SANS 10400-XA Municipal Toolkit

For Auditing, Upskilling and Building Capacity in South African Municipalities on SANS 104000-XA Regulation

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Contents

Abbreviations

BCO	Building Control Officer
BEA	Building Efficiency Accelerator
BI	Building Inspector
NBR	National Building Regulations
NDC	Nationally Determined Contributions
SANS	South African National Standards
SOP	Standard Operating Procedure
WRI	World Resource Institute

Introduction and importance of the toolkit

This methodology toolkit was developed as part of the Building Efficiency Accelerator Partnership (BEA) in Africa. The BEA global partnership is designed to complement existing networks of cities by facilitating access to global expertise in building efficiency topics and providing a venue for engagement with private sector partners. The BEA process of engagement in a city includes guidance and technical advice to:

- Assess and prioritize locally-appropriate building efficiency policies and actions
- Implement actions, matching city needs with available expertise, technical resources and tools
- Track action and documenting progress, and share lessons learned
- Increase ambition for improving the overall efficiency of the building stock

As a component of BEA project delivery in South Africa, ICLEI Africa implemented a SANS 10400-XA Implementation Audit project in three municipalities: KwaDukuza Local Municipality, City of uMhlathuze Local Municipality, and Msunduzi Local Municipality, KwaZulu-Natal Province, South Africa. Toolkit gives an overview of the process followed in this audit project and has been collated for municipalities in South Africa to assist with:

- Assessing how the Building Control Officers (BCOs)/Building Inspectors (BIs) are equipped to implement the SANS 10400-XA minimum requirements;
- Understanding the challenges faced by BCOs/ BIs in implementing the regulation
- Assessing the Standard Operating Procedure (SOP) for implementation of SANS 10400-XA
- Conducting a training for BCOs/BIs to upskill in the implementation of the regulation

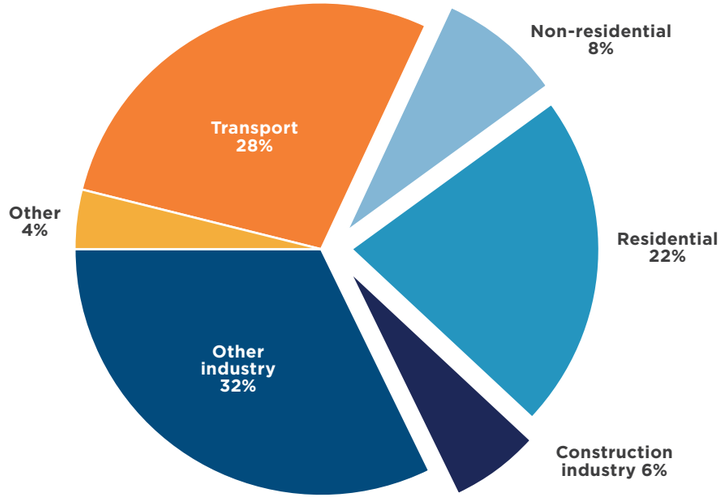
The toolkit comprises of three sections:

1. The importance of building efficiency measures to municipalities
2. Methodology to assess SANS 10400-XA compliance:
   - **Phase 1:** Reviewing SOP
   - **Phase 2:** Skills Gap Analysis
   - **Phase 3:** Training
3. Lessons learnt

Importance of Building Energy Efficiency Measures to municipalities

With the continuous growth and expansion of cities, the energy requirements and related greenhouse gas emissions from the built environment are also rapidly increasing. According to the Global Status Report, 2019, the building and construction sector is one of the major contributors of energy consumption and greenhouse gas (GHG) emissions, accounting for 36% of final energy used, 70% electricity consumption and nearly 39% carbon emissions (IEA, 2018). See Figures 1 and 2.

Energy



Emissions

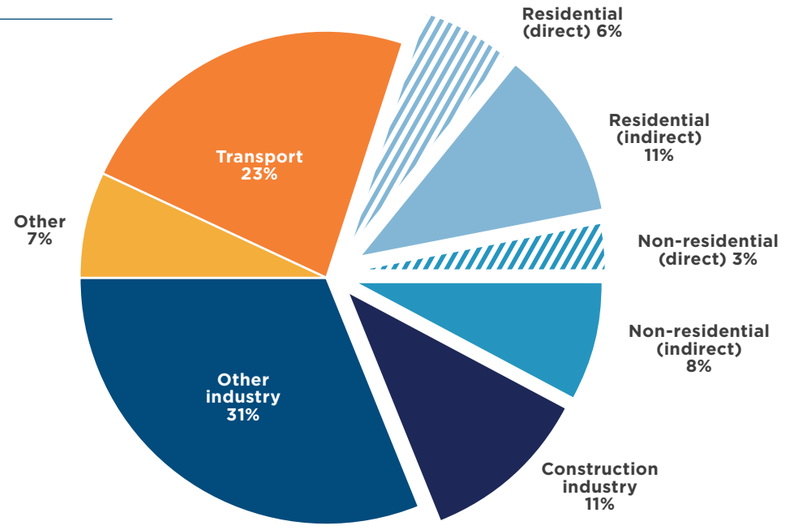


Figure 1 and 2: Global share of buildings and construction final energy and emissions. Source: IEA, 2018.

The building sector has a key role to play to ensure that cities achieve a low-carbon economy and development trajectory with the aim of limiting the average global temperature rise to 1,5ºC. As the majority of building-related GHG emissions emanate from energy consumption in South Africa, cities have the opportunity to reduce GHG emissions through energy efficient design improvements. In South Africa, the National Building Regulation (NBR) SANS 10400-XA is an important regulatory tool that can aid cities and support the global efforts of emissions reductions in the building sector.

Background on SANS 10400-XA

The SANS 10400-XA regulation forms part of South Africa's National Building Regulations and provides guidelines for energy use in new and refurbished buildings alongside SANS 10400-204. While the NBR and Building Standards Act was originally passed in 1977, a number of amendments have been added to it over time. In 2011, the Minister of Trade and Industry amended the regulations to include a section on SANS 10400 that relates to environmental sustainability and part-XA that relates to energy usage in buildings. The regulation was published as a starting point for implementing environmental sustainability in new buildings, primarily through providing guidelines that help to curb excessive energy consumption and associated carbon emissions from new builds and extensions of specified occupancy types.

Buildings can be compliant with SANS 10400-XA by following one of three "Compliance routes":

- 'Compliance through a Prescriptive Route': It is generally available to all persons, and will commonly be used for residential and smaller buildings. This route requires that a set of rules is adhered to for water heating, insulation and glazed areas, i.e. windows, glass doors and roof lights.
- 'Compliance through the Reference building Route' and
- 'Performance building Route' can both be achieved by means of a Rational Design by a Competent Person – Energy.

The majority of buildings follow the prescriptive route due to the reference building route requiring specialist skills and being more costly.

If well implemented, SANS 10400-XA regulation is a vital tool in enabling South Africa to achieve its Nationally Determined Contributions (NDCs) to peak, plateau and decline its emissions by 2050. However, it is only in the implementation of the regulation by all relevant stakeholders such as the architects, engineers, Building Control Officers (BCO) and Building Inspectors (BIs) that its impact is fully realised. That is why the implementation of SANS 10400-XA should be built into the Standard Operating Procedures (SOP) for municipal building application and control processes, including the BIs who ensure that buildings are built in accordance with building codes.

Prior to the implementation of SANS 10400-XA, there was limited training received by BIs and BCOs to acquire the essential skill-set and knowledge to ensure compliance with the regulations. As a result, the above-mentioned personnel have experienced various challenges when implementing the regulations. To ensure implementation of the regulations, as well as to increase the compliance of SANS 10400-XA minimum requirements, municipalities need to take a first step and identify the required skills and knowledge of the municipal staff responsible for this work.

Through this project, four key areas were identified for municipalities to build capacity and increase the number of SANS 10400-XA compliant buildings:

- What challenges are faced by the municipalities in implementing the regulation?
- Who are the key building control personnel that require further support?
- How can building control officials be up skilled and capacitated to ensure compliance?
- How does the SOP of the municipality affect the overall implementation of SANS 10400-XA by the Building Inspectors?

Methodology to follow to assess SANS 10400-XA compliance

Phase 1: Assessing the SOP for the implementation of SANS 104000-XA

Phase 2: Skills Gap Analysis

Phase 3: Training

Phase 1:
Assessing the SOP for the implementation of SANS 104000-XA

1. 1 Understanding SANS 10400-XA regulatory requirements

This section identifies the key regulations that should be reviewed together with SANS 10400-XA as they are closely linked to energy usage and efficiency in buildings. These regulations stipulate the compliance requirements of the different building elements outlined in the prescriptive route. **The building elements and the regulations to guide compliance are:**

- Orientation and shading: SANS 204
- External walls: SANS 10400-XA
- Fenestration: SANS 10400-XA
- Roof assembly: SANS 10400-XA
- Floors with in-slab heating: SANS 10400-XA
- Services and energy control: SANS 204
- Hot water systems: SANS 10400-XA

Municipal documents such as Form 1: Checklist for pre-submission application, building inspection notes, compliance scorecard/score sheet and approved building plans should also be reviewed. The review of such documentation is to formulate recommendations for the municipality's SOP to ensure that the compliance requirements for SANS 10400-XA are met by the buildings constructed.

1.2 Review of building compliance to SANS 10400-XA

To assess the level of building plans and built projects compliance to the regulation, develop a SANS 10400-XA audit criteria sheet (see Annexure B) with which to review building plans and identify if the compliance to SANS 10400-XA and related energy efficiency and usage regulations are included and where any gaps may be.

1.3 Review of building plans and site visits

This stage involves the evaluation of building plans and site visits to projects that were implemented since the SANS 10400-XA regulation was passed. The evaluation is conducted using the audit criteria sheet that was developed earlier (Annexure B). This stage is important in identifying the compliance gaps and which aspects of the regulation are not being implemented in the design and construction phase of approved buildings so as to make recommendations.

Assumptions to consider in the selection of buildings and building plans to review:

- Choose building plans for review that were designed and submitted for approval after the implementation of SANS 10400-XA in 2011.
- The 5-year window after the implementation of the regulation allows for the upskilling of the BCOs and BIs, either on job or through formal training.
- Choose a building typology to review that does not require specialised energy and design requirements to operate. The suggested building typologies that could be reviewed are residential and public buildings.

1.4 Review of municipal procedure from design to construction of buildings

A municipality's SOP is a very important aspect of how the municipality can ensure that compliance is met. Understanding this is crucial because it helps to identify the different roles of the design, approval and building construction team and establish where, along the entire process, BCOs and BIs could be enabled to execute their work better. This involves understanding the roles of key players such as the client and architect, municipal building control officers, competent persons, the building contractor, construction specialists, as well as other key personnel in ensuring compliance to SANS 10400-XA (see Figure 3). In addition, a review of the design, approval and construction process could be carried out in three stages as outlined below.

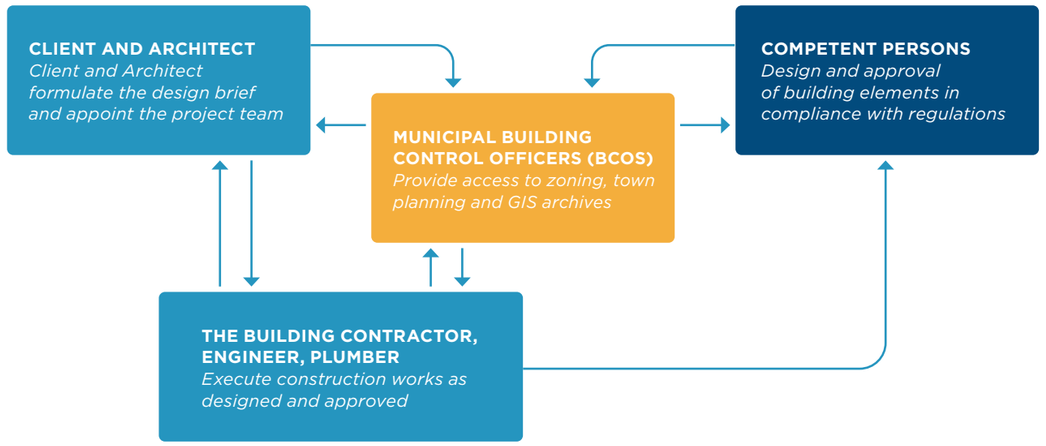


Figure 3: Understanding the process of compliance to SANS 10400-XA at the municipal level

1.4.1 Building design

Review the building plans submitted to municipalities and check how the designs comply with the requirements of SANS 10400-XA and whether this information is clearly shown on the plans. **The specifications to check for on the building plans are:**

- Building orientation
- Percentage of fenestration
- Hot water supply system and R value of proposed insulation products
- Vertical shading system
- Walling material and R value of proposed insulation products
- Roof covering material, ceiling and R value of insulation products
- Energy demand and total energy consumption of the building

This stage involves a review of the formal building plan submission process at the building control department to ensure that the plans submitted and approved for construction comply with the requirements of SANS 10400-XA. It is also important to review the Forms 1, 2/3/4 submitted alongside the building plans as well as other documentation that show that the building plans comply with the regulatory requirements.

1.4.2 Building construction

Review the milestones inspected and approved by the BIs on the construction site and identify where there is potential to expand the scope and include inspection for compliance to the requirements of SANS 10400-XA regulation.

Phase 2:
Skills Gap Analysis

The process of undertaking a skills gap analysis entails developing a skills gap questionnaire (see Annex C). This questionnaire for BCOs and BIs consists of four different, but related, sections as listed below;

2.1 Work experience and knowledge/skills-set

Develop a questionnaire to determine educational background, work experience, professional development, capabilities prior/post implementation of the regulations etc. This series of questions should be used to determine whether the BIs/BCOs prior experience better equips them to ensure compliance to SANS 10400-XA or if further necessary training is required.

2.2 Work/Job requirements

The municipality should review the hiring requirements before and after the implementation of the SANS 10400-XA, such as acquired certifications, professional body requirements by the municipality, and whether it aligns with attracting the skills-set for assessing compliance to the regulations. This should be used to identify whether the municipality is seeking and hiring staff based on the relevant requirements and qualifications with regards to the regulations, if not, determine what is being done to upskill and capacitate the municipal staff.

2.3 Requirements for effective implementation

The questionnaire should also include questions to address BIs/BCOs' required needs to effectively execute their day to day jobs, such as tools, training and professional body accreditation.

2.4 Minimum requirements of the prescriptive compliance route

Develop a self-assessment matrix score sheet based on SANS 10400-XA minimum requirements for BIs/BCOs to rate their own understanding of the requirements and identify the official's professional developmental needs. The findings of the assessment should be used to curate the SANS 10400-XA implementation training agenda or training material.

Phase 3:
Training

The training should be designed to up skill and capacitate BIs and BCOs on the implementation of the SANS 10400-XA regulations.

To curate a training relevant for the participants' needs, the participants should undergo an assessment in the form of either a;
- Skills Gap Analysis (Annex C): To determine the developmental needs of the participants and/or;
- Pre-post assessment (Annex D): To determine the participants understanding of the overall requirements of the regulations before and after the training.

The relevant training materials used to offer the training should be peer-reviewed by the National Regulator in South Africa. This is significant as all BCOs and BIs report to the National Regulator on SANS 10400-XA compliance issues. **Briefly, the training materials should include the following:**
- The content of the current SANS 10400-XA;
- The content of newer versions if available;
- Practical ways of illustrating and presenting the subject matter to the participants.

The training material should be prepared in the form of a PowerPoint presentation, PDF or any relevant form. As this is a complex and technical topic, the facilitators should split the sessions, preferably with presentation during the first half of the sessions and practical exercises during the second half of the sessions.

Lessons learnt

During the project, significant lessons were learnt, as captured below:

- Early and frequent communication and coordination between the municipality, the project team and BCO/BIs from the onset creates a more effective and efficient working process
- Early identification of the required data is vital. From the beginning of the project, attaining data and relevant documents from the municipality can be challenging. It is therefore important to identify a focal point who will be responsible to ensure all required information are made available and for all relevant parties to be involved in the inception phase and understand the importance of the requirements and the overall objective of the project
- Concerted efforts should be made with the relevant teams to build and maintain relationships for future work

Assessing the SOP

- The SANS 10400-XA audit criteria sheet plays an important role in linking the regulatory requirements to what was designed on the building plans and implemented on site. Therefore it is an important tool to use throughout the assessment and could potentially be adopted as a municipal checklist
- Many energy efficiency measures are 'hidden' within the building elements such as walls and ceilings, therefore, for site visits, tools are required to ascertain whether compliance was met
- As the SANS 10400-XA regulation evolves to incorporate more stringent measures, the BCOs and BIs should be regularly up skilled and the municipal SOP revised to incorporate the new regulatory requirements

Training

- Technology can play an important role in the successful delivery of virtual training sessions. However, to deliver online training, each participant needs to have access to a laptop with strong internet connection.
- Future trainings should consider the use of effective online communication platforms such as WhatsApp and Zoom to assist in the delivery of the training online and coordination of participants.

References

Department of Environmental Affairs, 2014. South Africa's Greenhouse Gas (GHG) Mitigation Potential Analysis. Pretoria, Department of Environmental Affairs.

UN Environment and International Energy Agency (2017). Towards a zero-emission, efficient, and resilient buildings and construction sector. Global Status Report 2017.

South African National Standard. The application of the National Building Regulations Part X: Environmental sustainability Part XA: Energy usage in buildings.

IEA (2019a), World Energy Statistics and Balances (database), www.iea.org/statistics and IEA (2019b), Energy Technology Perspectives, buildings model, www.iea.org/buildings.

Annexure A:
Data Matrix

Required	If required data not available supply alternative recommended data by municipality	Source of data	Notes
List of buildings (9 Residential and 1 Public building)		Municipality	
10 Copies of approved building plans (9 Residential and 1 Public building)		Municipality/ Developer/ Architect	
Electricity bills (2019)		Building users	
Occupancy certificate/ building inspectors compliance signoff sheet		Municipality	
Product/Spec sheets	Online spec for products	Developer/ Municipality	
Criteria/requirements for hiring Building Inspectors (Pre and post 2011 if available)		Municipality	
Municipalities criteria for inspecting newly constructed buildings after construction phase (Before and after implementation of SANS 10400 -XA)		Municipality	
LUM and Building Control Application forms			

Annexure B:
SANS 10400 Audit Criteria Sheet

Climatic zone for region: _____

Name of municipality: _____

Building Typology: _____

Building Information

Variables	UOM (Unit of Measurement)	Value
Name of building		
Classification of building occupancy		
Description of building		
Net Floor Area (Building size?)		
Building Orientation		
Fenestration Area		
Design population		
Design occupancy time	hrs per day/ days per week	
Internal heat gains for appliance and equipment	W/m^2	

SANS 10400- XA requirements (Prescriptive Compliance Route)			**Min requirements**	**Design** (assumed to be correct)		**Construction** (compliant with min requirements?)		**Discrepancies**
				Drawings Present, N/A	**Notes**	**On site** Y, N, N/A	**Notes**	
Building Orientation	**Orientation**		Living spaces located on northern facade of building					
			Uninhabited rooms located on western facade					
			Major areas of glazing located on northern facade					
Building Design	**Fenestration**	Fenestration area does not exceed 15% of total nett floor area (applicable to building complying with shading & orientation)						
		More than 15%	Rational design used to prove compliance					
	External walls	Non-masonry	Minimum total R' Value is achieved (1,9)					
			Minimum CR value is achieved (60)					
		Masonry	Minimum CR value is achieved (60)					
			Double skin masonry (thickness 220-230mm)					
			Single leaf masonry (greater than or equal to 140mm)					
			R' Value of 0,35 for other types of masonry is achieved (e.g. cast concrete, natural stone)					
	Glazing	Openable glazing	Tested to achieve maximum Permissible air leakage and pressure (2,0 L/s.m^2 & 75Pa)					
		Non-openable glazing	Tested to achieve maximum Permissible air leakage and pressure (0,31 L/s.m^2 & 75Pa)					
		Glazed double swing doors or revolving doors	Tested to achieve maximum Permissible air leakage and pressure (5,0 L/s.m^2 & 75Pa)					
		GLASS type and glazing performance	Single/clear					
			Single tinted					
			Double clear					
	Floors	Underfloor heating	Insulated with insulation material achieving minimum R' value at least 1,0					
	Shading	Permanent feature (veranda, etc.)	Extends horizontally on both sides of glazing for same projection distance					
			Provides equivalent shading with a reveal or other shading element					
		External shading device	Capable of restricting 80% of summer solar radiation					
			If adjustable, able to be operated by building occupants					

SANS 10400- XA requirements (Prescriptive Compliance Route)			**Min requirements**	**Design** (assumed to be correct)		**Construction** (compliant with min requirements?)		**Discrepancies**
				Drawings Present, N/A	**Notes**	**On site** Y, N, N/A	**Notes**	
	Roof assemblies	Thermal resistivity (R' Value) for all roof assemblies	Total minimum R 'Value achieved (2,7 m2.K/W)					
		With metal sheet roofing	Insulation achieves minimum R' Value (0,36 m^2. K/W)					
			Thermal break has material achieving R' Value not less than 0,2					
			R' Value of roof covering material (0,36) Of ceiling (0,05)					
			Added R' Value for insulation (2,29)					
		Clay tiles sheeting	R' Value (2,7 m2.K/W)					
			R' Value of roof covering material (0,48) Of ceiling (0,05)					
			Added R' Value for insulation (2,17)					
		Thermal insulation	Abuts/overlaps adjoining sealing/ sealed					
			Forms a continuous barrier with ceilings, walls etc.					
			Does not affect safe/ effective operation of services/ equipment					
			Material tested to be non-combustible or:					
			If combustible – tested and classified for its use and application					
		Reflective insulation	Supported by necessary airspace (15 mm) to meet required R' Value					
			Minimum achieved R' Value?					
			Tightly fitted and tapped against any penetration door/widow opening					
			Adjoining sheet of roll membrane is overlapped by not less than 100mm or taped together					
		Bulk insulation	Installed to maintain its position and thickness					
			In ceilings- overlaps wall membrane by not less than 50 mm or tightly fitted against a wall with no insulation in wall					

SANS 10400- XA requirements (Prescriptive Compliance Route)			**Min requirements**	**Design** (assumed to be correct)		**Construction** (compliant with min requirements?)		**Discrepancies**
				Drawings Present, N/A	**Notes**	**On site** Y, N, N/A	**Notes**	
	Roof lights (serving a habitable room, public space, corridor, hallway or stairway)	Total floor area 1,5%-3%	SHGC ≤ 0,75					
			Total U value ≤ 5,0					
		Total floor area 3%-5%	SHGC ≤ 0,50 or ≤ 0,70					
			Total U Value ≤ 5,0					
		Total floor area 5%-10%	SHGC ≤ 0,25, ≤ 0,35 or ≤ 0,45					
			Total U Value ≤ 2,5					
		Total floor area greater than 10%	SHGC ≤ 0,25					
			Total U Value ≤ 2,0					
Building services	**Lighting and power (Artificial lighting)**	Maximum energy demand	5W/m²					
		Maximum energy consumption	5KWh/m²					
		Max lux						
	Natural lighting and ventilation		All habitable rooms, including the garage are provided with a means of lighting and ventilation					
			Any habitable room/ bedroom is provided with at least one opening for natural ventilation					
			All artificial ventilation systems on site approved by an approved person					
	Glazing		Choice of glazing for the openings is transparent or an approved translucent material in accordance with SANS 10400-N					
			Minimum U value and SHGC performance of glazing element in accordance with Table 6 SANS 204					
			Total area of openings or glazing including frames and glazing bars: >= 5% of the floor area of the room					
			Openings/ glazing have a zone of space outside it without obstruction/ according to SANS 204 specs					
			Area of opening for rooms with a verandah: >= 10% of the total floor area of the room concerned					
	Hot water services	Alternative energy system	Type, capacity and location of hot water heating system					
			Type of alternative energy source (Solar water heater/ heat pumps, heat recovery, etc)					

SANS 10400- XA requirements (Prescriptive Compliance Route)			**Min requirements**	**Design** (assumed to be correct)		**Construction** (compliant with min requirements?)		**Discrepancies**
				Drawings Present, N/A	**Notes**	**On site** Y, N, N/A	**Notes**	
			>= 50% hot water demand met by alternative energy source					
		All exposed pipes to and from the cylinders insulated	<80mm - 1,00 R-value >80mm - 1,50 R-value Insulation protected against effects of weather and sunlight					
		All hot water vessels and tanks insulated	Insulation material: min. R value 2,0					
		Insulation on vessels, tanks and piping containing cooling water	Insulation protected by vapour barrier on the outside of the insulation					
		For pipes located within a space for space heating or encased within a concrete slab or masonry	Compliance with SANS 10252-1					
	Mechanical ventilation and air conditioning	Type and technology of air conditioning	Compliance with SANS 204 Air and water economizers					
		Air conditioning controls	At least one automatic temperature control device					
			Thermostatic controls that can adjust temperature between 20°C and 24°C					
			Humidistat controls that can regulate relative humidity between 30% and 60%					
		Zone Controls	Each air conditioned zone should be controlled by individual thermostat control					
			Controls in place to prevent: • Heating previously cooled air • Cooling previously heated air • Both heating and cooling at the same time					
			Alternative means of natural ventilation provided (in case of failure of mechanical ventilation)					
		Cooling and heating equipment	Have efficiencies in accordance with ASHRAE 90.1					

Annexure C:
Skills Gap Analysis Questionnaire

Skill Analysis Questionnaire (Interview Guide) for Building Inspectors
(Prerequisite for SANS 10400-XA Training)

1. What is your name?
2. Which municipality do you work for?
3. What is your educational background?
4. How long have you been a building inspector?
5. Are you a member of any professional body? If so, which body is it?
6. Do you participate in any Continuous Professional Development (CPD) conducted by the municipality or by a Professional Body?
7. Did you have prior field of work or specialisation before taking the role of a Building Inspector? If so, what was it?
8. Have you had prior training in the implementation of SANS 10400-XA?
9. If yes to question 8, were you better equipped to carry out your day to day work after attending the training?
10. If no to question 8, did you learn the implementation of the regulation while on the job?
11. Did you get certification from an accredited body to work as a building inspector?
12. Are there any tools you use when conducting a SANS 10400-XA compliance? What are these tools? (For example lux meter, calorimeter, pyrometer):
13. What other tools do you think would be necessary to fully conduct a building inspection?
14. What challenges do you face while carrying out your job?
15. What do you think would aid you in effectively executing your job especially ensuring compliance with SANS 10400-XA?

16. Please rate your understanding of the implementation of the SANS 10400-XA minimum requirements (on a scale of 0 to 3, with 0- I don't understand, 1- minimum understanding, 2- moderate understanding and 3- good understanding). Use audit criteria for reference.

SANS Requirement	0 (I don't understand)	1 (minimum understanding)	2 (moderate understanding)	3 (good understanding)
1. Building Orientation				
2. Building Design				
Roof, wall and floor insulation				
Fenestration				
Non-masonry and masonry external walling				
Openable and non- openable glazing				
External Shading				
Underfloor heating				
3. Roof assembly (insulation and lighting)				
4. Building services				
Artificial and natural lighting				
Hot water services (alternative energy system and insulation of geyser and piping)				
Mechanical ventilation and air conditioning				
Cooling and heating equipment				
Other:				
Comments:				

Annexure D:
Pre-post Assessment Questionnaire

Pre and Post Test

Participant Identification Details	
Name and Surname	
Gender (Female/Male)	
Your Age (In Years)	
Name of Office or Unit (e.g. Building Control)	
Name of Organisation/City	
Geographical Location of Office (Where)	
Today`s Date	

For official use only

Name and Surname of Facilitator(s)

Facilitator 1 _____

Facilitator 2 _____

Facilitator 3 _____

Very Important Instructions to the Participant:

1. This is a list of questions to pre-test your current knowledge about SANS 10400-XA and EDGE implementation before the scheduled training is conducted. It's a simple but useful exercise and not purely a class- test.
2. This Online Assessment needs to be completed prior to the SANS 10400-Xa and EDGE Training Workshop. You will not be allowed to participate in the workshop without completing it.
3. It should take between 20 and 30 minutes to complete.

Questions

1. When was Version 1 of SANS 10400-XA published in South Africa?

	In September of 2011
	In August of 2011
	In August of 2012
	In September of 2012

2. What was the main reason why SANS 10400-XA was developed?

	There was nothing clear at the time to guide Developers on water and energy standards
	Many Developers were confusing standards with the Act
	To drive energy efficiency in the Built Environment
	Clarity was needed on "prescriptive" and "mandatory" standards in the built environment

3. What is the minimum percentage of hot water supply that must be derived from alternative heating (heat pump, solar, etc)?

	45%
	65%
	50%
	60%

4. SANS 10400-Part XA is the "Deemed-to-Satisfy" compliance route for NBR-XA.

	True
	False
	Partially True
	None of the above

5. What are the routes to compliance to NBR-XA?

	Deemed to Satisfy (SANS 10400-XA)
	Rational Design
	Reference Route
	All of the Above

6. The Hot Water requirement is part of the SANS 10400-XA Deemed to Satisfy.

	True
	False (it is part of the Regulation)

7. "The South African government is bound to promote and defend the implementation of the NBR through the mechanisms and procedures used to control new buildings. All new buildings must comply with the regulations, as must any additions and extensions to existing buildings"

Specifically whose responsibility in the municipalities does this lies more with?

	Building Inspector
	Building Control Office
	Building Control Officer
	Managers and Supervisors for both Building Control Officers and Inspectors

8. An Occupancy Certificate can only be issued when:

	The Competent Person signs that all the energy calculations are correct.
	The Plans examiner is satisfied that the assumptions behind the calculations are correct and the Building Control Officer concurs.
	The Owner states that the building complies.

9. "To meet the minimum requirements of this route, Schedule A of Form 1 must indicate that this route has been chosen, and the design must adhere to certain rules"
What route does the excerpt above referring to?

_____

_____

10. What is an R-Value?

	The Rand Value
	Measure of Thermal Resistance
	It means that insulation has been installed
	The heat flow rate

11. What is Fenestration?

	Windows
	All glazed areas
	All glass except Skylights
	Glass Doors

12. What is the nature of a Reference Building?

	Complies with SANS 10400-XA
	It's a Hypothetical Building
	The Energy Consumption is Modelled using energy software
	All of the Above

13. What makes a Green Building?

	Complies with SANS 10400-XA, i.e. Reduce building energy consumption
	Meets EDGE* certification or similar standard
	Is a resource efficiency building
	All of the Above

**EDGE standard is 20% reduction in energy, water, and energy in materials.*

SANS 10400-XA Municipal Toolkit

For Auditing, Upskilling and Building Capacity in South African Municipalities on SANS 104000-XA Regulation

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