  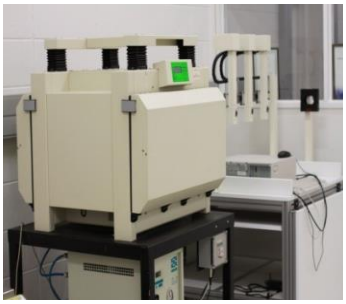

TEST REPORT

DI18126-01

THERMAL TESTING OF GLASS WOOL BATTS R2.0

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

NATA

IANZ

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:

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Signed:

Jennifer Evans
NATA CEO

Date: 24 March 2014

Dr Llewellyn Richards
IANZ CEO

Date: 24th March 2014

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DOCUMENT REVISION STATUS

ISSUE NO.	DATE ISSUED	DESCRIPTION
01	27/09/2023	Initial Issue

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 brown fibreglass insulation segment. The nominal thickness of the product is 0.09 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
D7067A	-	-
D7067B		
D7067C		
D7067D		
D7067E		
D7067F		
D7067G		
D7067H		
D7067I		
D7067J		

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	18/09/23 SR18					
BRANZ reference		D7067A	D7067B	D7067C	D7067D	D7067E
Sample weight	gram	461	444	405	451	449
'grams per sq. metre'	g/m^2	1251.7	1161.2	1154.7	1223.6	1249.2
Test date		21/09/23	22/09/23	22/09/23	22/09/23	22/09/23
Measured thickness	mm	112.1	125.2	122.0	122.3	121.7
Test thickness	mm	90.0	90.0	90.0	90.0	90.0
Density	kg/m^3	13.9	12.9	12.8	13.6	13.9
Heat-flux	W/m^2	12.34	12.82	13.17	12.33	12.12
Thermal resistance	m^2K/W	2.11	2.03	1.98	2.11	2.15
Thermal conductivity	W/mK	0.0427	0.0444	0.0456	0.0427	0.0419
Difference between heat flux transducers	%	1.5	0.3	1.7	0.3	0.1

* 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	25/09/23 SR01					
BRANZ reference		D7067F	D7067G	D7067H	D7067I	D7067J
Sample weight	gram	375	412	438	370	473
‘grams per sq. metre’	g/m^2	1131.5	1168.8	1207.3	1127.9	1256.8
Test date		25/09/23	25/09/23	26/09/23	26/09/23	26/09/23
Measured thickness	mm	113.5	119.0	132.0	114.5	118.6
Test thickness	mm	90.0	90.0	90.0	90.0	90.0
Density	kg/m^3	12.6	13.0	13.4	12.5	14.0
Heat-flux	W/m^2	12.62	12.73	12.55	13.10	11.75
Thermal resistance	m^2K/W	2.06	2.04	2.07	1.99	2.21
Thermal conductivity	W/mK	0.0437	0.0441	0.0434	0.0453	0.0407
Difference between heat flux transducers	%	0.9	2.0	1.5	0.2	1.2

* 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 Batts R2.0
Description of contents	Glass wool insulation
Name of manufacturer/supplier	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	R2.0 at a mean temperature of 23°C
Number of pieces	34
Nominal total area	22.88 m^2
Nominal length, width, and thickness	1160 mm, 580 mm, 90 mm
Nominal net weight of contents or supplied quantity	20.59 kg

(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}	2.07	m^2K/W
λ_{mean}	0.0434	W/mK
Std. dev. of 10 test samples	3.5	%
$R_{50/90}$	2.04	m^2K/W
$\lambda_{50/90}$	0.0441	W/mK

This is the end of the report