



Manufacturers of quality pavers
with Character, Colour & Style

TEST RESULTS

(DATE OF TESTING: 29th March to 11th April 2005)

TEST

Determination of:

Compressive Strength

Breaking Load

Potential to effloresce

Dry Density

Abrasion resistance

Slip resistance classification

of new pedestrian surface materials

Resistance to salt attack

METHOD OF TEST

AS/NZS 4456.4:2003

AS/NZS 4456.5:2003

AS/NZS 4456.2:2003

AS/NZS 4456.8:2003

AS/NZS 4456.9:2003

AS/NZS 4586:2004 Appendix A

AS/NZS 4456.10:2003

TEST CERTIFICATE NO: 6738

COMPRESSIVE STRENGTH

Capping type: full. Test Specimens: 100 x 100 mm segments were cut from pavers.

Specimen no	Unconfined compressive strength, MPa	Specimen no	Unconfined compressive strength, MPa
1	28	6	29
2	27	7	27
3	28	8	27
4	27	9	26
5	28	10	24

Mean unconfined compressive strength: 27 MPa

Unbiased Standard Deviation: 1 MPa



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BREAKING LOAD

Orientation of the specimens: inverted

Span between support bars: 450mm

Specimen no	Breaking load, kN	Specimen no	Breaking load, kN
1	4.8	6	4.8
2	4.3	7	5.9
3	5.2	8	5.9
4	5.4	9	5.5
5	5.2	10	5.1

Mean breaking load: 5.2 kN

Unbiased standard deviation: 0.5 kN

Notes on Australian Standards

Breaking Load

AS/NZS 4456.5

The Breaking Load test, (also known as transverse strength), measures the force needed to break a paver in half.

The paver, supported by two beams, 25 mm in from each end, has force applied via another beam in the centre of the paver.

Test results are reported in kilo-newtons (kN).

Kilo-newtons are a measure of the paver's ability to resist the stresses of handling, transporting and laying, and the loads likely to be encountered once in service.

Pavers with a breaking load of 2 kN or more are deemed to be strong enough to be transported and laid.

Higher strengths (5kN and up) are needed for driveways and roads and other similar applications.

The breaking load test is typically done on a sample of 10 pavers of the same size.



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POTENTIAL TO EFFLORESCE

The test specimens (cut pieces of a paver) were placed with one end in water

Specimen no	1	2	3	4	5
Specimen dimensions, mm	260x120	220x90	220x80	240x160	260x120
Classification	Slight	Nil	Slight	Nil	Nil

Classification of the sample:

Slight

Type of efflorescence:

Very small areas of fine white crystals

Notes on Australian Standards

Potential to effloresce AS/NZS 4456.6

Efflorescence as noted previously in this document is a deposit of salts, usually white, on the surface of pavers.

The salts usually come from ground water or out of the bedding sand that the pavers are laid on, but may come from within the pavers themselves.

This test predicts the probability that the pavers will display such deposits from salts that they already contain.



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DRY DENSITY

Specimen no	Dry density, kg/m ³	Specimen no	Dry density, kg/m ³
1	2130	7	2120
4	2120	9	2110
5	2140		

Mean dry density: 2120 kg/m³

ABRASION RESISTANCE

Specimen no	Abrasion index	Specimen no	Abrasion index
1	0.4	9	0.4
2	0.5	10	0.2
3	0.3	11	0.3
4	0.3	12	0.4
5	0.3	13	0.2
6	0.6	14	0.2
7	0.2	15	0.0
8	0.8	16	0.2

Mean abrasion index: 0.3

Unbiased standard deviation: 0.2



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Notes on Australian Standards

Abrasion Resistance AS/NZS 4456.9

Pavers are generally subjected to abrasive wear on their exposed useable surface.

This is typically from foot traffic (high-heeled shoes, because they are usually metal tipped, are particularly tough on pavers), but can also be caused by vehicular traffic.

The laboratory test for abrasion resistance involves bombarding the paver surface with hundreds of steel ball bearings. Sixteen pavers (or segments of pavers) are fixed to the outside of a drum containing the ball bearings, and as the drum rotates the ball bearings tumble and roll against the pavers through round holes in the drum. After an hour of this treatment, the pavers are weighed to measure the mass loss, which is then converted to a volume loss and reported as the abrasion index.

Pavers with an abrasion index of 3.5 or less are considered suitable for high-volume pedestrian traffic (eg shopping centre entrances & pedestrian malls where usually the most severe abrasion could be expected to occur).

An abrasion index of up to 5 is suitable for roads and low-volume public footpaths.

For domestic driveways an abrasion index of around 7 is acceptable.



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SLIP RESISTANCE OF NEW PEDESTRIAN SURFACES

Type of test: Unfixed test specimens
Location of test: Laboratory Test rubber: TRRL
Laboratory temperature: 18°C (The results have been temperature corrected to 23°C)

Specimen no	2	4	6	8	10
British Pendulum No.	73	73	78	73	74

Mean British Pendulum No: 74 Classification: V
Contribution of a floor made with these units to the risk of slipping when wet: **very low**

Notes on Australian Standards

Slip Resistance AS/NZS 4586 Appendix A

Slip resistance is of particular interest to local councils and operators of public areas such as shopping centres, mainly due to the legal implications of pavements which may be slippery to pedestrians when wet.

Slip resistance is also an important consideration for areas around public and domestic swimming pools.

The most common test for slip resistance involves sliding a rubber pad on the end of a pendulum across a wet paver surface and measuring how far the pendulum swings up on the other side.

The more slippery the paver surface, the lower the test result, which is reported as "British Pendulum Number".

Depending on this value, the paver can be classified from Class V (least slippery) through to Class Z (most slippery).



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RESISTANCE TO SALT ATTACK

Test solution: sodium sulphate

Side tested: face

Test method: method B

Specimen no	2	4	6	8	10
Mass loss, g	0.1	0.9	0.6	0.4	2.0
Stopped at cycle no	20	20	20	20	20

In line with conventional building and construction practice, all areas around pools, especially salt-water pools, should be sealed with a non-slip penetrating sealer.

Notes on Australian Standards

Salt Attack Resistance

AS/NZS 4456.10

Salts in the soil are an inherent part of Australia's landscape. Australia's salinity problems have resulted largely from human activities. Clearing of land for agriculture and planting of shallow rooted crops and pastures, along with increased watering has caused the water table to rise significantly. As the water table rises, dissolved salts are being brought with it.

Salinity can generally be classified as one of five different forms. They are: dry land salinity; groundwater salinity; irrigation salinity; river salinity and urban salinity. The first four forms affect rural areas, however urban salinity is a problem that is affecting infrastructure such as roads, pipes and buildings in both rural and metropolitan areas.

In some situations, pavers can be attacked by salts from within ground water (typically referred to as Urban Salinity), or by the salt treated water contained in swimming pools and spas etc.

How resistant a given paver is to the effects of salt crystallisation will be dependent on the porosity of the paver and the strength of the material from which the paver is made, as well as the concentration and type of salt, the ambient temperature and the intensity of the sun which causes rapid drying of salt laden water.

Pavers may be classed as Exposure Grade if they either have a history of coping with a salty environment, or have passed a laboratory test which simulates such conditions. Laboratory tests involve small segments of paver being subjected to a series of 40 cycles of alternate soaking in a salt solution, then drying in an oven. A pass is when the specimens survive the 40 cycles with less than a specified loss in mass.