

THERMAL INSULATION EVALUATION BY CALCULATION

FLAT CONCRETE ROOF, 50MM REFLECTIVE CAVITY, 65MM REFLECTIVE SL GRADE POLYSTYRENE, UNVENTILATED 70-600MM REFLECTIVE CAVITY ABOVE SUSPENDED CEILING

Calculation: 223.28s

Evaluation for Summer, 36.0°C ambient air temperature, 24.0°C inside air temperature.

Roof Element	m ² .K/W	°C out	°C in	°C avg	Δt	Assumed Cavity Properties				
						e1	e2	mm	Heat Flow	Note
Outside air film:	0.040	36.00	35.90	35.95	0.10					1
Roof membrane:	0.061	35.90	35.75	35.83	0.15					4
150mm concrete slab:	0.104	35.75	35.50	35.62	0.26					4
Sealed reflective 50mm air space:	1.269	35.50	32.37	33.93	3.13	0.87	0.03	50	Down	5,6
SL Grade EPS, 65mm, with RFL:	1.551	32.37	28.54	30.45	3.83			65		7
Unventilated reflective 70-600mm air space:	1.622	28.54	24.54	26.54	4.00	0.03	0.87	70	Down	5,6
Suspended 10mm plasterboard ceiling:	0.059	24.54	24.39	24.47	0.15					3
Indoor air film (unreflective surface):	<u>0.160</u>	24.39	24.00	24.20	<u>0.39</u>					2
R_{Ti} = 4.86		m ² .K/W		12.00						

Corresponding Total Conductance (k_{Ti}): 0.21 W/(m².K)

NOTES:

Calculated 2/7/08 22:30

Ref: 223_E.xls

Determinations based upon AS/NZS 4859.1:2002/Amdt 1 2006, Materials for the thermal insulation of buildings

- 1 AS/NZS 4859.1:2002/Amdt 1 2006, Clause K5(a)
- 2 AS/NZS 4859.1:2002/Amdt 1, Table K1 and Clause K4.2 (a) (iv)
- 3 AS/NZS 4859.1:2002/Amdt 1 2006, Clause K8.1(a) 'RFL'=Reflective Foil Laminate
- 4 AIRAH 2000 Handbook, page 617
- 5 Cavity air space insulation values (shown in italics) were estimated using Reflect3 software. These are iterative calculations per the USA Division of Housing Research Paper 32, applicable for roof pitch 18°-35° to ±0.05 m².K/W. The cavity R calculation assumes an air cavity of the gap shown with uniform parallel surfaces. Although the air space may be more than 70mm, calculation is for 70mm as R&P extrapolation is prohibited by AS/NZS 4859.1:2002/Arr
- 6 The calculations incorporate the dust assumptions of AS/NZS 4859.1:2002/Amdt 1 2006, Clauses K3.2 & K4.2 (e+0.0)
- 7 Assumes k=0.0407 W/m.K for 23°C; e=0.10 and 0.03. R adjusted 0.39%/K in line with AS/NZS 4859.1:2002/Amdt 1 2006, Clause K3.1
- 8 Indoor & outdoor air temperatures per AS/NZS 4859.1:2002/Amdt 1 2006, Clause K3.1
- 9 Thermal short-circuiting by frames is not considered here as evaluation is for the insulation path only.
- 10 This report may not be reproduced except in full. Results may not be quoted without reference to the assumptions.
- 11 Calculated by James Fricker, M.AIRAH, M.IEAust, CPEng.

CONCLUSION:

For the above roof having SL Grade EPS and Double Sided Antiglare Foil infrared emittances of 0.10 and 0.03, the SUMMER Total R-value per AS4859.1:2002/Amdt 1 2006 Clause K3.1 is:

R4.86 m².K/W for an air temperature difference of 36°-24° = 12K

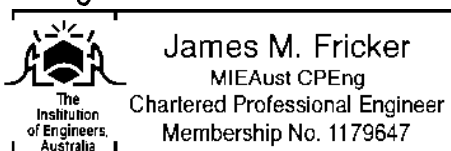
Application results for various EPS grades

(65mm, 30.5°C mean and 6K Δt)

EPS Grade	k at 23°C	EPS R	Total R	Added R value
Class L	0.0427	1.479	4.79	4.09
Class SL	0.0407	1.551	4.86	4.16
Class S	0.0394	1.602	4.92	4.21
Class M	0.0380	1.661	4.97	4.27
Class H	0.0365	1.728	5.04	4.34
Class VH	0.0349	1.807	5.12	4.42
	(W/m.K)	\	m ² .K/W	/

Signed:

James Fricker



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