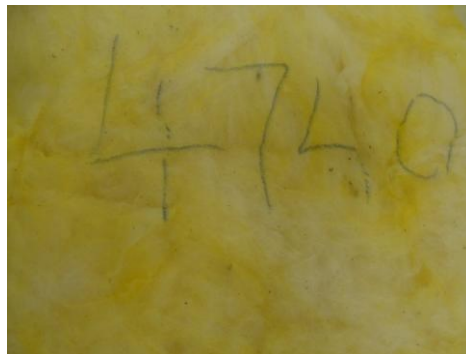


TP1847/DU01/02

Thermal Resistance of an Insulation Sample



Author: Sheng-Huei Huang
Technician
IANZ Approved Signatory



Reviewer: Roger Stanford
Senior Technician
IANZ Approved Signatory



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

Contact: BRANZ Limited
Moonshine Road
Judgeford
Private Bag 50908
Porirua City
New Zealand
Tel: +64 4 237 1170
Fax: +64 4 237 1171
www.branz.co.nz



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

BRANZ's agreement with its Client in relation to this report contains the following terms and conditions in relation to **Liability and Indemnification**

- a. Limitation and Liability
 - i. BRANZ undertakes to exercise due care and skill in the performance of the Services and accepts liability to the Client only in cases of proven negligence.
 - ii. Nothing in this Agreement shall exclude or limit BRANZ's liability to a Client for death or personal injury or for fraud or any other matter resulting from BRANZ's negligence for which it would be illegal to exclude or limit its liability.
 - iii. BRANZ is neither an insurer nor a guarantor and disclaims all liability in such capacity. Clients seeking a guarantee against loss or damage should obtain appropriate insurance.
 - iv. Neither BRANZ nor any of its officers, employees, agents or subcontractors shall be liable to the Client nor any third party for any actions taken or not taken on the basis of any Output nor for any incorrect results arising from unclear, erroneous, incomplete, misleading or false information provided to BRANZ.
 - v. BRANZ shall not be liable for any delayed, partial or total non-performance of the Services arising directly or indirectly from any event outside BRANZ's control including failure by the Client to comply with any of its obligations hereunder.
 - vi. The liability of BRANZ in respect of any claim for loss, damage or expense of any nature and howsoever arising shall in no circumstances exceed a total aggregate sum equal to 10 times the amount of the fee paid in respect of the specific service which gives rise to such claim or NZD\$50,000 (or its equivalent in local currency), whichever is the lesser.
 - vii. BRANZ shall have no liability for any indirect or consequential loss (including loss of profits).
 - viii. In the event of any claim the Client must give written notice to BRANZ within 30 days of discovery of the facts alleged to justify such claim and, in any case, BRANZ shall be discharged from all liability for all claims for loss, damage or expense unless legal proceedings are commenced in respect of the claim within one year from:
 - The date of performance by BRANZ of the service which gives rise to the claim;
 - or
 - The date when the service should have been completed in the event of any alleged non-performance.
- b. Indemnification: The Client shall guarantee, hold harmless and indemnify BRANZ and its officers, employees, agents or subcontractors against all claims (actual or threatened) by any third party for loss, damage or expense of whatsoever nature including all legal expenses and related costs and howsoever arising relating to the performance, purported performance or non-performance, of any Services.
- c. Without limiting clause b above, the Client shall guarantee, hold harmless and indemnify BRANZ and its officers, employees, agents or subcontractors against all claims (actual or threatened) by any party for loss, damage or expense of whatsoever nature including all legal expenses and related costs arising out of:
 - i. any failure by the Client to provide accurate and sufficient information to BRANZ to perform the Services;
 - ii. any misstatement or misrepresentation of the Outputs, including Public Outputs;
 - iii. any defects in the Products the subject of the Services; or
 - iv. any changes, modifications or alterations to the Products the subject of the Services.



Thermal Resistance of an Insulation Sample

1. CLIENT

GreenBull Ltd, 50 Jeffrey's Road, Fendalton, Christchurch 8052, New Zealand

2. LIMITATION

The results reported here relate only to the item/s tested.

3. 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.

4. PROCEDURE

The specimen was supplied by the client and consisted of one piece of yellow glasswool insulation segment (cut in two pieces). One piece was selected for testing. The dimensions of the sample were 600 x 435 mm. It was made up to the test size of 600 x 600 mm with similar material and tested at its nominal thickness of 160 mm, to the requirements of ASTM C518-04.

5. RESULTS

Nominal Upper Plate Temperature	10 °C
Nominal Lower Plate Temperature	36 °C
Nominal Difference in Temperature	26 K
Nominal Mean Temperature	23 °C

Measured results


Calibration check	01-Feb-09, SR05	
BRANZ reference		D4740
'grams per sq. metre'		2015
Sample weight	gram	526
Test date		01-Feb
Test thickness	mm	160
Density	kg/m ³	12.6
Temperature difference	K	26.0
Mean temperature	°C	23.0
Heat-flux	W/m ²	6.76
Thermal resistance	m ² K/W	3.893
Thermal conductivity	W/mK	0.0411
Difference between heat flux transducers	%	1.0

SHH.

SHH



RSS

	Report Number: TP1847/DU01/02	Date of Issue: 2 February 2010	Page 3 of 4 Pages
---	----------------------------------	--------------------------------	-------------------

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

6. 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

SHH.

SHH



RSS

	Report Number: TP1847/DU01/02	Date of Issue: 2 February 2010	Page 4 of 4 Pages
---	----------------------------------	--------------------------------	-------------------