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Intertek Test Report 130418014GZU-001
EVALUATION
OF
Cylindrical lever lockset, AGL-7000, Grade 2
FOR
Angel Metal Co., Ltd
#1099 Woram-Dong, Dalseo-Gu, Daegu, South Korea

TEST STANDARD:

Per customer's specifications, using the following standard as a guideline: ANSI/BHMA A156.2 - 2011 "American National Standard for Bored and Preassembled Locks & Latches".

SAMPLES:

Samples were identified by the client as Cylindrical lever lockset, AGL-7000, Grade 2. Samples were received in good condition on April 16, 2013 from Angel Metal Co., Ltd Testing was conducted at Intertek Testing Services Shenzhen Ltd. Guangzhou Branch.

TEST DATES:

From April 18, 2013 to May 15, 2013.

RESULTS: COMPLIANT

Subsection	Test Description	Initial Test Results	Retest Test Results
9	Operational Tests	Compliant	N/A
10	Strength Tests	Compliant	N/A
11	Cycle Tests	Compliant	N/A
12	Security tests	Compliant	N/A
13	Material Evaluation Tests	Compliant	N/A

The attached summary and data are results of the product testing and evaluation.

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TEST RESULTS
ANSI/BHMA A156.2-2011 AMERICAN NATIONAL STANDARD FOR
BORED AND PREASSEMBLED LOCKS AND LATCHES

Model	Series	Function	Grade	Trim	Finish	Base Material
AGL-7000	4000	F81	2	key/lever	—	—

Date Started: 2013-4-18 Date Completed: 2013-5-15

9 Operational Tests

9.1 Force to Retract Unloaded Bolt

Compliant/Non: Compliant

9.1.1 Torque to retract latch bolt by lever - Maximum (lbf in.)

9.1.2 Torque to retract latch bolt by knob - Maximum (lbf in.)

Knob/Lever Direction	Specimen #001		Specimen #002		Specimen #003		Max Allowable	
	Initial	50%	Initial	50%	Initial	50%	Initial	50%
Outside CW	24.8	23.0	26.6	23.9	23.9	23.0	28.0	34.0
Outside CCW	21.2	21.2	22.1	17.7	21.2	21.2	28.0	34.0
Inside CW	20.4	19.5	22.1	18.6	21.2	19.5	28.0	34.0
Inside CCW	23.0	21.2	23.0	20.4	23.9	23.9	28.0	34.0

Comments:

9.1.3 Force to retract latch bolt with Thumbpiece (lbf)

Compliant/Non: Not applicable

	Specimen #001		Specimen #002		Specimen #003		Max Allowable	
	Initial	50%	Initial	50%	Initial	50%	Initial	50%
Inside Force	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Outside Force	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Comments:

No thumb piece.

9.1.4 Force to retract latch bolt by Paddle (lbf)

Compliant/Non: Not applicable

Direction	Specimen #001		Specimen #002		Specimen #003		Max Allowable	
	Initial	50%	Initial	50%	Initial	50%	Initial	50%
Inside Force	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Outside Force	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Comments:

No paddle

**9.1.5 Torque to retract latch bolt by key,
with deadlatch depressed (lbf-in).**

Compliant/Non: Not applicable

Key Direction	Specimen #001		Specimen #002		Specimen #003		Max Allowable	
	Initial	50%	Initial	50%	Initial	50%	Initial	50%
CW	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
CCW	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Comments:

Not applicable for locks that allows to be unlocked by the key to permit the bolt to be retracted by operating trim.

9.1.6 Torque to retract latch bolt by turn. (lbf-in) Compliant/Non: Not applicable

Turn Direction	Specimen #001		Specimen #002		Specimen #003		Max Allowable	
	Initial	50%	Initial	50%	Initial	50%	Initial	50%
CW	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
CCW	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Comments: No turn

9.2 Force to Retract Preloaded Bolt. (Warped Door) (lbf in.) with 50 lb load applied
Repeat 9.1.1 - 9.1.4

9.1.1 Torque to retract latch bolt by lever - Maximum (lbf in.)

9.1.2 Torque to retract latch bolt by knob - Maximum (lbf in.)

Compliant/Non: Compliant

Knob/Lever Direction	Specimen #001		Specimen #002		Specimen #003		Max Allowable	
	Initial	50%	Initial	50%	Initial	50%	Initial	50%
Outside CW	49.6	48.7	49.6	51.3	51.3	53.1	70.0	85.0
Outside CCW	47.8	46.0	47.8	46.9	48.7	46.0	70.0	85.0
Inside CW	47.8	45.1	46.9	46.0	49.6	47.8	70.0	85.0
Inside CCW	51.3	46.9	51.3	48.7	49.6	48.7	70.0	85.0

Comments:

9.1.3 Force to retract latch bolt with Thumbpiece (lbf) Compliant/Non: Not applicable

	Specimen #001		Specimen #002		Specimen #003		Max Allowable	
	Initial	50%	Initial	50%	Initial	50%	Initial	50%
Inside Force	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Outside Force	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Comments: No thumb piece.

9.1.4 Force to retract latch bolt by Paddle (lbf) Compliant/Non: Not applicable

Direction	Specimen #001		Specimen #002		Specimen #003		Max Allowable	
	Initial	50%	Initial	50%	Initial	50%	Initial	50%
Inside Force	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Outside Force	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Comments: No paddle

9.1.5 Torque to retract latch bolt by key, with deadlatch depressed (lbf-in).

Compliant/Non: Not applicable

Key Direction	Specimen #001		Specimen #002		Specimen #003		Max Allowable	
	Initial	50%	Initial	50%	Initial	50%	Initial	50%
CW	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
CCW	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Comments: Not applicable for locks that allows to be unlocked by the key to permit the bolt to be retracted by operating trim.

9.1.6 Torque to retract latch bolt by turn. (lbf-in)

Compliant/Non: Not applicable

Turn Direction	Specimen #001		Specimen #002		Specimen #003		Max Allowable	
	Initial	50%	Initial	50%	Initial	50%	Initial	50%
CW	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
CCW	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Comments: No turn

9.3 Latch Bolt Projection Minimum (in.)

Compliant/Non: Compliant

when depressed to dead latched position.

	Specimen #001		Specimen #002		Specimen #003		Minimum Allowable	
	Initial	50%	Initial	50%	Initial	50%	Initial	50%
Projection	0.369	0.367	0.389	0.375	0.374	0.366	0.250	0.203

Comments:

9.4 Dead Latch or Aux. Latch Projection (in.)

Compliant/Non: Compliant

at first effective dead locking of latch bolt.

	Specimen #001		Specimen #002		Specimen #003		Minimum Allowable	
	Initial	50%	Initial	50%	Initial	50%	Initial	50%
Projection	0.286	0.271	0.302	0.277	0.277	0.271	0.219	0.172

Comments:

9.5 Force to latch door (lbf)

Compliant/Non: Compliant

Force	Specimen #001		Specimen #002		Specimen #003		Max Allowable	
	Initial	50%	Initial	50%	Initial	50%	Initial	50%
Unlocked	2.2	2.5	2.0	2.4	2.0	2.2	4.5	5.4
Locked	2.3	2.3	2.2	2.2	2.1	2.3	4.5	5.4

Comments:

10 Strength Tests

10.1 Locked Torque Test

Compliant/Non: Compliant

Knob/Lever Direction	Specimen #004	Specimen #005	Specimen #006	Test Torque Minimum (lbf-in)
Outside CW	450	450	450	450
Outside CCW	450	450	450	450
inside CCW	N/A	N/A	N/A	N/A
inside CCW	N/A	N/A	N/A	N/A

Comments:

10.2 Axial Load Test - Minimum (lbf)

Compliant/Non: Compliant

Knob/Lever	Specimen #004	Specimen #005	Specimen #006	Test Load Minimum (lbf)
Outside	300	300	300	300
Inside	300	300	300	300

Comments:

10.2.2 Lever Load 2 inches from Spindle (lbf)

Compliant/Non: Compliant

Knob/Lever	Specimen #004	Specimen #005	Specimen #006	Test Load Minimum (lbf)
Outside	150	150	150	150
Inside	150	150	150	150

Comments:

10.2.3 Entry Handleset, outside thumb piece

Compliant/Non: Not applicable

Thumb Piece	Specimen #004	Specimen #005	Specimen #006	Test Load Minimum (lbf)
Outside	N/A	N/A	N/A	N/A

Comments:

10.3 Vertical Load Test - Minimum (lbf)

Compliant/Non: Compliant

Knob/Lever	Specimen #004	Specimen #005	Specimen #006	Test Load Minimum (lbf)
Outside	250	250	250	250
Inside	250	250	250	250

Comments:

Locked Outside Thumb piece Load Compliant/Non: Not applicable

Thumb Piece	Specimen #004	Specimen #005	Specimen #006	Test Load Minimum (lbf)
Outside	N/A	N/A	N/A	N/A

Comments: No thumb piece

Paddle Load Compliant/Non: Not applicable

Paddle Mount	Specimen #004	Specimen #005	Specimen #006	Test Load Minimum (lbf)
Vertical	N/A	N/A	N/A	N/A
Horizontal	N/A	N/A	N/A	N/A

Comments: No paddle.

10.4 Latch Bolt Strength - Minimum (lbf) Compliant/Non: Compliant

	Specimen #004	Specimen #005	Specimen #006	Test Load Minimum (lbf)
Load	800	800	800	800

Comments:

10.5 Latch Bolt End Pressure - Minimum (lbf) Compliant/Non: Compliant

	Specimen #004	Specimen #005	Specimen #006	Test Load Minimum (lbf)
Load	100	100	100	100

Comments:

10.6 Unlocked Outside Lever or Knob Torque Test - Compliant/Non: Compliant

downward for levers, clockwise for knobs

Unlocked Knob/Lever	Specimen #004	Specimen #005	Specimen #006	Test Torque Minimum (lbf-in)
Load	225	225	225	225

Comments:

10.7 Unlocked Entry Handleset Load TestCompliant/Non: Not applicable

Unlocked Handleset	Specimen #004	Specimen #005	Specimen #006	Test Load Minimum (lbf)
Load	N/A	N/A	N/A	N/A

Comments: No handleset**10.8 Qualification Requirements**Compliant/Non: Compliant**9.1 Force to Retract Unloaded Bolt**Compliant/Non: Compliant**9.1.1** Torque to retract latch bolt by lever - Maximum (lbf in.)**9.1.2** Torque to retract latch bolt by knob - Maximum (lbf in.)

Knob/Lever Direction	Specimen #004	Specimen #005	Specimen #006	Maximum Allowed Torque (lbf-in)
Outside CW	26.6	27.4	31.0	34.0
Outside CCW	25.7	22.1	26.6	34.0
Inside CW	23.0	21.2	27.4	34.0
Inside CCW	27.4	25.7	29.2	34.0

Comments:

9.1.3 Force to retract latch bolt with Thumbpiece (lbf)Compliant/Non: Not applicable

	Specimen #004	Specimen #005	Specimen #006	Force Maximum (lbf)
Inside Force	N/A	N/A	N/A	N/A
Outside Force	N/A	N/A	N/A	N/A

Comments: No thumb piece.**9.1.4** Force to retract latch bolt by Paddle (lbf)Compliant/Non: Not applicable

Direction	Specimen #004	Specimen #005	Specimen #006	Force Maximum (lbf)
Inside Force	N/A	N/A	N/A	N/A
Outside Force	N/A	N/A	N/A	N/A

Comments: No paddle

9.1.5 Torque to retract latch bolt by key, with deadlatch depressed. (lbf-in)

Compliant/Non: Not applicable

Key Direction	Specimen #004	Specimen #005	Specimen #006	Maximum Allowed Torque (lbf-in)
CW	N/A	N/A	N/A	N/A
CCW	N/A	N/A	N/A	N/A

Comments: Not applicable for locks that allows to be unlocked by the key to permit the bolt to be retracted by operating trim.

9.1.6 Torque to retract latch bolt by turn. (lbf-in)

Compliant/Non: Not applicable

Turn Direction	Specimen #004	Specimen #005	Specimen #006	Maximum Allowed Torque (lbf-in)
CW	N/A	N/A	N/A	N/A
CCW	N/A	N/A	N/A	N/A

Comments: No turn

9.2 Force to Retract Preloaded Bolt (Warped Door) (lbf in.) with 50 lb load applied
Repeat 9.1.1 - 9.1.4

9.1.1 Torque to retract latch bolt by lever - Maximum (lbf in.)

9.1.2 Torque to retract latch bolt by knob - Maximum (lbf in.)

Compliant/Non: Compliant

Knob/Lever Direction	Specimen #004	Specimen #005	Specimen #006	Maximum Allowed Torque (lbf-in)
Outside CW	50.4	46.0	51.3	70.0
Outside CCW	46.9	44.3	46.9	70.0
Inside CW	48.7	45.1	46.9	70.0
Inside CCW	48.7	46.9	48.7	70.0

Comments:

9.1.3 Force to retract latch bolt with Thumbpiece (lbf)

Compliant/Non: Not applicable

	Specimen #004	Specimen #005	Specimen #006	Force Maximum (lbf)
Inside Force	N/A	N/A	N/A	N/A
Outside Force	N/A	N/A	N/A	N/A

Comments: No thumb piece

9.1.4 Force to retract latch bolt by Paddle (lbf) Compliant/Non: Not applicable

Direction	Specimen #004	Specimen #005	Specimen #006	Force Maximum (lbf)
Inside Force	N/A	N/A	N/A	N/A
Outside Force	N/A	N/A	N/A	N/A

Comments:

No paddle.

9.1.5 Torque to retract latch bolt by key, with deadlatch depressed. (lbf-in) Compliant/Non: Not applicable

Key Direction	Specimen #004	Specimen #005	Specimen #006	Maximum Allowed Torque (lbf-in)
CW	N/A	N/A	N/A	N/A
CCW	N/A	N/A	N/A	N/A

Comments:

Not applicable for locks that allows to be unlocked by the key to permit the bolt to be retracted by operating trim.

9.1.6 Torque to retract latch bolt by turn. (lbf-in) Compliant/Non: Not applicable

Turn Direction	Specimen #004	Specimen #005	Specimen #006	Maximum Allowed Torque (lbf-in)
CW	N/A	N/A	N/A	N/A
CCW	N/A	N/A	N/A	N/A

Comments:

No turn

9.3 Latch Bolt Projection Minimum (in.) Compliant/Non: Compliant
when depressed to dead latched position.

	Specimen #004	Specimen #005	Specimen #006	Minimum (inches)
Projection	0.375	0.361	0.368	0.250

Comments:

Lever can not deflect 3/8", nor can it touch the door with 25lbf at 2" from spindle.

Compliant/Non: Compliant

	Specimen #004	Specimen #005	Specimen #006	Standard
Lever Deflection (in)	0.09	0.16	0.16	3/8
Did lever touch the door? (Y/N)	N	N	N	N

Comments:

The lever rotational position shall be within 22.5 degrees of the original resting position.

Grade 1 only

Compliant/Non: Not applicable

	Specimen #004	Specimen #005	Specimen #006	Standard
Lever rotation	N/A	N/A	N/A	N/A

Comments:

For grade 1 only

11 Cycle Test 3 samples

Compliant/Non: Compliant

Rotation	Counter Reading	Date	Technician's Initials
ccw	0	2013-4-22	Alan Lai
ccw	58,924	2013-4-24	Alan Lai
ccw	120,558	2013-4-26	Alan Lai
ccw	155,126	2013-4-27	Alan Lai
ccw	200,124	2013-4-28	Alan Lai
ccw	237,205	2013-5-3	Alan Lai
ccw	275,618	2013-5-4	Alan Lai
ccw	355,442	2013-5-6	Alan Lai
ccw	400,000	2013-5-7	Alan Lai

11.5 Performance After Cycle Test

Compliant/Non: Compliant

Are locks operative in all respects including dead locking of the latch bolt?

Yes ✓
No _____

Comments:

11.6 Cylinder Cycle Test - 1 sample

Compliant/Non: Compliant

Rotation	Counter Reading	Date	Technician's Initials
ccw	0	2013-4-22	Alan Lai
ccw	14,206	2013-4-23	Alan Lai
ccw	20000	2013-4-24	Alan Lai

Are locks operative in all respects including dead locking of the latch bolt?

Yes ✓
No _____

Comments:

12 Security Tests

12.1 Dead Latch and Strike Impact Test

Compliant/Non: Compliant

Sample No.: #007

Impacts 2 blows of 60ft-lbf
2 blows of 90ft-lbf

Operable ✓
Inoperable _____

Entry _____
Non-Entry ✓

Comments:

--

**12.2 Abusive Locked Lever Test -
Outside Locked Levers - Grade 1 only**

Compliant/Non: Not applicable

Sample No.: _____

Load	Torque Applied

Operable _____
Inoperable _____

Entry _____
Non-Entry _____

	Measured (in.)	Minimum (in.)
9.3 Dead Latch Projection:		
9.4 Aux. Projection to Dead Latch:		

Comments:

<u>For grade 1 levers only</u>

**12.3 Locked Lever or Paddle Vertical Impact Test
Grade 1 only**

Compliant/Non: Not applicable

Sample No.: _____

Impacts _____

Operable _____
Inoperable _____

Entry _____
Non-Entry _____

Paddle Mount	Measured Inside Paddle Force	Inside Paddle Force Max.
Vertical	N/A	N/A
Horizontal	N/A	N/A

Comments:

<u>For grade 1 levers only</u>

12.4 Locked Cylinder in the Lever Face Impact Test Compliant/Non: Not applicable
Grade 1 only Sample No.: _____

Impacts	Impacts Conducted

Operable _____ Entry _____
 Inoperable _____ Non-Entry _____

Comments: For grade 1 lever only

12.5 Locked Lever or Knob Catch Attack Test Compliant/Non: Compliant
 Sample No.: #008

Applied Force	Catch Force (lbf)	Axial Force (lbf)
	50	100

Operable ✓ Entry _____
 Inoperable _____ Non-Entry ✓

Comments:

12.6 Cylinder Assembly Pulling Test Compliant/Non: Compliant
 Grade 1: Tension 500 lbf Measured Tension: 300 lbf Sample #009
 Grade 2: Tension 300 lbf
 Grade 3: Tension 250 lbf

Grade achieved: 2 Operable _____ Entry _____
 Inoperable ✓ Non-Entry ✓

Comments

12.7 Cylinder Assembly Torque Test Compliant/Non: Compliant
 Grade 1: Torque 300 lbf-in Measured Torque: 150 lbf-ft Sample #010
 Grade 2: Torque 150 lbf-in
 Grade 3: Torque 120 lbf-in

Grade achieved: 2 Operable _____ Entry _____
 Inoperable ✓ Non-Entry ✓

Comments

13 Material Evaluation Tests

13.1 Knob Crush Test

Compression Load: 1000 lbf

Compliant/Non: Not applicable

Sample No.: N/A

Deformation	Initial Diam.	Final Diam.	%	Max Allowable (%)
Outside Knob				
Inside Knob				
			Measured (lbf-in)	Maximum Allowable (lbf-in)
Key Torque-At Test Completion	CW			
	CCW			

Comments: Not applicable for lever lock

13.2 Rose Assembly Dent Test

Drop an 8 ounce projectile from a height of 12" in a drop tube

Compliant/Non: Compliant

Sample No.: #014

	Measured Depth (in)	Max. Depth Allowable (in)
Inside	0.024	0.075
Outside	0.016	0.075

Comments:

13.3 Outside Rose Deformation Test

Sample No.: #014

Compliant/Non: Compliant

Initial Rose Width (in)	Load (lbf)	Final Rose Width (in)	Min. Allowable (in)
3.537	560	3.451	3.184

Comments:

Product Photo



Product Drawing

PARTS NO.	MATERIAL	QUANTITY	HARDNESS	SURFACE TREATMENT
1	ASS'Y	1		
2	SCP1 T2.0	1		ZH-PL
3	ASS'Y	1		
4	ZH-9C	2		OPTION
5	ABS	2		
6	ASS'Y	1		
7	M8x8D	1		NI-PL
8	SCP1 T2.0	1		ZH-PL
9	ASS'Y	1		
10	STS304 T0.6	1		Cr-PL
11	ASS'Y	1		
12	STS304 T2.3	1		OPTION
13	SNRH	2		ZH-PL
14	SNRH	2		ZH-PL
15	MSRH17	4		NI-PL

DR. BY	DES. BY	SCALE	1	DESCRIPTION	AGL-7000L
APP. BY	CH. BY	SCALE	1	DESCRIPTION	AGL-7000L
				PARTS NAME	
				DWG NO.	

Revision Page

Revision No.	Date	Changes	Author	Reviewer
Original	May 20, 2013	First issue	Alan Lai	Blusea Dong