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FORCED-ENTRY RESISTANCE TESTS AS PER THE ASTM F476-84(2002) TESTING PROCEDURE ON AN ENTRANCE DOOR - COMPARATIVE STUDY -

Prepared for:

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TEST REPORT SUMMARY OF RESULTS	
Product type:	**Swinging Entrance Door (Insulated Steel Door)**
Product series/model:	**Inswing Single Entry Door**
Slab dimensions:	**808 mm width x 2006 mm height (32 in. width x 79 in. height)**
Test Results:	**Grade 10 (Door evaluated without any security *system*)**
	Grade 30 (Door evaluated with a competitor's security system)
	Grade 40 (Door evaluated with the *Safe Door Systems*)
Test completion date:	**10/01/2010**

AIR-INS INC.

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TABLE OF CONTENTS

1.0 INTRODUCTION 1

2.0 SPECIMENS DESCRIPTION 1

3.0 ALTERATION(S) 4

4.0 FORCED ENTRY RESISTANCE TESTS 4

4.1 IMPACT TESTING PROCEDURE 4

4.2 TEST RESULTS 6

5.0 CONCLUSION 7

APPENDIX A: ASSEMBLY DRAWINGS

APPENDIX B: PHOTOGRAPHS OF THE TESTS

FORCED-ENTRY RESISTANCE TESTS AS PER THE ASTM F476-84(2002) TESTING PROCEDURE ON AN ENTRANCE DOOR - COMPARATIVE STUDY -

1.0 INTRODUCTION

Air-Ins Inc. Laboratories has been held by " ***Safe Door Systems Inc.*** " to perform a comparative study of three entrance doors in accordance with specific performance criteria's from the *ASTM F476-84 (2002) Standard Test Methods for Security of Swinging Door Assemblies*.

Note concerning the use of units of measurement in this report:
According to the *ASTM F476-84 (2002) Standard*, the use of SI (metric) units is the standard, while IP (Imperial) values given in parentheses are for reference purposes only, and are inexact rounded values.

2.0 SPECIMENS DESCRIPTION

Model: Inswing Single Entry Door

Type: Hinged steel door assembled in a wooden frame. The door panel consists of a wood frame covered on each side with galvanized steel sheet, and the center is insulated with injected polyurethane foam. The total thickness of the door is 45 mm (1.73 in.).

Date(s) of specimen reception: 09/03/2010, 09/10/2010 and 09/17/2010

Date of testing: 09/07/2010, 09/13/2010 and 10/01/2010

Drawing(s): - *Door Hinges & Block Location and Dimensions*
- *Safe Door Systems Installation Guide*

Test frame and specimen installation:

-	Test frame:	2" x 4" spruce studs, at 410 mm (16 in.) c.c., covered with 13 mm (1/2 in.) exterior grade plywood and 13 mm (1/2 in.) gypsum board on the interior. The test frame was secured to a steel wall support fixture. *Refer to Article 6 of ASTM F476.*
-	Opening clearances:	6 mm (1/4") at jambs and head.
-	Fastening:	#8 x 3" screws; (1) at upper and lower extremities of lock-side jamb and (2) per hinge. The screw descriptions for the striker plates are reported for each door evaluated.
-	Installation:	The tested specimens were installed into the test frame by the laboratory staff as per the door manufacturer installation procedure.

Door without any security system:

-	Door frame:	Wood frame (Frame 1-3/16" by *Portes Métalliques Jacob Inc.*) with an aluminum sill, PVC thermal break, with weatherstripping at jambs and head.
-	Door slab:	*N300* by *Novatech*
-	Hinges:	(3) 4" long with (4) #8 x 1-1/8" screws into the slab, and with (2) #8 x 3/4" & (2) #8 x 3" screws into the frame.
-	Latch:	Model 310010BC32DM BALA Signature Series with a latch face with (2) #8 x 3/4" screws (DOREX).
-	Dead bolt:	Model 320151C15KDM with a latch face with (2) #8 x 3/4" screws (DOREX).
-	Striker plates:	(2) plates supplied with the latch/Dead bolt kits with (2) #8 x 3" screws per plate.
-	Security System:	None
-	Slab dimensions:	808 mm (32") width x 2006 mm (79") height.
-	Frame dimensions:	848 mm (33") width x 2081 mm (82") height.

Door equipped with a competitor's security system:

- Door frame: Wood frame (Frame 1-3/16" by *Portes Métalliques Jacob Inc.*) with an aluminum sill, PVC thermal break, with weatherstripping at jambs and head.
- Door slab: *N300* by *Novatech*
- Hinges: (3) 4" long with (4) #8 x 1-1/8" screws into the slab, and with (2) #8 x 3/4" & (2) #8 x 3" screws into the frame.
- Latch: Model 310010BC15AM BALA Signature Series with a latch face with (2) #8 x 3/4" screws (DOREX).
- Dead bolt: Model 320151C15AKDM with a latch face with (2) #8 x 3/4" screws (DOREX).
- Striker plate: Incorporated in the security system part.
- Security System: Two steel construction parts, the both pieces fit together making one unit that goes on the locking side of the frame; (1) 1499 mm (58") long x 2 mm (5/64") thick x 51 mm (2") wide installed with (13) #10 x 2-1/2" screws ((10) every 165 mm (6-1/2") and (3) at each locking cut-outs). The system from the competition was bought by *Safe Door Systems*, but the installation was done by the laboratory staff as per the manufacturer installation procedure.
- Slab dimensions: 808 mm (32") width x 2005 mm (79") height.
- Frame dimensions: 850 mm (33") width x 2096 mm (83") height.

Door equipped with the *Safe Door Systems*:

- Door frame: Wood frame (Frame 1-3/16" by *Portes Métalliques Jacob Inc.*) with an aluminum sill, PVC thermal break, with weatherstripping at jambs and head.
- Door slab: *N300* by *Novatech*
- Hinges: (3) 4" long with (4) #8 x 1-1/8" screws into the slab, and with (2) #8 x 3/4" & (2) #8 x 3" screws into the frame.
- Latch: Model 310010BC3M BALA Signature Series with a latch face with (2) #8 x 3/4" screws (DOREX).

-	Dead bolt:	Model 20151C3KD with a latch face with (2) #8 x 3/4" screws (DOREX).
-	Striker plate:	(1) 12" plate (Part #30G09) with (4) #10 x 3" & (2) #10 x 1-1/4" screws.
-	Security System:	*Safe Door System*; the *Safe Door Channel* and *Striker* installation was done by the laboratory staff as per the manufacturer installation procedure.
-	Slab dimensions:	808 mm (32") width x 2006 mm (79") height.
-	Frame dimensions:	848 mm (33") width x 2097 mm (83") height.

3.0 ALTERATION(S)

Alteration(s) performed in the laboratory on tested specimen to meet the reported performances: None

4.0 FORCED-ENTRY RESISTANCE TESTS

The goal of this comparative study was to determine the impact of the *Safe Door Systems* door security system when it is installed on a regular steel entrance door. For this reason, all the other tests referred by the *ASTM F476-84 (2002)* related to the hardware and frame performances are removed from the test sequence.

4.1 IMPACT TESTING PROCEDURES

For the *Door Impact* procedure, with the door being installed in a suitable test position, the center of the door panel is subjected to two (2) impacts at each required level (See table no.1 for the load applications). The impact point is defined by the intersection of a vertical center line of the door and a line from the center of the bolt to the center of mid-height hinge.

For the *Bolt Impact* procedure, with the door being installed in a suitable test position, the bolt edge is subjected to two (2) impacts at each required level (See table no.1 for the load applications). The impact point is defined by the intersection of a vertical line 200 mm (8 in.) from the lock edge, and a line from the center of the bolt to the center of mid-height hinge.

Table 1: Door Impact load application

TEST	MEASURED PARAMETER	GRADE 10	GRADE 20	GRADE 30	GRADE 40
Door impact	Impact resistance at center of panel	2 blows of 80J (59 pd-ft)	Grade 10 + 2 blows of 120J (89 pd-ft)	Grade 20 + 2 blows of 160J (118 pd-ft)	Grade 30 + 2 blows of 200J (148 pd-ft)
Bolt Impact	Impact resistance at bolt	2 blows of 80J (59 pd-ft)	Grade 10 + 2 blows of 120J (89 pd-ft)	Grade 20 + 2 blows of 160J (118 pd-ft)	Grade 30 + 2 blows of 200J (148 pd-ft)

The door ram is a pendulum system with a cylindrical weight of 45 kg (99.2 lb) capable of delivering horizontal impacts of 200J (148 ft-lbf). The ram itself is a steel cylinder 152 mm (6 in.) in diameter, 375 mm (14.75 in.) long with a hemispherical impact nose. The suspension system for the door ram consists of four flexible steel cables adjusted with turnbuckles such that the ram swings in a straight true arc.

A rigid extruded polystyrene foam block is used as an impact buffer at the impact point. A new impact buffer is installed on the door for each successive impact.

After each impact, an attempt is made to open the door or test panel by turning the knob and observing the dead bolt or dead latch end pressure resistance.

4.2 TEST RESULTS

Performance Grade	Door without any security system	Door equipped with a competitor's security system	Door equipped with the *Safe Door Systems*
Grade 10	Door: 2 blows of 80J (59 pd-ft) Bolt: 2 blows of 80J (59 pd-ft) Entrance is not gained [1].	Door: 2 blows of 80J (59 pd-ft) Bolt: 2 blows of 80J (59 pd-ft) Entrance is not gained [3].	Door: 2 blows of 80J (59 pd-ft) Bolt: 2 blows of 80J (59 pd-ft) Entrance is not gained.
Grade 20	Door: 2 blows of 120J (89 pd-ft) Bolt: Failure from second blow of 120J (89 pd-ft), entrance is gained [2].	Door: 2 blows of 120J (89 pd-ft) Bolt: 2 blows of 120J (89 pd-ft) Entrance is not gained [4].	Door: 2 blows of 120J (89 pd-ft) Bolt: 2 blows of 120J (89 pd-ft) Entrance is not gained.
Grade 30	Not performed	Door: 2 blows of 160J (118 pd-ft) Bolt: 2 blows of 160J (118 pd-ft) Entrance is not gained [5].	Door: 2 blows of 160J (118 pd-ft) Bolt: 2 blows of 160J (118 pd-ft) Entrance is not gained [7].
Grade 40	Not performed	Door: 2 blows of 200J (148 pd-ft) Bolt: Failure from first blow of 200J (148 pd-ft), entrance is gained [6].	Door: 2 blows of 200J (148 pd-ft) Bolt: 2 blows of 200J (148 pd-ft) Entrance is not gained [8].
Out-of-standard specifications - Supplementary testing	N/A	N/A	Door: 2 blows of 234J (173 pd-ft) Bolt: 2 blows of 234J (173 pd-ft) Entrance is not gained [8].
	N/A	N/A	Door: 2 blows of 260J (197 pd-ft) Bolt: Failure from first blow of 260J (197 pd-ft), entrance is gained [9].

Note: 1) The door latch is damaged, but still operational. Cracks are observed in the wooden edge of the slab at dead bolt faceplate location.
2) The door slab is broken and damage is observed on the locking devices, strikers and frame.
3) Cracks are observed in the wooden edge of the slab at faceplates locations.
4) The door slab is broken. The locking devices are damaged, but still operational.
5) The door slab is broken and the locking devices are no longer operational.
6) The door slab is broken and opens under the impact allowing entrance.
7) Cracks are observed in the wooden edge of the slab at faceplates locations.
8) Deformation is observed on the striker plate with damage to the frame. The dead bolt is damaged, but still operational.
9) The dead bolt is damaged and door slab is deformed; the door panel opens under the impact.
10) See the photographs of the installation and the tests in Appendix B.

5.0 CONCLUSION

Based on tests results, the entrance door without any security system meets the requirement of the *Door Impact* and *Bolt Impact* tests with a test result of ***Grade 10*** of the *ASTM F-476-84 (2002)* Standard.

Based on tests results, the entrance door with a competitor's security system meets the requirement of the *Door Impact* and *Bolt Impact* tests with a test result of ***Grade 30*** of the *ASTM F-476-84 (2002)* Standard.

Based on tests results, the entrance door with the *Safe Door Systems* security system meets the requirement of the *Door Impact* and *Bolt Impact* tests with a test result of ***Grade 40*** of the *ASTM F-476-84 (2002)* Standard.

Supplementary *Door Impact* and *Bolt Impact* tests were conducted with success on the entrance door with the *Safe Door System* up to 1.2 times the load applications of *Grade 40*.

The entrance door with the *Safe Door Systems* presents a *Door Impact* and *Bolt Impact* resistance 2.9 times better than the one without any security system.

The results presented in this report are valid only for the doors as described in section 2.0.

The above results were secured by using the designated test methods and they indicate compliance with the performance requirements of the referenced specification. This report does not constitute certification of this product.

AIR-INS INC.

Jean Miller, Eng.

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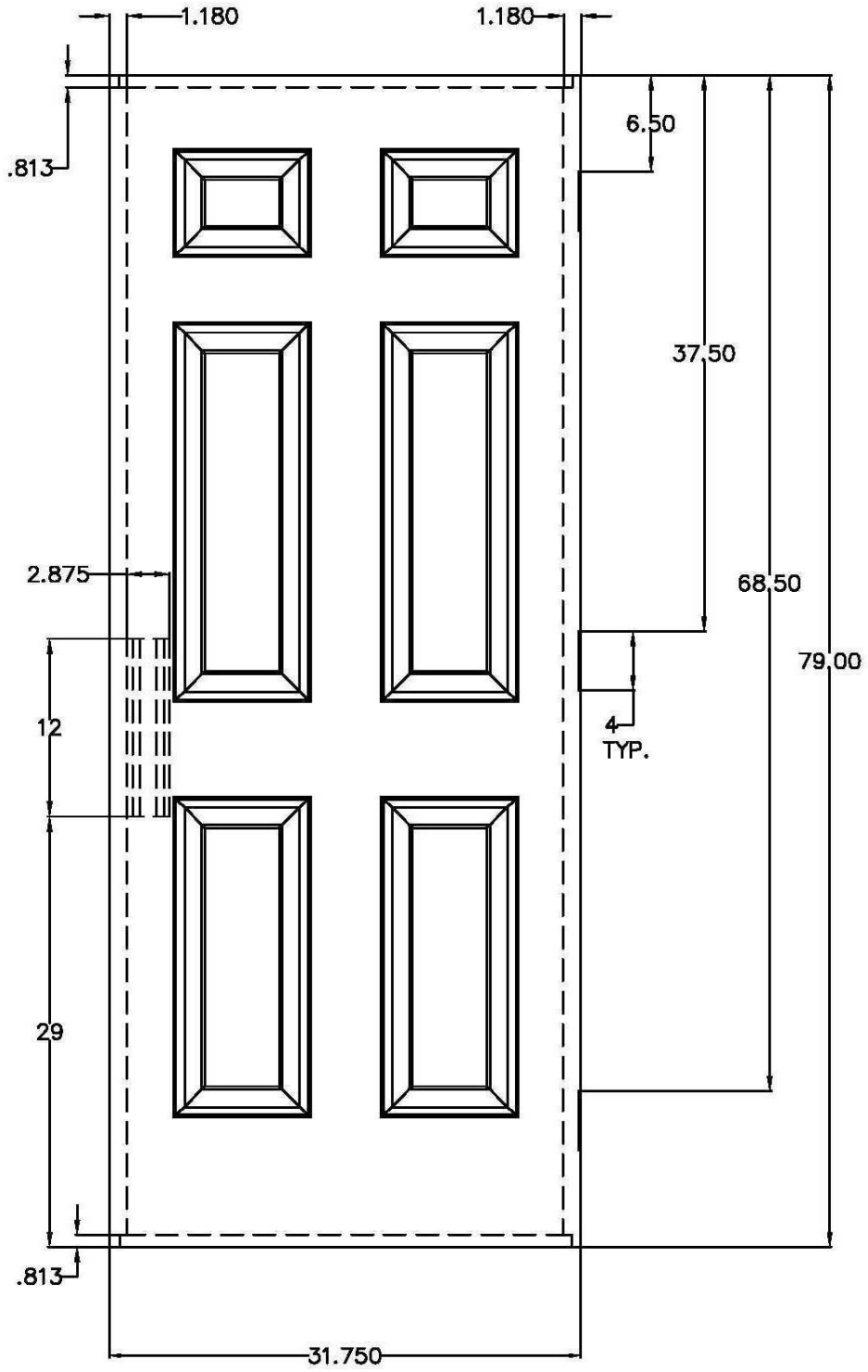
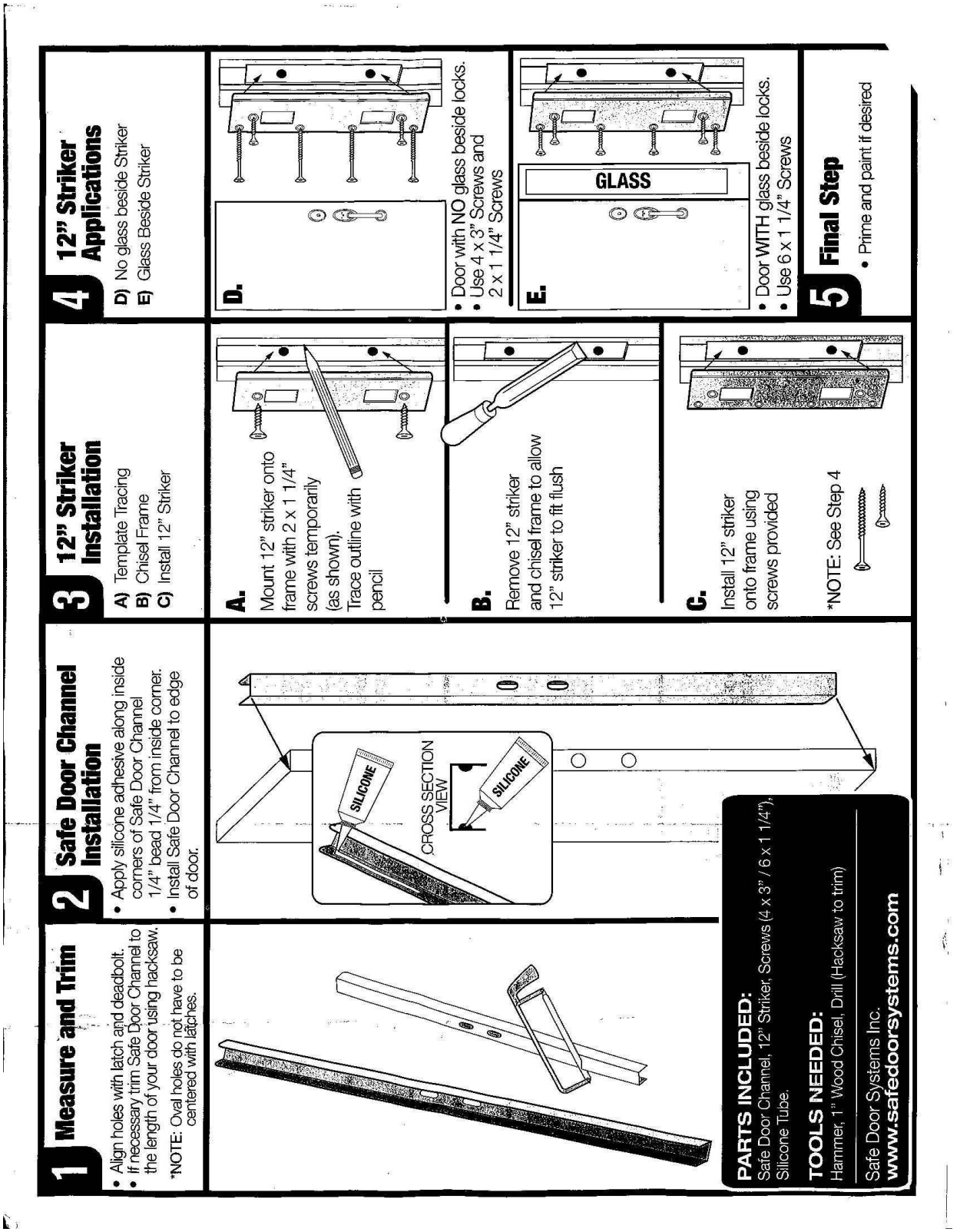
APPENDIX A

ASSEMBLY DRAWINGS



Forced-Entry Resistance Tests as per ASTM F476-84(2002) on a Single Inswing Entry Door



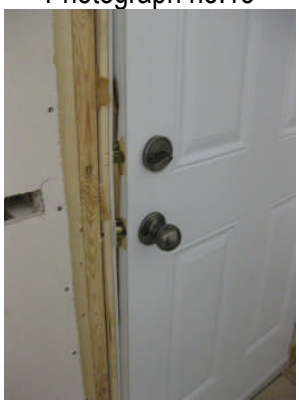
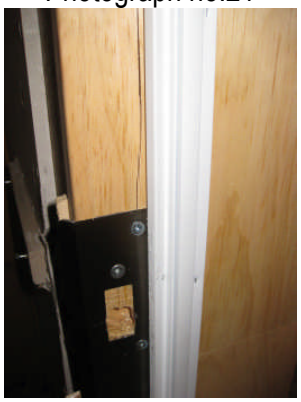
Forced-Entry Resistance Tests as per ASTM F476-84(2002) on a Single Inswing Entry Door

APPENDIX B

PHOTOGRAPHS OF THE TESTS

Description	Door without any security system	Door equipped with a competitor's security system	Door equipped with the *Safe Door Systems*
Testing set-up	Photograph no.1 	Photograph no.7 	Photograph no.16 
Striker(s) installation	Photograph no.2 	Photograph no.8 	Photograph no.17 
Latch and deadlock installation	Photograph no.3 	Photograph no.9 	Photograph no.18 

Grade 10	Photograph no.4  The door latch is damaged and cracks are observed in the wooden edge of the slab at dead bolt faceplate location.	Photograph no.10  Cracks are observed in the wooden edge of the slab at faceplates locations.	No damage is observed
Grade 20	Photograph no.5  The door slab is broken and damage is observed on the locking devices.	Photograph no.11  The door slab is broken and the locking devices are damaged, but still operational.	No damage is observed
	Photograph no.6  Damage is observed on the frame and strikers	Photograph no.12  No damage is observed on the striker plate.	No damage is observed

Grade 30	Not performed	Photograph no.13  The door slab is broken and the locking devices are no longer operational.	Photograph no.19  Cracks are observed in the wooden edge of the slab at faceplates locations.
Grade 40	Not performed	Photograph no.14  The door slab is broken and opens under the impact allowing entrance.	Photograph no.20  Cracks observed in the slab and the dead bolt is damaged, but still operational.
	Not performed	Photograph no.15  Deformation is observed on the striker plate.	Photograph no.21  Deformation observed on the striker plate with damages to the frame.