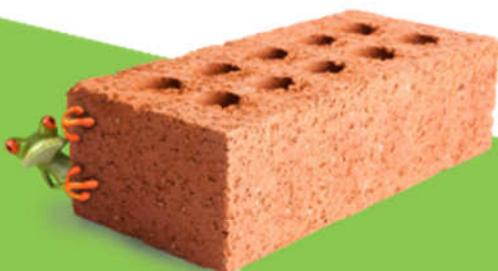


## TECHNICAL SHEET

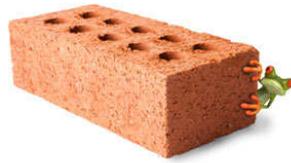
### The material properties and use of clay brick

*Teaser*



[www.claybrick.org](http://www.claybrick.org)





**Date:** February 2017

## THE MATERIAL PROPERTIES & USE OF CLAY BRICK

Clay brickwork is made from selected clays that are moulded or cut into shape and fired in ovens. The firing process transforms the clay into a building component with high compressive strength and excellent weathering qualities, attributes that have been exploited for millennia to build structures ranging from single-storey huts to enormous viaducts. Clay brickwork is South Africa's most popular loadbearing wall construction material and continues to enjoy rapid growth in its use.



The use of clay brickwork is informed by extensive local and international research, manufacturing and construction experience evident in the extent and variety of clay brickwork housing across South African cities and towns.

Clay bricks are readily available, mass-produced in modern, efficient, environmentally friendly and legislated facilities around the country. Bricks most desirable acoustic and thermal properties derive from their relatively high mass. Clay bricks are affordable, require little or no maintenance, have an attractive appearance and possess high durability and load bearing capacity.

### PERFORMANCE SUMMARY

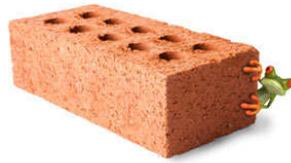
#### APPEARANCE

Clay brickwork is available in a great variety of natural colours and textures derived from red clay used in combination with cement mortar joints of various colours and finishes. The bricks remain stable and colour-fast and do not need to be rendered or painted. Clay brickwork is most commonly used uncoated to display the richness and texture of the material.

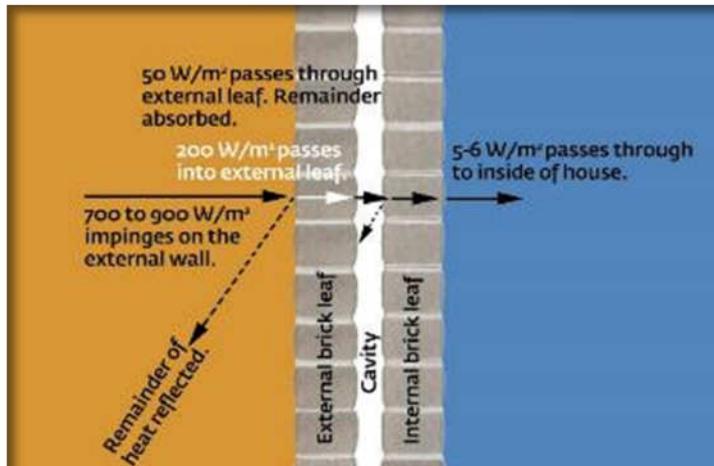
#### STRUCTURAL CAPABILITY

The high compressive strength of red clay bricks has been exploited for millennia to build structures ranging from single-storey huts to massive public buildings and enormous bridges and viaducts.

Clay brickwork walls can support relatively high loads such as suspended concrete slabs. Clay brickwork is commonly used in four-storey construction and with suitable detailing can be used for loadbearing walls in much higher buildings.



## THERMAL MASS



Clay brickwork has high thermal mass. If a building with internal clay brickwork walls and concrete doors is subjected to a heating and cooling cycle that crosses the comfort zone, the brickwork and concrete will maintain a stable level of heat energy for an extended period. In summer, they will remain relatively cool and in winter, the same building will remain relatively warm.

Research recently undertaken at the University of Newcastle in Australia found that only a small proportion of the heat on a typical cavity brick or brick veneer wall enters the building directly through the wall in temperate conditions. The rest is either reflected or absorbed.

## INSULATION

Clay brickwork, combined with a cavity, has excellent thermal resistance (R-value).

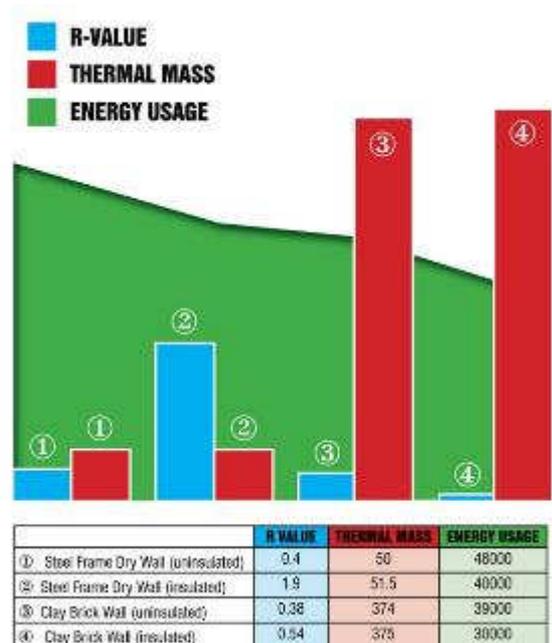
The thermal resistance of clay brick veneer or cavity walls can be enhanced by adding either foil or bulk insulation. Wall insulation should be accompanied by appropriate detailing to avoid thermal transfers by bridging through window and door frames, by radiation through window openings or by convection through leakage.

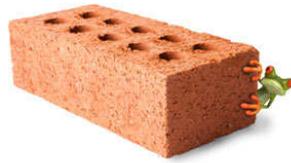
Sound insulation

Due to their mass, clay bricks provide excellent sound insulation, particularly for low frequency noise.

## VERMIN RESISTANCE

Clay brickwork consists of dense inorganic materials that do not harbour vermin. Termite resistance may be achieved in a variety of ways, including proprietary termite barriers developed for use with clay brickwork.





## DURABILITY AND MOISTURE RESISTANCE

Clay brickwork is extremely durable. Clay brickwork walls resist the penetration of rainwater, including wind-driven rain, although they are not completely waterproof. Some moisture may eventually soak through the mortar joints. For this reason external clay brickwork is generally constructed as either cavity walling (two leaves of brickwork separated by ties) or brick veneer or curtain wall (one leaf of brickwork separated from, but tied to a structural frame). Detailing incorporates damp-proof courses and weep holes.



## FIRE RESISTANCE

Clay bricks are an excellent medium for achieving fire resistance, rated at 240 minutes (or not combustible). Clay brickwork does not burn when exposed to bushfire and can help protect the more combustible items inside a house.

## TOXICITY & BREATHABILITY

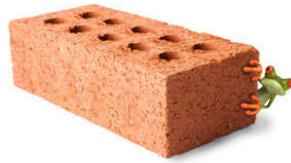
Clay bricks are naturally inert and are not prone to off-gassing of volatile materials. Clay brickwork and its constituents are non-toxic, however when handling cement (used in the mortar) or cutting brickwork with a masonry saw, manufacturer's safety procedures must be observed to eliminate risk of skin irritation and lung damage.

## BUILDABILITY, AVAILABILITY AND COST

As a result of the long history of cavity brick and single leaf brick wall construction in South Africa, there is a huge body of knowledge and experience on construction standards and techniques.

Clay bricks are manufactured throughout South Africa and are available at competitive prices. Even in remote areas, clay bricks can be supplied at moderate prices due to the wide availability of truck transport and back-loading opportunities.





## SUSTAINABILITY & ENVIRONMENTAL IMPACT

Clay brick manufacture uses energy but the investment of embodied energy is repaid by the longevity of the material. Clay brick homes have a long life and low maintenance costs making them a potentially sustainable form of construction.

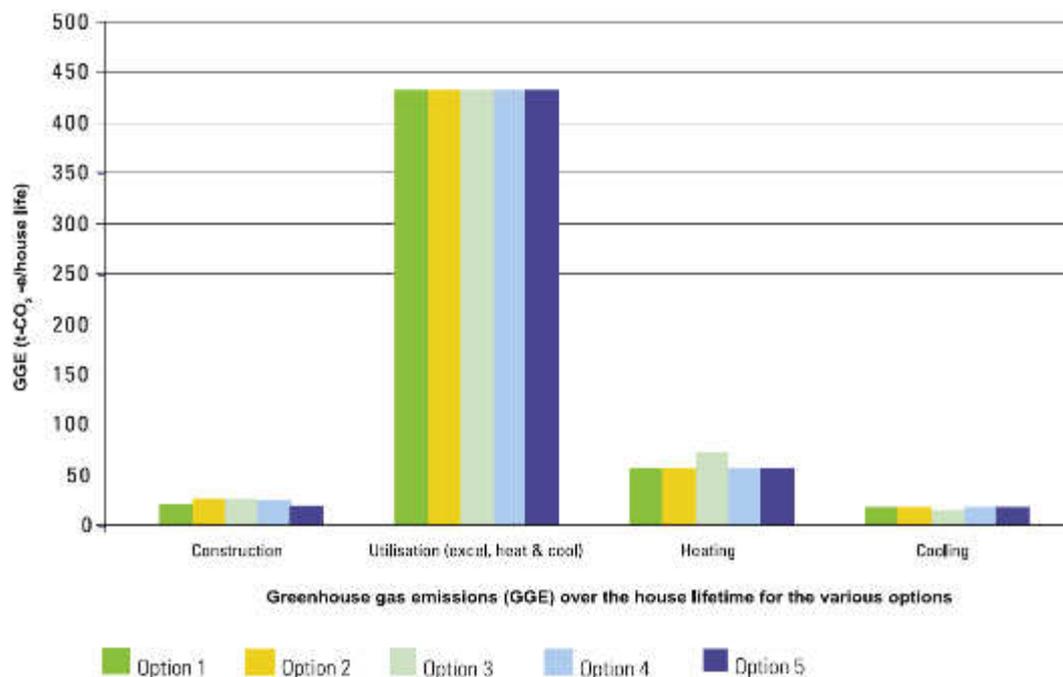
To ascertain the energy efficiency of a small sized project home, a Life Cycle Analysis was carried out by The University of Newcastle based on a house life of 60 years. It looked at all stages of production (building materials, transportation to the site) and construction and then occupation (energy costs of cooking, lighting, heating and cooling, repairs and maintenance) and building decommissioning.

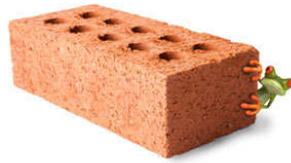
The study concluded that of the five housing options studied, operational energy use had the greatest environmental impact accounting for over 90% of energy consumption and greenhouse gas emissions for all options. Researchers reported that the materials of construction had only a very small impact on the overall resource energy and greenhouse gas emissions.

A range of construction materials and methods were considered for both their resource energy and greenhouse gas emissions.

- Option 1: Brick single wall/timber frame/concrete slab
- Option 2: Brick single wall/steel frame/concrete slab
- Option 3: Brick double wall/concrete slab
- Option 4: Timber clad/steel frame/concrete slab
- Option 5: Timber clad/timber frame/concrete slab

### Greenhouse gas emissions over life cycle of a house





**For further information:**

The Clay Brick Association of South Africa

Website: [www.claybrick.org](http://www.claybrick.org)

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