NEWS ARTICLE

CLAY BRICK PROVEN SUSTAINABLE WALLING SOLUTION FOR SA CLIMATE

The days of selecting walling materials merely on price could very well be something of the past. Today, the design, appropriate specification and construction of a buildings shell or envelope are critical factors in the sustainability equation, particularly with regard to their impact on the structural integrity, maintenance, occupancy comfort, operating costs and the life of the building itself.

In South Africa, it is estimated that the heating and cooling of internal spaces consumes as much as 25% to 40% of the total operational energy. "Our climate is categorised by large variations in daily average temperatures (diurnal swings) coupled with long hot summer periods. This presents a challenge for walling to moderate the external temperature amplitudes to more bearable levels indoors, while also ensuring that average indoor temperatures, across all seasons, remain at acceptable levels. When indoor temperatures are the most comfortable, energy usage is reduced, as occupants tend to opt for natural ventilation," notes At Coetzee, Executive Director of ClayBrick.org, referring to the findings of independent studies undertaken by WSP Green by Design on behalf of the Association.

The research made use of sophisticated computer modelling based on years of empirical research data to determine the optimal thermal performance of 41 different walling systems across the six major climatic zones of South Africa. Details such as occupancy type, time of year, specific location and local weather data were also factored in. "The results clearly showed that occupants enjoyed greater comfort and consumed less energy on heating and cooling, in houses constructed from materials with high CR values, such as clay masonry," says Coetzee.

The CR Method initially developed by the CSIR, and since refined by Professor Dieter Holm, makes use of empirical data to determine the thermal performance of a building material. The CR value refers to the thermal capacity (C-value) of a building material, combined with its thermal resistance (R-value) and is useful in determining the levels of comfort to be experienced in a building.

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"The research demonstrates that clay masonry brings both values to the table. Lightweight walls, on the other hand can only offer resistance. Without the requisite thermal capacity, lightweight walls are unable to moderate internal temperatures as effectively as clay masonry, thus leading to sub optimal thermal outcomes," says Coetzee.

The thermal capacity inherent in clay bricks acts like a battery, in that heat energy is slowly absorbed, stored and released later on. In the summer months, the thermal capacity slows down the heat transfer from the outside, often delaying the peak indoor temperature to later in the day. This occurs more or less at the same time that the heat flow direction reverses, as the thermal capacity in the wall absorbs heat from the indoor air when the outside cools. This is known as thermal lag, with similar dynamics occur during the winter months.

With the abundance of ‘free’ solar energy in South Africa, and the use of Passive Solar Design in modern construction, the thermal efficiencies of a building can be further optimised through correct orientation, natural ventilation, sufficient shading and the appropriate levels of thermal capacity and insulation in the building envelope. "Clay masonry, with its high thermal mass is perfectly suited to this approach with the primary objective of eliminating imported building energy," says Coetzee.

The studies, as undertaken by WSP Energy Africa for ClayBrick.org have resulted in the minimum CR values for external walls, for all building types, across the six major climatic zones of South Africa being proposed for inclusion in the next version of SANS 204: Energy Efficiency in Buildings. Clay masonry is associated with social acceptability and aspirational values, thanks to its structural strength, enduring aesthetics, acoustic and thermal insulation, comfort and security.

Clay face brick buildings feature permanent colours and the need for very little maintenance, resulting in almost no cost outlay for the upkeep of the exterior of the building. The extreme durability and thermal comfort afforded by clay brick ensures that property owners benefit from peace of mind way beyond the 25 to 50 year life cycle associated with less durable lightweight walling materials.

Says Coetzee, "In the context of today’s sustainability paradigm, clay brick is the only walling material that can be relied on to perform consistently throughout a building's life. So, the next time you look at a clay masonry unit, know that it is not just another brick in the wall. It is a tried and trusted building material that discreetly balances the economic, social and environmental values of sustainability, to provide security, peace of mind, occupancy comfort and long term savings ~ For Good."