CITY OF CAPE TOWN
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STAD KAAPSTAD

ENERGY EFFICIENCY AT HOME

Understanding SANS 10400-XA 2021 (ed. 2) compliance

A non-technical guide for homeowners and built environment professionals.

Making progress possible. Together.

This document supports the City of Cape Town's efforts to encourage energy efficiency in homes by simplifying and explaining the South African National Standard (SANS) 10400–XA 2021 ed.2 on energy usage in buildings.

What is SANS 10400-XA?

A set of national standards that **governs energy efficiency in all buildings**, it forms part of the National Building Regulations and Standards that control the legal erection of buildings across South Africa. By promoting energy-efficient building practices, SANS 10400-XA aims to **reduce the environmental impact of buildings, decrease energy costs for occupants, and contribute to national energy efficiency goals**. It is important to note that SANS 10400-XA does not address energy sources (i.e. where the energy comes from such as grid or renewable energy) – it only governs efficiency, irrespective of energy source.

Why is it important for you?

Besides being a legal requirement, reducing electricity consumption **reduces costs** associated with running your home: heating the water, switching on the lights, powering up plugs and maintaining indoor temperatures. This results in an **overall reduction in electricity demand** on the already constrained grid and a **reduction in carbon emissions** from fossil fuel burned at centralised power stations. Reduced electricity demand also results in the need for **a smaller, more affordable solar PV and battery installation** should you wish to install one.

Why is it important for the City?

The City's State of Energy and Carbon Report (2021) identifies **residential and commercial energy use as contributing 18% and 24% respectively to the City's overall carbon emissions**. In response to this, the City's Energy Strategy 2050 includes commitments to **optimise energy use for businesses and households**, while the Climate Action plan has a strategic focus on **net zero carbon buildings and precincts**. As such, ensuring all new buildings are designed and built to optimise energy use is a key climate change mitigation strategy.

The City of Cape Town, via the C40 network, has committed to **net zero carbon in operation for all new buildings by 2030**. Energy efficiency in buildings plays an important role in reaching this ambitious target, so ensuring **high levels of compliance with SANS 10400-XA** is a very important step in the roadmap to achieving the City's net zero carbon goals. We recognise that this target can only be met through **strong collaboration** and **enabling initiatives** that drive market transformation.

This publication aims to support both residents and businesses contribute to sustainability in their homes and work environments.

When and how do buildings become compliant with SANS 10400-XA?

When **plans for a new building or renovation to an existing building are submitted to your local authority** for approval, they must illustrate how compliance is achieved. As part of the approval process, **plans examiners will assess the information provided** by the appointed professional.

Your **architect and professional team will show compliance** via one of three routes:

1. **Deemed to satisfy:** Compliance is met by **showing that various building features meet the minimum requirements** of the standard. These include glazing dimensions, insulation thickness and wall types. This route, also known as the prescriptive route, is typically for **houses and smaller buildings** and **completed by the appointed professional.**
2. **Rational assessment performance:** A competent person such as a **mechanical engineer** or **energy modeler** will illustrate the **building has a theorateical energy use that is compliant** with the requirements of **SANS 10400-XA** .
3. **Rational assessment via reference building:** Compliance is illustrated by comparing the proposed **building's energy needs to a reference building that is compliant** with the requirements of **SANS 10400-XA**.

What is a net zero carbon building in operation?

A building that is **highly energy-efficient**, and the **remaining energy use is from renewable energy**, preferably on-site but also off-site where absolutely necessary, so that there are **zero net carbon emissions on an annual basis** for operational energy use.

Route 2 and 3 are typically used for **larger, more complex buildings**, often making use of **energy modeling software.**

Who is responsible?

The **homeowner** is considered to be the person responsible for compliance, **unless they appoint a professional**, e.g. an architect, draughtsperson or engineer, who is then deemed to be the responsible person for the duration of their employment on the project. The professional must be familiar with the regulation and include the required information on plans submitted.

Homeowners play an important role in ensuring that they appoint architects and professional teams that are familiar with the standard. They should also work closely with the professional teams and be receptive to advice on energy-saving design features and materials. Ultimately, a **balance must be struck between cost, daylight, good indoor thermal comfort and overall energy use**.

What are the main aspects that need to be considered for energy efficiency?

While the regulation covers all aspects that affect overall energy use in the design of homes and buildings, these are the main points to consider:

Orientate your main living spaces to face north:

This will affect how your home responds to the sun.

Why it's important: A home's **orientation** has the **largest impact on its energy performance** and thermal comfort. A well-orientated home supports **good passive design**, where it can **harness the sun's energy for heating and lighting** while **optimising shading for cooling**, without the use of mechanical systems. Natural ventilation is also used to passively heat and cool a space.

Tip: In the southern hemisphere, ideal orientation for most buildings is when the **longest side (elevation) and most used spaces face north**. **Minimise east and west elevations** where sun control is more difficult.

Energy efficiency compliance is easier to achieve with a north-facing home. In some cases, **suboptimal orientation may cost the homeowner more**, as money must be spent on shading, performance glazing and mechanical heating and cooling. **North orientation is recommended by SANS10400-XA** but is not mandated.

Shade your glass doors and windows

Why it's important: **How** and **where** doors and windows are placed in a home **contributes significantly to its heat loss and gain**. Design and installation of **shading devices and overhangs** influences **the way sun enters a space**. In order to heat and cool your space naturally, **allow the warm winter sun inside** and **block out the hot summer sun**.

The **ratio of glass to floor space should also not be too high**: too much glass leads to excessive heat gain and the need to mechanically control the indoor air temperature.

Tip: Due to the angle of the sun, generally, **north facing openings require horizontal shading** e.g. roof overhangs or eaves; while **east and west facing glazing requires vertical shading** to prevent heat from the low rising and setting sun entering your home e.g. sliding shutters.

Plant deciduous trees that drop their leaves in winter and provide shade in summer. Trees with leaves also have a cooling effect on the air surrounding your home.

Ensure you have **opening windows** to create a breeze to naturally cool down spaces.

Heat your water efficiently:
Heat water using at least 50% alternative energy.

Why it's important: **Water heating is the most significant contribution to household energy use**, therefore it is important to address how you heat and manage your hot water.

Conventional approaches to water heating use electricity to heat an element that heats water inside a geyser tank – this is known as 'electrical resistance heating'.

Approximately **50% of the energy consumed by middle-to-upper-income households is used to heat water**, so heating water using alternative sources is one of the most significant ways in which homeowners can save on electricity.

Tip: SANS 10400-XA mandates that at least **50% by volume of annual average water use must be heated by means other than resistance heating** i.e. using solar or alternative energy sources. The choice of technology used (e.g. solar water heater, heat pump etc.) is up to the homeowner.

It also mandates that **hot water pipes are insulated**.

Using a device such as a **solar water heater** can **save 25% to 40%** of the electricity used by a conventional geyser. A **heat pump** is also more efficient than electric geysers, as it works by transferring heat from the surrounding air to heat water rather than generating all the necessary heat via an element.

To further improve your geyser's efficiency:

- Set the temperature to between 55-60°C
- Install a geyser blanket
- Install a ceramic element
- Put your geyser on a timer that correlates to when you require hot water

Install high performance glass in doors and windows

Why it's important: Glass comes in a variety of **thicknesses** and **types** that **influence its performance to transfer heat**. Higher performance glass, such as double-glazing, assists in managing excessive heat gain and loss, and provides better indoor thermal comfort.

Tip: Try to achieve a **balance between cost, adequate daylight, good indoor thermal comfort and overall energy use**.

Not all glass throughout the house needs to be the same specification. Unshaded glass should be high performance to manage heat gain and loss.

Insulate your roof, ceilings, walls and floors with underfloor heating

Why it's important: Insulation is one of the **most effective ways of improving the energy efficiency and thermal comfort** of your home. By adding insulating products to the building envelope, it greatly assists in managing heat loss and gain and as a result, less energy is required to keep the building cooler in summer and warmer in winter.

Tip: Prioritise insulation above your ceiling and consider insulation to walls. Install insulation under suspended floors and floors with underfloor heating.

Ventilate your roof space – this allows hot air built up in the ceiling space to escape.

Seal up the gaps

Why it's important: **Physically sealing** gaps, typically between wall and windows, beneath roof sheeting or tiles and between walls and roofs, **prevents cold drafts and heat loss**.

Tip: Install rubber linings or brushes to the underside of doors to close up gaps.

Procure high quality doors and windows and ensure good workmanship upon installation.

Use LED lights

Why it's important: Energy-efficient lighting has become standard and affordable practice. Light-emitting diode (LED) lamps use 90% less electricity and last up to 25 times longer than older technology such as incandescent bulbs.

Tip: **Make sure all your lights are LEDs**. Encourage switching off lights when not needed.

Use energy-efficient air conditioning units

Why it's important: Air conditioning has a significant contribution to household energy use, typically due to the long hours of use.

Tip: **Limit air conditioning use** where possible. Install an efficient system. Greater efficiency can be achieved if a **higher temperature is set in summer** (the unit will not have to work so hard to cool the air) and a **lower set point selected in winter. Make use of ceiling fans.**

Useful City resources	
Climate change resources and campaigns including net zero commitments	Energy Strategy 2050 Climate Change Action Plan Climate Change Action plan summary State of Energy and Carbon 2021 Carbon Neutral commitments Let's ACT against Climate Change CCT_Smart_Home_Disclosure_Checklist
City of CAPE Town Planning portal	CCT - Planning Portal
Energy efficiency resources	Top ways to save electricity at home Energy Waste Water Forum sign up
Going solar and load-shedding	Safe and Legal Solar PV installations Apply for SSEG Load-shedding Reslience Guide