

roof tiles for living



roof tiles.
people look
up to bristile

build for living

 bristilerooting®

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Tile Colour: **Aniseed**
Tile Profile: **Vienna**
Range: **Valley Essentials**

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.




Tile Colour: **Grape**
 Tile Profile: **Vienna**
 Range: **Valley Essentials**

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
 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.
- 

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


Water Capture/Run Off
 Water run off from tiled roofs is as safe to use as that from any other roofing material.
- 

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.
- 

Low Embodied Energy
 Testing shows that roof tiles have a lower embodied energy compared to metal roof.
- 

Longevity
 When it comes to longevity, terracotta roof tiles outperform the leading competing alternative. Terracotta roof tiles are supplied with our famous "Colour For Life" warranty.
- 

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.
- 

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

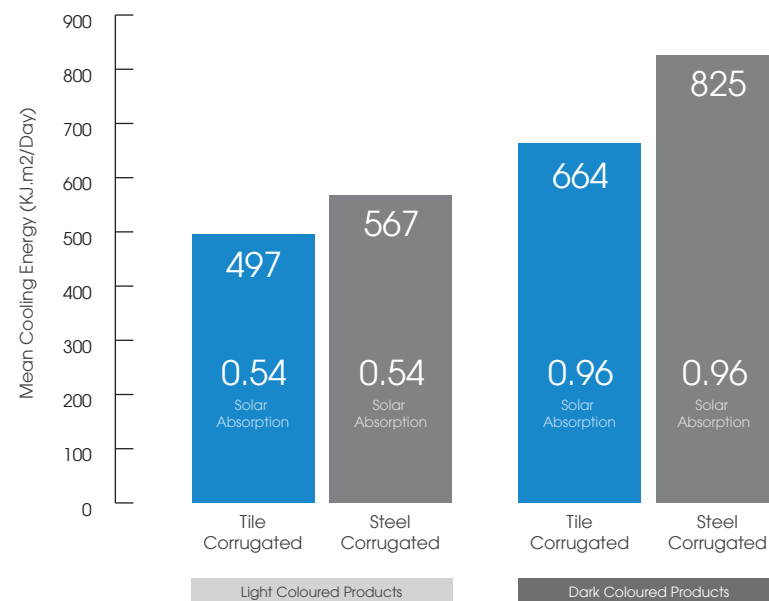
Thermal Performance

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

Energy difference (70MJ/m ²)	X	Average roof size (250m ²)	X	365 days	=	6,387,550 kJ	Yearly saving of \$349.18 Using Roof Tiles

Dark Coloured Roof Tiles Vs Metal

Energy difference (161MJ/m ²)	X	Average roof size (250m ²)	X	365 days	=	14,691,250 kJ	Yearly saving of \$803.12 Using Roof Tiles

Figures based on a roof size of 250m² and average electricity price for the city of Brisbane at the time of print of 19.68 cents per kWh. 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.

Source: Testing conducted by the Roofing Tile Association of Australia at the University of Newcastle



Tile Colour: **Oyster**
Tile Profile: **Vienna**
Range: **Valley Essentials**

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.

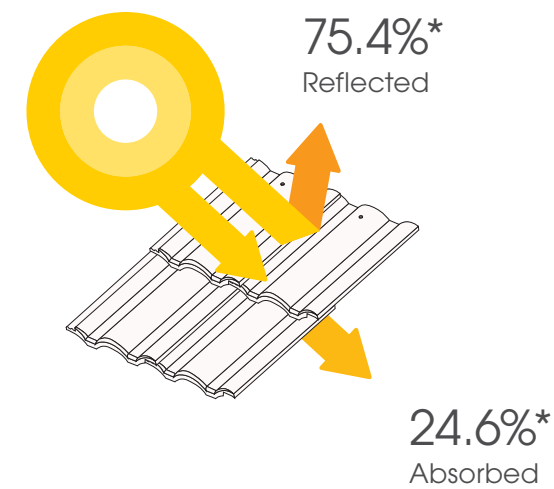
As solar energy moves through a given material it can (depending on the properties of the material through which it is being transmitted) dissipate or reduce in strength as the energy is absorbed by the material.

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

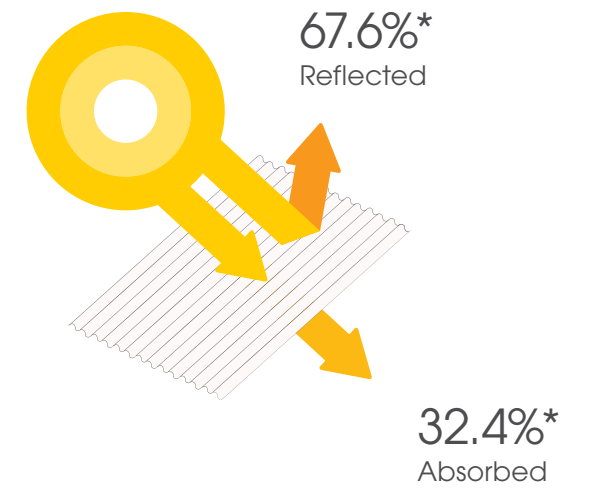
Tests conducted by the Florida Solar Roofing Center (USA)* show that roof tiles reflected more heat away from the home than metal roofing of the same colour. This means the roof tile had lower solar absorption, and is more effective in reducing the transfer of heat into the roof space, thereby effectively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

Solar Reflectance of Roof Tiles and Metal Roofing

Light Coloured Roof Tile



Light Coloured 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 reflect 7.8% more heat away from the home than metal roofing in the same colour.



Tile Colour: Aniseed
Tile Profile: Vienna
Range: Valley Essentials



Tile Colour: Truffle
 Tile Profile: Monaco
 Range: Valley Essentials



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

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.

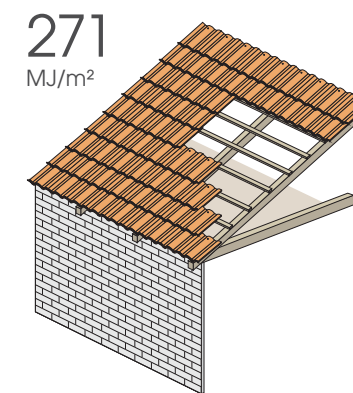
Embodied energy is one of the terms used to measure the impact of a product on the environment which is why an understanding of the term is important to informed debate on environmental sustainability.

The figures opposite show the difference in embodied energy between Terracotta roof tiles, and sheet metal roofing.

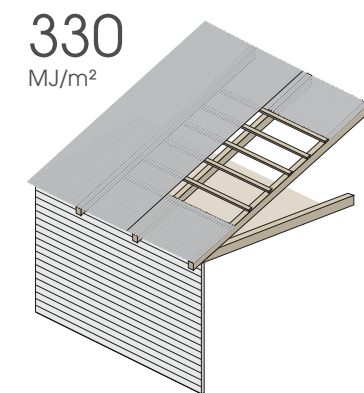
In order to enable comparison, structures were built changing the one independent variable: the roof cladding.

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.



Construction:
 Terracotta Roof Tiles
 Timber Frame
 Plasterboard Ceiling



Construction:
 Sheet Metal Roofing
 Timber Frame
 Plasterboard Ceiling

$$\left\{ \begin{array}{l} \text{Sheet metal} \\ (330 \text{ MJ/m}^2) \end{array} - \begin{array}{l} \text{Terracotta} \\ \text{roof tile} \\ (271 \text{ MJ/m}^2) \end{array} \right\} \times \begin{array}{l} \text{Average} \\ \text{roof size} \\ (250\text{m}^2) \end{array} = 14,750 \text{ MJ} \text{ less embodied energy than a sheet metal roof}$$

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 250m²



Tile Colour: **Cocoa**
 Tile Profile: **Vienna**
 Range: **Valley Essentials**



Sound insulation capabilities of concrete roof tiles and sheet metal roofing

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.

Roof Tiles

70_{dB}

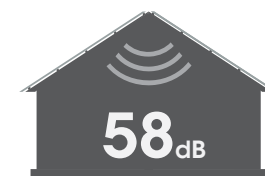


40_{dB}

30dB Reduction

Sheet Metal

70_{dB}



58_{dB}

12dB Reduction

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

The Bristle Roofing 50 year product warranty on terracotta roof tiles (manufactured from 2013) 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.

Reusability/Recyclability

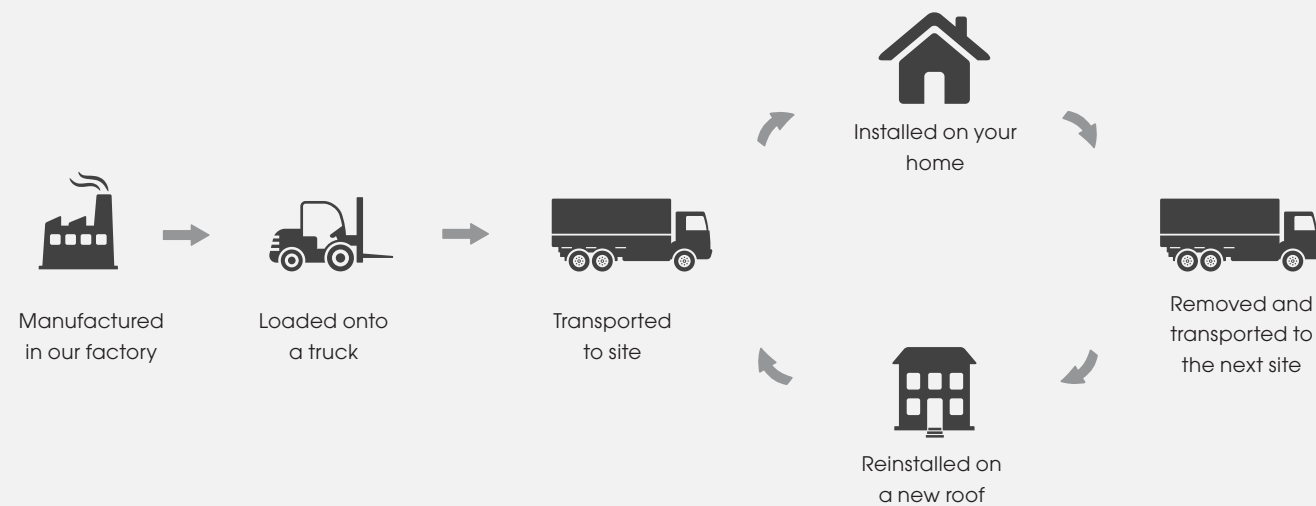
Roof tiles are reusable and recyclable

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.

Terracotta roof tiles can also be recycled for use in other products. 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



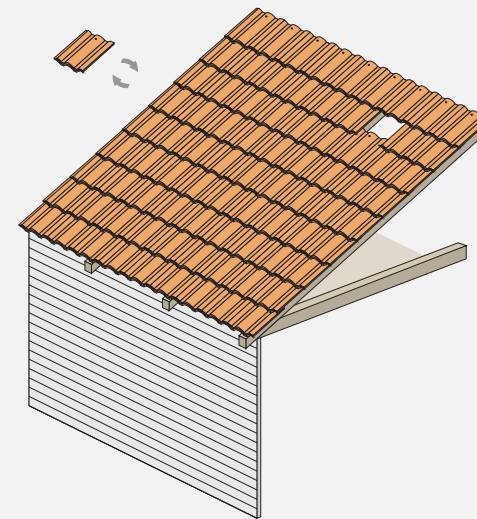
Re-use of building materials roof tiles commonly saves about 95% of embodied energy.

Repair and Replacement

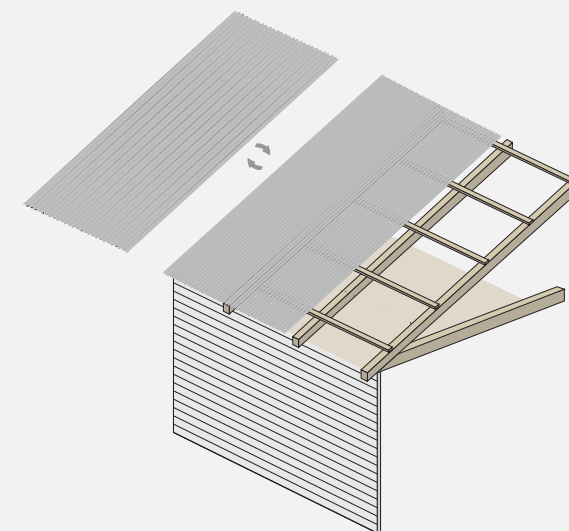
Roof tiles are easy to repair or replace

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.



Tile Colour: **Lucentum**
Tile Profile: **Roman**
Range: **La Escandella**

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. Terracotta roof tiles however are non corrosive and therefore don't rust which makes them ideal for use in coastal areas or marine environments.



Tile Colour: Graphite
Tile Profile: Marseille
Range: Vue collection

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

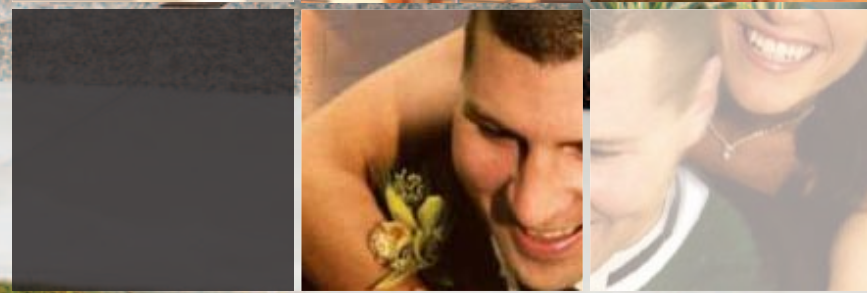
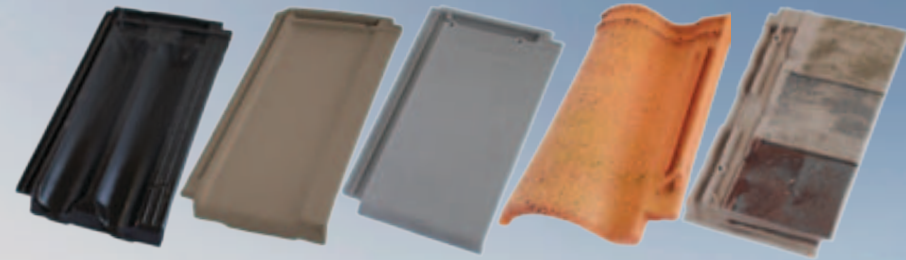
Roof tiles are made from non combustible materials and provide excellent protection against bushfires. Testing funded by Australia's leading manufacturers of terracotta roof tiles and conducted by the Roofing Tile Association of Australia, revealed that roof tiles are ideal for use in Fire Zone areas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

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.

Bristile clay tiles.

Superior quality, stylish range and very easy on the eyes.



 Colour for Life Warranty	 Natural Insulator Year-Round	 Environmentally Friendly
 Rainwater Safe	 Improves Resale Value	 Strong Security & Weather Resistance

With our superior new range of distinctive, high quality clay tiles, Bristile clay tiles are the natural choice for your roof. Exceptional strength, outstanding insulation and a colour that lasts - these are just some of the benefits Bristile clay tiles bring to your home. To find out more and how our clay tiles can add more quality and colour to your life, for life, visit www.bristilerroofing.com.au



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www.bristilerroofing.com.au

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Tile Colour: **Pepper**
Tile Profile: **Vienna**
Range: **Valley essentials**



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.

The Jade 909 has been constructed using recyclable building materials with the best thermal mass qualities and quality energy efficient appliances and fittings throughout adding cost saving benefits to future occupants.

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

The JADE 909 Won DISPLAY HOME \$210,000 - \$230,000 AND EXCELLENCE IN ENERGY EFFICIENCY AWARDS at the 2011 MBA Housing Excellence Awards and won the PROJECT HOME OF THE YEAR at the 2010 National HIA Greensmart Awards, Finalist in the HIA Water Efficiency and Finalist in the 2010 BPN Sustainability Awards for New Homes.



Associated Companies Brickworks Group of Companies



Bristile Roofing™ was established in 1929 when Sir Lance Brisbane opened his first terracotta products factory in Perth. The division is now one of Australia's largest manufacturers and expert installers of quality terracotta, and concrete roof tiles.



Austral Bricks® is the largest and most efficient producer of pavers, bricks, building materials, façade systems and landscaping products in Australia. With the commissioning of a new brick factory at Wollert, Victoria in 2012 we continue to set the pace for quality, efficiency and high levels of environmental performance. The introduction of robotic brick handling equipment at plants around Australia enables us to greatly reduce manufacturing costs and enhance production flexibility.



The acquisition of a number of concrete masonry manufacturers has complemented established manufacturing Victorian facilities and led to the formation of Austral Masonry®. Through natural growth and acquisition Austral Masonry® has become a significant player in the market for masonry block and retaining wall systems on the East Coast of Australia and provides further diversification of earnings for the group.



A new addition to the Brickworks Building Products™ family, our inventive precast solutions team works with clients to deliver architecturally striking and commercially cost-effective solutions for the industrial, commercial and residential markets. World-class style is built on attention to detail, so we're proud of our relentless focus on the use of advanced technology, quality control and commitment to service.



Auswest Timbers® manufactures a diverse range of timber products including heavy structural timbers, roof tile battens through to floor boards and decking. The company has manufacturing plants in Western Australia, Victoria and the A.C.T.

roof tiles for **living**

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

Offices and Display Locations

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