards applicable to natural stone include:

- **AS 1530.1:1994 – Methods for Fire Tests on Building Materials:** This standard classifies natural stone as a non-combustible material.
- **AS 3959:2018 – Construction of Buildings in Bushfire-Prone Areas:** Natural stone can be used as a recommended material for building in areas with high Bushfire Attack Levels (BAL).

- **National Construction Code (NCC) Compliance:** Natural stone cladding and paving meet fire-resistant construction requirements when installed as per NCC guidelines.

### **Fire Testing and Performance**

Fire tests on various natural stones indicate that they maintain structural integrity even when exposed to extreme heat. Key findings include:

- **Non-combustibility:** Natural stone does not ignite or contribute to fire spread.
- **Thermal Stability:** Some stones may experience discoloration or surface cracking when exposed to temperatures above 600°C.
- **Structural Strength:** Most natural stones retain their load-bearing capacity under high temperatures.

### **Conclusion**

Natural stone is an inherently fire-resistant material that complies with Australian fire safety standards. It is a safe and reliable choice for fire-prone environments, providing both aesthetic and functional benefits. RMS Traders recommends natural stone for projects requiring fire-resistant construction materials.

For more information on the fire rating of specific stone products, please contact RMS Traders.

RMS Traders [naturalstonetiles.com.au](http://naturalstonetiles.com.au)



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## BPN to P Rating Conversion Table

<b>BPN (British Pendulum Number)</b>	<b>P Rating</b>
0 - 24	P0
25 - 34	P1
35 - 44	P2
45 - 54	P3
55 - 64	P4
65 - 74	P5
75 - 84	P6
85 - 94	P7
95 - 104	P8
105 - 114	P9
115 - 124	P10

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## **Stone Tests**

### **Bluestone Pavers**

- Thickness: 12mm, 20mm, 30mm, 40mm
- Weight per m<sup>2</sup>: 33kg, 55kg, 82.5kg, 110kg
- Size Tolerance: +/-1mm, +/-2mm
- Slip Resistance (BPN): 55, 82.5, 110
- Modulus of Rupture (MPa): Dried 19.4, Soaked 19.7
- Salt Resistance (% Mean Weight Loss): 0.5% (A Grade)
- Water Absorption (Mean): 0.185%
- Bulk Specific Gravity (KG/M<sup>3</sup>): 2900
- Flexural Strength (MPa): Dried 16.7, Soaked 14
- Solar Reflectance Index (SRI): 17.41, 17.42
- Weathering/Exposure: ASTM D5722, General Appearance, Cracking, Erosion
- Fire Rating: Non-combustible, complies with AS 1530.1:1994 and AS 3959:2018

### **Granite Pavers**

- Thickness: 16-20mm
- Weight per m<sup>2</sup>: 47kg, 55kg
- Size Tolerance: +/-1mm, +/-2mm
- Slip Resistance (BPN): 19.4, 19.7
- Modulus of Rupture (MPa): Dried 19.4, Soaked 19.7
- Salt Resistance (% Mean Weight Loss): 0.1%
- Water Absorption (Mean): 0.185%
- Bulk Specific Gravity (KG/M<sup>3</sup>): 2900
- Flexural Strength (MPa): Dried 16.7, Soaked 14
- Solar Reflectance Index (SRI): 17.41, 17.42
- Weathering/Exposure: ASTM D5722, General Appearance, Cracking, Erosion
- Fire Rating: Non-combustible, complies with AS 1530.1:1994 and AS 3959:2018

## **Limestone Pavers**

- Thickness: 20-30mm
- Weight per m<sup>2</sup>: 52kg, 78kg
- Size Tolerance: +/-2mm
- Slip Resistance (BPN): 16.4, 16.7
- Modulus of Rupture (MPa): Dried 16.4, Soaked 16.7
- Salt Resistance (% Mean Weight Loss): 0.25%
- Water Absorption (Mean): 0.185%
- Bulk Specific Gravity (KG/M<sup>3</sup>): 2900
- Flexural Strength (MPa): Dried 16.7, Soaked 14
- Solar Reflectance Index (SRI): 17.41, 17.42
- Weathering/Exposure: ASTM D5722, General Appearance, Cracking, Erosion
- Fire Rating: Non-combustible, complies with AS 1530.1:1994 and AS 3959:2018

## **Marble Pavers**

- Thickness: 10-12mm
- Weight per m<sup>2</sup>: 35kg
- Size Tolerance: +/-2mm
- Slip Resistance (BPN): 19.4, 19.7
- Modulus of Rupture (MPa): Dried 19.4, Soaked 19.7
- Salt Resistance (% Mean Weight Loss): 0.1%
- Water Absorption (Mean): 0.185%
- Bulk Specific Gravity (KG/M<sup>3</sup>): 2900
- Flexural Strength (MPa): Dried 16.7, Soaked 14
- Solar Reflectance Index (SRI): 17.41, 17.42
- Weathering/Exposure: ASTM D5722, General Appearance, Cracking, Erosion
- Fire Rating: Non-combustible, complies with AS 1530.1:1994 and AS 3959:2018

## **Travertine Pavers**

- Thickness: 10-30mm
- Weight per m<sup>2</sup>: 26kg, 52kg, 76kg
- Size Tolerance: +/-2mm
- Slip Resistance (BPN): 15.4, 14.8
- Modulus of Rupture (MPa): Dried 14.8, Soaked 13.8
- Salt Resistance (% Mean Weight Loss): 0.2%
- Water Absorption (Mean): 1.32%
- Bulk Specific Gravity (KG/M<sup>3</sup>): 2448
- Flexural Strength (MPa): Dried 14.8, Soaked 13.8
- Solar Reflectance Index (SRI): 56.5, 65
- Weathering/Exposure: ASTM D5722, General Appearance, Cracking, Erosion
- Fire Rating: Non-combustible, complies with AS 1530.1:1994 and AS 3959:2018

## **Slate Pavers**

- Thickness: 10-12mm
- Weight per m<sup>2</sup>: 34.5kg, 31kg
- Size Tolerance: +/-2mm
- Slip Resistance (BPN): 19.4, 19.7
- Modulus of Rupture (MPa): Dried 19.4, Soaked 19.7
- Salt Resistance (% Mean Weight Loss): 0.1%
- Water Absorption (Mean): 0.185%
- Bulk Specific Gravity (KG/M<sup>3</sup>): 2900
- Flexural Strength (MPa): Dried 16.7, Soaked 14
- Solar Reflectance Index (SRI): 17.41, 17.42
- Weathering/Exposure: ASTM D5722, General Appearance, Cracking, Erosion
- Fire Rating: Non-combustible, complies with AS 1530.1:1994 and AS 3959:2018

## **Porcelain Pavers**

- Thickness: 20mm, 30mm, 40mm
- Weight per m<sup>2</sup>: 55kg, 82.5kg, 110kg
- Size Tolerance: +/-1mm, +/-2mm
- Slip Resistance (BPN): 55, 82.5, 110
- Modulus of Rupture (MPa): Dried 19.4, Soaked 19.7
- Salt Resistance (% Mean Weight Loss): 0.5% (A Grade)
- Water Absorption (Mean): 0.185%
- Bulk Specific Gravity (KG/M<sup>3</sup>): 2900
- Flexural Strength (MPa): Dried 16.7, Soaked 14
- Solar Reflectance Index (SRI): 17.41, 17.42
- Weathering/Exposure: ASTM D5722, General Appearance, Cracking, Erosion
- Fire Rating: Non-combustible, complies with AS 1530.1:1994 and AS 3959:2018

## **Cobblestones**

- Thickness: 20-30mm
- Weight per m<sup>2</sup>: 80kg
- Size Tolerance: +/-2mm, +/-10mm
- Slip Resistance (BPN): 18.5, 18.7
- Modulus of Rupture (MPa): Dried 19.4, Soaked 19.7
- Salt Resistance (% Mean Weight Loss): 0.25%
- Water Absorption (Mean): 0.185%
- Bulk Specific Gravity (KG/M<sup>3</sup>): 2900
- Flexural Strength (MPa): Dried 16.7, Soaked 14
- Solar Reflectance Index (SRI): 17.41, 17.42
- Weathering/Exposure: ASTM D5722, General Appearance, Cracking, Erosion
- Fire Rating: Non-combustible, complies with AS 1530.1:1994 and AS 3959:2018

## **Stepping Stones**

- Thickness: 20mm, 30mm, 40mm
- Weight per m<sup>2</sup>: 55kg, 82.5kg, 110kg
- Size Tolerance: +/-1mm, +/-2mm
- Slip Resistance (BPN): 55, 82.5, 110
- Modulus of Rupture (MPa): Dried 19.4, Soaked 19.7
- Salt Resistance (% Mean Weight Loss): 0.5% (A Grade)
- Water Absorption (Mean): 0.185%
- Bulk Specific Gravity (KG/M<sup>3</sup>): 2900
- Flexural Strength (MPa): Dried 16.7, Soaked 14
- Solar Reflectance Index (SRI): 17.41, 17.42
- Weathering/Exposure: ASTM D5722, General Appearance, Cracking, Erosion
- Fire Rating: Non-combustible, complies with AS 1530.1:1994 and AS 3959:2018

## **Pool Mosaics**

- Thickness: 20mm, 30mm, 40mm
- Weight per m<sup>2</sup>: 55kg, 82.5kg, 110kg
- Size Tolerance: +/-1mm, +/-2mm
- Slip Resistance (BPN): 55, 82.5, 110
- Modulus of Rupture (MPa): Dried 19.4, Soaked 19.7
- Salt Resistance (% Mean Weight Loss): 0.5% (A Grade)
- Water Absorption (Mean): 0.185%
- Bulk Specific Gravity (KG/M<sup>3</sup>): 2900
- Flexural Strength (MPa): Dried 16.7, Soaked 14
- Solar Reflectance Index (SRI): 17.41, 17.42
- Weathering/Exposure: ASTM D5722, General Appearance, Cracking, Erosion
- Fire Rating: Non-combustible, complies with AS

# Installation tips.

## Before installation

Stone tiles are often packed into crates very tightly, are wet at the point of production and may have some residue from the various finishing processes used. Because of this it is recommended that stone tiles are washed and are allowed to dry completely before every stage of the installation process. They will often lighten in colour as they dry.

It is necessary tiles are dry prior to installation. Dry tiles will show any unusual tonal markings which will indicate where tiles should be placed. At the point of installation always ensure that stone tiles are mixed to ensure an even and consistent distribution of varying patterns. This will mean opening all crates or pallets of materials supplied.

Minor damage such as edge chipping is often caused in packing or unpacking tiles, and should be expected. It is deemed normal practice for these to be used as cuts during the installation.

Stone tiles need to be graded prior to installation; the thicker tiles will dictate the nonlevel and should be installed first. Thinner tiles should be bedded with an appropriate adhesive.

Slight variations in size and thickness can occur with most stones and are deemed acceptable characteristics. All stones should be clean, dry, and free of dust, grease and any loose material before installation.

Make sure that you have discussed your requirements fully with your installer and that they are familiar with the product that is to be fixed.

*Please note: All stone should be inspected prior to installation. Stone will have natural occurring variations in colour, texture, chipping and surface finishes. It is these imperfections that make the product unique.*

Any tile with excessive chipping, sizing and variation may be subject to a warranty claim. This needs to be done before installation.

## Adhesion

All Stone tiles must be solidly bedded, with 100% adhesive coverage.

Tiles should occasionally be lifted during the laying process to ensure that sufficient compaction and full bed adhesion has been achieved.

We recommend Mapei or Laticrete products for the installation process (There are many reputable companies)

[au.laticrete.com/](http://au.laticrete.com/)

[mapei.com/au](http://mapei.com/au)

Fast setting adhesives are advisable to avoid issues with the moisture retention of some tiles.

Some tiles require the use of specific adhesives to ensure problem-free fixing; please speak to manufactures directly to discuss the requirements of your tile choice.

Light Coloured materials require fixing with white adhesives to prevent possible discoloration within the body of the stone. Flexible adhesives, combined with further substrate preparation, are required when the substrate is wood, or floor. For uncalibrated stone tiles, the appropriate Large Format

Floor Adhesive should be used to accommodate the variation in tile thickness and associated increases in the adhesive bedding. The variation in tile thickness will be most noticeable if laying a mix of sizes in an uncalibrated material.

## Grouts

The purpose of grout is to help maintain the stones in their place, create a water tight seam that prevents liquid from seeping into the substrate/adhesive - to its best ability - and to minimise breakages from expansion and contraction.

When grouting it is always recommended to use a high-quality grouting compound that is suitable for the application. Grouting products can be found below.

[au.laticrete.com/](http://au.laticrete.com/)

[mapei.com/au](http://mapei.com/au)

Please speak to a professional when selecting the correct grout for colour, suitability and durability.



## Substrates/foundations/ underfloor heating

The key to preventing problems occurring after tile installation is the correct preparation of the substrate prior to fixing. All substrates that are to be tiled on, floor or wall, should always be suitably prepared. They should be clean, flat, level, free from movement and free from anything which could be deleterious to adhesion.

Correct identification of the substrate is vital to ensure the correct advice and ancillaries are provided. With the increasing use of large format & Split face materials on walls, it is imperative to ensure that the substrate has a suitable weight bearing capability to accommodate the desired material.

For guidelines on fixing to specific substrates please call us for further information. We have a team dedicated in natural stone installations who can help contact the relevant professional (Engineer, architect, building consultant) to produce a work method statement to be specified for the correct substrate, foundations and underfloor heating.

All information required about the stone weight Per/m<sup>2</sup> can be obtained by contacting us directly.

## Cutting

Stone is best cut with a bench saw with a diamond blade. The stone should be washed after cutting to remove all dirt and cutting paste.

*Please note that silica dust can be found in natural products and is recommend that safety and health-cautions are used whilst cutting.*

## Storage

All stone is best stored in a dry area where it will not be affected by the weather. At the very least ensure coverage with a tarp.

## Crystalline silica

Commonly known as silica dust this is found in sand, stone, concrete, mortar and variety of products in the construction industry including bricks and plastics. Silica dust particles if exposed can cause health issues.

To prevent and reduce this protective equipment must be worn whilst using tools to cut, grind, drill or other any other procedures that involve manipulating the stone. Safety guidelines relating to silica must be obeyed. For more information, please see the link below.

[safeworkaustralia.gov.au/safety-topic/hazards/crystalline-silica-and-silicosis](https://safeworkaustralia.gov.au/safety-topic/hazards/crystalline-silica-and-silicosis)

## Sealing

It is crucial to understand that no two pieces are the same when sealing natural stone. Some natural stones are more porous than others, some tend to stain easier, and some manage just fine. When sealing natural stone, it's an industry recommendation that you seal everything on initial application. Doing so will allow you to keep your stone looking beautiful, avoid damages and will allow easier maintenance and cleaning.

Sealing stone can be done by yourself or by a hired professional. The advantage of hiring a professional is the convenience of professional application, cleaning, and preparation. If the job is quite small and you're handy with the tools with the right guidance you should seal it yourself. Please consult our sales staff or accredited sealing companies for a specified sealing system.

### Range of sealers to use:

We highly recommend sealing all natural stones to protect and retain its natural beauty for years to come. We recommend using high quality sealers such as Environex, Aqua mix or Dry Treat.

*Please note: We provide these recommendations as a service only and will not be responsible for any sealer claims.*

- **Aqua Mix**

[aquamix.com.au/products/sealers/natural-look-sealers/](http://aquamix.com.au/products/sealers/natural-look-sealers/)

- **Environex**

[environex.net.au/stonecare/products/sealer-product-selector/](http://environex.net.au/stonecare/products/sealer-product-selector/) • **Overseal:**

## Anti slip treatments

If the desired slip rating cannot be achieved using the product you have selected, you can perform an anti-slip treatment. Please contact RMS or the below companies for more information.

[devstonesolutions.com.au/anti-slip](http://devstonesolutions.com.au/anti-slip)

[griptek.com.au](http://griptek.com.au)

# Maintenance and cleaning.

Like any surface, stone will require a degree of maintenance. The correct sealing from the start is the key to minimal maintenance.

Heavily tracked areas will require more maintenance than those that are seldom used. The main maintenance regime required for stone is regular sweeping and vacuuming. In addition, the floor should be mopped regularly with a neutral routine cleaner formulated specifically for use with all tiles and natural stone products.

The use of abrasive, acidic or alkali household detergents should be avoided as they can remove the tiles surface sealant or in extreme cases damage stone or porcelain.

*Please note: acidic cleaners should not be used, unless professionally recommended.*

Always use accredited sealers and cleaners:

- **Aqua Mix**

[aquamix.com.au/products/cleaners/](http://aquamix.com.au/products/cleaners/)

- **Environex**

[environex.net.au/stonecare/products/cleaning-product-selector/](http://environex.net.au/stonecare/products/cleaning-product-selector/)



[naturalstonetiles.com.au](http://naturalstonetiles.com.au)

Richmond

(03) 9121 8888

591 Bridge Rd, Richmond

Hoppers Crossing

(03) 9748 7788

6 Nevada Crt, Hoppers Crossing

Geelong

(03) 5261 7777

327 Shannon Ave, Newtown