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Thermal Resistance of three Insulation Samples

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All tests reported herein have been undertaken at the BRANZ Ltd laboratories located in Judgeford, Porirua, New Zealand, unless stated otherwise.

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All tests reported herein have been performed in accordance with the laboratory's scope of accreditation.

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        or
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Thermal Resistance of three Insulation Samples

1. CLIENT

Expol Insulation, 105 Captain Springs Rd., Onehunga, Auckland, New Zealand

2. DESCRIPTION OF TEST EQUIPMENT

The test equipment used was a LaserComp Fox 600 heat flow meter. The specimen for testing is placed horizontally in the apparatus, with upwards heat flow. The hot and cold plates each have a 250 mm x 250 mm heat flux transducer embedded in their surface. The edges of the specimen are insulated from the room ambient temperature.

3. PROCEDURE

The specimens were supplied by the client and consisted of three pieces of polystyrene insulation segments. The dimensions of the samples were 600 x 560 mm. They were tested at their actual thicknesses, to the requirements of ASTM C518-04.

4. RESULTS

Nominal Upper Plate Temperature	13 °C
Nominal Lower Plate Temperature	33 °C
Nominal Difference in Temperature	20 K
Nominal Mean Temperature	23 °C

Measured results

Calibration check		17-Nov-08, EPS 01		
BRANZ reference		D4306A	D4306B	D4306C
'grams per sq. metre'		753	741	759
Sample weight	gram	253	249	255
Test date		13-Nov	21-Nov	21-Nov
Test thickness	mm	60.5	60.3	60.1
Density	kg/m^3	12.45	12.29	12.63
Temperature difference	K	20.0	20.0	20.0
Mean temperature	°C	23.0	23.0	23.0
Heat-flux	W/m^2	13.88	14.12	13.88
Thermal resistance	m^2K/W	1.442	1.417	1.441
Thermal conductivity	W/mK	0.0420	0.0426	0.0417
Difference between heat flux transducers	%	3.1	1.7	2.5

[8] **Results adjusted from a mean temperature of 23°C to a mean temperature of 15°C**

See AS/NZS 4859.1 Section 2.3.3.3 Figure 2.1 Effect of mean temperature on R-value

assuming thermal conductivity sensitivity of 0.4%/K

$$\text{thermal conductivity @ 15°C} = \frac{\text{thermal conductivity @ 23°C}}{1.032}$$

thermal resistance @ 15°C = 1.032 x (thermal resistance @ 23°C)

BRANZ reference	D4306A	D4306B	D4306C	
Estimated thermal conductivity of test sample	0.041	0.041	0.040	W/mK
Estimated thermal resistance of test sample	1.49	1.46	1.49	m^2K/W

These measurements comply with the requirements of ASTM C518. The uncertainty in the measurements of thermal conductivity and thermal resistance are estimated to be ± 3%.

5. REFERENCES

ASTM C518-04 *Standard Test Method for Steady-State Heat Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus*.
American Society for Testing and Materials, Philadelphia, PA, 2004