



NATIONAL CERTIFIED TESTING LABORATORIES

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STRUCTURAL, IMPACT, CYCLIC & FORCED ENTRY RESISTANCE PERFORMANCE TEST REPORT

REPORT NO.: 210-1940-1,2,3,4 (S)(C)(I)(F)
TEST DATE: 05-30-97
REPORT DATE: 06-15-97
EXPIRATION DATE: 06-30-01 (NCTL)

LAB CERTIFICATION NO.: 94-0323.47

CLIENT: Therma Tru
108 Mutzfeld Road
Butler, IN 46721

TEST SPECIMEN: Therma Tru's Model "Fiberclassic" Double Inswinging Patio Doors.
(Design Pressure Interior Negative = 60.0 psf) (Design Pressure Exterior Positive = 50.0 psf)

TEST SPECIFICATIONS: Dade County Building Code Compliance Office Protocol PA 202-94, "Criteria For Testing Impact And Non-Impact Resistant Building Envelope Components Using Uniform Static Air Pressure". And The South Florida Building Code Chapter 36, Paragraph No. 3603.2 (b) (5). Dade County Building Code Compliance Office Protocol PA 201-94, "Impact Test Procedures". Dade County Building Code Compliance Office Protocol PA 203-94, "Criteria For Testing Products Subject To Cyclic Wind Pressure", South Florida Building Code Chapter 2314.5, "Fatigue Load testing". South Florida Building 1994 **Broward County Edition** of Chapter 2316.6, 2316.7, 2315 and 2335.

Missile (Data) 2 x 4 Southern Yellow Pine S4S
Length: 6'0-3/4"
Weight: 9 lbs.
Velocity: 50 ft. per second 34 mph

TEST SPECIMEN DESCRIPTION

NOTE: Specimen No. 1 employed full glass inserts and was tested to PA 202-94 and forced entry. (See description)
Specimen No. 2,3 and 4 were flush fiberglass and were tested to all protocols.

Series/Model: "Fiberclassic"

Type: Inswinging Two (2) Panel Patio Door/Wood Frame/Aluminum Threshold (XX).

Overall Size: 6'2-1/2" wide by 8'2" high.

Configuration: Double Inswing (XX)

Number and Size of Slab: Two slabs, right active slab measured 3'0" wide x 7'11-1/4" long x 1-11/16" thick.

PROFESSIONALS IN THE SCIENCE OF TESTING

NOTE: Specimen No. 1 employed full glass inserts and was tested to PA 202-94 and forced entry. (See description)
Specimen No. 2,3 and 4 were flush fiberglass and were tested to all protocols.

Material Characteristics:

Frame Material: Wood frame, extruded aluminum threshold, combination wood/extruded aluminum astragal.

Glazing Note: Only specimen No. 1 employed the following glass description.

Material: 1/8" clear tempered.

Method: The glass unit was mechanically captured between interior and exterior plastic (lite frame) glazing stops (surrounds). The glass bite on the lite frames was 1/2". Eighteen (18) (#6 x 1-3/4") screws were used to capture the plastic stops, six (6) at each; three (3) at the top and three (3) at the bottom. The plastic surrounds were sealed to the exterior and interior skins with structural silicone.

Daylight Opening: The daylight opening was 19" wide by 79" long. (Specimen No.1 only)

Frame Construction: Jambs and head were constructed from 4-5/8" wide by 1-1/4" thick wood sections. The threshold was of extruded aluminum with integral wood substrate and weatherseal. The sill measured 0.850" high. The head/jamb corners were coped, butted and fastened using three 2-1/2" staples per corner. The sill/jamb corners were butted and sealed using 2-1/2" staples per corner through the jamb into integral wood block in the sill. The astragal was assembled using seven (#7 x 1-1/2") screws into the inactive slab.

Door Slab Construction: The door slabs were constructed from 0.018" thick fiberglass skins. The perimeters of each door employed wood blocking. The interior cavity of each door was filled with rigid polyurethane.

Astragal: A combination wood/aluminum "Therma Tru H-Series" astragal was fitted to the passive door panel lock side edge. The section employed an extruded aluminum core shape with details that fit to wood molding trim pieces at the inside and outside faces. The astragal was fastened to the door edge with five (5) #10 x 1" pan head screws. The astragal employed flush bolts at top and bottom housed in the extruded aluminum core shape. Each bolt was steel, 5/16" diameter, 18-7/8" long. Bolt throw at top and bottom was 1". The astragal was reinforced at top and bottom by 1/8" thick mounting brackets each fastened directly to the door edge with four (4) # 12 x 1-1/2" flat head screws. The brackets had "sleeve ears" each bent 90 degrees to the door edge face, the ears being bored with .340 inch guide holes for the 5/16" bolts. The brackets were to transfer reaction loads from the door panel, when under load, to the bolts. Strikes for latch and deadbolt were ANSI standard residential grades, 2-1/4" length, lipped for latch and unlipped for deadbolt. Strikes were fastened through plastic astragal mounting blocks and into door edge each with two (2) #7 x 1-1/2" flat head screws.

Note: The astragal was adhered to the right slab with structural silicone.

Strikes: For latch and deadbolt were ANSI standard residential grades 2-1/4" length, lipped for latch and unlipped for deadbolt. Strikes were fastened through plastic astragal mounting blocks and into door edge each with two (2) (#10 x 1-1/2") screws.

Weatherstripping: One row of thermoplastic compression weatherstrip was used at the head, jamb and astragal. The sill had an integral thermoplastic compression seal built in. Caulk was used to backbed the weatherstrip. A dual durometer multi flexible leaf strip was affixed to the bottom edge of each slab. A flexible bulb vinyl weatherseal was located at the astragal. One (1) centerfin dust pad was located at the aluminum threshold directly under the astragal. A flexible neoprene gasket was located at each end of the astragal.

Hardware:

<u>Description</u>	<u>Quantity</u>	<u>Location</u>
4" butt-type	6	14", 47-1/2", 81-1/2" from top of each door slab.
Lockset: Residential-grade locking passage type, tubular, mounts in 2-1/8" diameter crossbore	1	60" from door slab top
Astragal Integral Slide Bolt	2	12" from each end of left slab steel keepers at head and drilled a 7/16" hole at threshold.
Deadbolt: Residential grade single with inside latch-turn, mounts in 2-1/8" diameter crossbore	1	54" from door slab top

Sealant: A small-joint sealant was applied to the jamb/sill corners. An adhesive caulk was used to seal the plastic glazing surrounds to the slab skins. (Specimen No. 1 only). Each specimen's astragal was sealed to the right slab with a structural silicone.

Installation: The unit was mounted into the pressure treated wood 2 x 8 surround using (# 10 x 2-1/2" wood) screws located as follows: Eight (8) screws per side jamb starting at 6" from the top of the unit on 12" centers; seven (7) screws centered along the head jamb on 12" centers and one (1) through the sill at midspan. An adhesive caulk was used to seal the threshold to the buck.

STRUCTURAL TEST RESULTS
SPECIMEN NO. 1S (Inswing) (full glass insert)

<u>PARAGRAPH NO.</u>	<u>TITLE OF TEST</u>	<u>MEASURED</u>	<u>ALLOWED</u>
2.1.2/5.2.7	Air Infiltration (ASTM E-283) 1.57 psf (25 mph)	0.17 CFM/FT ²	0.20 CFM/FT ²
2.1.4/5.2.4	Design Loads (30 seconds) 50.0 exterior design pressure 60.0 interior design pressure		Meets as stated Meets as stated
3.4/5.2.5	Uniform Structural Loads Full Loads (30 seconds) 75.5 psf exterior 90.0 psf interior	0.201" 0.222"	0.384" 0.384"

STRUCTURAL TEST RESULTS
SPECIMEN NO. 2S (Inswing) (flush fiberglass)

<u>PARAGRAPH NO.</u>	<u>TITLE OF TEST</u>	<u>MEASURED</u>	<u>ALLOWED</u>
2.1.2/5.2.7	Air Infiltration (ASTM E-283) 1.57 psf (25 mph)	0.20 CFM/FT ²	0.20 CFM/FT ²
2.1.4/5.2.4	Design Loads (30 seconds) 50.0 exterior design pressure 60.0 interior design pressure		Meets as stated Meets as stated
3.4/5.2.5	Uniform Structural Loads Full Loads (30 seconds) 75.0 psf exterior 90.0 psf interior	0.244" 0.301"	0.384" 0.384"

IMPACT TEST RESULTS
SPECIMEN NO. 2 (I) (Inswing) (flush fiberglass)

<u>Impact No.</u>	<u>Location/Comments</u>	<u>Deflection Results</u>	<u>Set Results</u>
Impact No. 1:	Center of left active door panel/ "minimal crack in exterior skin only" meets as stated	0.371"	0.034"
Impact No. 2:	Lower corner opposite hinges/meets as stated - 6" from corners	1.671"	0.316"
Impact No. 3:	Midspan of astragal/meets as stated	0.467"	0.021"
Impact No. 4:	Bottom edge of right active panel. (midspan)/ "minimal crack in exterior skin only" meets as stated	0.501"	0.039"

IMPACT TEST RESULTS
SPECIMEN NO. 3 (I) (Inswing) (flush fiberglass)

<u>Impact No.</u>	<u>Location/Comments</u>	<u>Deflection Results</u>	<u>Set Results</u>
Impact No. 1:	Center of left active door panel/ "minimal crack in exterior skin only" meets as stated	0.761"	0.066"
Impact No. 2:	Lower corner opposite hinge/ meets as stated	0.141"	0.416"
Impact No. 3:	Midspan of astragal/meets as stated	0.318"	0.020"
Impact No. 4:	Bottom edge of right active panel. (midspan) "minimal crack in exterior skin only" meets as stated	0.391"	0.030"

IMPACT TEST RESULTS
SPECIMEN NO. 4 (I) (Inswing) (flush fiberglass)

<u>Impact No.</u>	<u>Location/Comments</u>	<u>Deflection Results</u>	<u>Set Results</u>
Impact No. 1:	Center of left active door panel/ "minimal crack in exterior skin only" meets as stated	0.491"	0.031"
Impact No. 2:	Lower corner left active door panel/ meets as stated	0.126"	0.317"
Impact No. 3:	Midspan of astragal/meets as stated	0.177"	0.017"
Impact No. 4:	Bottom edge of right active panel. (midspan) "minimal crack in exterior skin only" meets as stated	0.217"	0.019"

FATIGUE LOADING TESTING (Table 23F)

TEST RESULTS

Positive Design Pressure = 50.0 psf
 Negative Design Pressure = 60.0 psf

**POSITIVE PRESSURE RESULTS ((Inward Acting)
SPECIMEN NO. 2C (Inswing)**

Maximum Deflection = 2.021"
 Maximum permanent set = 0.019"

**POSITIVE PRESSURE RESULTS (Inward Acting)
SPECIMEN NO. 3C (Inswing)**

Maximum Deflection = 3.001"
 Maximum permanent set = 0.029"

**POSITIVE PRESSURE RESULTS (Inward Acting)
SPECIMEN NO. 4C (Inswing)**

Maximum Deflection = 2.217"
 Maximum permanent set = 0.021"

**NEGATIVE PRESSURE RESULTS (Outward Acting)
SPECIMEN NO. 2C (Inswing)**

Maximum Deflection = 3.170"
Maximum permanent set = 0.031"

**NEGATIVE PRESSURE RESULTS (Inward Acting)
SPECIMEN NO. 3C (Inswing)**

Maximum Deflection = 3.967"
Maximum permanent set = 0.038"

**NEGATIVE PRESSURE RESULTS (Outward Acting)
SPECIMEN NO. 4C (Inswing)**

Maximum Deflection = 4.162"
Maximum permanent set = 0.040"

NOTE: Each specimen showed no resultant failure or distress locks remained engaged and doors were operable at completion of tests.

All measurement readings taken using Mitutoyo Dial Indicator Gauges, digital deflection measurer and were taken at midspan of astragal. (See fastener diagram)

INWARD POSITIVE ACTING PRESSURE TABULATIONS

<u>RANGE</u>	<u>NO. OF CYCLES</u>	<u>DURATION PER CYCLE</u>
0.0 psf to 25.0 psf	600	One (1) second
0.0 psf to 30.0 psf	70	One (1) second
0.0 psf to 78.0 psf	1	Two (2) seconds

OUTWARD NEGATIVE ACTING PRESSURE TABULATIONS

<u>RANGE</u>	<u>NO. OF CYCLES</u>	<u>DURATION PER CYCLE</u>
0.0 psf to 30.0 psf	600	One (1) second
0.0 psf to 36.0 psf	70	One (1) second
0.0 psf to 78.0 psf	1	Two (2) seconds

Maximum positive pressure = 50.0 psf
Maximum negative pressure = 60.0 psf

**FORCED ENTRY RESISTANCE
TEST RESULTS SPECIMEN NO 1F (Inswing) (glass insert)**

<u>PARAGRAPH NO.</u>	<u>TITLE OF TEST</u>	<u>MEASURED</u>	<u>ALLOWED</u>
Test No. 1	Hand & Tool Manipulation	Meets as stated	
Test No. 2	Hand & Tool Manipulation/300 lbf.	Meets as stated	

**FORCED ENTRY RESISTANCE
TEST RESULTS SPECIMEN NO 2F (Inswing) (flush steel)**

<u>PARAGRAPH NO.</u>	<u>TITLE OF TEST</u>	<u>MEASURED</u>	<u>ALLOWED</u>
Test No. 1	Hand & Tool Manipulation	Meets as stated	
Test No. 2	Hand & Tool Manipulation/300 lbf.	Meets as stated	

TEST COMPLETED: 05-30-97

Structural Test Notes: Specimen No. 1 employed full glass lites. Specimen No. 2,3 and 4 was of flush fiberglass skins.

The products tested meets the criteria for Chapter 2309, 3603 and 3604 of the South Florida Building Code Broward County Edition and Protocol PA 202-94.

NOTE: At the conclusion of the testing there was no damage to the specimen. Locks remained engaged and normal operation of the door was observed.

Impact test Notes:

Two (2) mill visqueen was used for uniform static loads and did not effect the specimen performance.

Deflection and permanent set readings taken at opposite side of slab using calibrated dial indicators and collapsible rigid duct work.

NOTE: At the conclusion of each impact, the locks remained engaged and normal operation of the door was observed. Very minimal cracks were detected in exterior skin only.

The product tested meets the criteria of the South Florida Building Code Broward County Edition Chapter 35 and Protocol PA 201-94 of Metro-Dade Co. of Florida.

Cyclic (Fatigue Load Table 23F) Test Notes:

NOTE: At the completion of all testing no damage to the specimens or hardware to cause the specimens inoperable was observed

Two (2) mill visqueen was used to achieve pressures and did not effect the performance of the specimen.

The specimens were tested in accordance with Protocol 203-94 and meet the requirements for Chapter 3508 and 2314 of the South Florida Building Code.

*Permanent set measured readings recorded using a Mitutoyo Dial Indicator gauge and were taken at midspan of astragal.

Forced Entry Test Notes:

The specimens tested meet the criteria of Chapter 36 of the South Florida Building Code Broward Edition for Forced Entry Resistance.

NOTE: 300 lb. Forces were attached to the active door panel within 3" of the locking devices in the direction that would tend to open it. (Test # 2) pull forces were applied simultaneously with hand & tool manipulation.

At the conclusion of the testing, no damage to the specimen or hardware was observed.

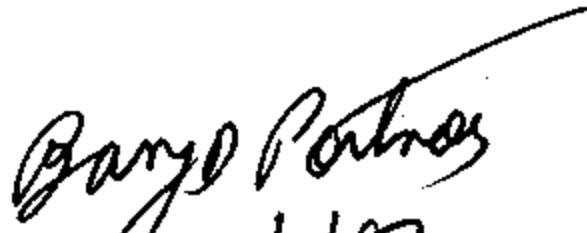
Pull test forces of 300 lbs. were achieved by use of geared pull along devices and measured with Dillon Force Gauges. Hand and tool manipulation were performed with steel wire, heavy duty screw driver and a heavy duty putty knife.

Detailed drawings were available for laboratory records and compared to the test specimen at the time of this report. A copy of this report along with representative sections of the test specimen will be retained by NCTL for a period of four (4) years. The results obtained apply only to the specimen tested.

Testing Witnessed by: Barry Portnoy, Professional Engineer (NCTL)
Mr. Michael Lane (NCTL)
Mr. John Williams (NCTL)
Mr. Paul Loomis (NCTL)
Mr. Pat Miller (Therma Tru)

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