



THERMAL TEST LABORATORY cc.

(Reg. Nr. 2005/124190/23)

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RESEARCH AND DEVELOPMENT TESTING FOR AFRICHILL – ABOARD REFRIGERATION

Africhill requested TTL to conduct Adhesion/Tensile tests on thermal insulated panels consisting of a 0.5 mm Chromadek sheet with a 20kg/m³ Expanded Polystyrene (EPS) core. The test results and in particular the mode of failure would then be reported on.

Test sample description:

Two ±500 mm by ±500 mm thermal insulation panel sections were received consisting of 0.5 mm white Chromadek IBR(profile smaller than 5 mm) profiled sheet on both sides with a 20kg/m³ EPS core. The sample panels were 75 mm thick in total. The sampling method used for extracting these sections of panel is unknown.

Test specimen description:

The test specimens were extracted out of the received sample by means of a fine tooth band saw. Specimen dimensions were ±100 mm wide and ±100 mm long.

Great care was taken to limit the vibration of the steel sheets during extraction as this could cause the steel sheets to partially delaminate from the core material having a direct affect on the test results.

Test specimens one to five were extracted out of only one of the panels of the received sample. See annexure-A for the specimen extraction plan used for this test.

After extraction the test specimens were conditioned for 48 hours at 25 C° (±15 C°) and 45 % RH (±10 %).

The test Specimens were then measured and weighed before commencing with the test. See annexure-B for specimen dimensions and calculated densities.

Test procedure:

Each test specimen was laminated to 20mm thick laminated wooden boards, with the wooden boards facing the Chromadek sheets of the specimen. The flatness of the wooden boards were within 0.5 mm. The surfaces of the wooden boards were also sanded to maximize the contact area for adhesion. The adhesive was then allowed to cure for 15 minutes under a compressive force of 250 N (± 5 N).

The test was conducted on a 5 KN compressive/tensile test bench. The crosshead speed was set to 10 mm/min. The tensile force and the elongation of each specimen were then logged during the test. After all specimens were tested a photo was taken of the failure surfaces to record the mode of failure.

Test results:

Test specimen no.	Maximum recorded force (N)	Tensile strength (kPa)	Corresponding deflection (mm)	Mode of failure
1	3140	312.1	3.6	± 30 % on adhesive surface and ± 70 % in core material.
2	2892	288.9	3.3	± 10 % on adhesive surface and ± 90 % in core material.
3	2680	267.5	3.1	± 20 % on adhesive surface and ± 80 % in core material.
4	2608	260.8	3.0	0 % on adhesive surface and 100 % in core material.
5	2438	243.8	2.9	± 5 % on adhesive surface and ± 95 % in core material.



	Maximum recorded force (N)	Tensile strength (kPa)	Corresponding deflection (mm)
Mean value:	2752	274.6	3.2
Standard deviation:	271	26.5	0.3

Photo of the failure surfaces of each specimen can be found in annexure-C.

Conclusions:

The adhesion failure pattern was inconsistent, in some cases the core material failed first and in other cases it was the adhesion to the Chromadek sheets that failed first.

Definitions:

Maximum recorded force: The maximum recorded force during the test, this force was also the measured force at the moment of failure for all tested specimens.

Tensile strength: The maximum calculated tensile stress recorded during the test. This stress was also the measured stress at the moment of failure for all tested specimens.

Corresponding deflection: The maximum measured extension of the tested specimen. This is the elongation of the specimen at the moment of failure.

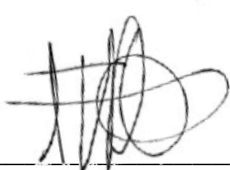
Notes:

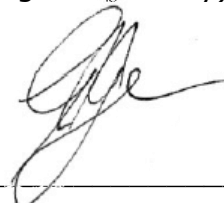
This test was performed in accordance with EN 1607:1997

TTL is a SANAS accredited test laboratory and the above mentioned standard does not fall inside the TTL schedule of accreditation.

Test officer: A P J van der Walt
(Technical Signatory)

Results verified by: Dr. G J Genis
(Manager Signatory)





Date: 11 / 07 / 2011

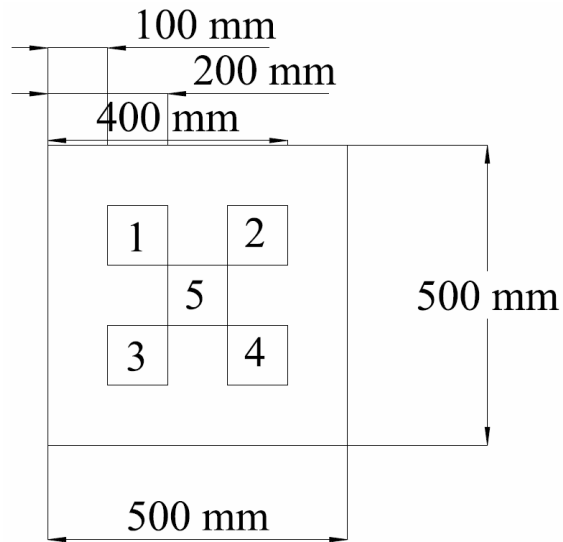


Disclaimer:

The test report and results only relate to products or samples submitted for testing. It does not imply TTL approved of the quality and/or performance of the item(s) in question and the test results do not apply to any similar item(s) that have not been tested. The test report shall not be reproduced except in full, without written approval from TTL. Tests marked "Not SANAS accredited" in this report are not included in the SANAS Schedule of accreditation for this laboratory.

END OF REPORT

ANNEXURE – A



ANNEXURE – B

Specimen no:	Mass (g)	Thickness (mm)	Width (mm)	Length (mm)	Area weighted density (kg/m ²)	Volumetric density (kg/m ³)
1	99.30	74.9	100.1	100.3	9.89	132.1
2	99.20	75.2	100.0	100.1	9.92	131.9
3	99.45	75.1	100.1	100.1	9.94	132.3
4	99.45	75.0	100.0	100.0	9.95	132.6
5	99.30	74.9	100.0	100.1	9.92	132.4

	Area weighted density (kg/m ²)	Volumetric density (kg/m ³)
Mean value:	9.9	132.3
Standard deviation:	0.02	0.28

ANNEXURE – C

Tested specimens (1 to 5 from bottom to top)



Force extension curves:

