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**Intertek Test Report 130121006GZU-001**  
EVALUATION  
OF  
**Cylindrical lever lockset, AGL-8000, Grade 1**  
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-8000, Grade 1. Samples were received in good condition on January 4, 2013 from Angel Metal Co., Ltd. Testing was conducted at Intertek Testing Services Shenzhen Ltd. Guangzhou Branch.

**TEST DATES:**  
From January 21, 2013 to March 25, 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.

Prepared By:

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Intertek

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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-8000	4000	F81	1	key/lever	—	—

Date Started: 2013-1-21      Date Completed: 2013-3-25

**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	23.9	24.8	23.0	24.8	23.9	23.9	28.0	34.0
Outside CCW	23.9	23.0	21.2	22.1	22.1	23.0	28.0	34.0
Inside CW	21.2	21.2	20.4	22.1	20.4	21.2	28.0	34.0
Inside CCW	23.0	23.9	23.0	23.9	22.1	22.1	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	57.5	60.2	60.2	61.1	60.2	63.7	70.0	85.0
Outside CCW	54.9	56.6	54.9	57.5	54.9	57.5	70.0	85.0
Inside CW	55.8	56.6	54.9	56.6	56.6	60.2	70.0	85.0
Inside CCW	57.5	58.4	59.3	57.5	58.4	61.1	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	0.401	0.391	0.389	0.386	0.397	0.392	0.344	0.344

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	0.344	0.317	0.331	0.319	0.330	0.320	0.313	0.250

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	2.0	2.0	1.9	2.0	1.9	2.0	4.5	5.4
Locked	2.1	2.1	2.0	2.1	2.1	2.1	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	700	700	700	700
Outside CCW	N/A	N/A	N/A	N/A
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	500	500	500	500
Inside	500	500	500	500

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	200	200	200	200
Inside	200	200	200	200

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	360	360	360	360
Inside	360	360	360	360

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	1200	1200	1200	1200

Comments:

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

	Specimen #004	Specimen #005	Specimen #006	Test Load Minimum (lbf)
Load	150	150	150	150

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	450	450	450	450

Comments:

**10.7 Unlocked Entry Handleset Load Test**Compliant/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	24.8	26.6	34.0
Outside CCW	23.0	23.0	23.9	34.0
Inside CW	25.7	24.8	22.1	34.0
Inside CCW	25.7	25.7	26.6	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	62.8	57.5	62.0	70.0
Outside CCW	61.1	60.2	62.0	70.0
Inside CW	58.4	56.6	58.4	70.0
Inside CCW	63.7	62.0	61.1	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	0.363	0.370	0.357	0.344

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)	0.15	0.21	0.09	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:

Compliant

	Specimen #004	Specimen #005	Specimen #006	Standard
Lever rotation	5.6	7.2	4.3	22.5

Comments:

**11 Cycle Test 3 samples**

Compliant/Non:

Compliant

Rotation	Counter Reading	Date	Technician's Initials
ccw	0	2013-1-23	Alan Lai
ccw	165,697	2013-1-28	Alan Lai
ccw	198,656	2013-1-29	Alan Lai
ccw	268,308	2013-1-31	Alan Lai
ccw	303,042	2013-2-1	Alan Lai
ccw	406,224	2013-2-4	Alan Lai
ccw	500,000	2013-2-7	Alan Lai
ccw	608,732	2013-2-16	Alan Lai
ccw	684,291	2013-2-18	Alan Lai
ccw	842,609	2013-2-22	Alan Lai
ccw	953,464	2013-2-25	Alan Lai
ccw	1000000	2013-2-27	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
CW	0	2013-1-25	Alan Lai
CW	14,682	2013-1-26	Alan Lai
CW	35240	2013-1-27	Alan Lai
CW	40000	2013-1-28	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  
2 blows of 120ft-lbf

Operable ✓ Entry           
 Inoperable          Non-Entry ✓

Comments:

--

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

Compliant/Non: Compliant

Sample No.: #008

Load	Torque Applied
1200lbf-in	1200lbf-in

Operable ✓ Entry           
 Inoperable          Non-Entry ✓

	Measured (in.)	Minimum (in.)
9.3 Dead Latch Projection:	0.370	0.344
9.4 Aux. Projection to Dead Latch:	0.296	0.250

Comments:

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

Compliant/Non: Compliant

Sample No.: #009

Impacts 5 blows of 60ft-lbf on lever

Operable          Entry           
 Inoperable ✓ Non-Entry ✓

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

Comments:

--

**12.4 Locked Cylinder in the Lever Face Impact Test  
 Grade 1 only**

Compliant/Non: Compliant

Sample No.: #010

Impacts	Impacts Conducted
5 @ 60 ft-lbs	5 blows

Operable          Entry           
 Inoperable ✓ Non-Entry ✓

Comments:

<u>After the test, the key can not insert into the cylinder, but the lever can operate normally.</u>
--

**12.5 Locked Lever or Knob Catch Attack Test**

Compliant/Non: Compliant

Sample No.: #011

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

Operable ✓

Inoperable         

Entry         

Non-Entry ✓

Comments:

**12.6 Cylinder Assembly Pulling Test**

Compliant/Non: Compliant

Grade 1: Tension 500 lbf

Measured Tension: 500 lbf

Sample #012

Grade 2: Tension 300 lbf

Grade 3: Tension 250 lbf

Grade achieved: 1

Operable         

Inoperable ✓

Entry         

Non-Entry ✓

Comments

**12.7 Cylinder Assembly Torque Test**

Compliant/Non: Compliant

Grade 1: Torque 300 lbf-in

Measured Torque: 300 lbf-ft

Sample #013

Grade 2: Torque 150 lbf-in

Grade 3: Torque 120 lbf-in

Grade achieved: 1

Operable         

Inoperable ✓

Entry         

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:

**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	0.030	0.075
Outside	0.028	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)
3.535	650	3.526	3.181

Comments:

## Product Photo



## Product Drawing

PARTS NO	MATERIAL	QUANTITY	HARDNESS	SURFACE TREATMENT
1	ASS'Y	1		
2	SCP1 T2.0	1		ZN-PL
3	ASS'Y	1		
4	ZN-DC	2		OPTION
5	ABS	2		
6	ASS'Y	1		
7	MSR60	1		NI-PL
8	SCP1 T2.0	1		ZN-PL
9	ASS'Y	1		
10	STSS04 T0.6	1		Cr-PL
11	ASS'Y	1		
12	STSS04 T2.3	1		OPTION
13	SPH	2		ZN-PL
14	SPH	2		ZN-PL
15	MSRR17	4		NI-PL

3RD-ANGLE PROJECTION	SCALE 1	DESCRIPTION	AGL-8000L
DR. BY	DES. BY	APP. BY	PARTS NAME
<b>ANGEL</b>			DRG. NO.

## Revision Page

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Revision No.	Date	Changes	Author	Reviewer
Original	April 9, 2013	First issue	Alan Lai	Blusea Dong
			<i>Alan Lai</i>	<i>Blusea Dong</i>