MASTERGRAIN™
REDEFINING THE ENTRY DOOR

Thermal Testing Results

Testing completed on 35.75 x 83 Six Panel Oak Grain Slab.
Testing preformed and documented by Weber Manufacturing Technologies Inc.

WEBER

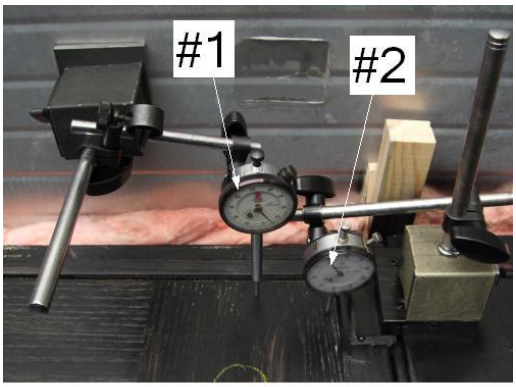
1 Introduction

Weber Manufacturing conducted a Thermal test on a MasterGrain door slab to prove the resistance of thermal bow. The test samples outlined in section #3 were all in good condition and the test was started on May 1, 2009 thru till May 6, 2009. This report gives the detailed information of the evaluation of MasterGrain slabs thermal bowing resistance. All results shown below have been documented by Weber Manufacturing according to guidelines and procedures put in place by Weber Manufacturing.

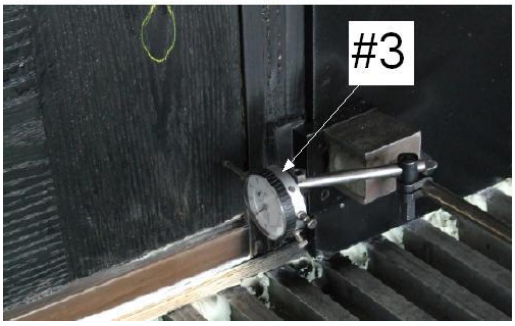
2 Test Installation and Procedures

A 2x6 stud wall with door assembly was installed into a refrigeration unit, which was fully insulated and sealed. The inside of the unit was to simulate outdoor temperature extremes as seen in severe winter conditions and the outside of the container would represent the inside conditions of a home. All holes and small voids were then stuffed with batt insulation or filled with low expansion spray foam. The door clearances were no less than .060" and no greater than .100" to ensure the door was not binding prior to the test start up. All weather seals were checked for good compression and seal. The dead bolt and lock set were tested to ensure they were functioning without any interference. Prior to applying the cold temperatures to the inside of the unit we installed indicators in three positions on the door to monitor the movements under thermal differences. See Images 2-1 thru 2-3 for the indicator positions.

2-1



2-2



2-3

3 Thermal Testing of MasterGrain slabs - Testing Samples and Assembly Description

Component	Size / Configuration	Details	Part Number	Manufacturer
MasterGrain Door Slab	6 Panel Oak 1.72" x 35.75" x 83"	**Skins:** Fiberglass .085-.095 thick, 18% glass with polyester resin. Material: CSP - SMC 520B	SK-O-3480-6P	Pasda
		Stiles: Engineered LSL wood with .63 hardwood caps	N/A	Weyerhauser
		Top Rail: Weyerhauser, 1.0" Wood Composite	N/A	Weyerhauser
		Bottom Rail: Weyerhauser, 1.5" Wood Composite	N/A	Weyerhauser
		Core: Urethane Foam CE 101 (density 1.1 lbs/ft cubed)	CR 857	Voracor
Jambs	6/ 916"	Finger jointed pine construction	N/A	N/A
Sill	5 5/8" x 1 3/8"	Z Classic sill - black anodized aluminum.	ZAIL5625F	Endura
Sill Extension	3" x 5° / 7°	Black anodized aluminum.	XXW / XXW7	Endura
Seal	Perimeter Weather Strip	Compression seal with .650" reach	V-9650	Loxcreen
Sweep	Door Bottom Weather Seal	Fixed Kerf Style Sweep	V-2964	Loxcreen
Hinges	Standard 4" x 4" Steel	Plain steel standard hinges. Brass plated	N/A	N/A
Lock Set	Standard	Plain Brass Dead Bolt with single lock set handle	N/A	Weiser
Indicators	Plunger Dial Indicators	Indicator #1 - Last calibrated on 06-Nov-08	1000 R	Lawson
		Indicator #2 - Last calibrated on 06-Nov-08	2416 F	Mitutoyo
		Indicator #3 - Last calibrated on 06-Nov-08	2416 F	Mitutoyo
Wall Construction	2 x 6 stud wall	2 x 6 Studs	STD.	STD.
		Fiberglass insulation R20	STD.	STD.
		1/2" Plywood sheeting & Reinforcement	STD.	STD.
		1/2" Drywall sheeting on the inside.	STD.	STD.
		Vapor Barrier	STD.	STD.
		All cracks and holes to be stuffed with insulation.	STD.	STD.
Refrigeration Container	30’ insulated container	Capable of reaching temperatures up to –30°C	R-134A	Carrier

4 Thermal Testing of MasterGrain Slabs – Testing and Evaluation of Results

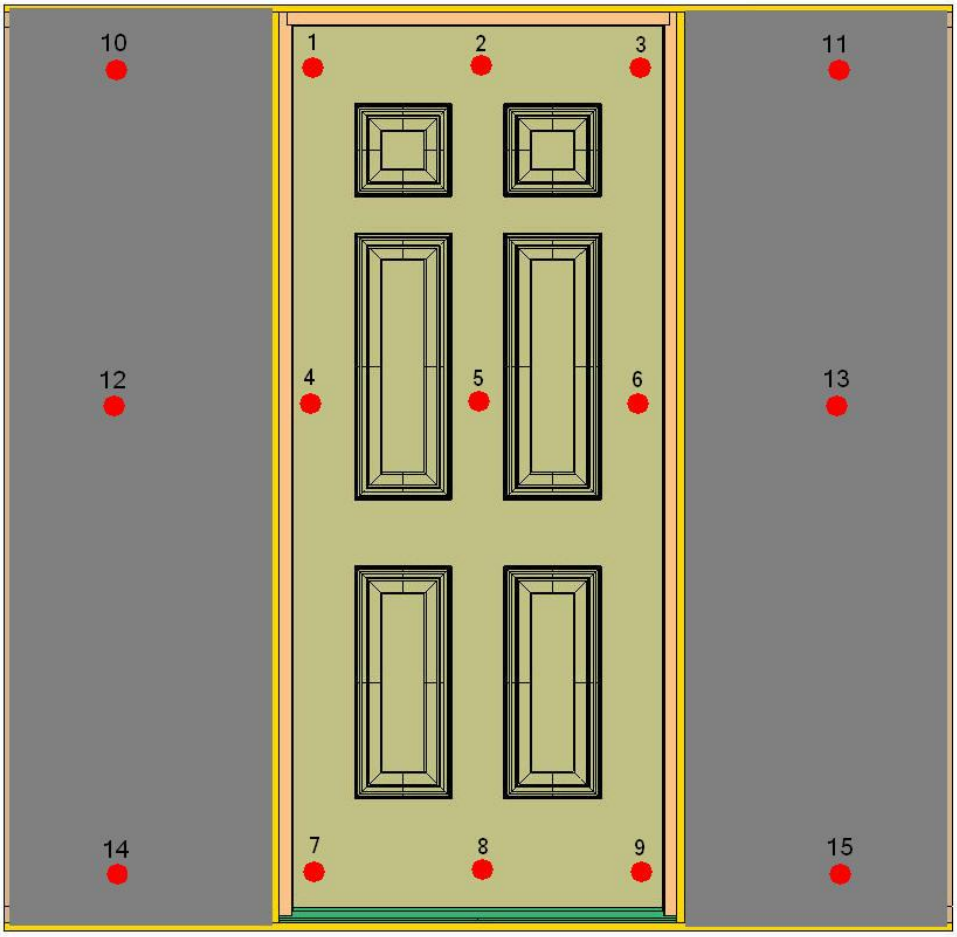
The door slab proved very well throughout the duration of the test, with very minimal thermal bow. At no time did the door slab ever bow of twist more that the allowable limits of the weather seals. The indicators were checked on separate occasions for each temperature range over the four-day period. Indicator #1 was mounted on the roof of the container and Indicator's #2 & 3 were mounted against the wall structure to give independent readings. The difference between indicator #1 & 2 were very minimal, showing that the wall was very stable and not affected by the thermal differences.

Category Descriptions: "Outside Set Point °C" is the current room temperature or "Ambient Air".
"Inside Set Point °C" is what the refrigeration unit is set to.
"Inside Sensor °C" is a thermostat located inside the refrigeration unit.
"Outside Sensor °C" is a thermostat located outside the refrigeration unit in the room temperature.
"Actual Surface Temp Checks °C" are surface locations checked with a pyrometer. See Chart on page 5

Thermal Testing – Documented Thermal Bow Results

Date	Time	Inside Set Point °C	Outside Set Point	Inside Sensor °C	Outside Sensor °C	Actual Surface Temp Checks °C	Top of Door Indicator #1	Top of Door Indicator #2	Bottom of Door Indicator #3	Thermal Imaging Camera File Reference Number
1-May-09	2:00 PM	Ambient	Ambient Air	24.4	24.2	See Chart	0.000	0.000	0.000	010509-200-TI
1-May-09	3:00 PM	-10	Ambient Air	-7.6	24.2	See Chart	-0.050	-0.045	0.040	Not Recorded
4-May-09	9:00 AM	-10	Ambient Air	-10.5	20.1	See Chart	-0.075	-0.070	-0.020	040509-900-TI
4-May-09	11:00 AM	-15	Ambient Air	-15.1	23.4	See Chart	-0.080	-0.078	-0.038	Not Recorded
4-May-09	1:00 PM	-15	Ambient Air	-15.2	24.1	See Chart	-0.083	-0.080	-0.042	040509-1100-TI
4-May-09	4:00 PM	-20	Ambient Air	-20.0	24.9	See Chart	-0.095	-0.085	-0.070	Not Recorded
5-May-09	9:00 AM	-20	Ambient Air	-19.7	21.2	See Chart	-0.094	-0.083	-0.065	050509-400-TI
5-May-09	11:00 AM	-25	Ambient Air	-24.3	22.6	See Chart	-0.105	-0.091	-0.070	Not Recorded
5-May-09	1:00 PM	-25	Ambient Air	-24.9	23.4	See Chart	-0.106	-0.093	-0.702	Not Recorded
5-May-09	4:00 PM	-30	Ambient Air	-29.3	24.5	See Chart	-0.116	-0.101	-0.073	050509-900-TI

5 Thermal Testing of MasterGrain Slabs – Actual Surface Temperatures

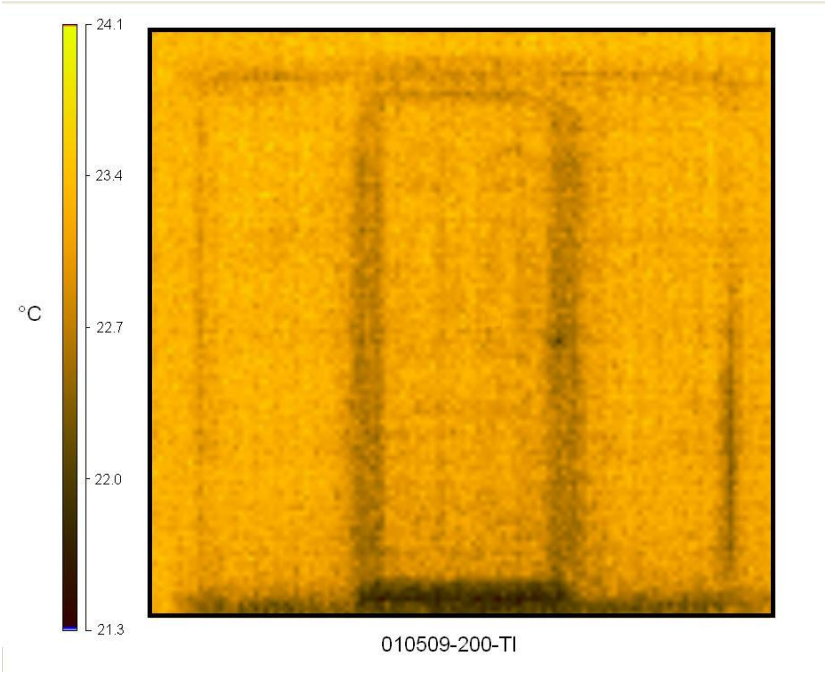


				Points Checked on Door & Wall with Pyrometer °C														
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Date	Time	Inside Sensor °C	Outside Sensor ° C															
1-May-09	3:00 PM	-7.6	24.2	24.1	24.1	24.2	23.9	24.0	24.0	23.8	23.8	23.7	24.2	24.1	24.1	24.0	23.9	23.8
4-May-09	9:00 AM	-10.5	20.1	16.2	19.5	15.9	15.9	19.4	15.7	15.1	18.8	15.4	21.6	21.4	21.2	21.1	20.5	20.4
4-May-09	11:00 AM	-15.1	23.4	18.9	22.2	18.5	18.8	22.4	18.4	17.4	21.1	17.6	23.2	23.9	24.0	24.1	23.2	23.7
4-May-09	1:00 PM	-15.2	24.1	19.1	22.5	18.6	19.0	22.4	18.5	17.6	21.4	17.8	23.3	23.9	24.1	24.2	23.4	23.7
4-May-09	4:00 PM	-20.0	24.9	19.1	22.3	18.6	18.0	22.3	16.7	16.1	21.1	16.5	23.3	23.7	23.8	24.0	22.9	23.2
5-May-09	9:00 AM	-19.7	21.2	16.7	19.9	16.7	15.8	19.9	15.9	14.7	19.0	15.8	20.8	21.1	21.5	21.6	20.7	20.9
5-May-09	11:00 AM	-24.3	22.6	16.5	20.4	16.6	15.7	20.8	15.7	15.6	19.7	14.8	21.7	22.4	22.5	23.1	21.8	22.3
5-May-09	1:00 PM	-24.9	23.4	16.7	21.4	16.9	16.2	21.2	16.1	16.0	20.9	15.8	22.1	22.2	21.9	21.7	21.4	21.6
5-May-09	4:00 PM	-29.3	24.5	17.1	21.9	17.2	17.1	22.5	17.2	15.5	20.5	15.3	23.2	24.1	24.1	24.5	23.5	23.8

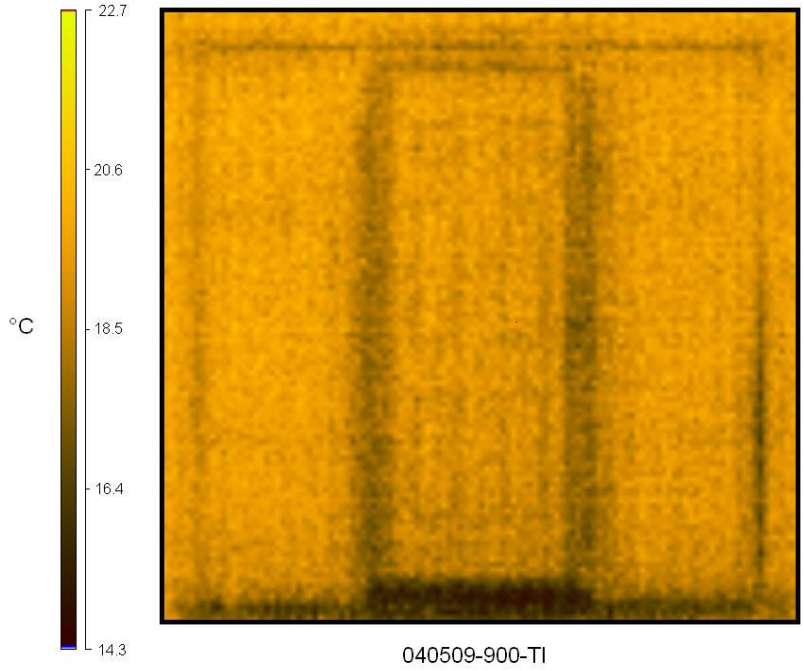
6 Thermal Imaging Camera Pictures (page1 of3)

On separate occasions throughout the testing procedure thermal imaging picture were taken. These pictures illustrate the temperature differences between the door slab and the wall. The most notable area of temperature loss was found along the stiles of the door slab and sill.

Thermal Imaging Camera used: **Raytek Thermo View Ti30 - High performance Thermal Imager**

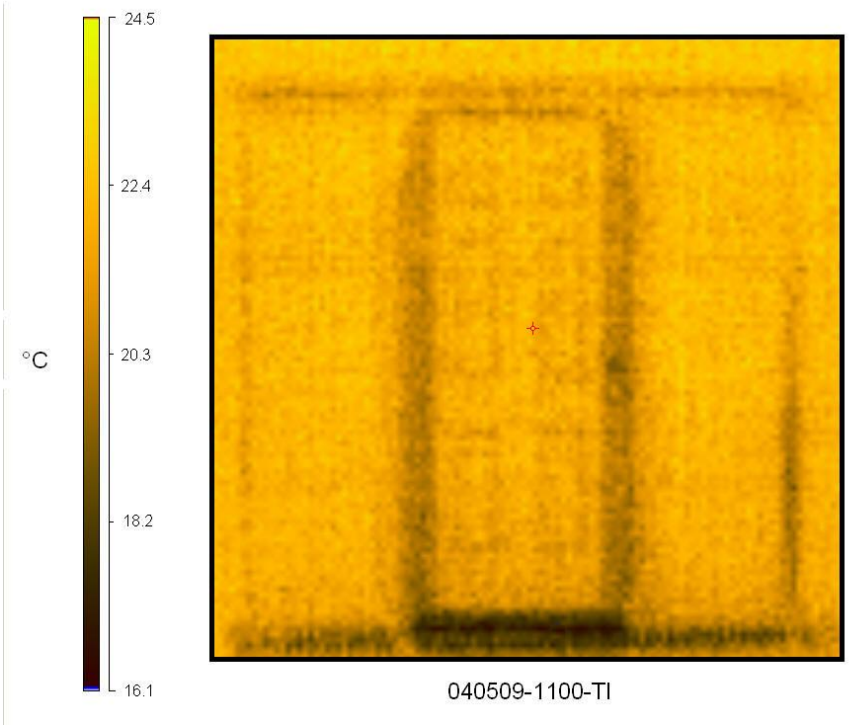


010509-200-TI



040509-900-TI

Thermal Imaging Camera Pictures (page 2 of 3)



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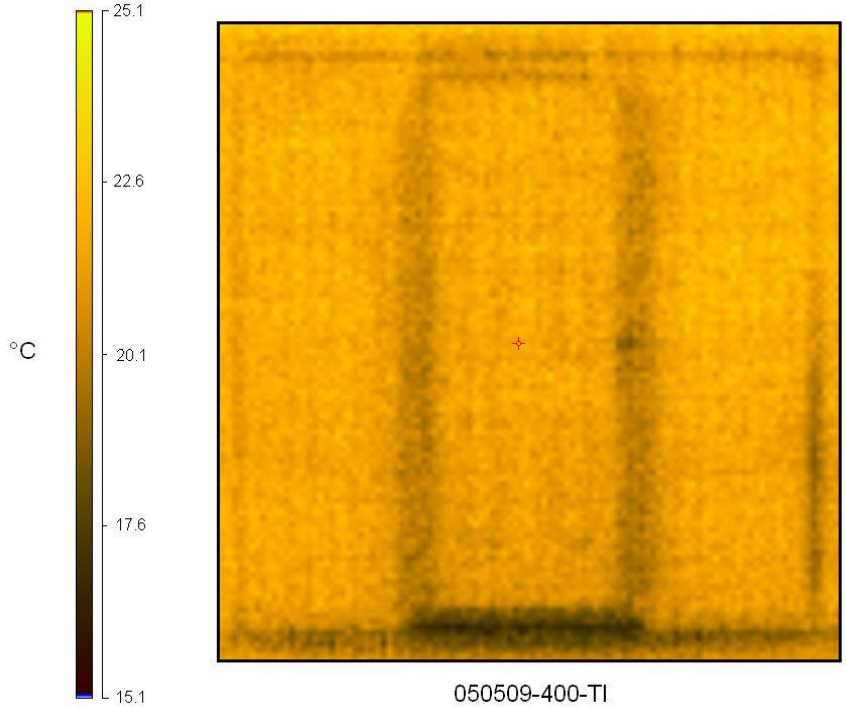
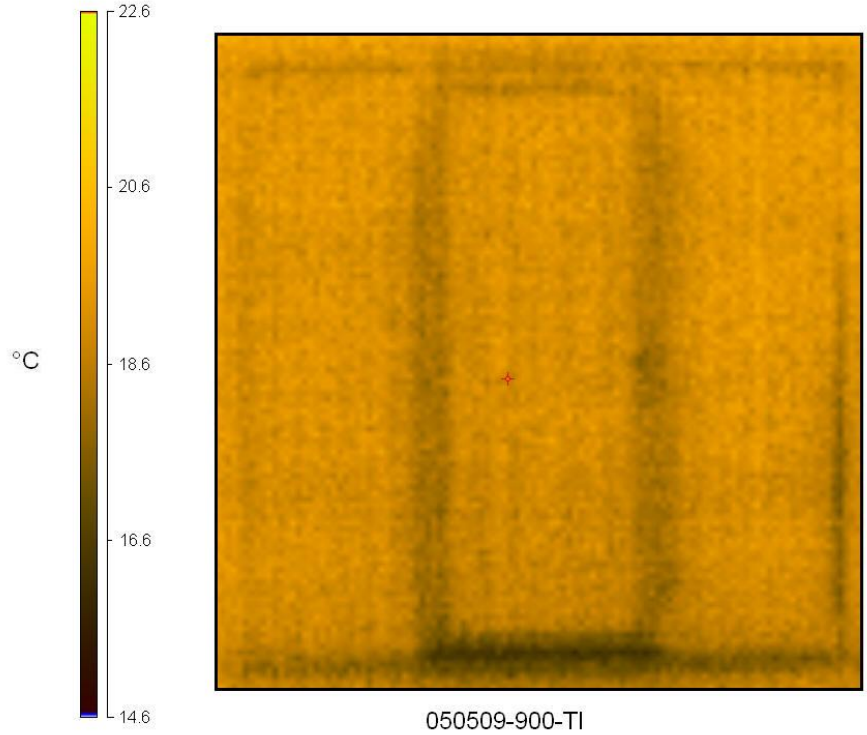


050509-400-TI

Thermal Imaging Camera Pictures (page 3 of 3)



050509-900-TI

6 Conclusion

The MasterGrain 6 Panel Slab 3’0” by 7’0” with the polyurethane foam core, engineered wood stiles and composite top and bottom rails, complied well within the limits of thermal bowing acceptance. At no time during the 4-day test did the slab ever loose contact with the weather seals. The maximum recorded movement of 0.116” was located at the top of the door with a recorded inside temperature of –29.3°C and a recorded outside temperature of 24.5°C.

This report does not automatically imply that every slab will perform as documented in this test. All data was recorded in a controlled environment to simulate severe temperature differences.

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