

roof tiles for living



roof tiles.
people look
up to bristile

build for **living**

 **bristilerooting®**

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Introduction to Roof Tiles

The roof is one of the largest external facing surface areas of your home, and a key component of the home impacting internal temperatures as a consequence. For this reason the choice of roofing material is paramount to creating an energy efficient home.



Both in their construction and their ongoing use, our homes have a significant impact on the environment. For this reason it is important that building product manufacturers, builders, architects, and home buyers ensure the products they produce or use offer both aesthetic and functional benefits in the operation of the home.

As one of Australia's largest suppliers and installers of concrete and terracotta roofing products, Bristle Roofing is aware of its responsibility to operate with a sustainable conscience. We continually strive to minimise the

impact of our operations on the environment and offer products that provide aesthetic appeal and practical benefits.

The information in this document illustrates roof tiles practical benefits across a number of categories including strength, longevity, embodied energy, reusability, thermal performance, and solar absorptance. Research has been gathered from leading institutions in Australia and abroad, and gives insight into the factors that should be considered when making a choice of roofing material.

Roof tiles have long been one of the most popular products used on Australian homes, and now research proves the choice Australians have made for generations has been the right one.



The Facts About Roof Tiles

Research conducted by universities and independent institutions, confirms that a roof constructed from terracotta or concrete roof tiles offers many benefits. The research shows that roof tiles reduce energy consumption, do not rust or corrode and offer the added benefits of fire resistance and sound insulation.

Extensive testing and investigations has been conducted and the results show that roof tiles offer:



Affordability

Concrete roof tiles are one of the most affordable roofing products on the Australian market.



Strength

Roof tiles must comply with strict standards in strength and concrete roof tiles actually increase in strength as they age.



Large Colour and Profile Range

Roof tiles are available in more colour and profile combinations than any other commonly used roofing product in Australia.



Sound Insulation

Roof tiles can reduce noise by 30 decibels which is more than twice the noise reduction achieved by other commonly used roofing materials.



Ideal for Coastal Areas

Roof tiles are ideal for use in coastal areas as they are impervious to rust and corrosion.



Reduced Cooling Requirements

Testing of similarly coloured roofing products shows roof tiles have a lower cooling requirement than other commonly used roofing materials.



Tile Colour. **Slate**
Range. **Vienna**



Fire Resistance

Roof tiles are ideal for bushfire prone areas as they are non combustible.



Low Embodied Energy

Testing shows that concrete roof tiles are the lowest embodied energy product of the three most commonly used roofing materials in Australia.



Solar Reflectance

Testing shows roof tiles will reflect more heat away from the home than other commonly used roofing materials.



Water Capture/Run Off

Water run off from tiled roofs is as safe to use as that from any other roofing material.



Longevity

When it comes to longevity, concrete and terracotta roof tiles both outperform the leading competing alternative. Concrete roof tiles offer a 50 year product warranty and terracotta roof tiles are supplied with our famous "Colour For Life" warranty.

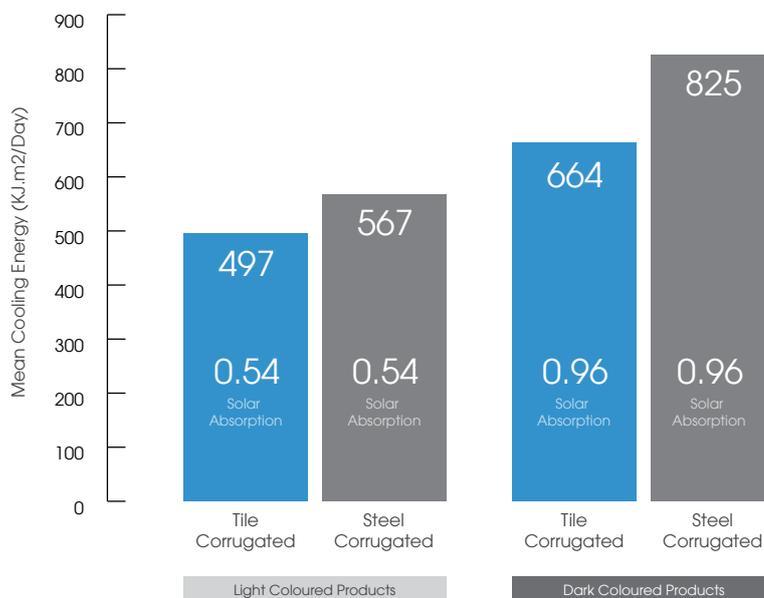
Thermal Performance

Reduce your cooling costs with roof tiles

The graph below displays the importance of the choice of roofing material and the impact it has on the temperature within your home. The values shown are the amount of energy needed to maintain an acceptable temperature based on simulations in which the roof material colour, solar radiation and mean air temperatures have been adjusted to a common basis.

Tiled roofs outperform coloured metal roofing resulting in substantial savings (see table).

Daily Cooling Energy Required for Products **Without** Insulation



Light Coloured Roof Tiles Vs Metal

$$\text{Energy difference (70MJ/m}^2\text{)} \times \text{Average roof size (250m}^2\text{)} \times \text{365 days} = 6,387,550 \text{ kJ}$$

Yearly saving of
\$459.55
Using Roof Tiles

Dark Coloured Roof Tiles Vs Metal

$$\text{Energy difference (161MJ/m}^2\text{)} \times \text{Average roof size (250m}^2\text{)} \times \text{365 days} = 14,691,250 \text{ kJ}$$

Yearly saving of
\$1056.95
Using Roof Tiles

Figures noted are based on an average national electricity price 25.9 cents per kWh. Figures based on a roof size of 250m². Differences due to colour of the materials used, solar radiation and mean air temperature have been accounted for by adjusting the means in this table to a common basis using the following values: SA Light = 0.54 and Dark = 0.96MJ.m⁻² per day-1, mean air temperature = 25 degrees celsius. Roof tiles tested were made from concrete.



Tile Colour. **Sanctuary**
Range. **Designer**

Solar Absorption/Reflectivity

Roof tiles have higher reflectivity than metal roofing

Products such as roof tiles reflect more heat away from the home thereby reducing the need for artificial cooling.

Solar absorptance and solar reflectance are interlinked as the value of both together must add up to 1 (so if the reflectance of a product is 0.80 then the absorption value must be 0.20).

Solar reflectance measures the amount of solar energy that is reflected back into the atmosphere after coming into contact with a given material, with the solar energy reflected remaining at the same strength as when it hits the surface of that material.

Solar absorption refers to the amount of solar energy that is transmitted into the material itself and is used as a measure to determine the amount of heat and cool energy that is transmitted through building materials into internal living areas. Solar reflectance and absorption are used to determine the ability of a material to minimise the need for heating and cooling by reducing external temperature fluctuations impacting the temperature of internal living areas.

As solar energy moves through a given material it can (depending on the properties of the material through which it is being transmitted) dissipate or reduce in strength as the energy is absorbed by the material.

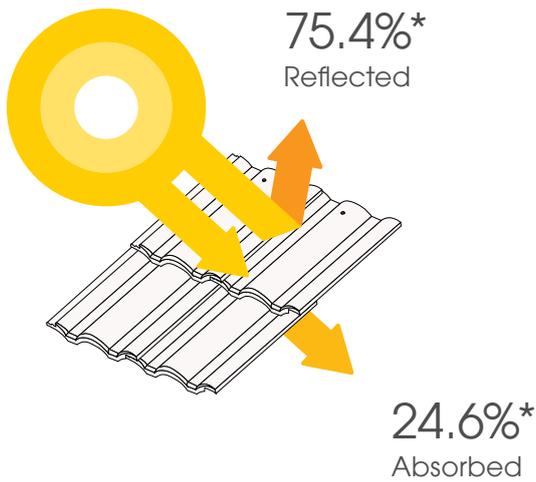
Based on testing, concrete and terracotta roof tiles cause the amount of the energy being transmitted through them to dissipate significantly.

Tests conducted by the Florida Solar Roofing Center (USA)* show that roof tiles reflected more heat away from the home than metal roofing of the same colour. This means the roof tile had lower solar absorption, and is more effective in reducing the transfer of heat into the roof space, thereby effectively reducing the need for cooling devices such as air conditioning.

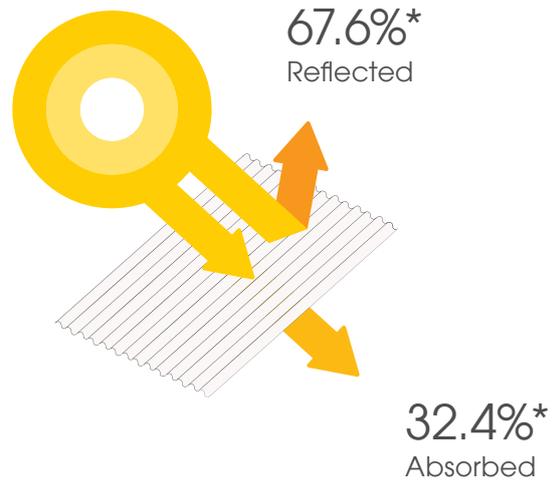


Solar Reflectance of Roof Tiles and Metal Roofing

White Concrete Roof Tile



White Metal



*Source: Florida Solar Energy Center, Comparative Summer Attic Thermal Performance of Six Roof Constructions (1997). Tests compared a white barrel style concrete roof tile with a standard white standing seam metal roofing sheet.

Roof tiles can reflect 7.8% more heat away from the home than metal roofing in the same colour.



Tile Colour. **Slate**
Range. **Planum**



Embodied Energy

Roof tiles are low in embodied energy

Embodied energy measures the amount of energy involved in the extraction of raw materials, their transportation to the point of manufacture, the production process, delivery to the building site and installation of the product.

Embodied energy is one of the terms used to measure the impact of a product on the environment which is why an understanding of the term is important to informed debate on environmental sustainability.

The figures opposite show the difference in embodied energy between Australia's three most commonly used roofing materials: concrete roof tiles, terracotta roof tiles, and sheet metal roofing.

In order to enable comparison, three structures were built using common construction materials (timber framing and plasterboard) and changing the one independent variable: the roof cladding.

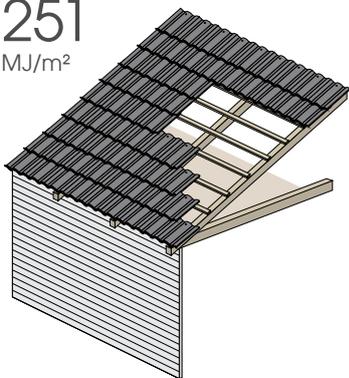
The results of the testing clearly identify concrete roof tiles as the lowest embodied energy product, followed by terracotta roof tiles. Sheet metal roofing attained the highest embodied energy of the three materials tested.

It is important to note that while embodied energy is important, it should be considered in relation to a product's usage life or product lifecycle.



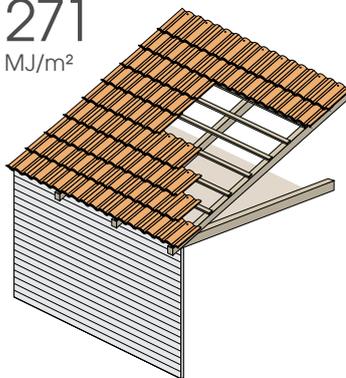
The total amount of energy used to produce various types of roof cladding

251
MJ/m²



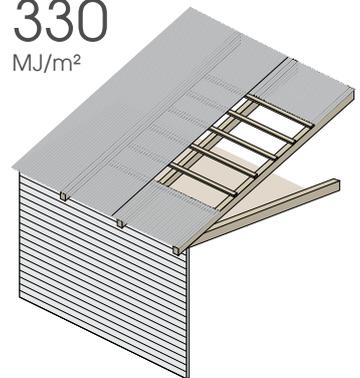
Construction:
Concrete Roof Tiles
Timber Frame
Plasterboard Ceiling

271
MJ/m²



Construction:
Terracotta Roof Tiles
Timber Frame
Plasterboard Ceiling

330
MJ/m²



Construction:
Sheet Metal Roofing
Timber Frame
Plasterboard Ceiling

$$\left\{ \begin{array}{l} \text{Sheet metal} \\ (330 \text{ MJ/m}^2) \end{array} - \begin{array}{l} \text{Concrete roof tile} \\ (251 \text{ MJ/m}^2) \end{array} \right\} \times \begin{array}{l} \text{Average} \\ \text{roof size} \\ (250\text{m}^2) \end{array} = 19,750 \text{ MJ}^* \\ \text{less embodied energy} \\ \text{than a sheet metal roof}$$

Concrete and terracotta roof tiles have lower embodied energy than sheet metal roofing.

Source: Lawson Buildings, Materials, Energy and the Environment (1996). Figures calculated using a roof size of 250 m². MJ refers to megajoules of energy.



Tile Colour. **Slate**
Range. **Planum**

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Sound Insulation

Roof tiles are the quieter roofing material

The density of roof tiles means they are better at insulating against external noise from vehicles, air traffic and extreme weather conditions.

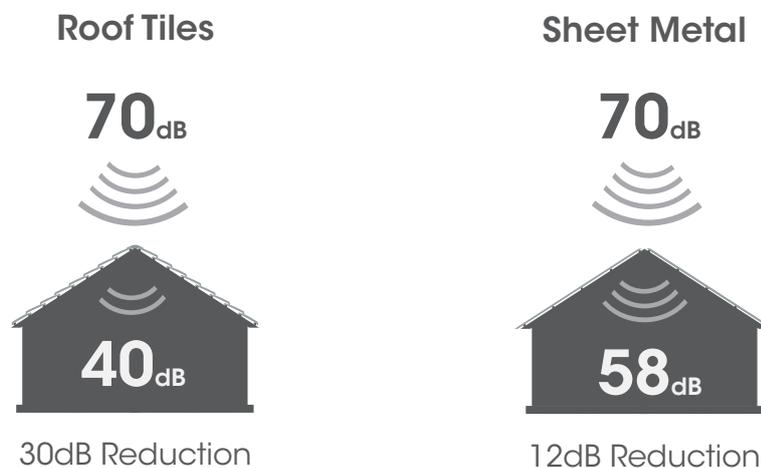
Most roofs reduce noise but a tile roof provides a more substantial barrier than many other roofing materials due to its sheer density. In fact, roof tiles can reduce external noise by as much as 30 decibels compared to a reduction of 12 decibels for a sheet metal roof.*

A tiled roof also helps minimise “creaking” and “popping” sounds which occur with some types of roofing as a result of temperature variations.

The raw figures alone are impressive enough. However, the jump from 12 to 30 decibels, in terms of actual noise levels, is exponential. Something akin to going from a sneeze to a New Year’s firecracker.



Sound insulation capabilities of concrete roof tiles and sheet metal roofing



Please note: the above diagram is an example only and is based on testing results in which roof tiles reduce outside noise by 30 decibels and metal roofing reduces noise by 12 decibels.

The difference between 12 to 30 decibels is something akin to going from a sneeze to a New Year's firecracker."

*Cement and Concrete Association of Australia Technical Report. TR/F81.Sept. 1984



Longevity

Roof tiles are long lasting

With their 50 year product warranty and an abundance of examples attesting to their longevity, it's no surprise that concrete roof tiles are the most commonly used material on Australian roofs.

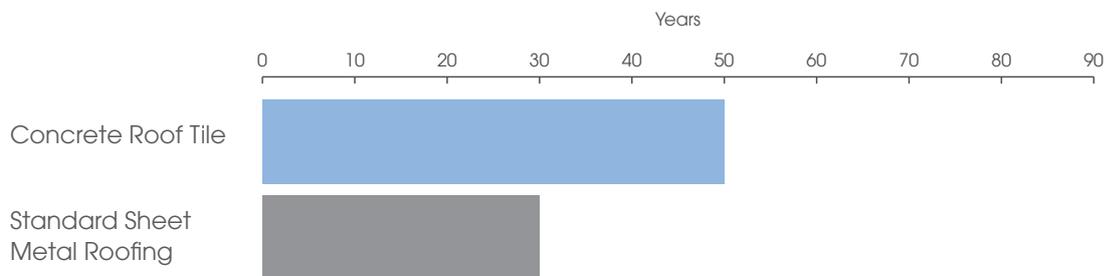
The Bristle Roofing 50 year product warranty on concrete roof tiles states that roof tiles will not "crack, split or warp due to defective manufacturing, will not become porous or leak, and will not be damaged by coastal salt".

Terracotta roof tiles are offered with a "Colour for Life" warranty meaning the colour of the tile is warranted for the life of the product. This is due to the high temperature of the firing process during manufacturing which effectively seals the product and locks in the colour. The long life of terracotta roof tiles has been recognised for centuries with many hand made tiles still featured on some of the worlds ancient marvels.



Tile Colour. **Pepper**
Range. **Vienna**

Standard Warranty Periods for Standard Roofing Products



* Warranties noted are based on Standard roof tiles and Colorbond Steel residential roofing installations within 2500m of calm coastal conditions.

Reusability/Recyclability

Roof tiles are reusable and recyclable

The ability to re-use a product lengthens its lifecycle and ensures the energy used during manufacture is spread over a longer period achieving greater efficiency.

Roof tiles can be re-used by simply removing them from one building and transferring them to another, eliminating the energy consumption and costs that would be associated with manufacturing a new product.

Both concrete and terracotta roof tiles can also be recycled for use in other products. Concrete roof tiles are commonly recycled as road base while terracotta roof tiles can be used in the manufacture of products such as bricks or utilised in the production of new terracotta roof tiles.

How Roof Tiles are Re-used



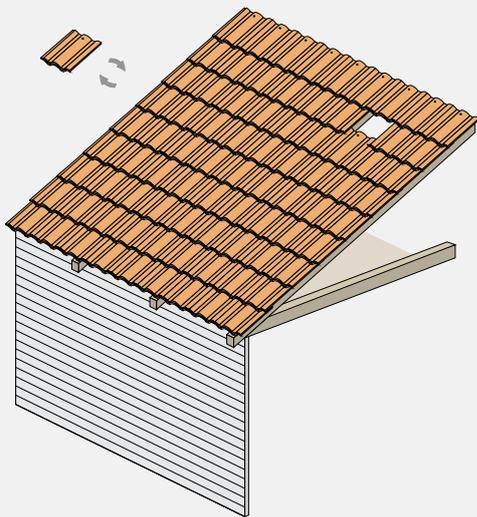
Re-use of building materials commonly saves about 95% of embodied energy.

Repair and Replacement

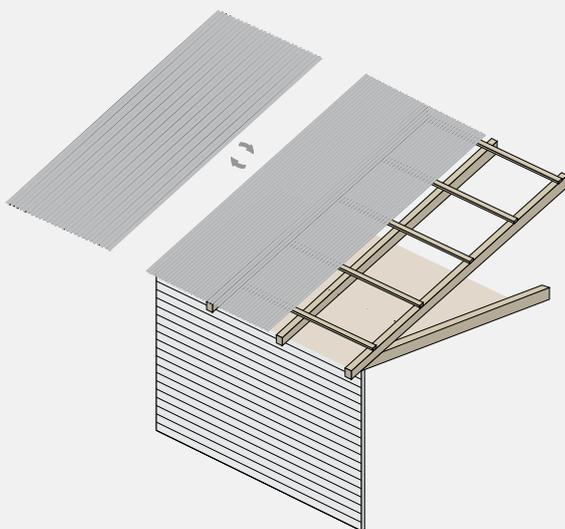
Roof tiles are easy to repair or replace

Because a tiled roof is composed of a large number of small pieces, damaged tiles can be removed and replaced with relative ease. This not only reduces costs and saves time but also reduces energy expelled in production of the material required to repair the roof. Competing alternatives require entire sections of the roof to be replaced even when only a small section of it is damaged.

Roofing Repairs - Roof Tile Vs Metal



If a tiled roof is damaged, one or more tiles can be easily removed and replaced.



When a metal roof is damaged the entire metal panel needs to be replaced, even when only a small part of it is damaged.



Corrosion Resistance/Marine Exposure

Roof tiles are ideal for coastal homes

Some building materials can be damaged by corrosion as a result of exposure to salt and moisture. Concrete and terracotta roof tiles however are non corrosive and rust resistant which makes them ideal for use in coastal areas or marine environments.



Tile Colour. **Gun Metal**
Range. **Classic**

Roofing Product Warranties

The simple facts

	Warranty applies to product installed within 200m of breaking surf	Warranty applies to product installed within 5km of salt water	Roof must be cleaned with fresh water biannually to maintain warranty*	Warranty applies to colour longevity
Bristile Roofing Colour For Life Warranty - Terracotta Roof Tiles	Yes	Yes	No	Yes
Bristile Roofing 50 Year Product Warranty - Concrete Roof Tiles	Yes	Yes	No	No
Standard Metal Roofing 36 Year Extended Warranty	No	No	Yes	No

* Areas not normally exposed to rain must be hosed every six months



Other Factors

Water Capture/Run Off

Water run off from tiled roofs is as safe to use as that from any other roofing material. Please note: the greatest potential for the contamination of water collected from any roof is the organic material that collects in the gutters. To avoid contamination of collected water, the water tank should be installed with a first flush system and/or regularly cleaned.

Fire Resistance

Roof tiles are made from non combustible materials and provide excellent protection against bushfires. Testing funded by Australia's leading manufacturers of concrete and terracotta roof tiles and conducted by the Roofing Tile Association of Australia, revealed that roof tiles are ideal for use in Fire Zone areas provided they are installed to AS 1530.8.



Tile Colour. **Slate**
Range. **Planum**

Manufacturing Techniques

Bristle Roofing is continually searching for ways to achieve greater environmental outcomes. We are dedicated to reducing the amount of energy and water consumed, and the amount of waste and greenhouse gas (carbon dioxide) generated through business operations.

Colour and Profile Range

Bristle Roofing offers the most comprehensive colour and profile range of any manufacturer in Australia. From the Prestige range of flat concrete roof tiles through to the Curvado range of high roll European terracotta roof tiles, Bristle Roofing is bound to have a product to suit your style.



Tile Colour. **Palladium**
Range. **Prestige**



High Performing Energy Efficient Housing

8 Star House - Queensland

One of Queensland's major project builders has developed in conjunction with Bristle Roofing™ and Austral Bricks® an 8 Star House at the Erapah estate in Victoria Point, Queensland.

The 8 Star House demonstrates how heavy weight materials in conjunction with clever design can reach unprecedented energy efficiency levels while still achieving a pleasing aesthetic and contemporary style.

From the positioning of the windows, to the choice of building materials, the 8 Star House has been designed to be cool in the hot summer months and warm in the cold season. The rooms are light and airy because the home is oriented to make the most of winter sun and summer airflows, and the exterior has deeper roof eaves to provide shade. The classic brick exterior, roof tiling, striking internal brick walls and beautiful ceramic flooring are not only distinctive design elements of the home, but they also combine to store energy from the

sun and replace the need for artificial heat and cooling.

The 8 Star House is an impressive example of sustainable design with real world application, developed in conjunction with Austral Bricks® and Bristle Roofing™.



Tile Colour. **Pepper**
Range. **Vienna**

9 Star House - Western Australia

The Jade 909 House utilises the four well-established Passive Design Principles: Orientation, Insulation, Ventilation and Thermal mass.

Coined as “beyond carbon neutral”, it has no air-conditioning, just ceiling fans to assist ventilation and the three kilowatt PV cells exceed the home’s power requirements. The result is a water saving of 76 percent over a standard house and a remarkable 119 percent energy saving.

The use of clay bricks and terracotta roof tiles is a feature of the home as both are materials that have a very long life expectancy.

The design and construction of the home meets not only high levels of sustainability but it’s also affordable. How affordable is it? The base model is around \$200,000 rising to about \$285,000 as displayed with photo-voltaic cells, grey water system and rainwater tanks.

Not surprisingly, the home won numerous awards at the WA GreenSmart Awards, including the coveted Home of the Year and Water Efficiency Award.



^ Austral Bricks®



^ Austral Precast®



^ Austral Masonry®

Products and brands available from Brickworks Building Products™

BRICKWORKS BUILDING PRODUCTS

Brickworks Building Products™ is one of Australia's largest and most diverse building material manufacturers. Under the Brickworks Building Products™ umbrella are some of Australia's best known building materials brands.

Our products include bricks, pavers, masonry blocks, retaining wall systems, precast concrete panels, concrete and terracotta roof tiles, timber products and specialised façade systems.

With a broad product portfolio and manufacturing and sales facilities across Australia, Brickworks Building Products™ is uniquely placed to service the demands of the building industry.

With over 1200 staff across Australia and New Zealand, we pride ourselves on our commitment to product and service excellence and our leadership position.



Founded in 1908, Austral Bricks® is Australia's largest, best-known and most efficient clay brick and paver manufacturer.

Austral Bricks® add distinct style to any type of home. Their natural colours and textures enable you to create striking façade contrasts or more traditional neutral colour tones. By investing in new technology Austral Bricks® now produce bricks with a variety of surface finishes, exciting colours and different sizes.

The result is a wonderful range of bricks for you to build a stylish, contemporary home.



BOWRAL BRICKS

When Bowral Bricks began production in 1922, a teenage Don Bradman was still scoring runs for the local side. Today their distinctive dry-pressed bricks are highly valued by discerning architects and builders across the country.

The unique combination of traditional craftsmanship and modern technology will ensure that the Bowral Bricks brand will remain the

benchmark for brick excellence for many years to come.



With a heritage reaching back to 1862, Nubrik™ premium-quality bricks are still moulded the traditional way on century-old presses. Their time-honoured expression of authenticity and elegance is acknowledged by architects, builders and discerning homebuyers who also value their rich colour blends, solidity and crisply-defined edges.



Since 1853, Daniel Robertson® has helped build Australia with building products that combine craftsmanship with architectural excellence. In a world of mass production, where qualities are constantly compromised, Daniel Robertson® premium-quality clay bricks are highly prized for their unique character, earthy appeal and individual charm.



^ Bristile Roofing™



^ Auswest Timbers®



^ Austral Façades®

nzbrick DISTRIBUTORS

Backed by a proud history of more than a century of brickmaking experience, NZ Brick Distributors™ offers New Zealand's most comprehensive range of high quality bricks and pavers in an unmatched palette of colours, textures and sizes, backed by a nation-wide sales and distribution network.

australmasonry™

Austral Masonry™ is a leading manufacturer and supplier of concrete masonry products focused on providing functional but stylish solutions to the civil, residential, commercial and industrial building and construction markets. Our passion is to create products to meet the technical and functional demands of the building industry, while also delivering architecturally striking and fashionable finishes to completed building projects. Our range of products includes standard grey concrete blocks, coloured architectural concrete blocks with a range of different finishes and a comprehensive range of retaining walls, pavers and garden edging.

australprecast®

In just a few years, Austral Precast® has become Australia's premier supplier of high-quality, innovative and customisable precast concrete product solutions. Using state-of-the-art technology, production techniques and systems, our precast division produces a diversified range of wall, floor, column, and client-specific precast solutions. To meet the construction industry's ever-increasing demands, the company operates from five plants located along the eastern seaboard and in Western Australia.

bristileroofting™

For almost a century, Bristile Roofing™ has delivered stylish and innovative roofing products for Australian homes. Bristile is now one of Australia's largest manufacturers and installers of quality roof tiles and the exclusive Australian distributor of La Escandella premium-quality terracotta roof tiles from Spain. Product innovation, manufacturing expertise and first-class service guarantee a strong, low maintenance roofing solution that will look great and perform superbly for generations.

auswesttimbers®

From production facilities in Western Australia, Victoria and the ACT, Auswest Timbers® manufactures a diverse range of timber products. Jarrah, karri and chestnut timbers are processed into a range of decorative, seasoned products for furniture and joinery, flooring, decking, staircase components, veneers and fence screening. Green structural timbers are also processed for mine, wharf and rail track construction, as well as for floor joists, roofing timbers and roof tile battens.

australfaçades™

Façade systems are a cost-and time-efficient approach to cladding commercial and upscale residential buildings. The Terraçade™ system, developed in Australia by Brickworks Building Products™, combines the visual appeal and colourfastness of terracotta with the low maintenance and functional efficiency demanded in today's competitive market.

Brickworks Design Centres Sales & Selection

NSW

Horsley Park
(NSW Head Office)
738-780 Wallgrove Rd

Albion Park
45 Princes Highway
Albion Park

Bowral
1 Kiama St
Bowral

Newcastle
2 Yangan Dr
Beresfield

Port Macquarie
1/28 Fernhill Rd
Port Macquarie
Tel. +61 2 6581 1533

Punchbowl
62 Belmore Road North
Punchbowl

Sydney
50 Carrington St
Sydney

Canberra
7 Lithgow St
Fyshwick

VIC

Dandenong
(VIC Head Office)
41 - 55 Elliott Rd
Dandenong

Lynbrook
Cnr Northey Road
& Westport Highway
Lynbrook

Deer Park
972 Western Highway
(Near cnr of Robinson Rd)
Deer Park

Geelong
Surf Coast Highway
Grovedale
(cnr Essington St)

Richmond
490 Swan Street
Richmond

Thomasfown
Craigieburn East Rd
Craigieburn

QLD

Wacol
164 Viking Drive
Wacol

Rosedale
105 Gardner Rd
Rosedale

Toowoomba
29 Mart St
Toowoomba

Townsville
Lot 2 Blakey St
Garbutt

Cairns
8 Palmer St
Portsmith

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roof tiles for living



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build for living

We are committed to social and environmental responsibility and sustainability and are proud of our record of community support.

a member of



proud supporters



The range of building products from
BRICKWORKS
BUILDING PRODUCTS

