Architectural Testing

**AAMA/WDMA/CSA 101/I.S.2/A440-05**
**TEST REPORT**

**Rendered to:**

**FLEETWOOD WINDOWS AND DOORS**

**SERIES/MODEL: Kona 3800 Vertical TDL**
**PRODUCT TYPE: Fixed Window**

| Title | Summary of Results |
|---|---|
| Primary Product Designator | FW-C50 3048 x 3048 (120 x 120) |
| Design Pressure | ±2400 Pa (±50.13 psf) |
| Air Infiltration @ 300 Pa (6.27 psf) | <0.05 L/s/m$^2$ (<0.01 cfm/ft$^2$) |
| Air Infiltration @ 75 Pa (1.57 psf) | <0.05 L/s/m$^2$ (<0.01 cfm/ft$^2$) |
| Water Penetration Resistance Test Pressure ASTM E 331 | 580 Pa (12.11 psf) |
| Water Penetration Resistance Test Pressure ASTM E 547 | 580 Pa (12.11 psf) |
| Uniform Load Structural Test Pressure | ±3600 Pa (±75.19 psf) |
| Forced Entry Resistance | ASTM F 588 CAWM |

**Test Completion Date**: 11/19/09

Reference must be made to Report No. 94550.02-301-44, dated 08/10/10 for complete test specimen description and data.

2524 E. Jensen Ave
Fresno, CA 93706
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Architectural Testing

# AAMA/WDMA/CSA 101/I.S.2/A440-05 TEST REPORT

Rendered to:

FLEETWOOD WINDOWS AND DOORS
395 Smitty Way
Corona, California 92879

| | |
|---|---|
| Report No.: | 94550.02-301-44 |
| Test Dates: | 11/10/09 |
| Through: | 11/19/09 |
| Report Date: | 01/22/10 |
| Revision 3 Date: | 08/10/10 |
| Record Retention End Date: | 11/19/13 |

**Project Summary**: Architectural Testing, Inc. was contracted by Fleetwood Windows and Doors to perform and validate testing on a Series/Model Kona 3800 Vertical TDL fixed window. The sample tested successfully met the performance requirements for a FW-C50 3048 x 3048 (120 x 120) rating. Test specimen description and results are reported herein. The sample was provided by the client.

**Test Specification**: The test specimen was evaluated in accordance with the following

AAMA/WDMA/CSA 101/I.S.2/A440-05, *Standard/Specification for Windows, Doors, and Unit Skylights.*

CAWM 301, *Forced Entry Resistance Tests for Windows.*

**Test Specimen Description**:

**Series/Model**: Kona 3800 Vertical TDL

**Product Type**: Fixed

**Overall Size**: 3048 mm (120") wide by 3048 mm (120") high

**Daylight Opening Size**: 1454 mm (57-1/4") wide by 2972 mm (117") high

**Overall Area**: 9.29 $m^2$ (100.00 $ft^2$)

**Finish**: Anodized Aluminum

2524 E. Jensen Ave
Fresno, CA 93706
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**Test Specimen Description**: (Continued)

**Frame Construction**: All members were constructed of extruded aluminum. The vertical frame members' corners were routed to fit the horizontal framing members and fully sealed with silicone. The frame corners were attached using three (3) #10 1" long stainless steel Phillips head screws. The vertical frame member dividing each lite was attached with two (2) #10 1" long stainless steel Phillips head screws. All frame members were thermally broken.

**Weatherstripping**: No weatherstripping was utilized.

**Glazing Details**: The specimen utilized 1" thick annealed glass units fabricated from two 3/16" thick annealed sheets and a 5/8" thick airspace. The glass was set from the exterior against a vinyl bulb gasket and Tremco silicone at the interior. An aluminum glazing stop and a vinyl bulb gasket was applied from the exterior. The glass bite was 1/2".

**Drainage**:

| Description | Quantity | Location |
|---|---|---|
| 1/2" by 1/4" weep slots | 4 | 6" from all corners in the sill face |
| 2" by 1/2" weep slots | 4 | 6" from all sill corners in the glazing stop leg |
| 1" weep notch | 4 | 6" from corners in center leg of sill |

**Hardware**: No hardware was utilized.

**Reinforcement**: No reinforcement was utilized.

**Installation**: The test specimen was installed into a two layer nominal 2 x 8 Douglas Fir test buck. Thirty-two (32) #10 x 2" wood screws were located in all perimeter frame members located 6" from each corner and 16" on center. The rough opening was 1/4" wider and taller than the unit.

**Test Results**: The temperature during testing was 21°C (70°F). The results are tabulated as follows:

| Paragraph | Title of Test - Test Method | Results | Allowed |
|---|---|---|---|
| 5.3.2.1 | Air Leakage Resistance per ASTM E 283 | | |
| | 75 Pa (1.57 psf) | <0.05 L/s/m$^2$ (<0.01 cfm/ft$^2$) | 1.5 L/s/m$^2$ (0.3 cfm/ft$^2$) max. |
| | 300 Pa (6.27 psf) | <0.05 L/s/m$^2$ (<0.01 cfm/ft$^2$) | 1.5 L/s/m$^2$ (0.3 cfm/ft$^2$) max. |

***Note #1**: The tested specimen meets (or exceeds) the performance levels specified in AAMA/WDMA/CSA 101/I.S.2/A440-05 for air leakage resistance.*

5.3.3.2 Water Penetration Resistance per ASTM E 547 and E 331 See Note #2

***Note #2**: The client opted to start at a pressure higher than the minimum required. Those results are listed under "Optional Performance".*

5.3.4.2 Uniform Load Deflection per ASTM E 330 See Note #2

5.3.4.3 Uniform Load Structural per ASTM E 330 See Note #2

5.3.5 Forced Entry Resistance per ASTM F 588

| | | |
|---|---|---|
| Type: D | Grade: 10 | |
| Disassembly Test | No entry | No entry |
| Lock Hardware Manipulation Test | No entry | No entry |
| Forced Entry Resistance per CAWM | | |
| Type: V | | |
| Disassembly Test | No entry | No entry |
| Test A | No entry | No entry |
| Test B | No entry | No entry |

**Test Results**: (Continued)

| Paragraph | Title of Test - Test Method | Results | Allowed |
|---|---|---|---|
| | Optional Performance | | |
| 4.4.2.6 | Water Penetration Resistance per ASTM E 547 and E 331 | | |
| | 580 Pa (12.11 psf) | No leakage | No leakage |
| 4.4.2.6 | Uniform Load Deflection per ASTM E 330 | | |
| | (Deflections were taken on the vertical member) | | |
| | (Loads were held for 10 seconds) | | |
| | 2400 Pa (50.13 psf) (positive) | 27.5 mm (1.08") | See Note #3 |
| | 2400 Pa (50.13 psf) (negative) | 23.8 mm (0.94") | See Note #3 |

***Note #3**: The deflections reported are not limited by AAMA/WDMA/CSA 101/I.S.2/A440-05 for this product designation. The deflection data is recorded in this report for special code compliance and information only.*

| | | | |
|---|---|---|---|
| 4.4.2.6 | Uniform Load Structural per ASTM E 330 | | |
| | (Permanent sets were taken on the vertical member) | | |
| | (Loads were held for 10 seconds) | | |
| | 3600 Pa (75.19 psf) (positive) | 1.5 mm (0.06") | 9.1 mm (0.36") max. |
| | 3600 Pa (75.19 psf) (negative) | 0.8 mm (0.03") | 9.1 mm (0.36") max. |

Tape and film not used to seal against air leakage during structural testing.

**Drawing Reference**: The test specimen drawings have been reviewed by Architectural Testing and are representative of the test specimen reported herein.

**List of Official Observers**:

| Name | Company |
|---|---|
| Nathan Baker | Fleetwood Window and Doors |
| Tyler Westerling, P.E. | Architectural Testing, Inc. |

Detailed drawings, data sheets, representative samples of test specimens, a copy of this report, or other pertinent project documentation will be retained by Architectural Testing, Inc. for a period of four years from the original test date. At the end of this retention period, such materials shall be discarded without notice and the service life of this report will expire.

Results obtained are tested values and were secured by using the designated test methods. If test specimen contains glazing, no conclusions of any kind regarding the adequacy or inadequacy of the glass in the test specimen can be made. This report does not constitute certification of this product nor an opinion or endorsement by this laboratory. It is the exclusive property of the client so named herein and relates only to the specimen(s) tested. This report may not be reproduced, except in full, without the written approval of Architectural Testing, Inc.

For ARCHITECTURAL TESTING, INC.

Digitally Signed by: Tyler Westerling

Tyler Westerling, P.E.
Project Engineer

Digitally Signed by:Leaton Kirk

Leaton Kirk
Director – Regional Operations

TW:ss

Attachments (pages): This report is complete only when all attachments listed are included.

- Appendix-A: Alteration Addendum (1)
- Appendix-B: Test Equipment (1)
- Appendix-C: Photographs (1)
- Appendix-D: Drawings (3)

## Revision Log

| Rev. # | Date | Page(s) | Revision(s) |
|---|---|---|---|
| 0 | 01/22/10 | N/A | Original report issue |
| 1 | 02/22/10 | 2 | Updated glazing description to non-laminated |
| 2 | 03/01/10 | Cover, 1 | Changed Curtainwall to Fixed Window |
| 3 | 08/10/10 | Cover | Changed reference report date |

# Appendix A

## Alteration Addendum

**Alteration #1**: Date-10/01/09
Cause for alteration- Failed Uniform Load per ASTM E 330
Remedial action taken- Installation screws at head replaced with same size and type and less countersinking was employed.

# Appendix B

## Test Equipment

| Instrument | Manufacturer | Asset # |
|---|---|---|
| Spray rack | ATI | Mockup |
| Control Panel | ATI | 005062 |
| Linear Transducer | Celesco | 003431 |
| Linear Transducer | Celesco | 004487 |
| Linear Transducer | Celesco | 004486 |
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# Appendix C

## Photographs

**Photo No. 1**
**Water Penetration Test**

**Photo No. 2**
**Structural Load Test**

# Appendix D

## Drawings

## TABLE OF CONTENTS



## GENERAL NOTES

1. THESE SYSTEMS HAVE BEEN TESTED, ANALYZED AND APPROVED FOR DESIGN PRESSURES NOT TO EXCEED THOSE SHOWN IN THE "ALLOWABLE DESIGN LOAD" TABLE.

2. BUCKING OPENINGS & BUCKING FASTENERS MUST BE PROPERLY DESIGNED & INSTALLED TO TRANSFER LOADS TO THE STRUCTURE AND TO BE REVIEWED BY BUILDING OFFICIAL.

3. ALL HARDWARE & FASTENERS SHALL BE IN ACCORDANCE WITH THESE DRAWINGS & MAY NOT VARY UNLESS SPECIFICALLY MENTIONED ON THE DRAWINGS.

4. THE DETAILS & SPECIFICATIONS SHOWN HEREIN REPRESENT THE PRODUCTS TESTED & PROPOSED FOR WATER, AIR, IMPACT, CYCLIC & UNIFORM STATIC AIR PRESSURE TESTING IN CONFORMANCE WITH AAMA AND FBC PROTOCOLS TAS 201, 202 & 203 FOR LARGE MISSILE IMPACT AND ASTM 1886/1996.

5. THESE SYSTEMS HAVE BEEN DESIGNED IN ACCORDANCE WITH THE FLORIDA BUILDING CODE (FBC) INCLUDING HIGH VELOCITY HURRICANE ZONES (HVHZ).

6. ALL ANCHORS SHALL BE INSTALLED AS SPECIFIED ON THESE DRAWINGS. SPECIFIED EMBEDMENT TO BASE MATERIAL SHALL BE BEYOND WALL FINISH OR STUCCO.

7. MATERIALS, INCLUDING BUT NOT LIMITED TO STEEL SCREWS, THAT COME INTO CONTACT WITH OTHER DISSIMILAR MATERIALS SHALL MEET THE REQUIREMENTS OF AAMA AND FLORIDA BUILDING CODE.

### GLAZING TYPES

| | ASTM 1886/1996 TAS 201, 202,203 LARGE MISSILE IMPACT AND CYCLIC WIND LOADING |
|---|---|
| OA: 1": (5MM–ANNEALED, 0.625 AIR, 5MM–ANNEALED. | NO |
| OA: 1–1/4" INSULATING LAMINATED GLASS COMPRISED OF: 6MM TEMPERED– 5/8" AIRSPACE – 5MM HEAT STRENGTHENED – 90 MIL SENTRY GLASS®– 5MM HEAT STRENGTHENED | YES |

### ALLOWABLE DESIGN LOAD

| | | | |
|---|---|---|---|
| MAXIMUM DESIGN PRESSURE: | | +50 PSF | -50 PSF |
| MAXIMUM FRAME SIZE WITH TDL BARS: | 120" X 120" | | |
| MAXIMUM FRAME SIZE WITHOUT TDL BARS: | 120" X 60" | | |
| MAXIMUM TDL BAR LENGTH: | 120" | | |
| | | GLAZING DAYLIGHT OPENING | |
| MAXIMUM GLAZING SIZE | | 120" X 60" | |
| WITH NON–INTERSECTIONG TDL BARS | | 120" X 60" | |
| WITH INTERSECTIONG TDL BARS | | 60" X 60" | |

### *FRAME ANCHOR REQUIREMENTS TABLE

| OPENING TYPE (SUBSTRATE) | FRAME TO OPENING FASTENER TYPE | MINIMUM EMBEDMENT | MINIMUM EDGE DIST. |
|---|---|---|---|
| 2X_ WOOD FRAME OR BUCK | (1)NO. 10 SMS SCREW | 1 1/2" | 3/4" |
| MIN. 18 GA. 33 KSI STEEL STUD | (1)NO. 10 SMS SCREW | FULL | 3/8" |
| CMU/CONCRETE | (2)3/16" CONCRETE SCREWS | 1 1/4" | 2 5/8" |

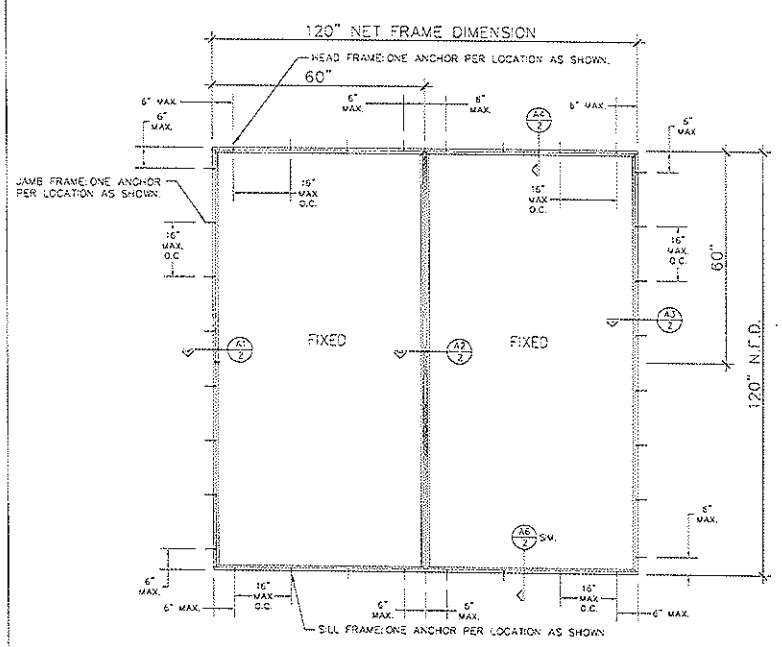
(1) SMS SCREWS GRADE 5
(2) CONCRETE SCREWS SHALL BE 3/16" ITW TAPCON OR EQUIVALENT

Architectural Testing, Inc.
Test sample complies with these details
Deviations are noted

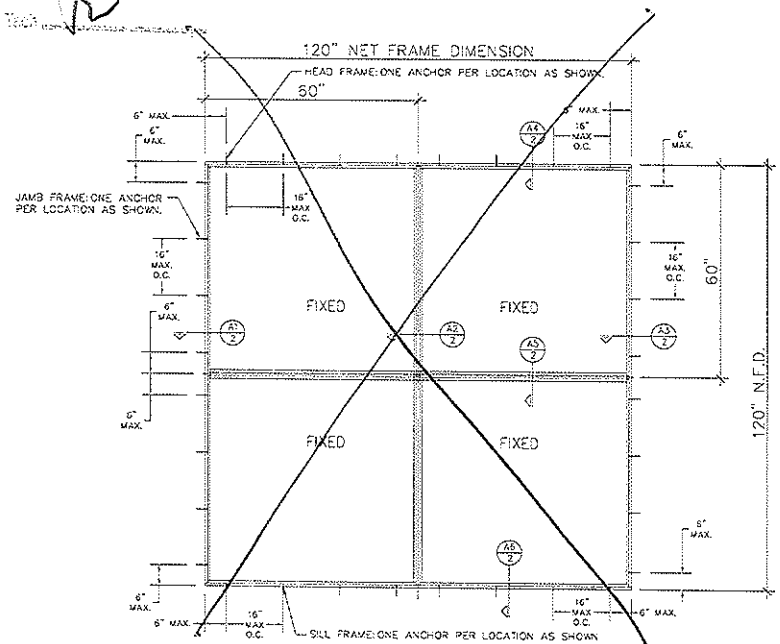
94550 [illegible]

Report# Date

Tech




SPECIMEN 1: VERTICAL TDL




SPECIMEN 2: INTERSECTING TDL

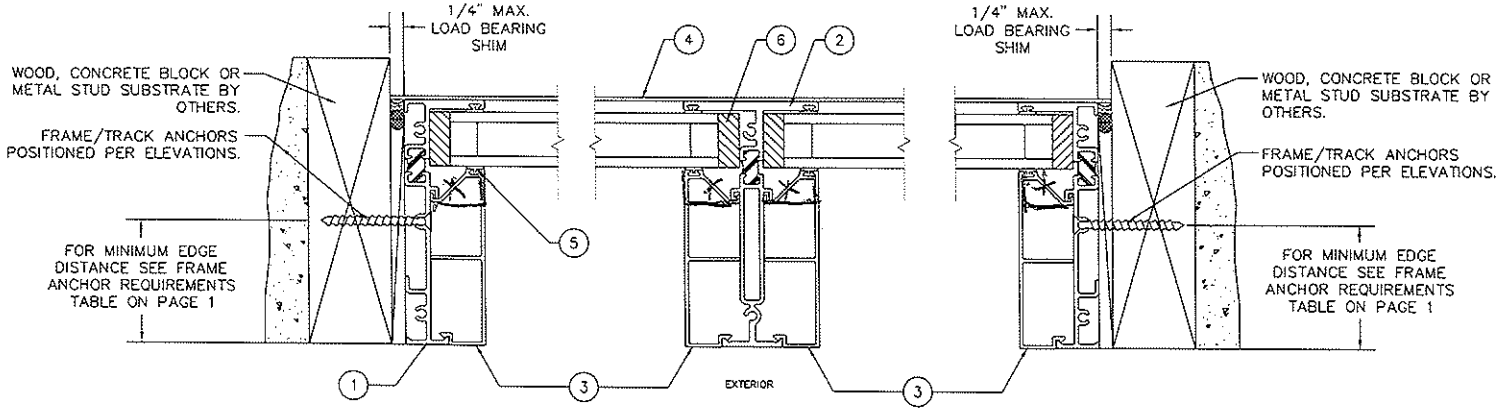
VALIDATOR INITIAL

COMMENTS | DRAWN BY | DATE | REVISIONS | DATE: 08/17/2009 | DRAWN BY: KEVIN | JOB NUMBER: 25385

TITLE: KONA 3600 AAMA, FBC, ASTM 1886/1996 CERTIFICATION
CUSTOMER: FLEET WOOD WINDOWS AND DOORS
POS NAME: KONA 3600 CERTIFICATION

FLEETWOOD WINDOWS AND DOORS
395 SMITH AVE CORONA, CALIFORNIA 92880 - www.fleetwoodusa.com

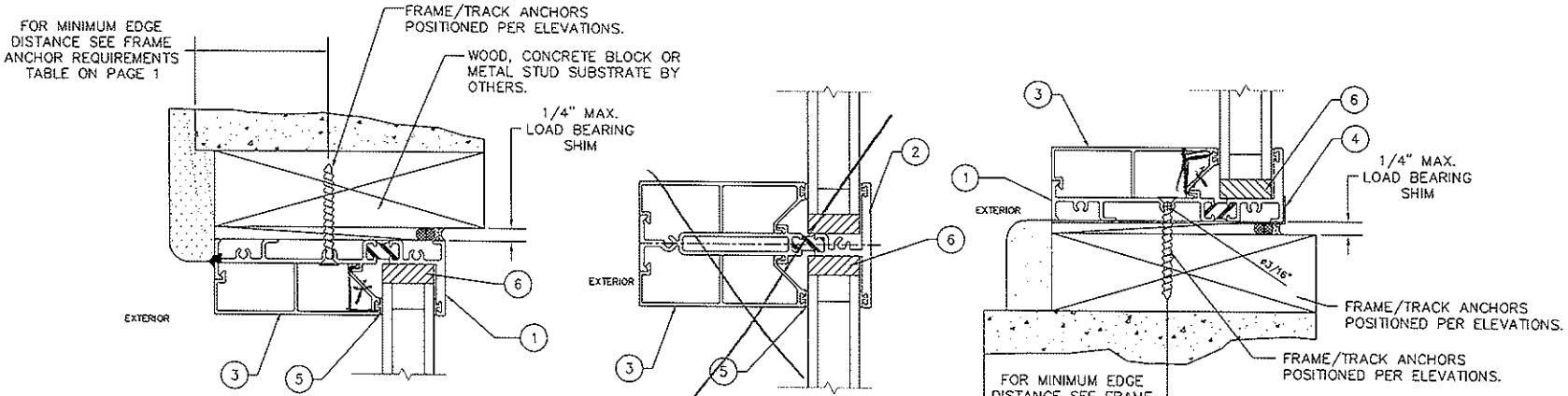
SCALE : 1:16
DRAWING NO. : CERT-3600-09
SHEET : 1 OF 3




A1 2 JAMB SCALE: FULL

A2 2 V. MULLION SCALE: FULL

A3 2 JAMB SCALE: FULL




A4 2 HEAD SCALE: FULL

A5 2 H. MULLION SCALE: FULL

A6 2 SILL SCALE: FULL

Architectural Testing, Inc.
Test sample complies with these details
Deviations are noted

94550 JAN 05 2010

Remarks Date

Tech

VALIDATOR INITIAL

FLEETWOOD WINDOWS AND DOORS
305 SMITH AVE CORONA, CALIFORNIA 92880 - www.fleetwoodusa.com

TITLE: KONA 3800 - AAMA, NWC, ASTM 1886/ 1996 CERTIFICATION
CUSTOMER: FLEET WOOD WINDOWS AND DOORS
JOB NAME: KONA 3800 CERTIFICATION
DRAWN BY: KEVIN
DATE: 09/17/2009
JOB NUMBER: 253695

REVISIONS | DATE | DRAWN BY | COMMENTS

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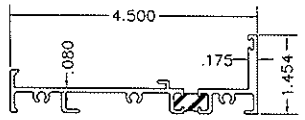
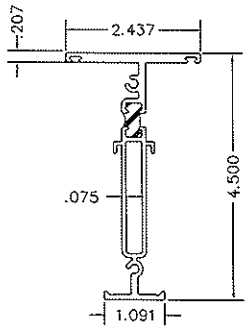
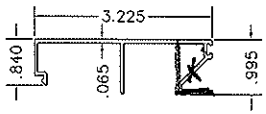
DRAWING NO.: CERT 3800-09
SHEET: 2 OF 3



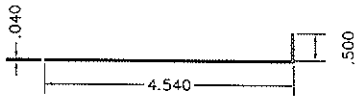

① SILL, HEAD & JAMB




② MULLION

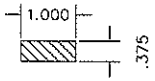



③ GLASS STOP




④ SILL PAN


⑤ SANOPRENE BULB




⑥ EDGE BLOCK

| ITEM # | PART | ITEM DESCRIPTION |
|---|---|---|
| | | EXTRUSIONS |
| 1 | 3805 | SILL, HEAD JAMB |
| 2 | 3806 | MULLION |
| 3 | 3801 | GLASS STOP |
| 4 | 3822 | SILL PAN |
| 5 | OVP04 | SANOPRENE BULB |
| 6 | FW-1006 | EDGE BLOCK |

Architectural Testing, Inc.
Test sample complies with these details
Deviations are noted

94550 JAN 05 2010

Report# Date

Tech

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FLEETWOOD WINDOWS AND DOORS
395 SMITTY AVE CORONA, CALIFORNIA 92880 www.fleetwoodusa.com

TITLE: KONA 3800 - AAMA, HIC. ASTM 1886/1996 CERTIFICATION
CUSTOMER: FLEETWOOD WINDOWS AND DOORS
JOB NAME: KONA 3800 CERTIFICATION

DRAWN BY: KEVIN
DATE: 05/17/2009
JOB# NUMBER: 243985

REVISIONS | DATE | DRAWN BY | COMMENTS

SCALE: 1:1
DRAWING NO.: CERT 3800-09
SHEET: 3 OF 3