A clay-brick community health centre.

IBT COMPARATIVE SUPERIOR PERFORMANCE CLAIMS NOT CONVINCING

The Clay Brick Association (CBA) recently highlighted from an inspection of completed schools the shortcomings of lightweight IBTs in delivering school buildings of equal integrity, quality, and lower lifecycle cost of ownership, quicker build time and with indoor teaching and learning environments anyway comparable to that afforded by clay brick wall construction.

The evidence presented by the CBA contradicted the assertion, as reportedly derived from the outputs of the CSIR rating system, that 32 out of 40 IBTs identified for the building of schools generally afford "better quality control, significant savings in energy and lifetime costs" (Dr Llewellyn van Wyk, Principal Researcher, CSIR Built Environment Division – Built July 2014).

With the general applicability of the above "significant savings in energy" claim at variance with a plethora of quantitative thermal modelling research into the thermal performance of different walling envelopes of buildings using ASHRAE compliant modelling software, the CBA, to better understand how the walling systems of IBTs identified for use in schools actually compared to clay brick walling in terms of thermal efficiency, took a look at the Agrément certificates 2010/376 and 2011/400 pertaining to South Africa's "highest" Agrément certificated lightweight panel system.

Contrary to what one may reasonably expect to be the case, a reading of Agrément certificates 2010/376 and 2011/400, Table 2: Habitability, Sections Thermal Performance and Energy, confirms that:

- **"The thermal performance of both the Mi Panel 1 and Mi Panel 2 Building System buildings without insulation in the ceiling will be inferior to that of a standard brick house (SBH) – (A standard brick house comprises 220mm solid double skin walls with no insulation in the ceiling) and will perform better when insulated ceilings are installed".**
- **"The energy required to heat both a Mi Panel 1 and Mi Panel 2 Building System building without insulation ceiling will be up to two times that required to heat the SBH".**

To achieve certification it is a requirement that insulated ceilings must always be installed. It is the ceiling insulation therefore, and not the supposed 40% to 50% 'higher thermal rating' (R-value) of the wall panels that lower's the heating energy usage to below that of solid clay brick walled house without insulation in the ceiling.

This lesser thermal performance of the walling of Africa's "highest" certificated IBT wall panel system however does not end there. The Agrément SA certificates only reference 'heating' energy and in South Africa heating energy is only part of the

energy consumed in buildings. In South Africa's climates cooling energy usage can be a high number for achieving thermal comfort, particularly in day-time occupancy buildings.

This reality is well presented in the findings of the University of Pretoria study, "A Thermal Performance Comparison Between Six Wall Construction Methods Frequently Used in South Africa", that modelled the thermal performance of three building typologies in South Africa's six major climatic zones.

In the case of the 2000m^2 institutional type day-time occupancy buildings, the gross annual heating and cooling energy usage was found to be:

These research findings, that have passed critical review, point to the inappropriateness of extrapolating the outputs of the CSIR rating system as applied to a SBH, as indicative of the comparative thermal efficiencies of different wall construction types applied to day-time occupancy social infrastructure buildings, such as schools, community health centres and such like.

Zero evidence was found from the inspections of five IBT schools and five clay brick schools handed over between 2012 and 2014, the Agrément certificates of the highest certificated IBT wall panel system referenced above, and findings of thermal modelling research, to support the notion that IBTs are more

Gross annual heating and cooling energy for 2000 m^2 office in each climate zone expressed on kWh

		CLIMATIC ZONE					
Wall types		01 Bloemfontein	02 Pretoria	03 Musina	04 Cape Town	05 Durban	06 Upington
1	220mm Solid Double Clay brick	51088	82892	222937	67032	140756	190548
2	270mm Cavity (50mm) Clay Brick with no insulation	52630	87268	228858	71218	148191	192934
3	280mm Cavity (50mm) Clay Brick with insulation	56178	93772	236063	78817	158572	197806
4	Light Steel Frame to SABS 517	68921	117083	250258	105389	180980	209769

The most energy inefficient wall construction type is the LSF lightweight walling specified SAN517. The most energy efficient walling system for day-time occupancy commercial or institutional building is a 220mm solid clay brick masonry wall (or for Climatic Zone4: a 270mm clay brick cavity wall, as is the norm for the Southern Cape condensation problem areas).

Lightweight IBTs, represented in this instance by LSF specified SANS 517, was on average, 30% less energy efficient than 220mm solid double clay brick wall construction, for the six climatic zones.

LSF specified SANS 517 was also less energy efficient than both cavity brick and the same with insulation applied in the cavity.

efficient in meeting the challenge of providing sustainable, energy efficient, social infrastructure buildings any way comparable to that which clay brick construction has done so cost effectively and competently over the decades.

If the truth be told lightweight IBTs present a substantial compromise to clay brick constructions basket of proven performance benefits. In the South African context, best lifetime investment value in social infrastructure buildings is the clear preserve of clay brick construction. WR

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