TIASA - Thermal Insulation Association of Southern Africa
Thermal Insulation – The Invisible Energy Saver !

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

Example: Roof construction description: metal/tile roof 22° - 45° pitch with horizontal ceiling.
DTS - Recommended deemed-to-satisfy min thickness (mm) of bulk insulation product only; or
RB: System option with addition of Radiant Barrier over rafters - approx. (mm) of bulk insulation required

	Generic Insulation Products	Density Kg/m³	Thermal Conductivity W/(m.k.)	1 DTS Product	1 RB System	2 DTS Product	2 RB System	3 DTS Product	3 RB System	4 DTS Product	4 RB System	5 DTS Product	5 RB System	6 DTS Product	6 RB System
1	Cellulose Fibre Loose-Fill	27.5	0.040	135	*100*	115	*95*	100	*70*	135	*100*	100	*65*	130	*100*
2	Flexible Fibre Glass Blanket	10-18	0.040	135	*100*	115	*95*	100	*70*	135	*100*	100	*65*	130	*100*
3	Flexible BOQ Polyester Fibre Blanket	24	0.038	130	*95*	110	*90*	90	*65*	130	*95*	90	*60*	125	*100*
4	Flexible Polyester Blanket	11.5	0.046	160	*120*	140	*100*	120	*80*	160	*120*	110	*75*	150	*120*
5	Flexible Mineral/Rockwool	60-120	0.033	115	*85*	100	*80*	80	*75*	115	*85*	80	*55*	100	*90*
6	Flexible Ceramic Fibre	84	0.033	115	*85*	100	*80*	80	*75*	115	*85*	80	*55*	100	*90*
7	Rigid Expanded Polystyrene (EPS)SD	15	*0.035	120	*90*	100	*80*	90	*60*	120	*90*	80	*55*	115	*95*
8	Rigid Extruded Polystyrene (XPS)	32	*0.028	100	*70*	80	*65*	70	*50*	100	*70*	65	*45*	90	*75*
9	Rigid Fibre Glass Board	47.5	0.033	115	*85*	100	*80*	80	*55*	115	*85*	80	*55*	100	*90*
10	Rigid BOQ Polyester Fibre Board	61	0.034	115	*90*	100	*80*	80	*60*	115	*90*	80	*55*	110	*90*
11	Rigid Polyurethane Board	32	*0.025	85	*60*	70	*60*	60	*45*	85	*60*	60	*40*	80	*65*

The grey (RB) columns above indicates the reduced DTS thicknesses of bulk insulation required if a radiant barrier is installed over the rafters.

(*)Thermal efficiencies are dependent on materials thickness, density, age, operating temperature and moisture.

Notes: **(1)**Thermal Conductivity used for calculation of recommended thicknesses of typical insulation materials as per TIASA Protocol for routine product testing for non-ventilated roof and ceiling constructions. Thermal efficiencies are dependent on materials thickness, density, age, operating temperature and moisture. These are apparent values and the estimated uncertainty is between 10% - 15%. Thicknesses rounded-off to nearest production standard. This is a guideline for general design purposes & rational design is always an option.

(2) The aforementioned deemed-to-satisfy recommended levels of insulation could be achieved by the use of reflective foils, bulk insulation or rigid board insulation or in combination with one another. Maximum efficiency may be achieved at reduced thicknesses taking the aforementioned into account. Careful consideration should be given to climatic zones which is prone to high humidity. Refer "The Guide to Energy Efficient Thermal Insulation in Buildings" page 58.

(3) Actual R-Values for roof construction systems are established through testing in accordance with ASTM C1363 Standard Test Method for Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus with SAFIERA. Specifiers are encouraged to obtain these test results.

(4) Fire & safety: Refer SANS 10400 Part T Fire Protection – Insulation materials shall be tested and classified in accordance with SANS 428.

Climatic Zone	Roof & Ceiling Total System R-Value (m².K/W)		External Non-masonry Walls Total R-Value (m².K/W)		Floor Insulation R-Value (m².K/W) Under in slab heating		Pipe Insulation Internal Ø of pipe ≤ 80mm R-Value (m².K/W)		Pipe Insulation Internal Ø of pipe > 80mm R-Value (m².K/W)		Geysers Incl. of geyser Insulation	
1	3.7	See above	2.2	Thickness mm	1	Thickness mm	1	Thickness mm	1.5	Thickness mm	2	
2	3.2		1.9	EPS = 80	1	EPS = 35	1	EPS = 35	1.5	EPS = 55	2	Thickness mm
3	2.7		1.9	Fiber G = 100	1	Fiber G = 40	1	Fiber G = 40	1.5	Fiber G = 60	2	Fiber G = 80
4	3.7		1.9	Fiber P = 100	1	Fiber P = 50	1	Fiber P = 50	1.5	Fiber P = 70	2	Fiber P = 95
5	2.7		1.9	PU Foam = 55	-	PU Foam = 25	1	PU Foam = 25	1.5	PU Foam = 25	2	
6	3.5		2.2	XPS = 65	1	XPS = 30	1	XPS = 30	1.5	XPS = 45	2	

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