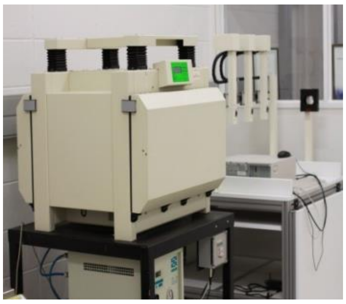

TEST REPORT

DI16630-07

THERMAL TESTING OF GLASS WOOL BLANKET R3.6

CLIENT
Hebei United Energy Tech Co. Ltd
B-510 Wanda Plaza
Guangyang District
Langfang City, 065000
China

All tests and procedures reported herein, unless indicated, have been performed in accordance with the laboratory's scope of accreditation

TO WHOM IT MAY CONCERN

Both NATA (National Association of Testing Authorities, Australia) and IANZ (International Accreditation New Zealand) are signatories to the ILAC Mutual Recognition Arrangement. Under the terms of this arrangement, each signatory:

(i) recognises within its scope of recognition of this Arrangement the accreditation of an organisation by other signatories as being equivalent to an accreditation by its own organisation,

(ii) accepts, for its own purposes, endorsed* certificates or reports issued by organisations accredited by other signatories on the same basis as it accepts endorsed* certificates or reports issued by its own accredited organisations,

(iii) recommends and promotes the acceptance by users in its economy of endorsed* certificates and reports,

* *The word "endorsed" means a certificate or report bearing an Arrangement signatory's accreditation symbol (or mark) preferably combined with the ILAC-MRA Mark.*

Signed:

Jennifer Evans
NATA CEO

Date: 24 March 2014

Dr Llewellyn Richards
IANZ CEO

Date: 24th March 2014

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1. TEST SPONSOR

Hebei United Energy Tech Co. Ltd
B-510 Wanda Plaza, Guangyang District, Langfang City, 065000, China

2. LIMITATION

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

3. TERMS AND CONDITIONS

This report is issued in accordance with the Terms and Conditions as detailed and agreed in the BRANZ Services Agreement for this work.

4. TEST SAMPLES

The specimens were supplied by the client and consisted of 10 pieces of yellow glasswool insulation segment. The nominal thickness of the product is 0.14 m (d_N). The dimensions of the samples were approximately 600 mm x 600 mm.

Table 1: Sample identification and traceability information

BRANZ Sample No.	Client Reference	Traceability Information
D6714A	Product Code: 14k 150mm R3.6	CDU2022-09-006
D6714B		
D6714C		
D6714D		
D6714E		
D6714F		
D6714G		
D6714H		
D6714I		
D6714J		

5. TEST EQUIPMENT

All tests reported have been undertaken at BRANZ Ltd laboratories located at Judgeford, unless stated otherwise. The ASTM C518 compliant test equipment used was a LaserComp FOX600 heat flow meter and Wintherm software. 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.

Table 2: Test condition set-points

Nominal Upper Plate Temperature	10.0	°C
Nominal Lower Plate Temperature	36.0	°C
Nominal Difference in Temperature	26.0	K
Nominal Mean Temperature	23.0	°C

6. PROCEDURE

The test was performed in accordance with AS/NZS 4859.1. The thickness was measured to the requirements of ASTM C167 and AS/NZS 4859.1 Appendix B. The specimens were tested at the lesser of nominal thickness and actual measured thickness, to the requirements of ASTM C518.

7. CONDITIONING

The sample segments were conditioned for at least 24 hours at 23°C ± 3°C, prior to the thermal performance measurements. The thickness and the weight of the specimens were recorded both before and after conditioning. Only the relevant results are included in this test report.

8. UNCERTAINTY

The estimated overall uncertainty of measurement is 2.0%.

9. RESULTS

Table 3: Measured test temperature

Temperature Difference	26.0	± 0.1	K
Mean Test Temperature	23.0	± 0.1	°C

Table 4: Measured results for the test specimens

Calibration check	21/11/22 SR14					
BRANZ reference		D6714A	D6714B	D6714C	D6714D	D6714E
Sample weight	gram	773	872	759	884	769
'grams per sq. metre'	g/m^2	2120.7	2434.5	2112.9	2463.4	2145.5
Test date		22/11/22	22/11/22	23/11/22	24/11/22	24/11/22
Measured thickness	mm	153.7	154.5	154.4	154.9	155.1
Test thickness	mm	150.0	150.0	150.0	150.0	150.0
Density	kg/m^3	14.1	16.2	14.1	16.4	14.3
Heat-flux	W/m^2	7.76	6.98	7.65	7.02	7.78
Thermal resistance	m^2K/W	3.35	3.73	3.40	3.70	3.35
Thermal conductivity	W/mK	0.0447	0.0402	0.0441	0.0405	0.0448
Difference between heat flux transducers	%	0.5	5.0	2.3	6.6	2.1

* Thermal conductance can be calculated by dividing the thermal conductivity by the thickness of the specimen
* Average temperature gradient in the specimen during test can be calculated by dividing the temperature difference by the thickness of the specimen
* The minimum duration of the measurement portion of the test once steady state (0.2% / 12 mins) is achieved is 6 minutes

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Table 4: Continued from previous page

Calibration check	21/11/22 SR14					
BRANZ reference		D6714F	D6714G	D6714H	D6714I	D6714J
Sample weight	gram	807	852	924	929	937
'grams per sq. metre'	g/m^2	2580.3	2717.3	2505.1	2588.0	2611.3
Test date		24/11/22	25/11/22	24/11/22	25/11/22	25/11/22
Measured thickness	mm	154.5	156.2	157.8	153.9	152.2
Test thickness	mm	150.0	150.0	150.0	150.0	150.0
Density	kg/m^3	17.2	18.1	16.7	17.3	17.4
Heat-flux	W/m^2	6.99	6.67	6.99	6.93	6.98
Thermal resistance	m^2K/W	3.72	3.90	3.72	3.75	3.72
Thermal conductivity	W/mK	0.0403	0.0385	0.0403	0.0400	0.0403
Difference between heat flux transducers	%	0.3	1.5	3.0	3.6	2.0

* Thermal conductance can be calculated by dividing the thermal conductivity by the thickness of the specimen
* Average temperature gradient in the specimen during test can be calculated by dividing the temperature difference by the thickness of the specimen
* The minimum duration of the measurement portion of the test once steady state (0.2% / 12 mins) is achieved is 6 minutes

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10. REFERENCES

AS/NZS 4859.1 *Thermal insulation materials for buildings – Part 1: General criteria and technical provisions*
Standards Australia, Sydney, Standards New Zealand, Wellington, 2018.

AS/NZS 4859.2 *Thermal insulation materials for buildings – Part 2: Design.*
Standards Australia, Sydney, Standards New Zealand, Wellington, 2018.

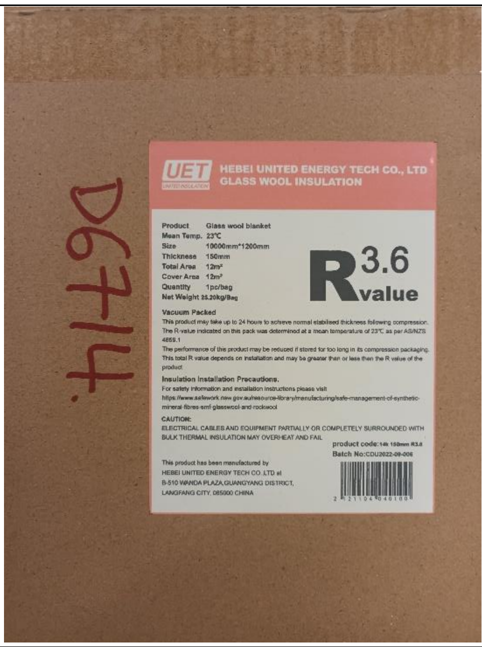
ASTM C167 *Standard Test Methods for Thickness and Density of Blanket or Batt Thermal Insulations*.
American Society for Testing and Materials, Philadelphia, PA, 2018.

ASTM C518 *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, 2017.

APPENDIX

(A) PRODUCT LABEL DETAILS

Table 5: Label information (AS/NZS 4859.1 Table 3.1)



Product name	Glass Wool Blanket R3.6
Description of contents	Glass Wool Insulation
Name of manufacturer/	Hebei United Energy Tech Co., Ltd
Address of manufacturer/supplier	B-510 Wanda Plaza, Guangyang District, Langfang City 065000, China
Identification of manufacturing plant	-
Batch identification or other traceability information	See Table 1
Safety guidance	*For safety information and installation instructions please visit https://www.safework.nsw.gov.au/resource-library/manufacturing/safe-management-of-synthetic-mineral-fibres-smf-glasswool-and-rockwool*
A statement of conformance with AS/NZS 4859.1	Yes
Declared material R-value and the temperature at which it applies	R3.6 at 23 °C
Number of pieces	1
Nominal total area	12 m^2
Nominal length, width, and thickness	10000 mm, 1200 mm, 150 mm
Nominal net weight of contents or supplied quantity	25.20 kg

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(B) STATISTICAL CALCULATION OF $R_{50/90}$

The statistical analysis of $R_{50/90}$ is calculated in accordance with AS/NZS 4859.1 Clause 2.3.3.5.

The declared R-value and declared thermal conductivity shall be derived from the statistically adjusted mean values $\lambda_{50/90}$ and $R_{50/90}$, representing a 50% fractile with 90% confidence, and a one-sided statistical tolerance interval, and which shall be based on thermal measurements on at least 10 individual specimens. $\lambda_{50/90}$ and $R_{50/90}$ shall be calculated using the following equations:

$$R_{50/90} = R_{mean} - k_2 \cdot s$$

$$\lambda_{50/90} = \lambda_{mean} + k_2 \cdot s$$

where

k_2 = coefficient used when the standard deviation is estimated for one-sided tolerance interval

s = sample standard deviation for the 10 or more measured values used to determine the declared value

Note 1: for the particular case of n = 10, the value of k_2 in Table C.1, Annex C, ISO 10456:2007 is 0.44.

Note 2: if any sample < nominal thickness then λ_{mean} = mean of the adjusted λ values

Table 6: Summary results from statistical calculation at declared temperature of 23 °C

R_{mean}	3.64	m^2K/W
λ_{mean}	0.0414	W/mK
Std. dev. of 10 test samples	5.3%	%
$R_{50/90}$	3.55	m^2K/W
$\lambda_{50/90}$	0.0424	W/mK

This is the end of the report

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