Table 2 - Average water consumption (hot and cold) appliances | Table 5 - Hot water demand, storage and heater power requirements

1	2	3	4			
Domestic and commercial appliances	L/operation	No of Fittings	Total/L operation	Total hot water demand	Storage volumn at 60° C	Heater power*
Bath	80 - 90	1	90			
Bidet	6 - 8	/				
Clothes washing machine	60 - 180	1	150			
Dishwashing machine	3 - 70	1	60			
Domestic waste disposal unit	10 - 15 a	/				
Shower	3 - 6 a	2	12			
Wash-hand basin	4 - 8	3	12			
W C flushing valve (normal flush)	8 - 10	2	18	159	150	20
Domestic appliances	L/day/person served					
Car washing and garden use	3 - 6	1	6			
Drinking, food preparation and cooking	18 - 22	1	18			
Laundry	10 - 15					
Personal washing and bathing	20 - 30					
Washing dishes	8 - 12	2	20			
W C flushing	32 - 40	2	70			
Offie installation appliances	L/day/person served					
Hand washing : normal taps	8 - 15	3				
Hand washing : spray taps	3 - 7					
Urinal flushing - 24 h day	10 - 18					
Urinal flushing - 8 h day	4 - 6					
W C flushing - no urinals provided	12 - 18					
W C flushing - urinals provided	4 - 6	2				
a Per minute						
		TOTAL	456			

SANS 10252-1

1	2	2	2
Premises	Total hot water demand	Storage volume at 60° C	Heater power*
Clinics	(120-150) L/bed/d	(30-35) L/bed/d	1,5 kW/bed/d
Colleges and schools			
Day school	(10-12) L/capita/d	(5-6) L/capita	0,1 kW/capita
Boarding school	(50-115) L/capita/d	(25-50) L/capita	0,5-0,8 kW/capita
Dwelling houses			
Low rental	(80-115) L/capita/d	(100-150) L/capita	2-3 kW/unit
Medium to high rental	(115-140) L/capita/d	(40-50) L/capita	2-5 kW/unit
Factories			
Staff	(10-20) L/capita/d	(5-7) L/capita/d	0,1 kW/capita
Ablutions	(30-60) L/capita/d	(30-60) L/capita/d	1,5-2 kW/capita
Flats (Blocks)			
Low rental	(65-75) L/capita/d	(20-25) L/capita	2-3 kW/capita
Medium to high rental	(115-140) L/capita/d	(25-35) L/capita	2-5 kW/capita

a Refers to direct electrical heating elements only

b Excluding kitchen but including laundry

c Storage normally a minimum of 15 L within 4 h heat-up period

WATER RETICULATION LEGEND

- WM — COMMUNAL Water Meter RES 3
- Cold water from meter
- Cold water in building
- Hot water in building
- Riser pipe
- Dropper pipe
- Lagged pipe
- WH — Storage waterheater
- Cold water tap
- Hot water tap
- HP — HEAT PUMP

SANS10400 - R-VALUE DETAILS

TIASA GUIDE TO LEVELS OF TYPICAL INSULATION PRODUCTS TO ACHIEVE DEEMED-TO-SATISFY RULE FOR ENERGY EFFICIENCY IN A NON-VENTILATED ROOF AND CEILING CONSTRUCTION (SANS 204) & A SYSTEM OPTION WITH A RADIANT BARRIER OVER RAFTERS

Climatic Zones	1	2	3	4	5	6
Minimum required Total R-Value (m².K/W) (for roof solar absorptance of more than 0.55)	3.7	3.2	2.7	3.7	2.7	3.5
Direction of heat flow	Up	Up	Down and Up	Up	Down	Up
Estimated Total R-Value (m².K/W) of roof and ceiling materials (Roof covering & plasterboard only)	0.35 - 0.40			0.41 - 0.53	0.35 - 0.40	
Estimated Minimum added R-Value of Insulation (m².K/W)	2.30 - 3.35			2.17 - 2.29	2.80 - 3.15	

Climatic Zones	1
Minimum required Total R-Value (m².K/W) (for roof solar absorptance of more than 0.55)	3.7
Direction of heat flow	Up
Estimated Total R-Value (m².K/W) of roof and ceiling materials (Roof covering & plasterboard only)	
Estimated Minimum added R-Value of Insulation (m².K/W)	

	Generic Insulation Products	Density Kg/m³	Thermal Conductivity W/(m.K)	Example DTS + Reflective Bulk System exampl	
				DTS Product	RB System
1	Cellulose Fibre Loose-Fill	27.5	0.040	115	100
2	Flexible Fibre Glass Blanket	10-18	0.046	115	100
3	Flexible BOQ Polyester Fibre Blanket	24	0.038	130	85
4	Flexible Polyester Blanket	11.5	0.046	160	120
5	Flexible Mineral/Rockwool	60-120	0.033	115	85
6	Flexible Ceramic Fibre	84	0.033	115	85
7	Rigid Expanded Polystyrene (EPS)SD	15	*0.036	120	90
8	Rigid Extruded Polystyrene (XPS)	32	*0.028	103	70
9	Rigid Fibre Glass Board	47.5	0.033	115	85
10	Rigid BOQ Polyester Fibre Board	61	0.034	115	90
11	Rigid Polyurethane Board	32	*0.025	85	60

PASS

4.4.5 Roof Assemblies
4.4.5.4 Table 9
Climate Zone = 1
Direction of heat flow = UP

Min. R-value (m K/W) roof tile = 0.35

Min. R-value (m K/W) ceiling = 0.05

Added R-value of insulation = 3.30

General explanatory information on roof and ceiling construction

F.1 Ventilation

F.1.1 The roof space ventilation option applies to a pitched roof with a flat ceiling to ensure an efficient cross ventilation is achieved in the roof space to remove hot air. Roof space ventilation is generally not acceptable for roof flat, skillion, cathedral ceiling and similar roof types because of the lack of space between the ceiling and the roof.

F.1.2 Care should be taken to ensure that the roof ventilation openings do not allow ingress of pests.

F.1.3 Gaps between roof tiles with sarking (or reflective insulation at rafter level) and metal sheet roofing are not acceptable methods of providing roof space ventilation.

F.1.4 Compliance with ventilation provisions may result in the ingress of wind driven rain onto the roof, or stimulate the growth of mould or fungus in the roof enclosure. Consideration should therefore be given to the surrounding environmental features.

F.2 Coloured roofs

A light-coloured roof reduces the flow of heat from solar radiation more effectively than a dark-coloured roof. The effective R-value value of a light-coloured roof (white, off-white, cream or light olive-aluminium) is less than 0.05.

Typical absorptance values are as given in table F.1 (see BCA 2007).

Table F.1 — Typical absorptance values

1	2
Colour	Value
Slate (dark grey)	0.80
Red, green	0.75
Yellow, buff	0.60
Zinc aluminium (dull)	0.55
Galvanised steel (dull)	0.55
UPS grey	0.45
Off white	0.35
Light cream	0.30

F.3 Heat flow direction

4.3.6 Roof assemblies

4.3.6.1 General

4.3.6.1.1 A roof assembly shall achieve the minimum total R-value specified in table 8 for the direction of heat flow

Table 8 — Minimum total R-values of roof assemblies

1	2	3	4	5	6
Climatic zones					
1	2	3	4	5	6
Minimum required total R-value					
m².K/W					
3,7	3,2	2,7	3,7	2,7	3,5
Direction of heat flow					
Up	Up	Down and up	Up	Down	Up

Table F.2 — Typical R-values for roof and ceiling construction

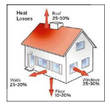
1	2	3	4	5	6
Roof construction description	Component	R-value required (m².K/W)			
		Up	Down	Up	Down
Roof 22° to 45° with metal roofing and metal cladding	Outdoor air film (1 m/s)	0.04	0.04	0.04	0.04
	Metal cladding	0	0	0	0
	Roof air space (non-reflective)	0.16	0.18	0.16	0.18
	Plasterboard, gypsum (12 mm, 288 kg/m³)	0.06	0.06	0.06	0.06
	Insulation (as required)	0.52	0.52	0.52	0.52
	Total R-value	0.78	0.80	0.78	0.80
Roof 22° to 45° with metal roofing and metal tiles 19 mm	Outdoor air film (1 m/s)	0.04	0.04	0.04	0.04
	Roof air space (non-reflective)	0.16	0.18	0.16	0.18
	Plasterboard, gypsum (12 mm, 288 kg/m³)	0.06	0.06	0.06	0.06
	Insulation (as required)	0.51	0.51	0.51	0.51
	Total R-value	0.46	0.54	0.53	0.79
Cathedral ceiling 22° to 45° slate with concrete tiles, 25 mm to 50 mm battens, and sarking or similar	Outdoor air film (1 m/s)	0.03	0.05	-	-
	Tiles/slate	0.14	0.14	-	-
	Roof air space (30 mm to 150 mm, non-reflective)	0.16	0.18	+	+
	Plasterboard, gypsum (12 mm, 288 kg/m³)	0.06	0.06	-	-
	Insulation (as required)	0.51	0.51	0.51	0.51
	Total R-value	0.90	0.94	0.72	0.75
Cathedral ceiling 22° to 45° tiles, 25 mm to 50 mm battens, 19 mm of rafters, and 25mm air space	Outdoor air film (1 m/s)	0.03	0.05	-	-
	Tiles/slate	0.14	0.14	-	-
	Roof air space (30 mm to 150 mm, non-reflective)	0.16	0.18	-	-
	Plasterboard, gypsum (12 mm, 288 kg/m³)	0.06	0.06	-	-
	Insulation (as required)	0.51	0.51	-	-
	Total R-value	0.72	0.78	-	-
Roof construction description	Component	R-value required (m².K/W)			
		Up	Down	Up	Down
Skillion roof greater than 22° pitch with 19 mm timber boards, sarking, and applied waterproof membrane	Outdoor air film (1 m/s)	0.04	0.04	-	-
	Metal cladding	0	0	-	-
	Roof air space (150 mm to 300 mm, non-reflective)	0.16	0.22	-	-
	Plasterboard, gypsum (12 mm, 288 kg/m³)	0.06	0.06	-	-
	Insulation (as required)	0.51	0.51	-	-
	Total R-value	0.77	0.83	-	-
Skillion roof greater than 22° pitch with 19 mm timber boards, sarking, and applied waterproof membrane	Outdoor air film (1 m/s)	0.04	0.04	-	-
	Metal cladding	0	0	-	-
	Roof air space (150 mm to 300 mm, non-reflective)	0.16	0.22	-	-
	Plasterboard, gypsum (12 mm, 288 kg/m³)	0.06	0.06	-	-
	Insulation (as required)	0.51	0.51	-	-
	Total R-value	0.77	0.83	-	-
Skillion roof, concrete roof tiles, 25 mm to 50 mm battens, sarking, and exposed external waterproof membrane	Outdoor air film (1 m/s)	0.03	0.05	-	-
	Tiles/slate	0.14	0.14	-	-
	Roof air space (150 mm to 300 mm, non-reflective)	0.16	0.22	-	-
	Plasterboard, gypsum (12 mm, 288 kg/m³)	0.06	0.06	-	-
	Insulation (as required)	0.51	0.51	-	-
	Total R-value	0.90	0.98	-	-
Skillion roof, concrete roof tiles, 25 mm to 50 mm battens, sarking, and exposed external waterproof membrane	Outdoor air film (1 m/s)	0.03	0.05	-	-
	Tiles/slate	0.14	0.14	-	-
	Roof air space (150 mm to 300 mm, non-reflective)	0.16	0.22	-	-
	Plasterboard, gypsum (12 mm, 288 kg/m³)	0.06	0.06	-	-
	Insulation (as required)	0.51	0.51	-	-
	Total R-value	0.90	0.98	-	-

NOTE 1 The R-value of air films, other than an air space, on two or more sides, may be disregarded as negligible for the increased thickness of the film.

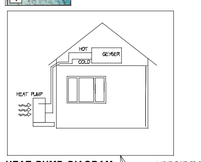
NOTE 2 The R-value of a form of construction may be increased by the amount that the R-value of an additional form is exceeded.

1) For ventilated spaces, the ventilation rate should not be less than 0.5 L/s.m²

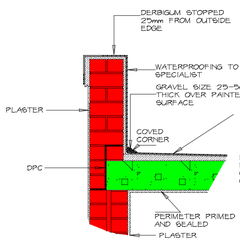
4.4.5 - ROOF ASSEMBLIES
SANS 10400 - PART XA - 2011



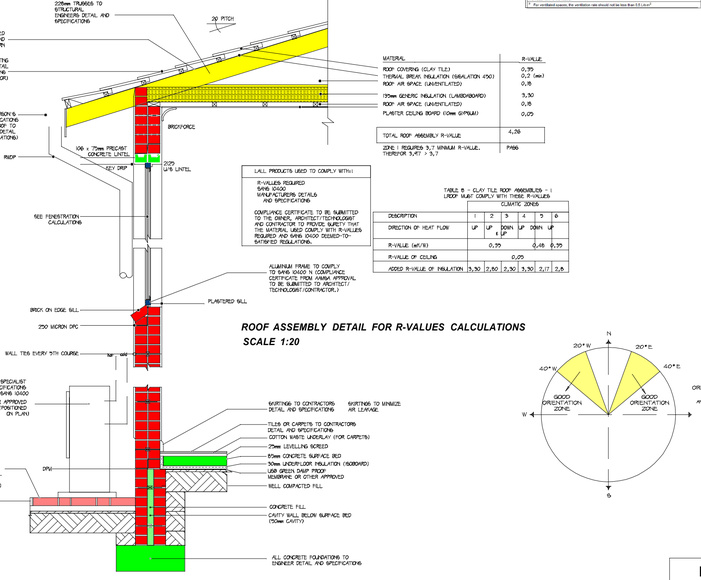
INSULATION: CELLULOSE FIBRE LOOSE-FILL DENSITY: 27.5Kg/m THERMAL CONDUCTIVITY : 0.040



HEAT PUMP DIAGRAM



DETAIL Q
1:20



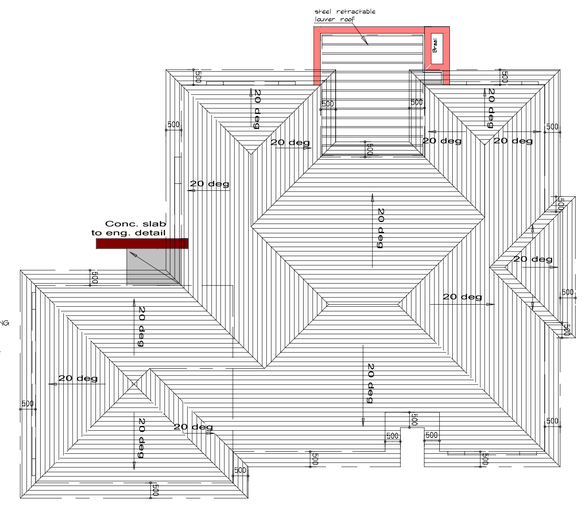
ROOF ASSEMBLY DETAIL FOR R-VALUES CALCULATIONS
SCALE 1:20

ROOF ASSEMBLY DETAIL FOR R-VALUES CALCULATIONS
SCALE 1:25

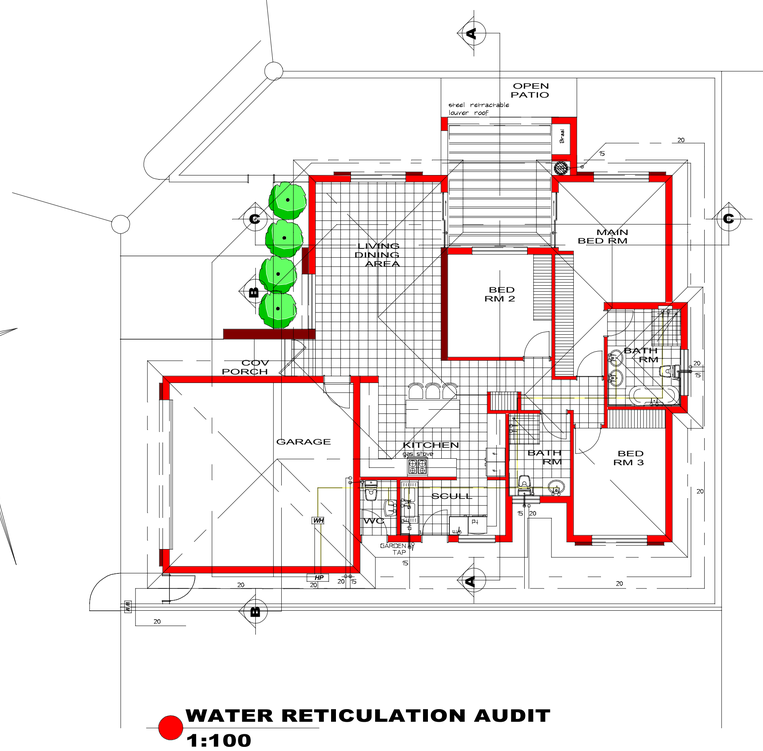
MATERIAL	R-VALUE
ROOF COVERING (CLAY TILE)	0,79
THERMAL BREAK INSULATION (SABALATION 450)	0,2 (min)
ROOF AIR SPACE (UNVENTILATED)	0,16
170mm GENERIC INSULATION (CLASSBOARD)	3,30
ROOF AIR SPACE (UNVENTILATED)	0,16
PLASTER CEILING BOARD (10mm GYPSUM)	0,05
TOTAL ROOF ASSEMBLY R-VALUE	4,66
ZONE 1 REQUIRED 3,7 MINIMUM R-VALUE, THERFOR 3,47 - 3,7	PASS

TABLE 8 - CLAY TILE ROOF ASSEMBLIES - 1
UNDER WALL COMPLY WITH THESE R-VALUES

DESCRIPTION	CLIMATIC ZONES					
	1	2	3	4	5	6
DIRECTION OF HEAT FLOW	UP	UP	DOWN + UP	UP	DOWN	UP
R-VALUE (m²/W)	0,35			0,48	0,35	
R-VALUE OF CEILING	0,05					
ADDED R-VALUE OF INSULATION	3,30	2,80	2,30	3,30	2,17	2,8



ROOF PLAN
1:100



WATER RETICULATION AUDIT
1:100

ROOF SLAB NOTES
CONCRETE ROOF SLAB TO ENGINEERS DETAILS
100Ø FULLBORE OUTLET TO DISCHARGE INTO 100X100mm OUTLET

WATERPROOFING NOTES
AN IMPERVIOUS SURFACE TO BE PROVIDED TO CONCRETE ROOF CONSTRUCTION AND IS TO BE LAID TO A FALL OF NOT LESS THAN 1 IN 50

WHERE A PARAPET WALL ABUTS A COVERED FLAT ROOF THE EDGES OF THE WATERPROOFING MATERIAL SHALL BE TURNED UP UNDERNEATH CORROSIONPROOF METAL COVER FLASHING WHICH IS TUCKED INTO THE HORIZONTAL JOINT OF THE BRICKWORK AT LEAST TWO COURSES ABOVE THE ROOF LEVEL

ROOF NOTES
CONCRETE ROOF TILES LAID ON 152X38mm SA PINE RAFTERS WITH 38X38mm SA PINE BATTENS TO SECURE 12.5mm GYPSUM CEILING BOARD GUTTERS : 100X75 M.S. GUTTERS PITCH=20 DEGREES

FINISHING SCHEDULE

NOTES:

* No awnings, tv aerials, satellite dishes must be located to be as un-obstructive as possible
* External walls plaster & painted Plascon
1- Pavers Paving
2 - Rhine Castle
* Rhinolite internal walls not bathrooms
* Internal Paint Plascon - Ravin
* DECORATIVE PLASTER LINES AS PER ELEVATIONS
* ALUMINIUM Windows & Doors
* GARAGE DOORS - COLOURED ALUMINIUM DOORS
* Drainage pipes shall be concealed in ducts with access panels
* FACE BRICK PLINTH
* COROBRIK MOROCCAN RED TRAVERTINE EBA FLUSH JOINTS
* MAX PLINTH 680
* Min Cut & Fill - 680mm
* ROOF TILES MARLEY - DOUBLE ROMAN - M11 COLOUR CHARRED SLATE 150411
* PAVING
* No precast, gabion mesh fencing wood fencing, razor wire electrified fencing allowed
* Landscaping to comply with Eestate list of indigenous species.
* CORNICES ESSENTIAL MOULDINGS GAIL 70X75
* TILE SKIRTINGS

STAND 410 CHANCLIFF EST.

GENERAL NOTES:

ALL LEVELS, DIMENSIONS DEPTHS OF EXCAVATIONS HEIGHTS OF PLINTHS, NUMBER OF STEPS AND SIZES OF FOUNDATIONS TO BE DETERMINED ON SITE

READ FIGURED DIMENSIONS DO NOT SCALE

DRAWINGS PREPARED ON SURFACE EXAMINATION ONLY

ALL WORK DONE SHOULD COMPLY WITH STANDARD AND LOCAL BUILDING REGULATIONS @ 400

ROOF NOTES

CONCRETE ROOF TILES LAID ON 152X38mm SA PINE RAFTERS WITH 38X38mm SA PINE BATTENS TO SECURE 12.5mm GYPSUM CEILING BOARD GUTTERS: 100x75M.S. GUTTERS PITCH=20DEGREES

PREFABRICATED ENGINEER DESIGNED TRUSSES TO SABS 0169 AND SABS 0163 SPECIFICATION

DRAINAGE NOTES

I.E'S TO ALL CONNECTIONS

RE'SAT CHANGE OF DIRECTIONS & HEAD OF DRAIN WITH MARKED COVER SAT GROUND LEVEL

WHERE DRAINAGE OCCURS UNDER FOUNDATIONS AND CONCRETE FLOORS LAB, DRAIN TO BE PROTECTED AGAINST THE LOAD

MINIMUM INVERT LEVEL OF DRAIN 460mm

100Ø OVPAT HEAD OF DRAIN

MINIMUM FALL OF DRAIN: 1:60

FLOOR NOTES:

SKIRTING 70X19 HARDWOOD WITH 19mm QUADRANT

FLOOR FINISH: AS ON PLAN

SCREED: SAND/CEMENT 25mm MINIMUM

SURFACE BED: 85mm CONCRETE FLOORS LAB ON 250 MICRON DAMP PROOF MEMBRANE ON WELL COMPACTED FILL

TERMITE POISONTO ALL SURFACE BED S PRIOR TO CONCRETE POUR

WINDOWS:

ALL GLAZED SECTIONS TO BE IN ACCORDANC WITH THE N-SECTION OF THE NBR I & THE SABS-0137

AREAS:

DWELLING	125.00
GARAGE	40.00
TOTAL	165.00
OPEN PATIO	16.45

REVISION SCHEDULE

NO:	DATE:	DISCRIPTION

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SANS 10400-XA 2011: PART 4

4.1 Hot Water Supply

4.1.1 (a) Volume of annual average hot water heating requirements - SANS 10252-1:2004

4.1.1 b) Solar water heating systems - SANS 1307, 10106, 10254 & 10252-1

4.1.3 Hot water service pipe cold with insulation - Min R-value - Table 1 & 6

4.2 Energy usage and building envelope

4.2.1 (a) Building occupance classified in Regulation A20 must have a competent person certifie that such building (excl. garage & stores) has a theoretical annual energy consumption based on the design assumption in 4.3 less than or equal to Table 2&3 OR

4.2.1 (b) building occupancy classified in Regulations A20 tables 2, 3, 4, 5, & 6 the orientation is in accordance with SANS 204

4.3 Design Assumptions -

(a) Where artificial ventilation systems are provided:

1) Design occupancy - Table 4
2) Space temperature lies within the range 19°C to 25°C for 98% plant operation time
3) Ventilation is provided - SANS 10400-O
4) Internal Heat Gains in the building from
i) Design population according to Table 5 average rate 75W per person
ii) Hot meals in dining, restaurant/cafe @ rate of 30W/person -Table 5
iii) Appliances & Equipment - Table 6
iv) Artificial lighting - Table 4

(b) Hot Water Supply

(c) Max. energy demand & usage calculated @ total building & not tenancies - Table 4.1

4.4 Building Envelope

4.4.1 Orientation -

4.4.1.1 * Compact in plan
* Most used rooms North for winter solar heat to penetrate glazing
* Living spaces on North side
* Uninhabited rooms, bathrms & storerooms West & South
* Longer axis of the house runs East/West

4.4.1.2 * Roof overhang on North/West sufficient to shade windows - SANS 204
* Windows on East & West are limited to min. light & ventilation

4.4.3 External Walls -

4.4.3.1 * Non-masonary walls must achieve R-value of
a) climate zones 1 & 6 = 2.2 R-value
b) climate zones 2, 3, 4 & 5 = 1.9 R-value

4.4.3.2 * These masonary walls comply with the R-value requirements:
a) Double-skin masonary with NO cavity, plasterea internally or rendered externally
b) Single leaf masonary nominal thickness greater than or equal to 140mm, plastered and rendered internally & externally

4.4.4 Fenestration -

4.4.4.1 Buildings with up to 15% fenestration area to nett floor area per storey comply with the min. energy performance requirments

4.4.4.2 Buildings exceeding 15% fenestration area to nett floor are per storey shall comply to - SANS 204

4.4.4.3 All fenestration air filtration comply to - SANS 613

4.4.5 Roof Assembly -

4.4.5.1 Roof assembly total min. R-value to comply to -Table 7

4.4.5.2 Metal sheeting fixed to purlins, metal rafters or battens must have a thermal break consisting of material with an R-value not less than 0.2 installed between metal sheeting anf supporting member (isolation)

4.4.5.3 Metal sheeting to comply to - Table 8

4.4.5.4 Clay tile assembly to comply to - Table 9

NOTE: TOWNSHIP IS IN JHB
CLIMATE ZONE I: COLD INTERIOR - JHB. BLM

ENGINEER SIGNATURE:

OWNERS SIGNATURE:

ARCHITECTS SIGNATURE:

PROJECT DETAILS:
PROPOSED NEW DWELLING ON ERF 410 CHANCLIFF ESTATE XT 32
FOR: OWNERS

SHEET DETAILS:
WATER RETICULATION AUDIT & ROOF PLAN

SHEET NUMBER: WD - 03
REVISION 0

DATE: 01-08-2020

DRAWN BY: AW
CHECKED BY: MNP

WORKING DRAWINGS

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MAIT (SA) SAIAT Reg. no. 31417

ERF 410 - WD03 - WATER & ROOF.DRW MP / 06 AUGUST 2020