

# BUILD HOW-TO GUIDE

BUILD YOUR OWN ENERGY EFFICIENT  
HOME THE STAND 47 WAY

# **BUILD YOUR OWN ENERGY EFFICIENT HOME THE STAND 47 WAY**

Looking to build your own house that has all the energy efficient benefits and living comforts offered by Stand 47? This guide is aimed at you. Do you want your house to be a home? More than just a safe shelter, a place where you look forward to coming back to after a long day at the office; a sanctuary that makes you happy and even healthier? An efficient structure utilising innovative materials that performs to your needs? This guide outlines the process, benefits and the next steps necessary to achieve that.

## **FIRST, SOME THINGS TO CONSIDER BEFORE YOU BEGIN...**

### **THE HOME'S ACCOMMODATION SCHEDULE**

An accommodation schedule is a summary of the number of people the home needs to accommodate – and consideration of how the home needs to accommodate them. In simple terms, it is a bedroom count plus the functional areas (the likes of kitchen, living rooms, dining rooms, home offices, garages and bathrooms).

Write these down and consider your current versus future needs. How many bedrooms do you require now versus the future and can any of the spaces potentially be flexible (for example, home offices or living areas that could convert into bedrooms and vice versa)? Once you have a clear idea of the function your home needs to perform, you're then ready to take the next step.

### **ESTABLISH A BUDGET**

When forming your budget make a visit your bank's home loan section on their website and use their

affordability calculators to understand how your budget can be shaped to your needs (and vice versa).

When you're ready to get down to details, include everything that will go into the project: the cost of the land, local fees and taxes, architect and engineering fees, construction of not just the home but the landscaping, plus furniture and decorating. And don't forget a healthy contingency. As with any complex project, things will happen, and the road from point A to point B will have a detour or two. Make sure that these little side trips won't send you over the edge.

### **ASSEMBLE A TEAM**

While you might think you can go it alone, assembling a team of professionals is the best approach.

The architect is often the first person you will hire to realise your project. It is best to hire an architect who will be involved in all phases of the process, from the initial design concept to the completed construction. They might also help you select and hire subcontractors, which can include the builders, engineers and landscape architects. One of the most important duties of an architect is to manage and supervise most aspects of construction, as

well as facilitate communication between all other contractors.

We suggest you choose an architect that has experience in energy efficient design and light steel-frame construction, and who is registered with SACAP – The South African Council for the Architectural Profession. Stand 47 was designed by Thomashoff & Partners.

Alternatively, contact CPW – a specialist retailer in efficient construction who can assist in recommending a suitable architect, or indeed a range of qualified subcontractors. If you already hold plans, CPW can assist in having these priced using specialist materials and providers.

Discuss your accommodation plan and your wish to pursue contemporary construction methods with your architect. Request advice on the best approach to take and enquire about cost estimates for your planned build. Once you feel comfortable with the architect, we advise that a SAIA client/architect agreement is signed, protecting all parties.

Your design journey effectively starts now – you and your architect will go through a process to design your ideal home.

— Your architect will advise you whether it is necessary to appoint other professionals – a Quantity Surveyor (registered with ASAQS – The Association of South African Quantity Surveyors) or a Structural Engineer (registered with ECSA – Engineering Council of South Africa) might form part of the team.

— Your architect will submit your plans for Council approval.

— In collaboration with your architect you will need to appoint a building contractor and we recommend you include CPW in this process.

— Obtain at least three different quotations for building, from different contractors that have

experience in building with light steel-frame, alternatively embark on putting the construction project out to tender, advisedly under the guidance of your architect.

— Choose a contractor based on scope of work, references, budget and time frame. It is advisable to visit one or two examples of a contractor's previous work and contact their references.

— Once you are agreed with the different contractors on the scope of work (the deliverables), the budget and the time frame, you will need to draw up a contract that legally binds the parties thereto, prior to commencing with construction. This needs to be done with the quantity surveyor and the architect.

— You may also need to enlist the services of a Light Steel Frame supplier that is registered with SASFA – The South African Light Steel Frame Building Association.

## SECOND, THINGS TO CONSIDER AS YOU DESIGN YOUR HOME...

### THE BENEFITS OF BUILDING WITH SAINT-GOBAIN MATERIALS

— **Thermal comfort** – a quality building has comfortable internal temperatures within an airtight building envelope. Saint-Gobain products used within building structures provide highly effective thermal insulation in an innovative way that limits high internal temperature variables, such as summer overheating, and winter heat loss.

— **Acoustic comfort** – Saint-Gobain systems provide high acoustic isolation limiting the transfer of airborne, impact and reverberation sounds through the building structure and the spaces contained therein. Sound absorbing wall and ceiling systems add significantly to indoor acoustic quality where users are ensured of privacy and quiet without being

disturbed by unexpected noise.

— **Flexibility, adaptability and maintenance ease** – because Saint-Gobain products use modular systems, buildings can be built faster and produce less site waste. This responsible approach decreases energy consumption, carbon footprints and running costs. Furthermore, these durable and low maintenance systems make future renovations easier to perform since modular systems are flexible and easily adapted, removed or added to without compromising the entire structure, building form or the aesthetic – with minimal inconvenience to the user.

Saint-Gobain drywall materials offer innovative design flexibility; versatility and aesthetic appeal by hiding messy and unattractive services like plumbing and electrical conduits inside the drywall cavity. This results in healthy, visually stimulating and productive interior spaces.

Lightweight building systems save on foundation costs and reduce structural load. Construction time is saved, while other construction costs such as transport and cranes decrease. This means a cleaner and potentially safer construction site is possible (in comparison to brick and mortar), with neater and more accurate installation finishes.

— **Visual comfort** – with technological innovation and efficiency requirements met, Saint-Gobain products also offer aesthetic solutions that promote the use of natural light while considering glare and luminance to provide a stimulating environment which when combined with clean modern lines and premium finishes create high quality spaces.

— **Indoor Air Quality** - From a health point of view, Saint-Gobain products include a high performance board that improves indoor air quality by taking formaldehyde and other toxins out of the air and converting them into safe, inert compounds.

— **Peace of mind** – Saint-Gobain (Gyproc) been around for 85 years and our proudly South African

products are locally sourced and manufactured, whilst our systems are SABS tested and SANS compliant. If installed correctly, systems produce consistent results for areas that have stringent performance requirements.

— **Sustainability** – as South Africans are becoming more environmentally responsible, Saint-Gobain is committed to creating a sustainable habitat for future generations in South Africa. They are the first local manufacturer to complete a unique critical Life Cycle Assessment (LCA) on their products to measure the environmental impact of a product in every stage of its life - from raw material through 5 stages to the end of its life cycle. Environmental impact is reduced through:

- responsible sourcing of raw materials which protect and sustain the environment,
- reducing energy consumption during production,
- reducing production waste to landfills,
- championing light weight building solutions that reduce transportation,
- active involvement promoting sustainability in the industry. Saint-Gobain Gyproc is a founding member of the Green Building Council of South Africa (GBCSA).
- Innovative technology – As an example, Saint-Gobain Gyproc plasters use less water than sand cement plasters. In the case of drywall systems, Saint-Gobain Isover's cavity insulation material is a self-supporting non-combustible glasswool insulation that offers effective acoustic and thermal insulation with a k-value (thermal conductivity) of 0.038 W/mK. Lastly, non-combustible aerolite in ceiling installations is made from sustainably sourced naturally occurring silica sand with up to 80% recycled glass being used in the glasswool making it environmentally friendly. Insulation also offers preventative fire protection.

## **HOW TO BUILD AN ENERGY EFFICIENT HOME – THE BASICS**

Making your home energy efficient requires reducing energy consumption in for example, electricity consumption. First, it is essential to get the basics right. Correctly designing the house's orientation and shading can naturally maximise heat gain from the sun in winter without overheating the building in summer.

Next, the building envelop should reduce heat loss and gain to improve thermal comfort and so conserve energy for heating and cooling, and of course, reduce costs. Any building with a difference between internal and external temperature, loses heat and affect thermal comfort. Savings are maximised where air leakage, thermal bridging, and the risk of condensation are reduced.

South Africa's local energy efficiency building standards specify the thermal performance required for the building envelope - external walls, windows, ceiling or roof and floors. Thermal comfort improves where internal temperatures are kept constant. Therefore heat storage is also important.

#### **WHERE CAN MY ARCHITECT SPECIFY SAINT-GOBAIN PRODUCTS IN MY ENERGY EFFICIENT HOME OF THE FUTURE?**

Whether building your new home with light steel like Stand 47 or with a hybrid system using bricks, innovative Saint-Gobain products and materials offer a variety of beneficial products that make an energy efficient home of the future possible. Speak to your architect about tailoring their durability, sound, fire and moisture resistance, and health benefits in your design.

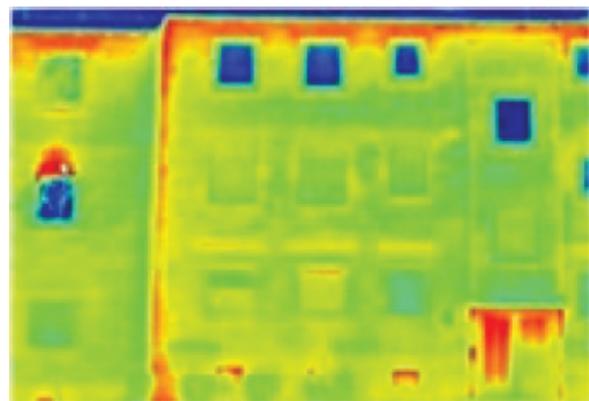
**Roof and ceiling** - Depending on the design, roofs and ceilings account for between 25 and 45% of heat gain or loss as a result of poorly insulated roofs. Good roof insulation ensures comfortable thermal and acoustic benefits for you all year round, and also offers the best

cost to benefit ratio; higher energy efficiency can be achieved with minimal costs. An insulated ceiling is often considered a luxury, however to properly insulate one costs less than 1% of the total per square meter building costs. This will save you money for the lifespan of your home.

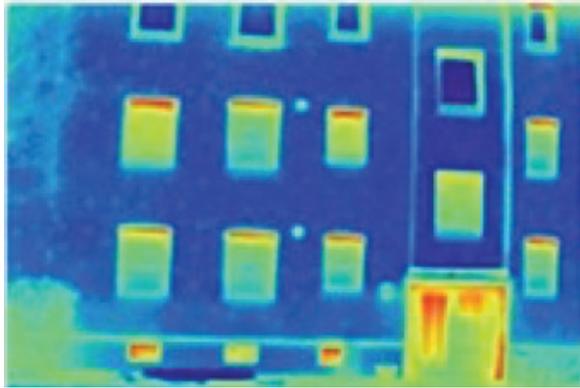
Consider installing...

- Saint-Gobain RhinoBoard - provides versatile, distinctive aesthetics that will improve the thermal performance of a roof assembly by 60%.
- Saint-Gobain's Isover Think Pink Aerolite – a thermal and acoustic ceiling insulation laid on the ceiling reduces the amount of energy required to maintain a comfortable living environment and offers a payback in less than 2 years. [Aerolite Approved Installers link \(www.isoover.co.za/approved-installers\)](http://www.isoover.co.za/approved-installers).

**Walls** - Outer walls in a house and can account for up to 30% of heat loss and gain. It is advisable to increase the insulation properties of your building envelop by increasing the wall thickness or using a material with low thermal conductivity (thermal insulation). Building a thick wall is costly, and cannot achieve the same energy savings as a thin layer of thermal insulation.



*Un-insulated home: Heat loss through the walls and windows.*



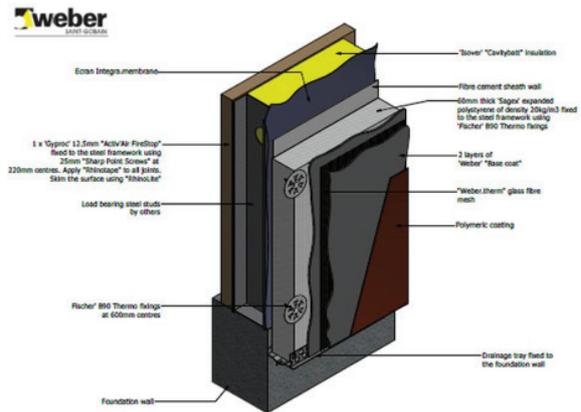
*Insulated home: Heat loss predominantly through windows - reduced heat loss through the building envelop.*

Adding thermal insulation to walls depends on the wall construction of the new home and its design. You can use Saint-Gobain systems in a hybrid system using bricks and drywalls (See our How To Retrofit Guide) or you can use it in a light steel frame building using drywalls as we did in Stand 47.

Since you are building a home of the future, we recommend using Saint-Gobain's ETICS (External Thermal Insulation Composite System), the high quality thermal wall insulation system:

ETICS is fitted to a steel frame designed by a structural engineer, consisting of an internal lining of 1 - 2 layers of a Saint-Gobain RhinoBoard (as per fire rating requirements) and finished as desired. The external lining consists of a moisture barrier membrane (Saint-Gobain 'Ecran Integra.membrane') which is fixed to the steel frame. A sheath wall is then fixed to the frame and insulation boards (Sagex Expanded polystyrene panels) are adhered to the sheath wall using adhesive and mechanical fixings as specified by Saint-Gobain.

Apart from significant savings in running costs, ETICS makes the construction process easier and provides a viable construction method for home owners looking to lower their construction times, and improve thermal efficiency during habitation. ETICS systems are said to be 84% more thermally efficient than conventional wall systems.

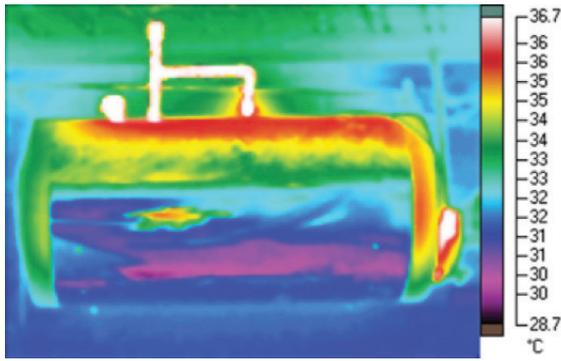


**Floors and foundations** - A substantial amount of heat is lost through the foundations and floor into the ground. Floors with under floor heating should have insulation installed. Heating elements can be installed above Saint-Gobain's expanded polystyrene insulation. If the floor is not heated, it is more economical to insulate the foundation walls where heat loss is greatest. Saint-Gobain's expanded polystyrene can be used as under as floor and perimeter insulation.

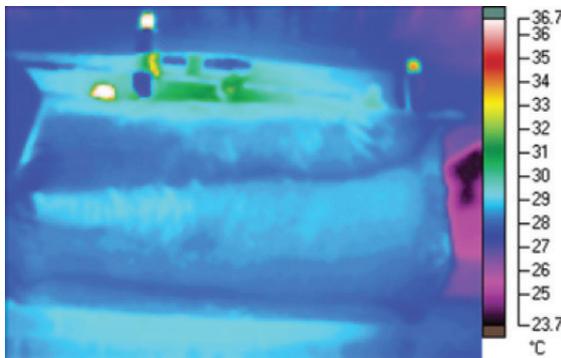
Another option is to install a light weight insulated screed using Saint-Gobain's Politerm Blu, which is a thermal insulation mortar consisting of EPS beads treated with a chemical additive to enable the production of lightweight, thermal insulation mortars of various densities. Politerm Blu is non-flammable and environmentally friendly as it uses less material or energy, produces fewer emissions, and does not contribute to global warming or the depletion of the ozone layer.

**Insulating services** - A geyser consumes 35% of a typical household's electricity and this can be reduced by 37% by insulating the geyser's adjoining hot water pipes. By insulating both your geyser and pipes you can save up to 58% of the running costs, with payback within 6 months.

Saint-Gobain's Geyser Insulation Pack consists of a flexible foil faced Glasswool insulation blanket with tape and five 1 metre snap on pipes, which exceed requirements.



Un-insulated geyser



Insulated geyser

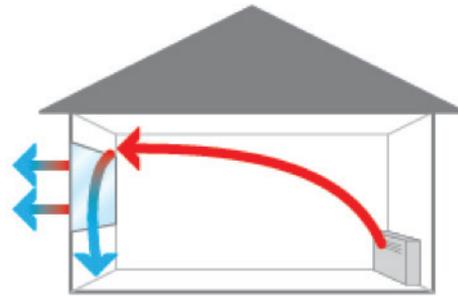
**Air leakage** - This occurs around exterior doors, windows, junction between the ceiling and the wall, expansion joints and service penetrations. To prevent heat gain or loss, seal gaps using an elastic sealer and a “door sweep” at the bottom of entrances, and install cornices at the ceiling perimeter such as Saint-Gobain’s cove cornice.

## OTHER GUIDELINES TO CONSIDER WHEN BUILDING FOR ENERGY EFFICIENCY:

### WINDOWS

A single pane of glass can lose almost 10 times as much heat as the same area of insulated wall. It would be a worthwhile to consider installing double pane,

low-e coating windows to reduce the transfer of heat through windows.



## HEAT LOSS FROM WINDOWS

- › Warm air moves toward cold glass
- › Heat is lost through unprotected glass

Low-emissivity (Low-E) coatings are microscopically thin, virtually invisible, metal or metallic oxide layers on a glazing surface primarily to reduce the U-factor by suppressing radiative heat flow. Low-E coatings are transparent to visible light, and opaque to infrared radiation. Different types of Low-E coatings have been designed to allow for high solar gain, moderate solar gain, or low solar gain.

### REDUCED WINDOW TO WALL RATIO

The correct balance between glazed and wall surfaces in the external façades maximizes daylight while minimizing unwanted heat transfer, resulting in reduced energy consumption.

### EXTERNAL SHADING DEVICES

External shading devices on the building façade protect windows from direct sunlight, which increases both solar heat gain and glare. Designs that take advantage of summer and winter sun should be considered.

### NATURAL VENTILATION

A well-designed natural ventilation strategy can

improve occupant comfort by providing both access to fresh air as well as reducing the temperature. This results in a reduction of the cooling load, which lowers initial capital and maintenance costs.

### **HEAT PUMP FOR HOT WATER**

Heat pumps for hot water use electricity to transfer heat from the air to water in an enclosed tank instead of generating heat directly.

### **ENERGY SAVING LIGHT BULBS**

The use of CFL (compact fluorescent lamps), LED (light emitting diode), or T5 lamps reduces the building's energy use for lighting; heat gains are lowered, which in turn reduce cooling requirements. The service life of these types of bulbs is generally higher and maintenance costs are reduced.

### **SOLAR PHOTOVOLTAICS**

Installing solar photovoltaic panels reduces the amount of electricity required from the grid. Photo Voltaic panels unlock the latent potential inherent in every building's roof space to generate clean renewable energy from the sun.

### **SMART METERS**

Reduce energy demand through increased awareness of energy consumption. Appreciate, understand, and contribute to responsible use of energy in your home. Smart meters provide immediate feedback that can result in 10 to 20% energy savings, as they are able to identify consumption in more detail than with conventional meters.

## **NEED MORE INFO OR ARE YOU READY TO BUILD?**

### **Saint-Gobain**

Saint Gobain Gyproc

[www.gyproc.co.za](http://www.gyproc.co.za)

0860.27.28.29

### **Ceiling & Partitioning Warehouse (CPW)**

David Henning – Sales Manager

[david@cpw.co.za](mailto:david@cpw.co.za)

072.650.8950

### **South African Council for the Architectural Profession**

[www.sacapsa.com](http://www.sacapsa.com)

011.479.5000