

EE Supplemental Guide



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Energy Efficiency in Buildings SANS 10400-XA & SANS 204 – Report

v.2.0

Report Date: 23 February 2014
Registered to: Roger Heatley

Competent Person: Roger Heatley
Professional Registration No: CAD21342

Client's Name: MR. Jurgen H. Tolksdorf

Project Description: Window & Door Replacement, Serving Hatch Made Bigger

Site Address: 83 Jan Hofmeyr Road

Cadastral Description: LOT 1281, Westville

EE Supplemental Guide

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LOT 1281, Westville

Occupancy Classification of Building

Occupancy:	H4	
Building Total Nett Floor Area:	194.316	m ²
Building Total Floor Area:	302.541	m ²
Design Occupancy Time:	24	Hrs per Day
	7	Days per Week

Climatic Zone of Building

Climatic Zone:	5	
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Maximum Energy Demand & Consumption

Design Assumption for Building Classification

Max. Energy Demand:	Non-specified	VA/m ²	No requirement
Max. Energy Consumption:	Non-specified	kWh/(m ²)	No requirement

Energy Demand & Consumption

Max. Energy Demand:	0	kVA (kW)	No requirement
Max. Annual Energy Consumption:	Non-specified	kWh	No requirement

Building Orientation

Orientation of windows / longer building axis:	North	Optimal orientation achieved
<i>Dominant windows of habitable rooms or longer axis of the building to be orientated within 15 deg's of true north.</i>		

Floor Construction

Slab-on-ground

Concrete slab-on-ground ?	Yes	
In-slab heating to be provided ?	No	

Suspended floor

Suspended floor as building envelope ?	No	
In-slab heating to be provided ?	No	

Insulation Requirements – Floors

Slab-on-ground

Perimeter insulation required ?	No	
Under-floor insulation required ?	No	

Suspended floor

Insulation of unenclosed perimeter required ?	No	
Perimeter & under-floor insulation required ?	No	

External Wall Construction

SANS 10400-XA Required R-value

Wall Type ?	Masonry	
Minimum R-value required:	0.35	<i>Refer SANS 10400-XA (4.4.3) & SANS 204 - Table 4 and Advisory Note.</i>
Compliant masonry walling:	<i>Double-skin masonry wall, no cavity, plastered internally or rendered externally, or Single-leaf masonry wall, nominal wall thickness not < 140 mm, plastered internally and rendered externally.</i>	

SANS 204 Required CR-value

Minimum CR-value required:	60	Hours
<i>Advisory Note - Applicable to masonry walls only in terms of SANS 204</i>		
Double brick wall types:	No cavity	CR-value: 40 <i>CR-value of wall insufficient.</i>

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Fenestration – Buildings with Natural Environmental Control

Constants

Conductance (C_U) constant:	1.4
Solar Heat Gain (C_{SHGC}) constant:	0.11

Storey Conductance / Solar Heat Gain

Ground Storey

Net Floor Area of Storey / Room: m^2	194.316
Fenestration Area of Storey / Room: m^2	47.546
% Fenestration Area to Net Floor Area: %	24.5

Permissible CONDUCTANCE & SOLAR HEAT GAIN I.T.O SANS 204.

Max. Conductance (C_U) for Storey / Room:	272.042
Max. Solar Heat Gain (C_{SHGC}) for Storey / Room:	21.375

Achieved

Conductance (C_U) for Storey / Room:	260.572
Solar Heat Gain (C_{SHGC}) for Storey / Room:	20.756

Available (In Hand)

Conductance (C_U) for Storey / Room:	11.471	Acceptable & refer SANS 204 (4.3.4)
Solar Heat Gain (C_{SHGC}) for Storey / Room:	0.619	Acceptable & refer SANS 204 (4.3.4)

First Storey

Net Floor Area of Storey / Room: m^2	0.000
Fenestration Area of Storey / Room: m^2	#VALUE!
% Fenestration Area to Net Floor Area: %	#VALUE!

Permissible

Max. Conductance (C_U) for Storey / Room:	0.000
Max. Solar Heat Gain (C_{SHGC}) for Storey / Room:	0.000

Achieved

Conductance (C_U) for Storey / Room:	
Solar Heat Gain (C_{SHGC}) for Storey / Room:	

Available (In Hand)

Conductance (C_U) for Storey / Room:	
Solar Heat Gain (C_{SHGC}) for Storey / Room:	

Second Storey

Net Floor Area of Storey / Room: m^2	0.000
Fenestration Area of Storey / Room: m^2	#VALUE!
% Fenestration Area to Net Floor Area: %	#VALUE!

Permissible

Max. Conductance (C_U) for Storey / Room:	0.000
Max. Solar Heat Gain (C_{SHGC}) for Storey / Room:	0.000

Achieved

Conductance (C_U) for Storey / Room:	
Solar Heat Gain (C_{SHGC}) for Storey / Room:	

Available (In Hand)

Conductance (C_U) for Storey / Room:	
Solar Heat Gain (C_{SHGC}) for Storey / Room:	

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Fenestration – Buildings with Natural Environmental Control

Third Storey

Net Floor Area of Storey / Room: m ²	0.000
Fenestration Area of Storey / Room: m ²	
% Fenestration Area to Net Floor Area: %	#VALUE!
Permissible	
Max. Conductance (C _U) for Storey / Room:	0.000
Max. Solar Heat Gain (C _{SHGC}) for Storey / Room:	0.000
Achieved	
Conductance (C _U) for Storey / Room:	
Solar Heat Gain (C _{SHGC}) for Storey / Room:	
Available (In Hand)	
Conductance (C _U) for Storey / Room:	
Solar Heat Gain (C _{SHGC}) for Storey / Room:	

Fourth Storey

Net Floor Area of Storey / Room: m ²	0.000
Fenestration Area of Storey / Room: m ²	
% Fenestration Area to Net Floor Area: %	#VALUE!
Permissible	
Max. Conductance (C _U) for Storey / Room:	0.000
Max. Solar Heat Gain (C _{SHGC}) for Storey / Room:	0.000
Achieved	
Conductance (C _U) for Storey / Room:	
Solar Heat Gain (C _{SHGC}) for Storey / Room:	
Available (In Hand)	
Conductance (C _U) for Storey / Room:	
Solar Heat Gain (C _{SHGC}) for Storey / Room:	

Fifth Storey

Net Floor Area of Storey / Room: m ²	0.000
Fenestration Area of Storey / Room: m ²	
% Fenestration Area to Net Floor Area: %	#VALUE!
Permissible	
Max. Conductance (C _U) for Storey / Room:	0.000
Max. Solar Heat Gain (C _{SHGC}) for Storey / Room:	0.000
Achieved	
Conductance (C _U) for Storey / Room:	
Solar Heat Gain (C _{SHGC}) for Storey / Room:	
Available (In Hand)	
Conductance (C _U) for Storey / Room:	
Solar Heat Gain (C _{SHGC}) for Storey / Room:	

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Fenestration – Buildings with Centrally Controlled Artificial Ventilation or Air Conditioning

Air-conditioning Energy Value

Energy index: 0.18

Ground Storey Facade

Orientation	Allowable Air-conditioning	Achieved Air-conditioning	
North	17.410	8.207	Acceptable & refer SANS 204 (4.3.4)
North East			
East	7.620	5.550	Acceptable & refer SANS 204 (4.3.4)
South East			
South	25.337	5.305	Acceptable & refer SANS 204 (4.3.4)
South West			
West	8.950	6.108	Acceptable & refer SANS 204 (4.3.4)
North West			

First Storey Facade

Orientation	Allowable Air-conditioning	Achieved Air-conditioning
North		
North East		
East		
South East		
South		
South West		
West		
North West		

Second Storey Facade

Orientation	Allowable Air-conditioning	Achieved Air-conditioning
North		
North East		
East		
South East		
South		
South West		
West		
North West		

Third Storey Facade

Orientation	Allowable Air-conditioning	Achieved Air-conditioning
North		
North East		
East		
South East		
South		
South West		
West		
North West		

Fourth Storey Facade

Orientation	Allowable Air-conditioning	Achieved Air-conditioning
North		
North East		
East		
South East		
South		
South West		
West		
North West		

Fifth Storey Facade

Orientation	Allowable Air-conditioning	Achieved Air-conditioning
North		
North East		
East		
South East		
South		
South West		
West		
North West		

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Roof Assembly

SANS 10400-XA Required R-value

Minimum Total R-value required:	2.7	m ² ·K/W
Direction of heat flow:	Down	

Construction Type R-value

Basic roof assembly:	Clay tile type	
R-value for roof covering material:	0.48	m ² ·K/W
R-value for ceiling:	0.05	m ² ·K/W
Required added R-value for insulation:	2.17	m ² ·K/W

SANS 204 Required R-value

Construction Type R-value

Roof venting:	Unventilated	
Basic roof construction ?	Conc./clay tile @ 22-45° w/ horiz. ceiling	

Basic R-value for Roof

Direction of heat flow:	DOWN	
Outdoor air film (7m/s)	0.03	
Roof tile, clay or concrete (1922 kg/m ³)	0.02	
Roof air space (non-reflective)	0.28	
Plasterboard, gypsum (10 mm, 880 kg/m ³)	0.06	
Indoor air film (still air)	0.16	
Total R-value	0.55	m ² ·K/W

Thermal Insulation

Minimum added R-Value of insulation required:	1.03	
Generic insulation product added ?	Flexible fibre glass blanket	
Density of generic insulation added:	10 – 18	kg/m ³
Thickness of generic insulation required:	45	mm

Roofs Lights

Room Dimensions

Floor area of space served by roof light:	0	m ²
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Roof Light Opening Dimension - External – (roof opening that allows light to enter the building)

Length of roof light ?	0	m
Width of roof light ?	0	m
or		
Diameter of roof light ?	0	m
No. of roof lights:	0	

Roof Light Opening Dimension - Internal – (roof opening ceiling level)

Length of roof light opening at ceiling level ?	0	m
Width of roof light opening at ceiling level ?	0	m
or		
Diameter of roof light opening at ceiling level ?	0	m

Roof Light Shaft Index

Vertical (shaft) height of roof light ?	0	m ²
Roof light shaft index:		

Area of Roof Light

Area of roof light:		m ²
Roof Light Area as % of Floor Area:		%

Thermal Performance of Transparent / Translucent Roof Light Elements

Max. SHGC permitted:	
Max. U-value permitted:	

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Air Infiltration and Leakage

Max. Permissible Air Leakage (AL):	<input type="text"/>	L/sm ² – Openable glazing
Max. Permissible Air Leakage (AL):	<input type="text"/>	L/sm ² – Non-openable glazing
Max. Permissible Air Leakage (AL):	<input type="text"/>	L/sm ² – Glazed double action swing doors and revolving doors
<i>All with 75 Pa pressure difference when tested in accordance with SANS 613.</i>		

Chimneys and Flues

Type of burning device ?	<input type="text" value="Solid-fuel – Open"/>	Refer SANS 204 (4.4.3) - Damper or flap required.
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Roof Lights and Skylights

Roof light or skylight installed ?	<input type="text" value="No"/>	
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External Doors

Door serves:	<input type="text" value="-----"/>	
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Exhaust Fans

Exhaust fan serves:	<input type="text" value="-----"/>	
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Roofs, Walls and Floors

Roofs, external walls & floors and	<input type="text" value="Habitable Room"/>	No Requirements.
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Services

Lighting and Power

Max. Energy Demand:	<input type="text" value="1512.705"/>	W – Permissible
Max. Energy Consumption per Annum:	<input type="text" value="1512.705"/>	kWh – Permissible

Lamp power (W) rating:	No. of lamps:	Hours in use / day:
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0

Total lamp energy demand (W):	<input type="text"/>	
or		
Total energy demand (W/m ²):	<input type="text"/>	
Available Energy Demand for Lights :	<input type="text" value="#VALUE!"/>	W
Total energy consumption – Lights (kWh):	<input type="text"/>	
or		
Total energy consumption – Lights (kWh/m ²):	<input type="text"/>	
Available annual energy consumption – Lights:	<input type="text" value="#VALUE!"/>	kWh

Hot Water Services

(Use actual measured data where available.)

Type of Accommodation ?	<input type="text" value="Dwelling houses - Low rental : 80-115 L/capita/day"/>	
Assumed Hot Water Consumption ?	<input type="text" value="85"/>	L
No. of Persons:	<input type="text" value="4"/>	Per Day
Assumed Daily Hot Water Consumption:	<input type="text" value="340"/>	L
Assumed Annual Hot Water Consumption:	<input type="text" value="123.76"/>	kL – Based on daily design occupancy per week
50 % of Annual Hot Water Consumption:	<input type="text" value="61.88"/>	kL – Minimum volume of hot water to be heated by means other than electrical resistance heating
or		
Daily Hot Water Consumption:	<input type="text" value="170"/>	L – To be heated by means other than electrical resistance heating

Insulation Requirements

Internal diameter of Hot Water Service Pipe ?	<input type="text" value="> 80"/>	mm
Minimum Required R-value for Pipe Insulation ?	<input type="text" value="1.5"/>	Refer SANS 204 (4.5.2)

Hot Water Vessels / Tanks

Minimum Required R-value for Vessel / Tank ?	<input type="text" value="2"/>	Additional insulation to manufacturer's insulation may be required to achieve this value.
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(Interpolation of solar exposure factors, energy constants and heating / cooling shading multipliers is utilised in fenestration element calculations)

I, the undersigned, hereby certify that all the information contained in this report is to the best of my knowledge and belief, true and correct.

Signature: _____
Competent Person: **Roger Heatley**

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GLAZING ELEMENTS : FACTOR & CO-EFFICIENT SUMMARY

Glazing Elements					Glazing Element		Sector		Shading			
Storey Level	Identifier No:	No. of Units	Size w x h	Area (m ²)	U-value	SHGC	Orientation	Projection (P)	Height (H)	Height (G)	P/H	
Ground Storey	W2	3	1.43 x 1.43	6.13	5.60	0.77	South	0.32	3.99	2.57	0.04	
							Factor (E)	C _A	C _B	C _C	Heating S _H	Cooling S _C
							0.77	0.00	0.48	0.02	1.00	1.00
Ground Storey	W3	1	0.9 x 1.4	1.26	5.60	0.77	South	0.32	2.24	0.84	0.07	
							Factor (E)	C _A	C _B	C _C	Heating S _H	Cooling S _C
							0.72	0.00	0.48	0.02	1.00	1.00
Ground Storey	W4	6	0.61 x 1.22	4.47	4.23	0.72	South	0.62	1.69	0.47	0.37	
							Factor (E)	C _A	C _B	C _C	Heating S _H	Cooling S _C
							0.44	0.00	0.48	0.02	1.00	0.89
Ground Storey	W5	6	0.61 x 1.22	4.47	4.23	0.72	North	0.62	1.69	0.47	0.37	
							Factor (E)	C _A	C _B	C _C	Heating S _H	Cooling S _C
							0.32	0.00	0.80	0.02	1.00	0.82
Ground Storey	W6	2	0.75 x 1.45	2.18	5.60	0.77	North	4.13	1.64	0.19	2.51	
							Factor (E)	C _A	C _B	C _C	Heating S _H	Cooling S _C
							0.12	0.00	0.80	0.02	1.00	0.20
Ground Storey	D2	1	3 x 2.032	6.10	5.60	0.77	North	4.13	2.38	0.19	1.74	
							Factor (E)	C _A	C _B	C _C	Heating S _H	Cooling S _C
							0.14	0.00	0.80	0.02	1.00	0.22
Ground Storey	W2	1	1.43 x 1.43	2.04	5.60	0.77	North	0.74	1.92	0.49	0.39	
							Factor (E)	C _A	C _B	C _C	Heating S _H	Cooling S _C
							0.31	0.00	0.80	0.02	1.00	0.82
Ground Storey	W1	1	2.05 x 1.43	2.93	7.90	0.81	North	0.74	1.92	0.49	0.39	
							Factor (E)	C _A	C _B	C _C	Heating S _H	Cooling S _C
							0.31	0.00	0.80	0.02	1.00	0.82
Ground Storey	W7	1	0.75 x 1	0.75	5.60	0.77	North	0.74	1.49	0.49	0.50	
							Factor (E)	C _A	C _B	C _C	Heating S _H	Cooling S _C
							0.27	0.00	0.80	0.02	1.00	0.72
Ground Storey	W2	1	1.43 x 1.43	2.04	5.60	0.77	East	0.00	1.70	0.27	0.00	
							Factor (E)	C _A	C _B	C _C	Heating S _H	Cooling S _C
							1.29	0.00	0.91	0.02	1.00	1.00
Ground Storey	D3	1	4.582 x 1.706	7.82	4.23	0.72	East	2.00	2.45	0.33	0.82	
							Factor (E)	C _A	C _B	C _C	Heating S _H	Cooling S _C
							0.53	0.00	0.91	0.02	1.00	0.63
Ground Storey	W2	1	1.43 x 1.43	2.04	5.60	0.77	West	0.22	2.95	1.52	0.04	
							Factor (E)	C _A	C _B	C _C	Heating S _H	Cooling S _C
							1.27	0.00	0.88	0.02	1.00	1.00

Storey Level	Identifier No:	No. of Units	Size w x h	Area (m ²)	U-value	SHGC	Orientation	Projection (P)	Height (H)	Height (G)	P/H	
Ground Storey	D1	1	2.696 x 1.696	4.57	7.90	0.81	West	0.22	2.39	0.26	0.09	
							Factor (E)	C _A	C _B	C _C	Heating S _H	Cooling S _C
							1.17	0.00	0.88	0.02	1.00	1.00
Storey Level	Identifier No:	No. of Units	Size w x h	Area (m ²)	U-value	SHGC	Orientation	Projection (P)	Height (H)	Height (G)	P/H	
Ground Storey	W8	2	0.61 x 0.61	0.74	5.60	0.77	West	0.44	0.90	0.29	0.49	
							Factor (E)	C _A	C _B	C _C	Heating S _H	Cooling S _C
							0.76	0.00	0.88	0.02	1.00	0.85
Storey Level	Identifier No:	No. of Units	Size w x h	Area (m ²)	U-value	SHGC	Orientation	Projection (P)	Height (H)	Height (G)	P/H	
							Factor (E)	C _A	C _B	C _C	Heating S _H	Cooling S _C
Storey Level	Identifier No:	No. of Units	Size w x h	Area (m ²)	U-value	SHGC	Orientation	Projection (P)	Height (H)	Height (G)	P/H	
							Factor (E)	C _A	C _B	C _C	Heating S _H	Cooling S _C
Storey Level	Identifier No:	No. of Units	Size w x h	Area (m ²)	U-value	SHGC	Orientation	Projection (P)	Height (H)	Height (G)	P/H	
							Factor (E)	C _A	C _B	C _C	Heating S _H	Cooling S _C
Storey Level	Identifier No:	No. of Units	Size w x h	Area (m ²)	U-value	SHGC	Orientation	Projection (P)	Height (H)	Height (G)	P/H	
							Factor (E)	C _A	C _B	C _C	Heating S _H	Cooling S _C
Storey Level	Identifier No:	No. of Units	Size w x h	Area (m ²)	U-value	SHGC	Orientation	Projection (P)	Height (H)	Height (G)	P/H	
							Factor (E)	C _A	C _B	C _C	Heating S _H	Cooling S _C
Storey Level	Identifier No:	No. of Units	Size w x h	Area (m ²)	U-value	SHGC	Orientation	Projection (P)	Height (H)	Height (G)	P/H	
							Factor (E)	C _A	C _B	C _C	Heating S _H	Cooling S _C
Storey Level	Identifier No:	No. of Units	Size w x h	Area (m ²)	U-value	SHGC	Orientation	Projection (P)	Height (H)	Height (G)	P/H	
							Factor (E)	C _A	C _B	C _C	Heating S _H	Cooling S _C
Storey Level	Identifier No:	No. of Units	Size w x h	Area (m ²)	U-value	SHGC	Orientation	Projection (P)	Height (H)	Height (G)	P/H	
							Factor (E)	C _A	C _B	C _C	Heating S _H	Cooling S _C
Storey Level	Identifier No:	No. of Units	Size w x h	Area (m ²)	U-value	SHGC	Orientation	Projection (P)	Height (H)	Height (G)	P/H	
							Factor (E)	C _A	C _B	C _C	Heating S _H	Cooling S _C
Storey Level	Identifier No:	No. of Units	Size w x h	Area (m ²)	U-value	SHGC	Orientation	Projection (P)	Height (H)	Height (G)	P/H	
							Factor (E)	C _A	C _B	C _C	Heating S _H	Cooling S _C
Storey Level	Identifier No:	No. of Units	Size w x h	Area (m ²)	U-value	SHGC	Orientation	Projection (P)	Height (H)	Height (G)	P/H	
							Factor (E)	C _A	C _B	C _C	Heating S _H	Cooling S _C
Storey Level	Identifier No:	No. of Units	Size w x h	Area (m ²)	U-value	SHGC	Orientation	Projection (P)	Height (H)	Height (G)	P/H	
							Factor (E)	C _A	C _B	C _C	Heating S _H	Cooling S _C

Storey Level	Identifier No:	No. of Units	Size w x h	Area (m ²)	U-value	SHGC	Orientation	Projection (P)	Height (H)	Height (G)	P/H	
							Factor (E)	C _A	C _B	C _C	Heating S _H	Cooling S _C
Storey Level	Identifier No:	No. of Units	Size w x h	Area (m ²)	U-value	SHGC	Orientation	Projection (P)	Height (H)	Height (G)	P/H	
							Factor (E)	C _A	C _B	C _C	Heating S _H	Cooling S _C
Storey Level	Identifier No:	No. of Units	Size w x h	Area (m ²)	U-value	SHGC	Orientation	Projection (P)	Height (H)	Height (G)	P/H	
							Factor (E)	C _A	C _B	C _C	Heating S _H	Cooling S _C
Storey Level	Identifier No:	No. of Units	Size w x h	Area (m ²)	U-value	SHGC	Orientation	Projection (P)	Height (H)	Height (G)	P/H	
							Factor (E)	C _A	C _B	C _C	Heating S _H	Cooling S _C
Storey Level	Identifier No:	No. of Units	Size w x h	Area (m ²)	U-value	SHGC	Orientation	Projection (P)	Height (H)	Height (G)	P/H	
							Factor (E)	C _A	C _B	C _C	Heating S _H	Cooling S _C
Storey Level	Identifier No:	No. of Units	Size w x h	Area (m ²)	U-value	SHGC	Orientation	Projection (P)	Height (H)	Height (G)	P/H	
							Factor (E)	C _A	C _B	C _C	Heating S _H	Cooling S _C
Storey Level	Identifier No:	No. of Units	Size w x h	Area (m ²)	U-value	SHGC	Orientation	Projection (P)	Height (H)	Height (G)	P/H	
							Factor (E)	C _A	C _B	C _C	Heating S _H	Cooling S _C

(Interpolation of solar exposure factors, energy constants and heating / cooling shading multipliers is utilised in fenestration element calculation)

I, the undersigned, hereby certify that all the information contained in this report is to the best of my knowledge and belief, true and correct.

Signature: _____

Competent Person: **Roger Heatley**

Professional Registration No: **CAD21342**