



Est. 1987

saiaat  
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saiaat **25**  
1987 - 2012

in a partnership with  
the **SDC** and **NRCS**  
to ensure  
compliance with the  
National Building Regulations  
and  
a reduction of CO<sub>2</sub> emissions  
through  
energy efficiency in buildings



Schweizerische Eidgenossenschaft  
Confédération suisse  
Confederazione Svizzera  
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Federal Department of Foreign Affairs

Swiss Agency for Development and Cooperation SDC  
Swiss Cooperation Office Southern Africa



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Department:  
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REPUBLIC OF SOUTH AFRICA

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Thermal Conductivity = K-value = W/m.K

Thermal Conductivity  
Thickness of material = U-value

$$U = \frac{1}{R}$$

$$R = \frac{1}{U}$$

$$\frac{0.040 \text{ W/m.K}}{1\text{m}} = 0.040 \text{ W/m}^2.\text{K}$$

$$\frac{1}{0.040 \text{ W/m}^2.\text{K}} = 25 \text{ m}^2.\text{K/W}$$

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Zone 1 (UP)

Required: 3.7 m<sup>2</sup>.K/W

Typical roof = 0.38m<sup>2</sup>.K/W

$$3.7 - 0.38 = 3.32$$

$$\frac{3.32}{25} = 0.133\text{m} \approx 135\text{mm}$$

$$0.38 - 0.06 = 0.32 \text{ (take out ceiling)}$$

$$3.7 - 0.32 - 1.00 = 2.38 \text{ (add better ceiling)}$$

$$\frac{2.38}{25} = 0.10\text{m} \approx 100\text{mm}$$

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Zone 2 (UP)

Required: 3.2 m<sup>2</sup>.K/W

Typical roof = 0.38m<sup>2</sup>.K/W

$$3.2 - 0.38 = 2.82$$

$$\frac{2.82}{25} = 0.113\text{m} \approx 115\text{mm}$$

$$0.38 - 0.06 = 0.32 \text{ (take out ceiling)}$$

$$3.2 - 0.32 - 1.00 = 1.88 \text{ (add better ceiling)}$$

$$\frac{1.88}{25} = 0.08\text{m} \approx 80\text{mm}$$



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Zone 3 (UP AND DOWN)

(Worst case = UP + Ventilated)

Required: 2.7 m<sup>2</sup>.K/W

Typical roof = 0.20m<sup>2</sup>.K/W

$$2.7 - 0.20 = 2.50$$

$$\frac{2.50}{25} = 0.100\text{m} \approx 100\text{mm}$$

$$0.20 - 0.06 = 0.14 \text{ (take out ceiling)}$$

$$2.7 - 0.14 - 1.00 = 1.56 \text{ (add better ceiling)}$$

$$\frac{1.56}{25} = 0.06\text{m} \approx 60\text{mm}$$

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Zone 4 (UP)

Required: 3.7 m<sup>2</sup>.K/W

Typical roof = 0.38m<sup>2</sup>.K/W

$$3.7 - 0.38 = 3.32$$

$$\frac{3.32}{25} = 0.133\text{m} \approx 135\text{mm}$$

$$0.38 - 0.06 = 0.32 \text{ (take out ceiling)}$$

$$3.7 - 0.32 - 1.00 = 2.38 \text{ (add better ceiling)}$$

$$\frac{2.38}{25} = 0.10\text{m} \approx 100\text{mm}$$



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Zone 5 (DOWN)

Required: 2.7 m<sup>2</sup>.K/W

Typical roof = 0.71 m<sup>2</sup>.K/W (ventilated!!)

$$2.7 - 0.71 = 1.99$$

$$\frac{1.99}{25} = 0.08\text{m} \approx 80\text{mm}$$

$$0.71 - 0.06 = 0.65 \text{ (take out ceiling)}$$

$$2.7 - 0.65 - 1.00 = 1.05 \text{ (add better ceiling)}$$

$$\frac{1.05}{25} = 0.04\text{m} \approx 40\text{mm}$$

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Zone 5 (DOWN)

Required: 2.7 m<sup>2</sup>.K/W

Typical roof = 0.53m<sup>2</sup>.K/W (unventilated)

$$2.7 - 0.53 = 2.17$$

$$\frac{2.17}{25} = 0.087\text{m} \approx 90\text{mm}$$

$$0.53 - 0.06 = 0.47 \text{ (take out ceiling)}$$

$$2.7 - 0.47 - 1.00 = 1.23 \text{ (add better ceiling)}$$

$$\frac{1.23}{25} = 0.05\text{m} \approx 50\text{mm}$$

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Zone 6 (UP)

Required: 3.5 m<sup>2</sup>.K/W

Typical roof = 0.38m<sup>2</sup>.K/W

$$3.5 - 0.38 = 3.12$$

$$\frac{3.12}{25} = 0.125\text{m} \approx 125\text{mm}$$

$$0.38 - 0.06 = 0.32 \text{ (take out ceiling)}$$

$$3.5 - 0.32 - 1.00 = 2.18 \text{ (add better ceiling)}$$

$$\frac{2.18}{25} = 0.087\text{m} \approx 90\text{mm}$$