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Intertek Test Report 130129052GZU-001

EVALUATION
OF
Model: AGK-8000, Grade 1, Cylindrical Knob Lockset
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 Model: AGK-8000, Grade 1, Cylindrical Knob Lockset. Samples were received in good condition on February 20, 2013 from Angel Metal Co.,Ltd. Testing was conducted at Intertek Testing Services Shenzhen Ltd. Guangzhou Branch.

TEST DATES:
From February 20, 2013 to March 26, 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:

Alex Yang
Engineer
Intertek

Report Reviewed By:

Blusea Dong
Project Engineer
Intertek

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
AGK-8000	4000	F82A	1	Knob	—	—

Date Started: 2013-2-20 Date Completed: 2013-3-26

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	7.08	6.55	6.90	6.73	7.26	6.90	9.0	11.0
Outside CCW	6.90	6.64	6.99	6.64	7.35	6.90	9.0	11.0
Inside CW	7.08	6.64	7.08	6.46	6.99	6.64	9.0	11.0
Inside CCW	7.17	6.46	7.08	6.46	6.99	6.73	9.0	11.0

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	21.2	20.4	19.5	17.7	22.1	20.4	45.0	54.0
Outside CCW	22.1	20.4	21.2	18.6	21.2	19.5	45.0	54.0
Inside CW	29.2	26.6	28.3	26.6	29.2	27.4	45.0	54.0
Inside CCW	29.2	26.6	29.2	25.7	30.1	27.4	45.0	54.0

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

	Specimen #001		Specimen #002		Specimen #003		Max Allowable	
Direction	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.) when depressed to dead latched position. Compliant/Non: Compliant

	Specimen #001		Specimen #002		Specimen #003		Minimum Allowable	
	Initial	50%	Initial	50%	Initial	50%	Initial	50%
Projection	0.375	0.372	0.367	0.365	0.377	0.374	0.250	0.203

Comments:

9.4 Dead Latch or Aux. Latch Projection (in.) at first effective dead locking of latch bolt. Compliant/Non: Compliant

	Specimen #001		Specimen #002		Specimen #003		Minimum Allowable	
	Initial	50%	Initial	50%	Initial	50%	Initial	50%
Projection	0.329	0.324	0.322	0.319	0.325	0.322	0.311	0.248

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	2.60	2.53	2.74	2.67	2.67	2.68	4.5	5.4
Locked	2.62	2.54	2.67	2.65	2.65	2.67	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	300	300	300	300
Outside CCW	300	300	300	300
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: Not applicable

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

Comments: No lever

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: No handdleset or thumb piece

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	250	250	250	250

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	7.1	7.3	6.9	11
Outside CCW	7.1	7.3	7.1	11
Inside CW	6.9	7.1	7.3	11
Inside CCW	7.1	7.3	7.3	11

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	42.5	40.7	40.7	45
Outside CCW	39.8	42.5	41.6	45
Inside CW	42.5	39.8	39.8	45
Inside CCW	40.7	39.8	39.8	45

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	0.364	0.364	0.366	0.344

Comments:

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

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

Comments: No lever

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: No lever

11 Cycle Test 3 samples Compliant/Non: Compliant

Rotation	Counter Reading	Date	Technician's Initials
CW	0	2013-2-25	Alex Yang
CW	86,718	2013-2-28	Alex Yang
CCW	216,855	2013-3-4	Alex Yang
CCW	294,802	2013-3-7	Alex Yang
CW	431,551	2013-3-11	Alex Yang
CCW	551,159	2013-3-15	Alex Yang
CW	744,258	2013-3-20	Alex Yang
CCW	1,000,000	2013-3-28	Alex Yang

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	2013-2-27	Alex Yang
cw	31,027	2013-2-28	Alex Yang
cw	40,000	2013-3-1	Alex Yang

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.: #008

Impacts: 2 blows of 60ft-lbf; 2 blows of 90ft-lbf; 2 blows of 120ft-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
1200lbf-in	N/A

Operable: Inoperable:

Entry: Non-Entry:

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

Comments: No lever, for grade 1 only

12.3 Locked Lever or Paddle Vertical Impact Test Grade 1 only

Compliant/Non: Not Applicable

Sample No.:

Impacts: N/A

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: No lever or paddle, for grade 1 only

12.4 Locked Cylinder in the Lever Face Impact Test Compliant/Non: Not Applicable

Grade 1 only Sample No.:

Impacts	mpacts Conducte
5 @ 60 ft-lbs	N/A

Operable Entry
Inoperable Non-Entry

Comments: No lever, for grade 1 only

12.5 Locked Lever or Knob Catch Attack Test Compliant/Non: Complaint

Sample No.: #009

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

Operable √ Entry
Inoperable Non-Entry √

Comments:

12.6 Cylinder Assembly Pulling Test Compliant/Non: Compliant

Grade 1: Tension 500 lbf Measured Tension: 500 lbf Sample #010
Grade 2: Tension 300 lbf
Grade 3: Tension 250 lbf

Operable Entry
Grade achieved: 1 Inoperable √ Non-Entry √

Comments

12.7 Cylinder Assembly Torque Test Compliant/Non: Compliant

Grade 1: Torque 300 lbf-in Measured Torque: 300 lbf-ft Sample #011
Grade 2: Torque 150 lbf-in
Grade 3: Torque 120 lbf-in

Operable Entry
Grade achieved: 1 Inoperable √ Non-Entry √

Comments

13 Material Evaluation Tests

13.1 Knob Crush Test

Compliant/Non: Compliant

Compression Load: 1000 lbf

Sample No.: #012

Deformation	Initial Diam.	Final Diam.	%	Max Allowable (%)
Outside Knob	2.239	2.227	0.5%	10.0%
Inside Knob	2.237	2.233	0.2%	10.0%

		Measured (lbf-in)	Maximum Allowable (lbf-in)
Key Torque-At Test Completion	CW	10.1	11
	CCW	9.2	11

Comments:

13.2 Rose Assembly Dent Test

Compliant/Non: Compliant

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

Sample No.: #013

	Measured Depth (in)	Max. Depth Allowable (in)
Inside	0.017	0.075
Outside	0.017	0.075

Comments:

13.3 Outside Rose Deformation Test

Compliant/Non: Compliant

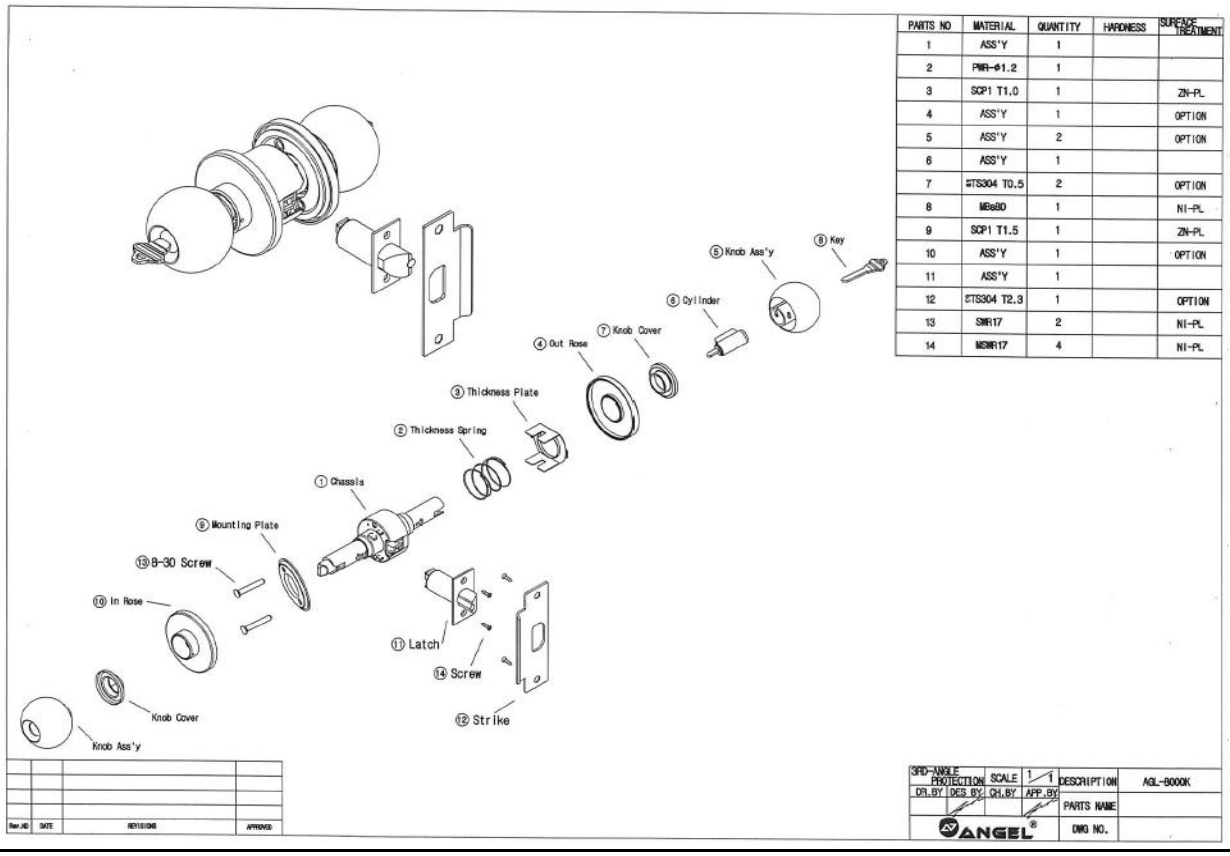
Sample No.: #014

Initial Rose Width (in)	Load (lbf)	Final Rose Width (in)	Min. Allowable (in)
2.867	650	2.853	2.580

Comments:

Product Photo

Product Drawing



PARTS NO	MATERIAL	QUANTITY	HARDNESS	SURFACE TREATMENT
1	ASS'Y	1		
2	PWR-Φ1.2	1		
3	SCP1 T1.0	1		ZN-PL
4	ASS'Y	1		OPTION
5	ASS'Y	2		OPTION
6	ASS'Y	1		
7	STS304 T0.5	2		OPTION
8	MBaBD	1		NI-PL
9	SCP1 T1.5	1		ZN-PL
10	ASS'Y	1		OPTION
11	ASS'Y	1		
12	STS304 T2.3	1		OPTION
13	SMR17	2		NI-PL
14	MSMR17	4		NI-PL

Revision Page

Revision No.	Date	Changes	Author	Reviewer
Original	April 8, 2013	First issue	Alex Yang	Blusea Dong