EVALUATION REPORT

Title: Evaluation of the SZ Single Flush Door & Frame

Report #: S011-001

Manufacturer: Ingersoll-Rand Company
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I. Introduction/ Scope

Based on wind load test results for the Florida approved SZ single flush door & frame, the following evaluation will estimate the performance for similar type door with thicker hinge and channel reinforcement and equal design pressures. The following door frames under evaluation are scheduled to be submitted for Florida Product Approval.

The following report evaluates the new overall door/frame design as it compares to the door/frame design tested.

II. Reference Material

The following items were used to prepare the evaluation report:

A. Florida Product Approval FL 13884
B. IR Dwg # 2037W, SZ Series Single Flush Door, 3 sheets, Dated 2/17/11.
C. Certified Testing Laboratories, Test Report No CTLA – 2037W, June 28, 2010.

III. Evaluation

A. Wind Load Design

A positive pressure wind load is directed towards the interior of the opening. Conversely, a negative wind load is directed away from the opening. The following analysis is for a single flush door frame elevation. For a positive wind load application, the wind load applied to the door panel would be distributed around the frame equally. For a negative wind load application on single doors, the wind load applied to the door panel will be concentrated around the hinges and hardware.

Recognizing that not every door size and wind pressure can be tested, rational analysis can be used to approve doors that fall outside the current testing limits. First, the total wind force on the panel and windows will be calculated and compared to the tested load. If the total loads are equal or less than the door panels that were tested then the evaluated doors will pass. If the door panels or window frames are larger than tested, then the door panels are subject to failure from bending. From the bending moment equation: $M = w \times L^2/8$, where w is windload and L is door height or width, it can be shown that a constant bending moment is a function of L^2. Consequently, to calculate the pressure, w1 for a door of width L1 that creates the same bending moment as a tested pressure of wt for a width of Lt:

$$w1 = wt * (Lt^2)/(L1^2)$$

This will be the primary basis for approving doors that are taller than tested at a lower wind load or a door that is shorter than tested at a higher wind load.

B. Product Comparisons

The following chart shows the door that was tested & approved by Florida Product Approval. The door and frame has been tested to TAS 201-94 (Large Missile Impact), TAS 202-94 (Uniform Static Air Pressure) and TAS 203-94 (Cyclic Wind Pressure). These standards are referenced in Section 1609.1.2 (Wind load, protection of openings) and Section 1714.5.3.1 (Exterior window and door assemblies) of the 2007 Florida Building Code.

The following chart also shows the door under evaluation and how it compares to the door that has already been tested and approved.

	FL 13884	**Evaluation - IR Dwg 2037W**
Door Type	SZ18-4 w/ polystyrene core material and 18 ga steel skin	SZ18-4 w/ polystyrene core material and 18 ga steel skin
Door Size	3070 , Single	3070, Single
Frame Size (h x w)	88" x 40"	88" x 40"
Frame Design	F-Series, 16 ga CRS, 5.75" jamb	F-Series, 16 ga CRS, 5.75" jamb
Design Pressure	+/-70 psf (MA Series) – In/Out +70/-60 psf (B & T Series) – Out +60/-70 psf (B & T Series) – In	+/-70 psf (MA Series) – In/Out +70/-60 psf (B & T Series) – Out +60/-70 psf (B & T Series) – In
Lock Types	Falcon B Series Cylindrical Falcon MA Series Mortise Falcon T Series Cylindrical	Falcon B Series Cylindrical Falcon MA Series Mortise Falcon T Series Cylindrical
Mounting	Inswing & Outswing	Inswing & Outswing
Hinge Reinforcement	8 ga steel	7 ga steel
Hinge Type/ Size	Butt, 1.25" x 8", 3 min	Butt, 1.23" x 9.19", 3 min
Top/Btm Channel	16 ga steel	14 ga steel
Lock Reinforcement	14 ga steel – mortise lock 16 ga steel – cylindrical lock	14 ga steel – mortise lock 16 ga steel – cylindrical lock
Slab Material	18 ga galvanized steel	18 ga galvaneal steel
Top/Btm Channel Welds	2" from each end, 6" OC	2.8" from each end, 4" OC
Anchors	EMA with lag bolt into wood stud wall	EMA with lag bolt into wood stud wall
Impact Rating, HVHZ & TAS 201	Yes	Yes

Table 1 – Florida Product Approvals & Door under Evaluation

C. Conclusion

Comparing the door and frame under evaluation against the Florida approved door and frame, I calculate that the door, frame and hardware under evaluation will be subjected to a equal load and will perform equal or better than the approved frames & doors. The door size and design pressures are identical and the primary differences are in hinge and channel designs.

The drawings cited above are an explicit part of this evaluation report. The text of this report can not address all design details (fastener size, spacing) but relies upon the illustrations of these drawings.

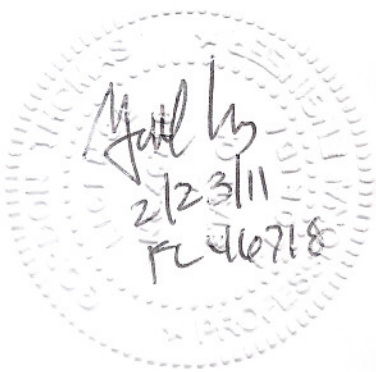
I conclude that the construction shown comply with the structural requirements of the 2004 and 2007 Florida Building Codes.

IV Limitations of Use

The following information summarizes the limitation of use for the doors/ frames under evaluation.

1. Elevation Summary

Maximum Door Panel width:	3 ft – 0 in
Maximum Door Panel height:	7 ft – 0 in
Maximum door glass size:	NA , flush door only
Maximum Wind Pressure	+/- 70 psf
Maximum window frames size	NA, door panel and frame only
Door Panel Construction	Refer to IR 2037W
Frame Anchor Types, Size & Spacing	Refer to IR 2037W
Rated for Large missile impact rating (TAS 201)	Yes
Not approved for water infiltration	



Certification of Independence of Evaluation Entity

I hereby certify that (1) I have no financial interest in Ingersoll-Rand Company; (2) I am an independent licensed Professional Engineer in the State of Florida and; (3) I comply with the criteria of independence as stated in 9B-72.110 (3), F.A.C. and 9B-72.110(4), F.A.C.