Y H

Item And Code No.

I T E M	CONNECTOR
S P E C	2.00㎜ Pitch Wire to Board SMD Type
M A K E R S P E C	20037WR-NN
	(02,06)
Code No.	

The Best Partner for Electronic Circuits Connections

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Specification Approval Sheet

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Pitch	2.00 mm
Special	Wire to Board
Type	SMD

20037 Series
Connector 제품규격
Product Specification

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● 제,개정 이력『History Revision』

NO	DATE	ISS.	CHK.	APP.	SUMMARY
1	2001.10.15	P.K.H	A.J.I	B.J.S	Presentation
2	2002.10.04	C.A.N	J.J.E	A.J.I	염수분무 시험조건 개정
3	2003.01.21	C.A.N	J.J.E	A.J.I	특허문구 삽입
4	2004.06.07	K.H.S		A.J.I	시험방법 및 시험조건 개정
5	2006.03.21	L.K.O	K.S.I	C.G.N	포장수량 변경
6	2006.06.14	L.K.O	K.S.I	L.K.J	냉땜 개선 살보강
7	2007.09 28	L.K.O	K.S.I	S.J.H	형합성 개선 LOCKING부 수정

아래와 같이 사양 승인원을 제출합니다.

『Yeon Ho Electronics CO.,LTD. submits the approval certification of connector specification.』

1. 업 체 명 : (주) 연 호 전 자
   『Manufactured by : Yeon Ho Electronics CO.,LTD.』
2. 기 안 부 서 : 품질관리실
   『Written by : Quality Control Department』

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1. 적용 범위 『Scope』

본 사양서는 (주)연호전자 제품 20037 series SMD connector에 한하여 적용한다.
『This specification covers the requirements for 20037 series SMD connector』

2. 형명 구성 『Numbering System of Products(Ordering Information of Products)』

20037 WR - NN

- NN : Number of Circuits
- WR : Parts : Right Angle Wafer
- 20037 : Series Name

SM H 200 - NN

- NN : Number of Circuits
- H : Parts : Housing
- SM 200 : Series Name

YST 200 — Parts : Terminal

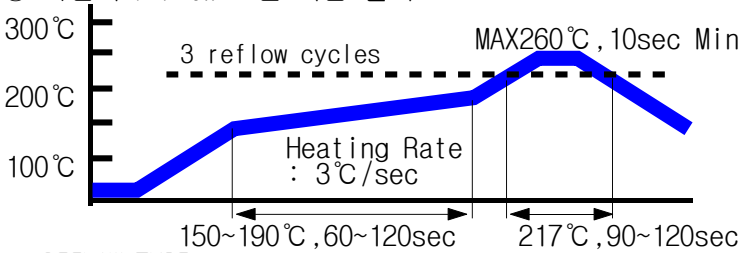
3. 원재료 『Material』

Item	Material	Maker	Plated / Color
Wafer Material	PA6T	Mitsui	Natural
Housing Material	PA66	LG Chem	White
Pin Material	Brass	Poong San	Tin plated
Hook Material	Brass	Poong San	Tin plated
Terminal Material	Phosphor Bronze	Poong San	Tin plated

4. 정 격 『Ratings』

항 목 (Item)	정 격 (Standard Data)
정격 전압 (Operating Voltage)	AC/DC 250V
정격 전류 (Current Rating)	AC/DC 3A
사용 온도 (Operating Temperature)	-25℃ ~ +85℃
적용 전선 (Applicable Wire)	AWG #22 ~ #28
적용 PCB (Applicable P.C.B)	0.8 ~ 1.6㎜

5. 성 능 『Performance Characteristics』

NO.	시험항목 『Test Title』	시 험 방 법 및 조 건 『Test Procedures/Methods Conditions』	규 격 『Requirements』
1.	외 관 치 수 『Dimensions 』		첨부 제품도에 준한다. 『Refer to Drawings』
2.	전 기 적 성 능 『Electrical Characteristics』		
	2-1.절연저항	⦿ 인접 Terminal(Contact)간에 DC 500V ±5V 전압을 1분±5초간 인가하였을 때 절연저항을 측정한다. (1회 측정에서 규격 치 미달인 경우 3시간 이내 재측정)	1000MΩ 이상
	2-1.Insulation Resistance	⦿ Measured between adjacent contacts ⦿ Test voltage : DC 500V ⦿ Electrification time : 1 Min ±5 Sec (Based upon MIL-STD-202G Method 302 Condition B)	1000MΩ MIN
	2-2.내 전 압	⦿ 인접한 Terminal간에 AC 1000V 전압을 1분±5초간 인가한다.	절연파괴 및 섬락이 없고 사용상 결함이 없을 것
	2-2.Dielectric Withstanding Voltage	⦿ Measured between adjacent contacts ⦿ Test voltage : AC 1000V ⦿ Electrification time : 1 min ± 5 sec (Based upon MIL-STD-202G Method 301)	No flashover and no physical damage shall be observed
	2-3.접촉저항	⦿ Terminal과 Wafer Pin간의 접촉저항 측정	30mΩ 이하
	2-3.Contact Resistance	⦿ Measured the resistance of mated connector, 20mV. 10mA	30mΩ MAX
3.	물 리 적 성 질 『Physical Characteristics』		
	3-1.납 땜 성	⦿ FLUX (ROSIN 10%, METHANOL 90%)에 5~10초 동안 담근 후 SnAg(3.5)Cu(0.7)의 Pot 납땜조 온도 (240℃±5℃)에 3초 ±0.5초 동안 침전시킨다.	침전 부위의 납땜이 90% 이상일 것
	3-1. Solder Ability	⦿ Immersion in flux consisting of rosin 10% and methanol 90% for a period of 5 to 10 seconds dip in molten solder consisting of SnAg(3.5)Cu(0.7) at 240℃±5℃ degrees for 3 ± 0.5 seconds.	More than 90% of area dipped in molten solder should be coated by solder
	3-2.납땜내열성	※ REFLOW TYPE ⦿ 하단의 REFLOW 조건 시험 실시  	외관 변형등이 없을 것
	3-2.Solder Heat Resistance	※ REFLOW TYPE ⦿ The connector shell be tested resistance, to soldering heat in the following conditions. The temperature shall be measured on the surface of P.C.B	Appearance : Good

NO.	시험항목 『Test Title』	시 험 방 법 및 조 건 『Test Procedures/Methods Conditions』	규 격 『Requirements』
	3-3.Pin유지력 3-3.Pin Retention Force	⦿ 사출물(수지)이 Pin을 유지하고 있는 힘 측정 * Pin을 25±3mm/min 속도로 뺄 때의 힘을 측정한다. ⦿ Measured withdrawal force that resin grips and supports pin * Velocity of withdrawal : 25±3mm/min	0.5Kgf 이상 0.5Kgf MIN
	3-4.총합삽입력 3-4.Total Insertion Force	⦿ 회로수가 같은 Housing Ass`y에 Wafer Ass`y 을 삽입할 때의 힘 측정 ⦿ Measured force to insert wafer assembly into the housing assembly which has same circuits	
	3-5.총합발거력 3-5.Total Withdrawal Force	⦿ 결합된 Housing Ass`y로부터 Wafer Ass`y 를 발거할 때의 힘 측정 ⦿ Measured force to withdraw wafer assembly from the housing assembly which has same circuits	
	3-6.내구성시험 3-6.Durability of Contact Resistance	⦿ 결합된 제품 Housing Ass`y과 Wafer Ass`y의 삽입 및 분리 동작을 10th/min 속도로 30회 행한 후 접촉저항 측정 ⦿ Measured contact resistance after 30 cycles of total insertion and withdrawal operation ⦿ Withdrawal Rate : 10th/min	접촉저항 : 50mΩ 이하 Contact Resistance : 50mΩ MAX
	3-7.Terminal 삽입력 3-7.Insertion Force of Terminal	⦿ Housing을 고정시키고 Terminal를 25 ±3㎜/min 속도로 일직선으로 삽입할 때의 삽입력 측정 ⦿ Insert a terminal into the housing straightly and measure insertion force ⦿ Velocity of insertion : 25 ±3mm/min	1.0Kgf 이하 1.0Kgf MAX
	3-8.Terminal 조립강도 3-8.Terminal Retention Force	⦿ Housing에 Terminal을 조립한 후 Terminal을 25 ±3mm/min 속도로 인장시켜 이탈될 때의 힘 측정 ⦿ Insert a terminal into the housing and measure the force to withdraw the terminal from housing. ⦿ Apply axial pull out force at the speed rate of 25 ±3mm/minute	0.5Kgf 이상 0.5Kgf MIN
	3-9.압착강도 3-9.Crimp Tensile Strength	⦿ Terminal에 Lead Wire를 압착한후 압착부위(심선부위)가 파괴될 때까지 25 ±3㎜/min 속도로 인장강도 측정 ⦿ Measured tensile strength of the crimped contact (stripped wire barrel section of contact) to conductor joint	AWG #22 : 2.5Kgf MIN AWG #24 : 2.0Kgf MIN AWG #26 : 1.5Kgf MIN AWG #28 : 1.0Kgf MIN

POS	Insertion Force	Withdrawal Force
02	2.5 MAX	0.20 MIN
03	3.0 MAX	0.30 MIN
04	3.5 MAX	0.40 MIN
05	4.0 MAX	0.50 MIN
06	4.5 MAX	0.60 MIN
07	5.0 MAX	0.70 MIN
08	5.5 MAX	0.80 MIN
09	6.0 MAX	1.00 MIN
10	6.5 MAX	1.10 MIN
11	7.0 MAX	1.20 MIN
12	7.5 MAX	1.30 MIN
13	8.0 MAX	1.40 MIN
14	8.5 MAX	1.50 MIN
15	9.0 MAX	1.60 MIN

NO.	시험항목 『Test Title』	시 험 방 법 및 조 건 『Test Procedures/Methods Conditions』	규 격 『Requirements』
4.	환 경 시 험 『Environmental Test』		
	4-1.내진동성 시 험	⦿ DC 100mA 통전상태에서 진폭1.52mm 진동수 10-55-10HZ 진동 상태에서 X,Y,Z방향으로 각각 2시간씩 진동을 시킨 후 단전상태 및 접촉저항 측정	1)접촉저항: 50mΩ 이하 2)단전상태: 1μsec 동안 단전상태 없을 것
	4-1.Vibration	⦿ Current of 100mA shall be applied during the testing The vibration shall be along each axis for the period of two hours with the maximum amplitude of 1.52mm and frequency of 10-55-10Hz/Min (Based upon MIL-STD-202G Method 201A)	1)Contact Resistance : 50mΩ MAX 2)Discontinue : 1μsec MAX
	4-2.염수분무 시 험	⦿ Connector를 결합한 상태에서 아래 조건으로 시험 후 흐르는 물에 세척 후 상온에서 4시간 방치 후에 특성을 측정한다. 조건: 염수농도 5% ±1% 염수분무 시간 48시간 ±4시간 시험온도 35℃ ±2℃	1)접촉저항: 50mΩ 이하 2)외관: 흑녹현상 없을것
	4-2.Salt Spray	⦿ Measure after exposure to salt solution spray of 5 ±1% density at a temperature of 35℃ ±2℃ for 48hrs ±4hrs. after test wash and leave to dry (Based upon MIL-STD-202G Method 101E Condition B)	1)Contact Resistance : 50mΩ MAX 2)Appearance : Not black rust
	4-3.내습성시험	⦿ Connector를 결합한 상태에서 아래조건에 따라 시험을 행한 후 측정한다. 조건 : 시험조의 온도 40℃ ±2℃ 상 대 습 도 90% ~ 95% 시 험 시 간 96시간	1)절연저항: 500MΩ 이상 2)접촉저항: 50mΩ 이하 3)외관 : 양호할 것
	4-3.Humidity	⦿ Mated connector shall be left for 96 hours in an environment of 40 ±2℃, and 90 ~ 95% humidity. After the exposure the connector shall be left in an ambient condition for one hour before the measurement is done (Based upon MIL-STD-202G Method 103B Condition B)	1)Insulation Resistance : 500MΩ MIN 2)Contact Resistance : 50mΩ MAX 3)Appearance : Good
	4-4.내고온성 시 험	⦿ Connector를 결합한 상태에서 시험조의 온도 85 ±2℃에서 96시간 동안 시험 후 상온에서 30분간 방치 후 측정한다.	1)접촉저항: 50mΩ 이하
	4-4.Resistance to High Temperature	⦿ Chamber temperature : 85 ±2℃ Exposed 30 minutes after being exposed 96hrs under the chamber temperature electrical characteristics were measured and tested (Based upon MIL-STD-202G Method 108A Condition A)	1)Contact Resistance : 50mΩ MAX
	4-5.내한성시험	⦿ Connector를 결합한 상태에서 시험조의 온도 -40 ±3℃에서 96시간 동안 시험 후 상온에서 30분간 방치 후 측정한다.	1)접촉저항: 50mΩ 이하
	4-5.Altitude Low Temperature	⦿ Chamber temperature : -40 ±3℃ Exposed 30 minutes after being exposed 96hrs under the chamber temperature electrical characteristics were measured and tested (Based upon JIS C60068-2-1)	1)Contact Resistance : 50mΩ MAX

<table>
<tr><th>NO.</th><th>시험항목
『Test Title』</th><th>시 험 방 법 및 조 건
『Test Procedures/Methods Conditions』</th><th>규 격
『Requirements』</th></tr>
<tr><td></td><td>4-6.열충격시험</td><td>⊙ Connector를 결합한 상태에서 아래조건에 따라 5회 연속 시험을 행한 후 시험을 실시한다.
<table>
<tr><td>단 계</td><td>1</td><td>2</td><td>3</td><td>4</td></tr>
<tr><td>온도(℃)</td><td>-55 +0 -3</td><td>25 +10 -5</td><td>85 +3 -0</td><td>25 +10 -5</td></tr>
<tr><td>시간(분)</td><td>30</td><td>5</td><td>30</td><td>5</td></tr>
</table></td><td>1)내전압: 절연파괴 및 섬락이 없고 사용상 결함이 없을 것
2)접촉저항: 50mΩ 이하
3)절연저항: 500MΩ 이상
4)외관 : 양호할 것</td></tr>
<tr><td></td><td>4-6.Thermal Shock</td><td>⊙ Mated connector shall be exposed five cycles as table #1 (Based upon MIL-STD-202G Method 107-A table #1)
<table>
<tr><td>STEP</td><td>1</td><td>2</td><td>3</td><td>4</td></tr>
<tr><td>Temperature (℃)</td><td>-55 +0 -3</td><td>25 +10 -5</td><td>85 +3 -0</td><td>25 +10 -5</td></tr>
<tr><td>Exposed Time (MIN)</td><td>30</td><td>5</td><td>30</td><td>5</td></tr>
</table></td><td>1)Dielectric Strength : No flash over and no physical damage shall be observed
2)Contact Resistance : 50mΩ MAX
3)Insulation Resistance : 500MΩ MIN
4)Appearance : Good</td></tr>
</table>

6. 포장 및 식별방법 『Identification and Packing』

1) 포장 조건 『Packing Condition』 : Emboss Taping

2) 수 량 『Quantity』

3) 포장 방법 『Packing Method』 :

Connector를 Embossed Tape에 포장 후 물리적 변형 또는 화학적 변화가 일어나지 않도록 Reel에 감아야하며 규격 및 수량표시를 한다.

『 1) Connector should be into the embossed tape.
the tape shall be sealed with cover tape by heat treatment
2) After sealed the embossed tape shall be wound to reel.
3) The wound reel shall be packaged in a carton box for shipment must have enough strengths in other to protect physical damage during transportation.』

4) 식별 표시 : 다음과 같은 사항을 제품포장 BOX에 명기한다.

『Identifications shall be marked as follows』 :

4-1. 제조회사, 제조자명 또는 상표 『Manufacture's LOGO』

4-2. 형명 또는 부품번호 『Part Number』

4-3. 수 량 『Quantity』

4-4. 제조 LOT NO 『Date Code』

4-5. 기타 상호 필요하다고 인정되는 사항

『Others agreed with manufacturer and customer』

Reliability Test Report

APP`R	Writ`N	CHK`D	APR`D
	P.H.M	K.J.M	B.J.S

DESCRIPTION	CONNECTOR	MODEL NO	20037WR-02	TEST CONDITION	Temp:22℃,Humid:65%

Test Title	Test Procedures	Specification		X1	X2	X3	X4	X5	Conclusion
2-1.Insulation Resistance	◦Test voltage : DC 500V±5V ◦Electrification time : 1min±5sec	1000MΩ MIN		1000MΩ MIN					GOOD
2-2.Dielectric Withstanding Voltage	◦Test voltage : AC 1000V ◦Electrification time : 1min±5sec	GOOD		0.K	0.K	0.K	0.K	0.K	GOOD
2-3.Contact Resistance	◦Measured the resistance of mated connector, 20mV. 10mA	30mΩ MAX		3.5	3.5	3.7	3.9	3.7	GOOD
3-1.Solder Ability	◦SnAgCu 240±5℃, 3±0.5sec	90% MIN		0.K	0.K	0.K	0.K	0.K	GOOD
3-2.Solder Heat Resistance	◦MAX 260℃, 10sec(Min) ◦After reflow (3 reflow cycles)	GOOD		0.K	0.K	0.K	0.K	0.K	GOOD
3-3.Pin Retention Force	◦Measured withdrawal force that resin grips and supports pin	0.5Kgf MIN		2.81	2.76	2.88	2.73	2.84	GOOD
3-4.Total Insertion Force	◦Measured forces to insert wafer ass'y into the housing ass'y which has same circuits	02P: 2.5Kgf MAX		1.04	0.91	0.98	1.01	0.96	GOOD
3-5.Total Withdrawal Force	◦Measured forces to withdraw wafer ass'y from the housing ass'y which has same circuits (Un Locking)	02P: 0.2Kgf MIN		0.76	0.83	0.82	0.76	0.72	GOOD
3-6.Durability of Contact Resistance	◦Measured contact resistance after 30 cycles of total insertion and withdrawal operation.	Contact Resistance : 50mΩ MAX		4.1	3.6	3.8	4.2	4.2	GOOD
3-7.Insertion Force of Terminal	◦Insert a terminal into the housing straightly and measure insertion force	1.0Kgf MAX		0.17	0.15	0.19	0.17	0.16	GOOD
3-8.Terminal Retention Force	◦Insert a terminal into the housing and measure the force to withdraw the terminal from housing.	0.5Kgf MIN		2.48	2.32	2.45	2.52	2.67	GOOD
3-9.Crimp Tensile Strength	◦ Measured tensile strength of the crimped contact to conductor joint	AWG #26: 1.5Kgf MIN		3.61	3.54	3.62	3.48	3.34	GOOD
4-1.Vibration	◦ 100mA, 1.52mm, 10-55-10Hz, 2hrs	Contact Resistance	50mΩ MAX	4.0	3.8	4.1	3.9	3.7	GOOD
		Discontinue	1μsec MAX	0.K	0.K	0.K	0.K	0.K	GOOD
4-2.Salt Spray	◦Salt solution : 5±1% ◦Exposed time : 48hrs ±4hrs ◦Temperature : 35±2℃	Contact Resistance	50mΩ MAX	4.7	4.5	4.5	4.9	4.7	GOOD
		Appearance	Not black rust	0.K	0.K	0.K	0.K	0.K	GOOD
4-3.Humidity	◦Chamber temperature: 40℃±2℃ ◦Relative humidity : 90~95% ◦Duration : 96hrs	Insulation Resistance	500MΩ MIN	500MΩ MIN					GOOD
		Contact Resistance	50mΩ MAX	4.2	4.1	4.5	4.1	4.4	GOOD
		Appearance	Good	0.K	0.K	0.K	0.K	0.K	GOOD
4-4.Resistance to High Temper	◦Chamber temperature : 85±2℃ ◦Exposed time : 96hrs	Contact Resistance	50mΩ MAX	4.1	4.2	4.2	4.3	3.9	GOOD
4-5.Altitude Low Temperature	◦Chamber temperature: -40±3℃ ◦Exposed time : 96hrs	Contact Resistance	50mΩ MAX	4.3	4.0	4.2	3.8	4.1	GOOD
4-6.Thermal Shock	◦1 Cycle is table #1 ◦After performing 5 cycles	Dielectric Strength	No damage	0.K	0.K	0.K	0.K	0.K	GOOD
		Contact Resistance	50mΩ MAX	4.4	4.1	4.3	4.2	4.5	GOOD
		Insulation Resistance	500MΩ MIN	500MΩ MIN					GOOD
		Appearance	Good	0.K	0.K	0.K	0.K	0.K	GOOD

STEP	1	2	3	4
Temperature (℃)	-55 +0 -3	25 +10 -5	85 +3 -0	25 +10 -5
Exposed Time (MIN)	30	5	30	5

Reliability Test Report

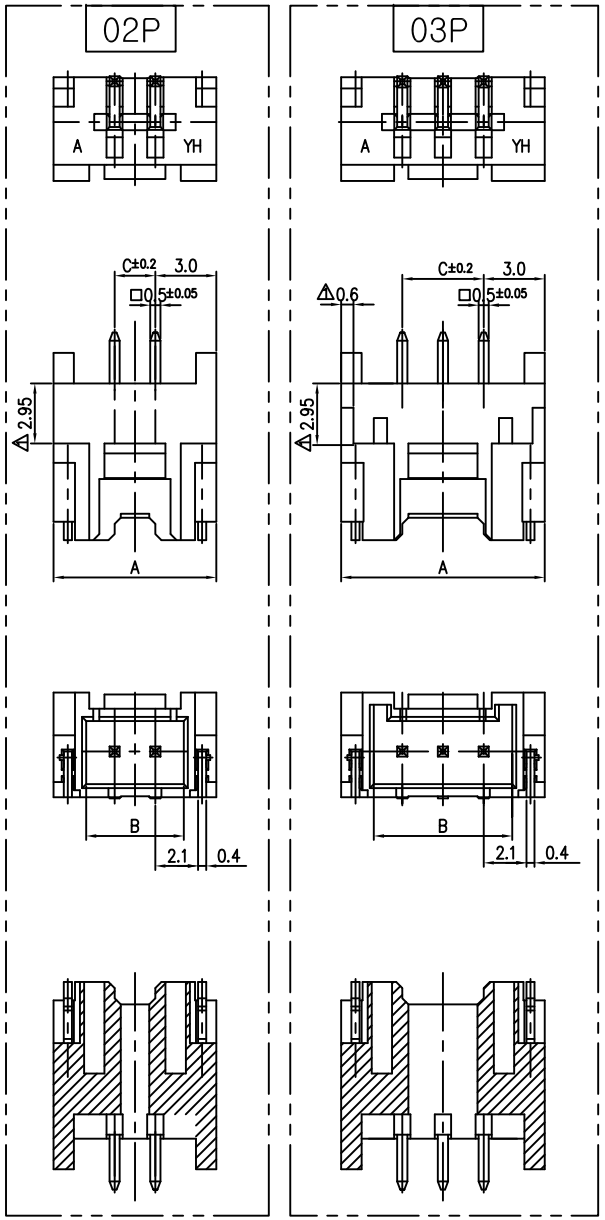
APP`R	Writ`N	CHK`D	APR`D
	P.H.M	K.J.M	B.J.S

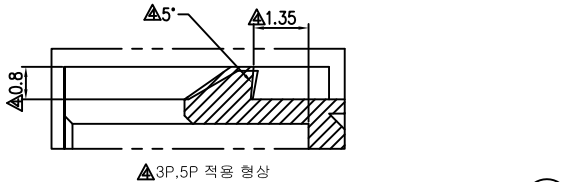
DESCRIPTION	CONNECTOR	MODEL NO	20037WR-06	TEST CONDITION	Temp:22℃,Humid:65%

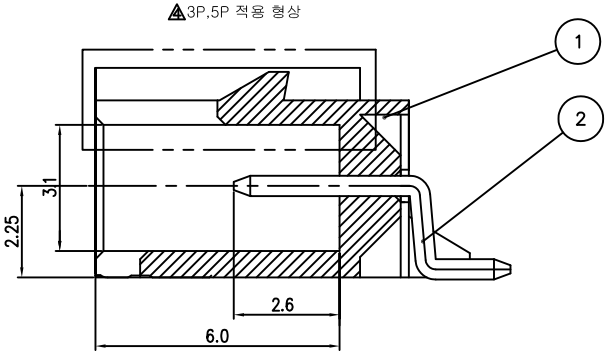
Test Title	Test Procedures	Specification		X1	X2	X3	X4	X5	Conclusion
2-1.Insulation Resistance	◦Test voltage : DC 500V±5V ◦Electrification time : 1min±5sec	1000MΩ MIN		1000MΩ MIN					GOOD
2-2.Dielectric Withstanding Voltage	◦Test voltage : AC 1000V ◦Electrification time : 1min±5sec	GOOD		0.K	0.K	0.K	0.K	0.K	GOOD
3-3.Contact Resistance	◦Measured the resistance of mated connector, 20mV. 10mA	30mΩ MAX		3.6	3.9	3.7	3.5	3.8	GOOD
3-1.Solder Ability	◦SnAgCu 240±5℃, 3±0.5sec	90% MIN		0.K	0.K	0.K	0.K	0.K	GOOD
3-2.Solder Heat Resistance	◦MAX 260℃, 10sec(Min) ◦After reflow (3 reflow cycles)	GOOD		0.K	0.K	0.K	0.K	0.K	GOOD
3-3.Pin Retention Force	◦Measured withdrawal force that resin grips and supports pin	0.5Kgf MIN		2.73	2.82	2.78	2.80	2.77	GOOD
3-4.Total Insertion Force	◦Measured forces to insert wafer ass'y into the housing ass'y which has same circuits	06P: 4.5Kgf MAX		2.48	2.53	2.58	2.43	2.55	GOOD
3-5.Total Withdrawal Force	◦Measured forces to withdraw wafer ass'y from the housing ass'y which has same circuits (Un Locking)	06P: 0.6Kgf MIN		1.25	1.20	1.28	1.23	1.26	GOOD
3-6.Durability of Contact Resistance	◦Measured contact resistance after 30 cycles of total insertion and withdrawal operation.	Contact Resistance : 50mΩ MAX		3.8	4.1	3.9	4.2	4.0	GOOD
3-7.Insertion Force of Terminal	◦Insert a terminal into the housing straightly and measure insertion force	1.0Kgf MAX		0.18	0.19	0.17	0.18	0.20	GOOD
3-8.Terminal Retention Force	◦Insert a terminal into the housing and measure the force to withdraw the terminal from housing.	0.5Kgf MIN		2.30	2.48	2.53	2.69	2.34	GOOD
3-9.Crimp Tensile Strength	◦ Measured tensile strength of the crimped contact to conductor joint	AWG #26: 1.5Kgf MIN		3.52	3.45	3.63	3.72	3.41	GOOD
4-1.Vibration	◦ 100mA, 1.52mm, 10-55-10Hz, 2hrs	Contact Resistance	50mΩ MAX	3.9	4.0	4.1	3.8	4.2	GOOD
		Discontinue	1μsec MAX	0.K	0.K	0.K	0.K	0.K	GOOD
4-2.Salt Spray	◦Salt solution : 5±1% ◦Exposed time : 48hrs ±4hrs ◦Temperature : 35±2℃	Contact Resistance	50mΩ MAX	4.5	4.6	4.9	4.7	4.8	GOOD
		Appearance	Not black rust	0.K	0.K	0.K	0.K	0.K	GOOD
4-3.Humidity	◦Chamber temperature: 40℃±2℃ ◦Relative humidity : 90~95% ◦Duration : 96hrs	Insulation Resistance	500MΩ MIN	500MΩ MIN					GOOD
		Contact Resistance	50mΩ MAX	4.0	4.2	4.3	4.4	4.1	GOOD
		Appearance	Good	0.K	0.K	0.K	0.K	0.K	GOOD
4-4.Resistance to High Temper	◦Chamber temperature : 85±2℃ ◦Exposed time : 96hrs	Contact Resistance	50mΩ MAX	3.9	4.0	3.8	4.1	4.2	GOOD
4-5.Altitude Low Temperature	◦Chamber temperature: -40±3℃ ◦Exposed time : 96hrs	Contact Resistance	50mΩ MAX	4.0	3.8	4.1	3.9	4.2	GOOD
4-6.Thermal Shock	◦1 Cycle is table #1 ◦After performing 5 cycles	Dielectric Strength	No damage	0.K	0.K	0.K	0.K	0.K	GOOD
		Contact Resistance	50mΩ MAX	4.2	4.0	4.1	4.3	4.4	GOOD
		Insulation Resistance	500MΩ MIN	500MΩ MIN					GOOD
		Appearance	Good	0.K	0.K	0.K	0.K	0.K	GOOD

STEP	1	2	3	4
Temperature (℃)	-55^{+0}_{-3}	25^{+10}_{-5}	85^{+3}_{-0}	25^{+10}_{-5}
Exposed Time (MIN)	30	5	30	5

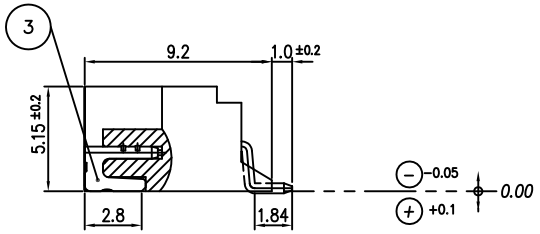
출 도 일	/ / /	연구소







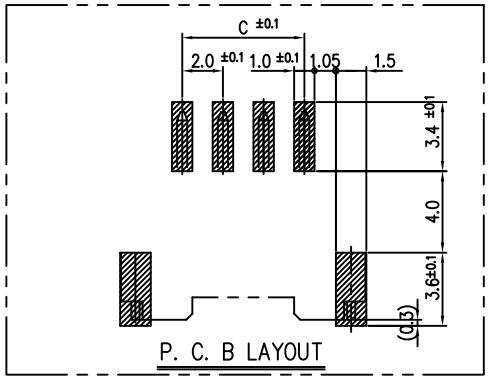
SEC A – A"



Circuits	Part NO	A	B	C
2	20037WR-02A00	8.00	4.75	2.00
3	20037WR-03A00	10.0	6.75	4.00
4	20037WR-04A00	12.0	8.75	6.00
5	20037WR-05A00	14.0	10.75	8.00
6	20037WR-06A00	16.0	12.75	10.0
7	20037WR-07A00	18.0	14.75	12.0
8	20037WR-08A00	20.0	16.75	14.0
9	20037WR-09A00	22.0	18.75	16.0
10	20037WR-10A00	24.0	20.75	18.0
11	20037WR-11A00	26.0	22.75	20.0
12	20037WR-12A00	28.0	24.75	22.0
13	20037WR-13A00	30.0	26.75	24.0
14	20037WR-14A00	32.0	28.75	26.0
15	20037WR-15A00	34.0	30.75	28.0

NOTES.
1.GENERAL TOLERANCE : ±0.3
2.MATING PARTS :
- HOOK=~~20015LR~~ △12505LR
- HOUSING = SMH200
- TERMINAL = YST200
3. 형 명 : 20037WR-00A00 (*)

COLOR
BK – BLACK
BL – BLUE
RE – RED
YE – YELLOW



P. C. B LAYOUT

I/NO	DESCRIPTION	MATERIAL	TREAMENT	QTY	REMARK
3	HOOK	BRASS	TIN PLATED	2	
2	PIN	BRASS	TIN PLATED	NN	
1	WAFER	PA6T		1	UL94-V0

LTR	REVISION RECORD	DR	CHK	ECN
△4	형합성 개선 LOCKING부 수정(3P,5P 적용)	07.09.28	L.S.H	J.J.H
△3	냉땜 개선 살보강(4P 이상 적용)	06.06.14	L.S.H	J.J.H
△2	20015LR 영구삭제 ----> 12505LR 대체 사용	04.11.29	H.S.K	C.J.W
△1	NOZZLE 사양변경으로인한 VACCUM AREA 확보(02P,03P수정)	02.12.13	C.B.H	K.S.N

"본 도면은 연호전자의 지적자산이므로 임의 COPY 및 배포를 금합니다"

YEONHO ELECTRONICS CO., LTD.

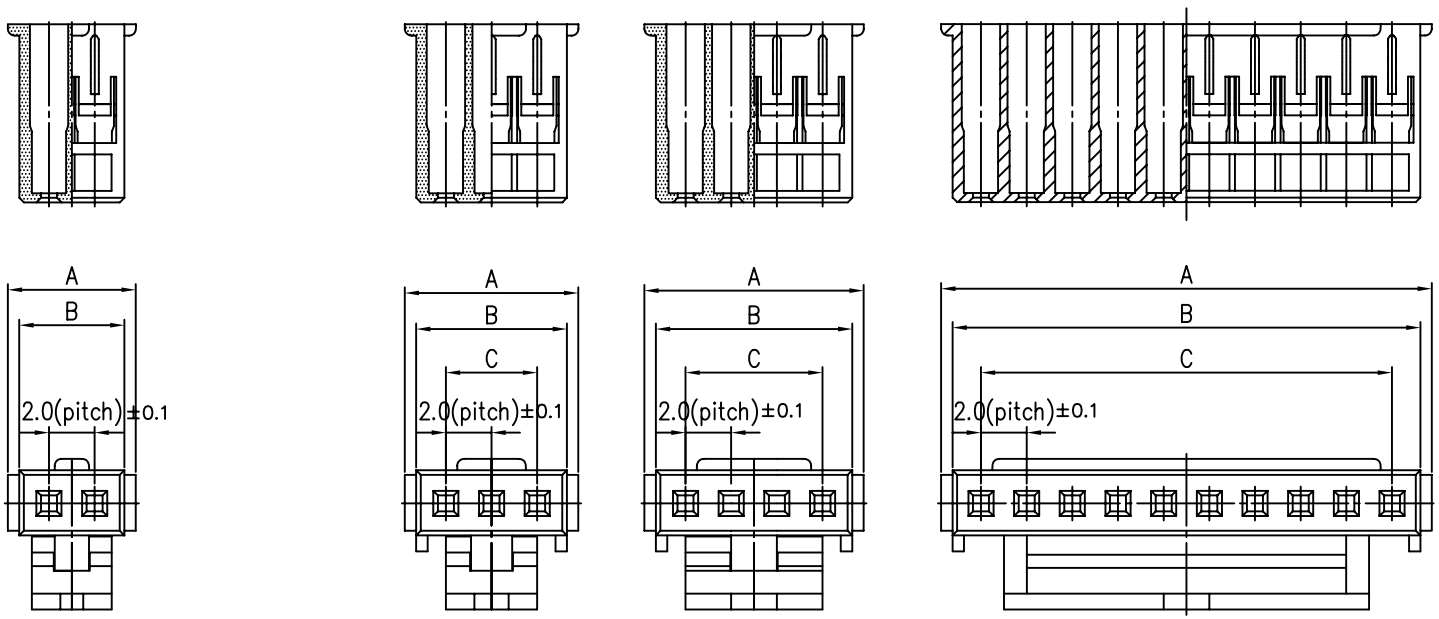
SCALE	DRAWN	DESIGN	CHECK	APPD
5/1		02.07.08 C. B. H	02.07.08 K. S. N.	

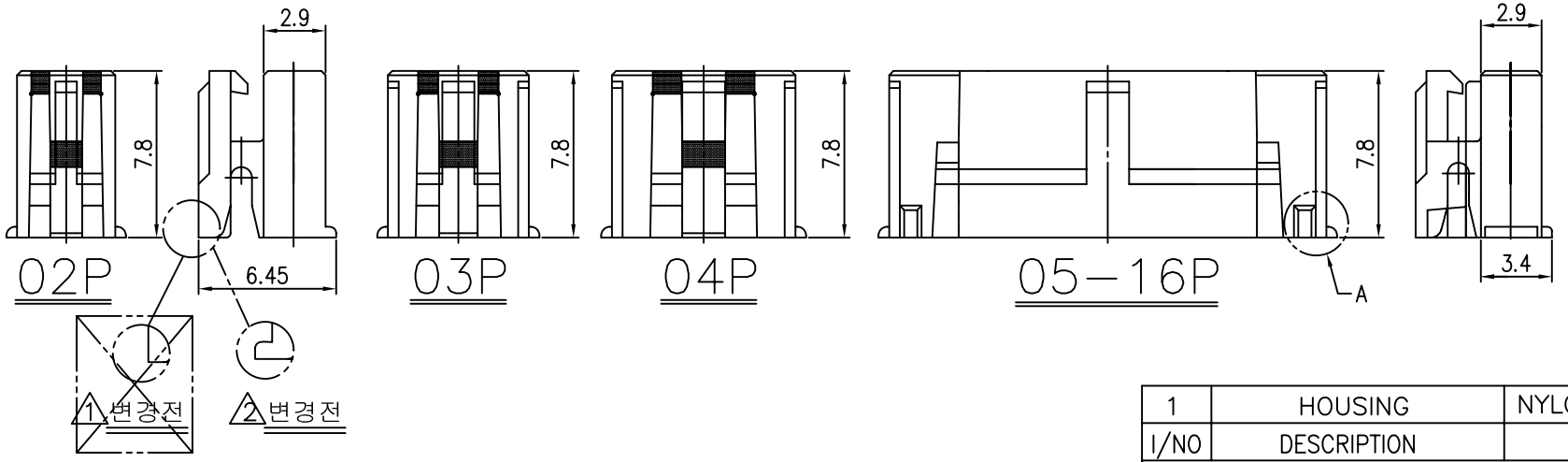
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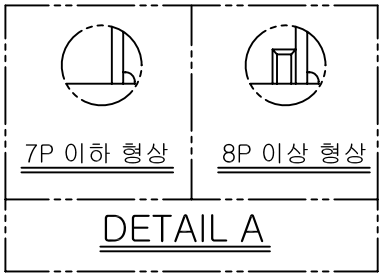
SIZE	DWG. NO	REV
A2	20037WR-00A-S	04

출 도 일	/ / /	연구소

Part No	No of Pin	A	B	C
SMH200-02P	2	5.6	4.6	2.0
SMH200-03P	3	7.6	6.6	4.0
SMH200-04P	4	9.6	8.6	6.0
SMH200-05P	5	11.6	10.6	8.0
SMH200-06P	6	13.6	12.6	10.0
SMH200-07P	7	15.6	14.6	12.0
SMH200-08P	8	17.6	16.6	14.0
SMH200-09P	9	19.6	18.6	16.0
SMH200-10P	10	21.6	20.6	18.0
SMH200-11P	11	23.6	22.6	20.0
SMH200-12P	12	25.6	24.6	22.0
SMH200-13P	13	27.6	26.6	24.0
SMH200-14P	14	29.6	28.6	26.0
SMH200-15P	15	31.6	30.6	28.0
SMH200-16P	16	33.6	32.6	30.0







NOTE
1, GENERAL TOLERANCE ±0.3

1	HOUSING	NYLON 66 UL94-V0	
I/NO	DESCRIPTION	MATERIAL	REMARK

YEONHO ELECTRONICS CO., LTD.

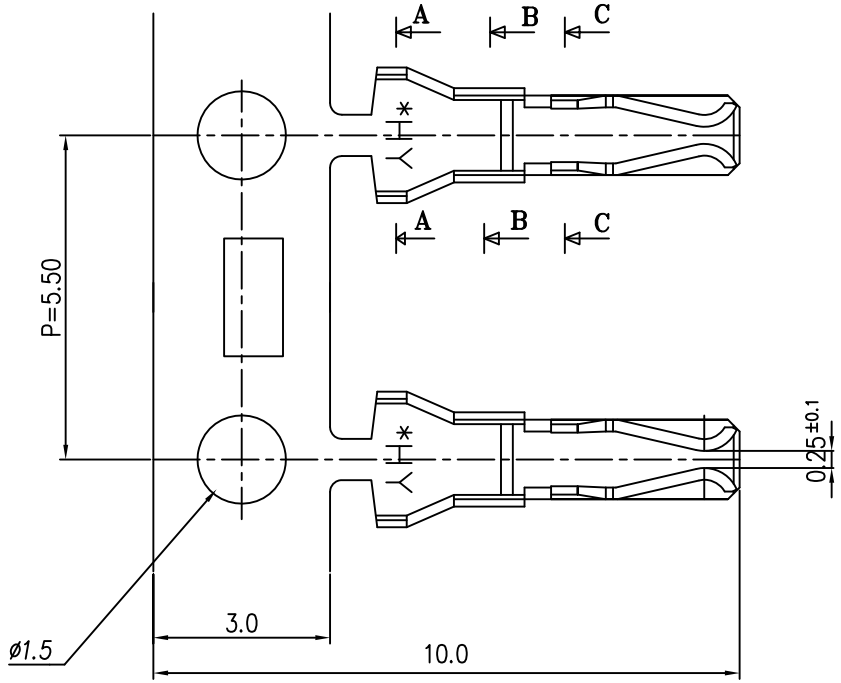
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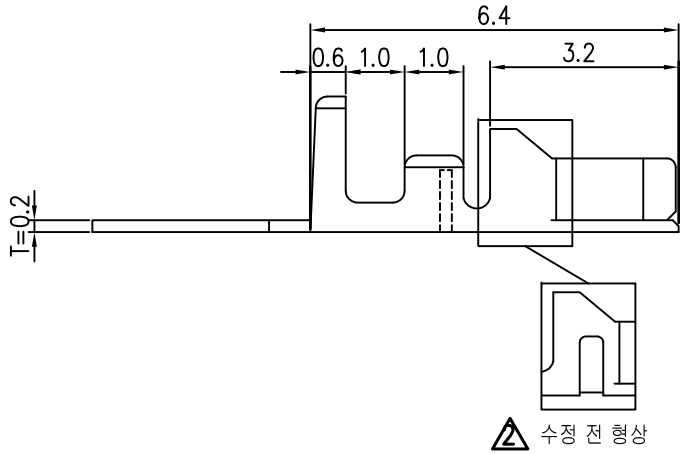
SCALE	DRAWN	DESIGN	CHECK	APPD
4/1	97.9.12 J.H.B		97.9.12 S.N.K	

SIZE	DWG. NO	REV
A3	SMH200-00A-S	2

LTR	REVISION RECORD	DATE	DR	CHK
2	도면 현실화	09.04.29	P.J.M	J.J.H
1	제품조립성 개선 형상 추가	05.05.17	H.S.K	C.J.W

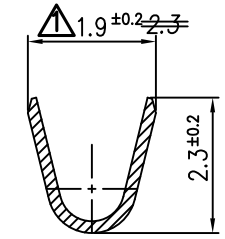
"본 도면은 연호전자의 지적자산이므로 임의 COPY 및 배포를 금합니다"



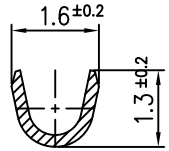


2 수정 전 형상

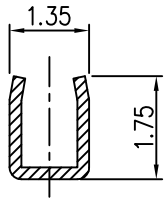
NOTES
1.MATERIAL: KS D5506 Phospher Bronze.
2.FINISH: MCuSn2
3.사용전선: AWG#28 ~ AWG22
4.일반공차: ±0.15



SECTION A-A



SECTION B-B



SECTION C-C

I/NO	DESCRIPTION	MATERIAL	TREATMENT	QTY	REMARK

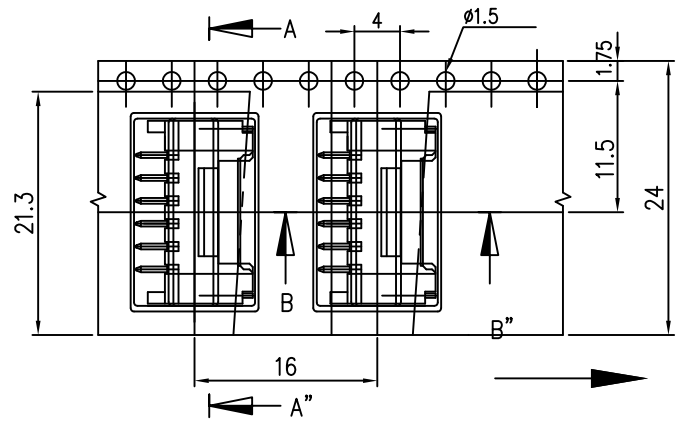
YEONHO ELECTRONICS CO., LTD.

TITLE: YST200

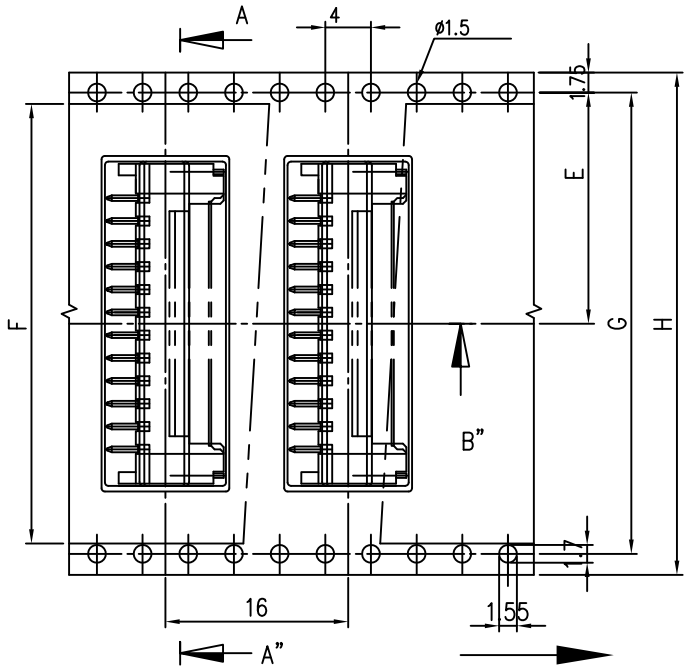
SCALE	DRAWN	DESIGN	CHECK	APPD
10/1	96.01.23 N.K.O		96.01.23 H.S.K	

SIZE	DWG. NO	REV
A3	20002TS-00S00	02

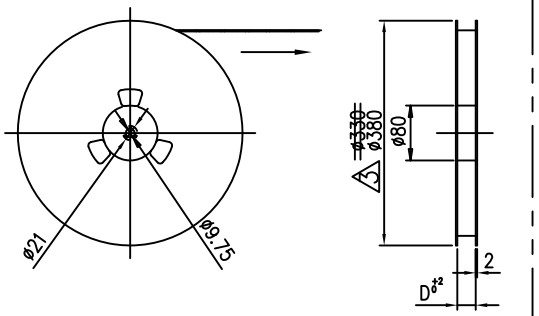
LTR	REVISION RECORD	DR	CHK	ECN
2	도면 현실화	09.03.09	P.J.M	J.J.H
1	도면 현실화	06.07.03	L.S.H	J.J.H

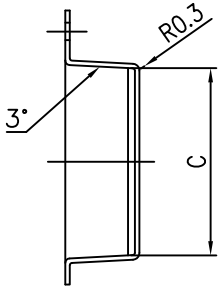


02~06 CKT

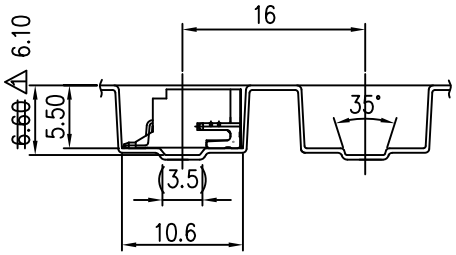


07 ~ 15CKT





SECTION A–A"(S=4/1)



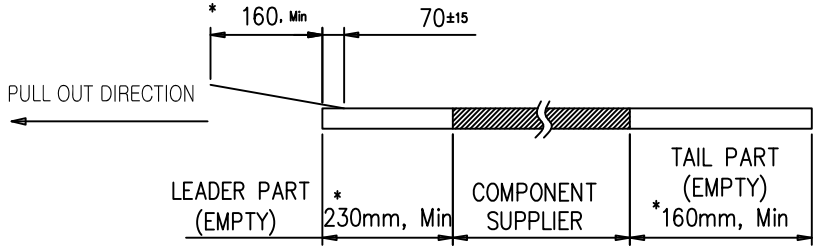
SECTION B–B"(S=4/1)

NO. OF POS.	A	B	C	D	E	F	G	H	REMARKS
02			8.40	25.5					
03			10.4	25.5					
04			12.4	25.5					
05			14.4	25.5					
06			16.4	25.5					
07			18.4	33	14.2	26.5	28.4	32	
08			20.4	33	14.2	26.5	28.4	32	
09			22.4	33	14.2	26.5	28.4	32	
10			24.4	45	20.2	38.5	40.4	44	
11			26.4	45	20.2	38.5	40.4	44	
12			28.4	45	20.2	38.5	40.4	44	
14			32.4	45	20.2	38.5	40.4	44	
15			34.4	58	26.2	50.5	52.4	56	

NOTES

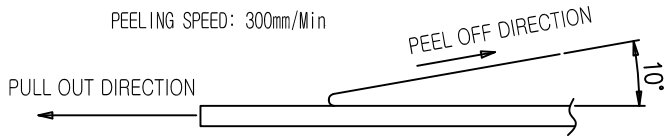
△2 ~~600~~

1. NUMBER OF CONNECTOR: 1000PCS/REEL
2. LEAD TAPE LENGTH(mm)



"*"표시는 CHIP MOUNT실과 별도 협의 한다.

3. TOP TAPE의 접착강도: 10 ~ 130gf(시험방법: 아래참조)



4. 재료: CARRIER TAPE: PS
   COVER TAPE: PET, PE, PEF
   REEL: PS

5. 일반공차 : ±0.2

	CARRIER TAPE				
I/NO	DESCRIPTION	MATERIAL	TREATMENT	QTY	REMARK

YEONHO ELECTRONICS CO., LTD.

TITLE: 20037WR–NN EMBOSS TAPING

SCALE	DRAWN	DESIGN	CHECK	APPD
2/1 (4/1)		CHOI, B. H. 02.08.14	K. S. N. 02.08.14	

SIZE: A3 | DWG. NO: 20037CR–00S00 | REV: 04

△3	도면 현실화 (보빈크기변경)	08.04.17	K.K.S	J.J.H
△2	포장수량 변경(생산성 향상)	06.03.21	L.S.H	J.J.H
△1	표시부 시방변경(치수변경 6.6 -- 6.1MM)	04.02.05	J.J.H	
LTR	REVISION RECORD	DATE	DR	CHK

To : IL KWANG POLYMER CO., LTD.

MITSUI CHEMICALS INC.
IWAKUNI-OHTAKE WORKS
IWAKUNI JAPAN 740-0061
TEL 0827-53-9003

CERTIFICATE OF ANALYSIS

Product name ARLEN E430N-T5
Lot No. 081124G
Delivery Quantity 4,325.000 KG

Item	Unit	Result	Specification
Ash	%	31.2	32±2
TS	MPa	160	140≦
FM	MPa	11500	8830≦
FS	MPa	280	200≦
IZOD	J/m	87	49≦
HDT	℃	307	285≦
EL	%	3	2≦

We hereby certify that the above is true and correct.

LG화학

㈜LG화학/익산공장
전북 익산시 용제동 599번지
Fax : 063-830-4007
.Tel : 063-830-4182

검사성적서

고객명	(주)동은피에프	제품명	EPC	GRADE/ COLOR	LUMID GN1001BF NP 25KG
LOT NO	Z90818B	출하수량 (KG)	9000	출하 일자	

검사결과 값

검사항목	시험방법	시험조건	시험단위	규격	시험결과
충격강도(Izod)	ASTM D256	1/4",NOTCHED	kgf cm/cm	Min.2.4	2.8
열변형온도	ASTM D648	4.6KG	℃	Min.220.0	238.8
인장강도	ASTM D638	50mm/min	kgf/㎠	Min.770	783
인장신율	ASTM D638	BP	%	Min.10.0	29.4
굴곡강도	ASTM D790	1/4",SPAN100,2.8mm/min	kgf/㎠	Min.1000	1042
굴곡탄성율	ASTM D790	1/4",SPAN100,2.8mm/min	kgf/㎠	Min.31000	31790
수분율	ASTM D4019		%	0.040~0.120	0.120
난연성	UL 94	UL94, 1/32"		V-0	V-0
Br	LSR-XA-Z6040	XRF	ppm	Max.100.0	3.5
Cl	LSR-XA-Z6040	XRF	ppm	Max.200.0	59.0

본 시험성적서는 당사 표준 및 시험기기에 준한 결과치 임.

생산일자		생산처	LG화학 익산공장 생산2팀
측정일자		측정자	
발행인	Technical Team Manager		J. H. Yang

LGChem
2009/09/01 박수아

CERTIFICATE OF TEST

POONGSAN

Customer : ㈜풍국통상
Sheet No. : C50126-026
Specification : KS D 5103 C2700WE-F
Size : 9.000 (mm) X 0.000 (mm) X 0.000 (mm)

Onsan Plant :
611, DaeJung-Ri, Onsan-Up, Ulju-Kun,
Ulsan Metropolitan City, Korea
Tel : (052) 231-9114
Fax : (052) 231-9400

	Cu (%)	Zn (%)	Pb (%)	Fe (%)	Tensile Strength (N/㎟)
SPEC. Min	63.0000	R			245.000
MAX	67.0000		0.0500	0.0500	
4BTB610	64.4700	R	0.0020	0.0054	307.736
					301.358
4BTB620	64.4700	R	0.0020	0.0054	305.085
					303.222
4BVB210	64.4400	R	0.0020	0.0045	306.850
					302.829
4BVB510	64.2500	R	0.0020	0.0042	303.222
					302.241

	Elongation (%)	Thickness (Outdiameter) (mm)	Appearance	Weight (kg)
SPEC. Min	30.000	8.900		
MAX		9.100		
4BTB610	42.000	9.000	Good	1,036.000
	43.000	9.050		
4BTB620	36.000	9.040	Good	3,581.000
	36.000	9.060		
4BVB210	36.000	9.040	Good	3,464.000
	38.000	9.060		
4BVB510	38.000	9.040	Good	1,798.000
	38.000	9.060		

Total Weight : 19,513.000 (kg)

Remark : We hereby certify that above material has been tested to comply with the specification.

H. K. Choi

Manager of Quality Assurance Dept.

CERTIFICATE OF TEST

POONGSAN

Customer : ㈜연호엠에스
Sheet No. : C90917-028
Specification : KS D 5201 C2680R-H 0.4X16 ㈜연호엠에스
Size : 0.400 (mm) X 16.000 (mm) X 0.000 (mm)

Onsan Plant :
611, DaeJung-Ri, Onsan-Up, Ulju-Kun,
Ulsan Metropolitan City, Korea
Tel : (052) 231-9114
Fax : (052) 231-9400

	Cu (%)	Zn (%)	Pb (%)	Fe (%)	Tensile Strength (N/㎟)
SPEC. Min	64.0000	R			441.000
MAX	68.0000		0.0500	0.0500	520.000
99392C0	65.0400	R	0.0014	0.0036	473.661
99791D0	65.0600	R	0.0007	0.0029	447.183

- Blank Line -

	Elongation (%)	Hardness (Hv 1kg)	Thickness (Outdiameter) (mm)	Width (Thickness) (mm)	BendingTest (Badway)
SPEC. Min	12.000	140.000	0.390	15.920	(180°,
MAX		160.000	0.410	16.020	R/t=0.5)
99392C0	23.000	153.000	0.402	15.930	Good
			0.406	15.970	
99791D0	26.000	145.000	0.398	15.930	Good
			0.401	15.960	

- Blank Line -

	Camber (mm) (1000mm)	Appearance	Weight (kg)
SPEC. Min			
MAX	1.000		
99392C0	0.200	Good	2,533.000
	0.300		
99791D0	0.200	Good	3,539.000
	0.600		

- Blank Line -

Total Weight : 6,072.000 (kg)

Remark : We hereby certify that above material has been tested to comply with the specification.

* 1 kg/㎟ = 9.806 N/㎟

I. Y. HWANG

Manager of Quality Assurance Dept.

CERTIFICATE OF TEST

POONGSAN

Customer : ㈜연호전자(광주)
Sheet No. : C90121-023
Specification : KS D 5506 C5191R(TPW)-H 0.2X12 ㈜연호전자(광주)
Size : 0.200 (mm) X 12.000 (mm) X 0.000 (mm)

Onsan Plant :
611, DaeJung-Ri, Onsan-Up, Ulju-Kun,
Ulsan Metropolitan City, Korea
Tel : (052) 231-9114
Fax : (052) 231-9400

	Cu (%)	Sn (%)	P (%)	Cu+Sn+P (%)	Tensile Strength (N/㎟)
SPEC. Min	R	5.5000	0.0300	99.5000	618.000
MAX		7.0000	0.3500		667.000
89HM1EM	R	5.9800	0.1909	99.9824	644.297

- Blank Line -

	Elongation (%)	Hardness (Hv 1kg)	Thickness (Outdiameter) (mm)	Width (Thickness) (mm)	Sn Plating (μm)
SPEC. Min	12.000	190.000	0.190	11.940	1.000
MAX		210.000	0.210	12.000	2.000
89HM1EM	17.000	209.000	0.197	11.940	1.680
			0.203	11.980	1.690

- Blank Line -

	BendingTest (Badway)	Peel off Test Test	Camber (mm) (1000mm)	Appearance	Weight (kg)
SPEC. Min	(180°,	(180℃ 1			
MAX	R/t=0.5)		1.000		
89HM1EM	Good	Good	0.200	Good	1,788.500
			0.800		

- Blank Line -

Total Weight : 1,788.500 (kg)

Remark : We hereby certify that above material has been tested to comply with the specification.

* 1 kg/㎟ = 9.806 N/㎟

BJ Lee

Manager of Quality Assurance Dept.

Test Report No. F690101/LF-CTSAYAA20-34706

Issued Date : 2020. 06. 23

ILKWANG POLYMER CO., LTD.
594-7, Dongtangiheung-ro
Hwaseong-si, Gyeonggi-do
Korea

The following sample(s) was/were submitted and identified by/on behalf of the client as:-

SGS File No.	:	AYAA20-34706
Product Name	:	E430NT5
Item No./Part No.	:	N/A
Received Date	:	2020. 06. 16
Test Period	:	2020. 06. 16 to 2020. 06. 23
Test Results	:	For further details, please refer to following page(s)

SGS Korea Co., Ltd.

Tommy Oh / Chemical Lab Mgr

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Sample No. : AYAA20-34706.001
Sample Description : E430NT5
Item No./Part No. : N/A
Materials : Resin

Heavy Metals

Test Items	Unit	Test Method	MDL	Results
Cadmium (Cd)	mg/kg	With reference to IEC 62321-5:2013 (Determination of Cadmium by ICP-OES)	0.5	N.D.
Lead (Pb)	mg/kg	With reference to IEC 62321-5:2013 (Determination of Lead by ICP-OES)	5	N.D.
Mercury (Hg)	mg/kg	With reference to IEC 62321-4:2013 (Determination of Mercury by ICP-OES)	2	N.D.
Hexavalent Chromium (Cr VI)*	mg/kg	With reference to IEC 62321-7-2:2017, determination of Hexavalent Chromium by Colorimetric Method using UV-Vis and Microwave system and /or with reference to IEC 62321-5:2013, determination of Chromium by ICP-OES.	8	N.D.
Antimony (Sb)	mg/kg	With reference to EPA 3052(1996), US EPA 6010B(1996), ICP	10	10600

Flame Retardants-PBBs/PBDEs

Test Items	Unit	Test Method	MDL	Results
Monobromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (GC-MS)	5	N.D.
Dibromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (GC-MS)	5	N.D.
Tribromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (GC-MS)	5	N.D.
Tetrabromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (GC-MS)	5	N.D.
Pentabromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (GC-MS)	5	N.D.
Hexabromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (GC-MS)	5	N.D.
Heptabromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (GC-MS)	5	N.D.
Octabromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (GC-MS)	5	N.D.
Nonabromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (GC-MS)	5	N.D.
Decabromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (GC-MS)	5	N.D.
Monobromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (GC-MS)	5	N.D.
Dibromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (GC-MS)	5	N.D.
Tribromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (GC-MS)	5	N.D.
Tetrabromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (GC-MS)	5	N.D.
Pentabromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (GC-MS)	5	N.D.
Hexabromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (GC-MS)	5	N.D.
Heptabromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (GC-MS)	5	N.D.
Octabromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (GC-MS)	5	N.D.
Nonabromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (GC-MS)	5	N.D.

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Sample No. : AYAA20-34706.001
Sample Description : E430NT5
Item No./Part No. : N/A
Materials : Resin

Flame Retardants-PBBs/PBDEs

Test Items	Unit	Test Method	MDL	Results
Decabromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (GC-MS)	5	N.D.

Phthalates

Test Items	Unit	Test Method	MDL	Results
Di-(2-ethylhexyl) phthalate (DEHP)	mg/kg	With reference to IEC 62321-8 ; 2017 , GC/MS	50	N.D.
Di-butyl phthalate (DBP)	mg/kg	With reference to IEC 62321-8 ; 2017 , GC/MS	50	N.D.
Benzyl butyl phthalate (BBP)	mg/kg	With reference to IEC 62321-8 ; 2017 , GC/MS	50	N.D.
Di-isobutyl phthalate (DIBP)	mg/kg	With reference to IEC 62321-8 ; 2017 , GC/MS	50	N.D.
Di-isononyl phthalate (DINP)	mg/kg	With reference to IEC 62321-8 ; 2017 , GC/MS	50	N.D.
Di-isodecyl phthalate (DIDP)	mg/kg	With reference to IEC 62321-8 ; 2017 , GC/MS	50	N.D.
Di-n-octyl phthalate (DNOP)	mg/kg	With reference to IEC 62321-8 ; 2017 , GC/MS	50	N.D.
Di-n-hexyl phthalate (DNHP)	mg/kg	With reference to IEC 62321-8 ; 2017 , GC/MS	50	N.D.

Chlorinated Paraffin

Test Items	Unit	Test Method	MDL	Results
Alkanes, C14~17, Medium Chain Chlorinated Paraffins(MCCP)	mg/kg	With reference to ISO 18219	50	N.D.

Halogen Content

Test Items	Unit	Test Method	MDL	Results
Bromine(Br)	mg/kg	With reference to EN 14582:2016, IC	30	90600
Chlorine(Cl)	mg/kg	With reference to EN 14582:2016, IC	30	N.D.

Flame Retardants

Test Items	Unit	Test Method	MDL	Results
Hexabromocyclododecane (HBCDD)	mg/kg	USEPA 3540C, LC/MS	5	N.D.

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NOTE: (1) N.D. = Not detected.(<MDL)
(2) mg/kg = ppm
(3) MDL = Method Detection Limit
(4) - = No regulation
(5) Negative = Undetectable / Positive = Detectable
(6) ** = Qualitative analysis (No Unit)
(7) * = a. The result of Hexavalent Chromium (Cr(VI)) is "ND" as the result of Chromium (Cr) is "ND", and confirmation test of Hexavalent Chromium (Cr(VI)) is not required.
b. If the Chromium (Cr) content is greater than the MDL of Hexavalent Chromium (Cr(VI)), confirmation test of Hexavalent Chromium (Cr(VI)) is required.
(8) The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This test report is not related to Korea Laboratory Accreditation Scheme.

Picture of Sample as Received:



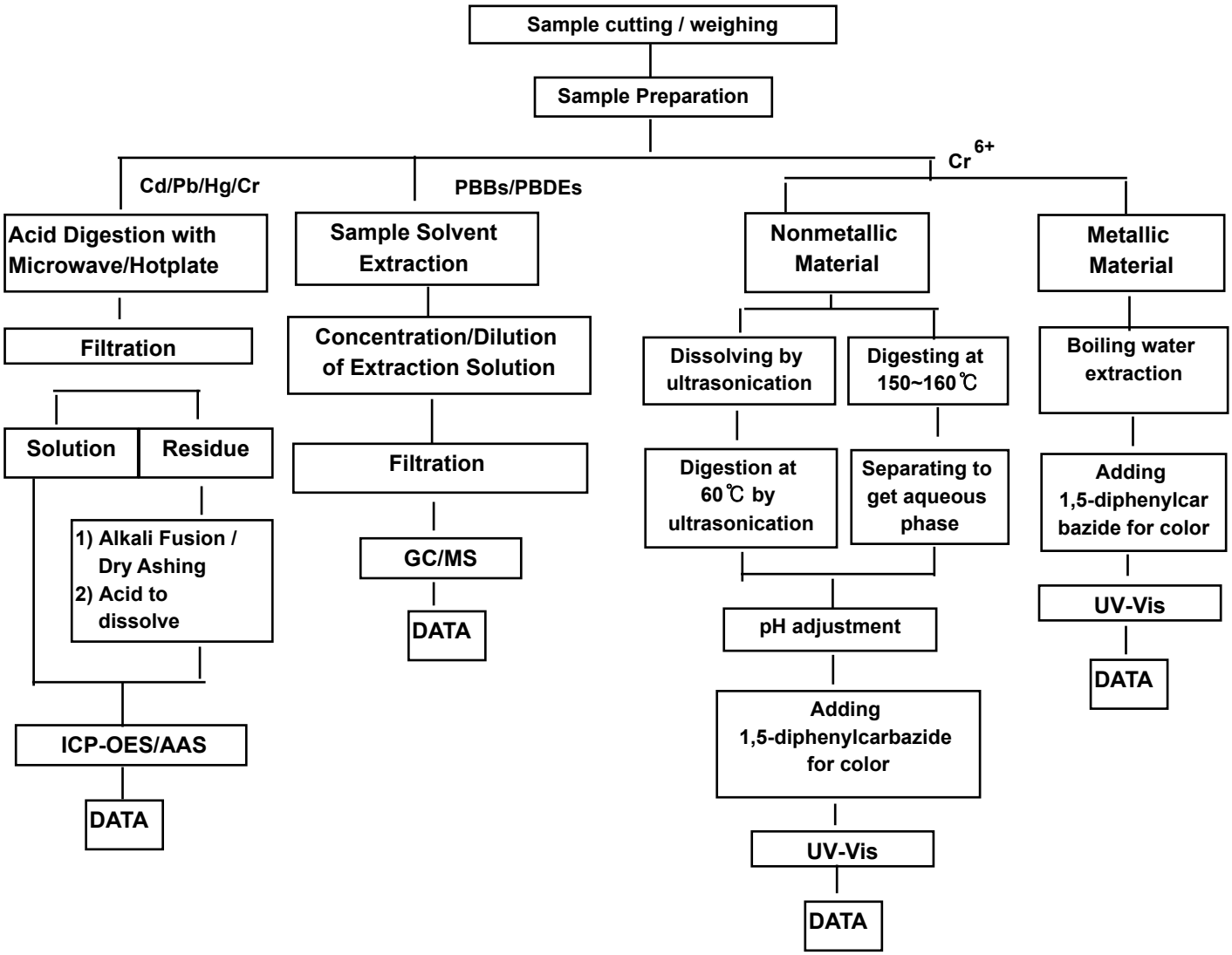
AYAA20-34706.001

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Testing Flow Chart for RoHS:Cd/Pb/Hg/Cr^{6+} /PBBs&PBDEs Testing



The samples were dissolved totally at the acid digestion step of the above flow chart for Cd,Pb,Hg
Section Chief : Timothy Jeon

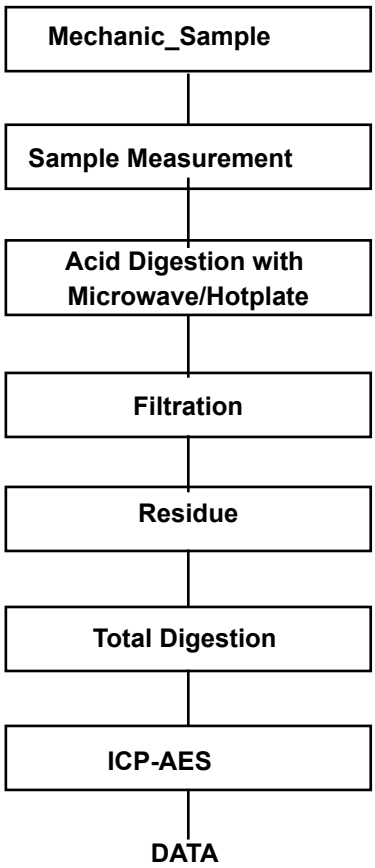
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Flow Chart for Inorganic Elements Testing

Inorganic Elements



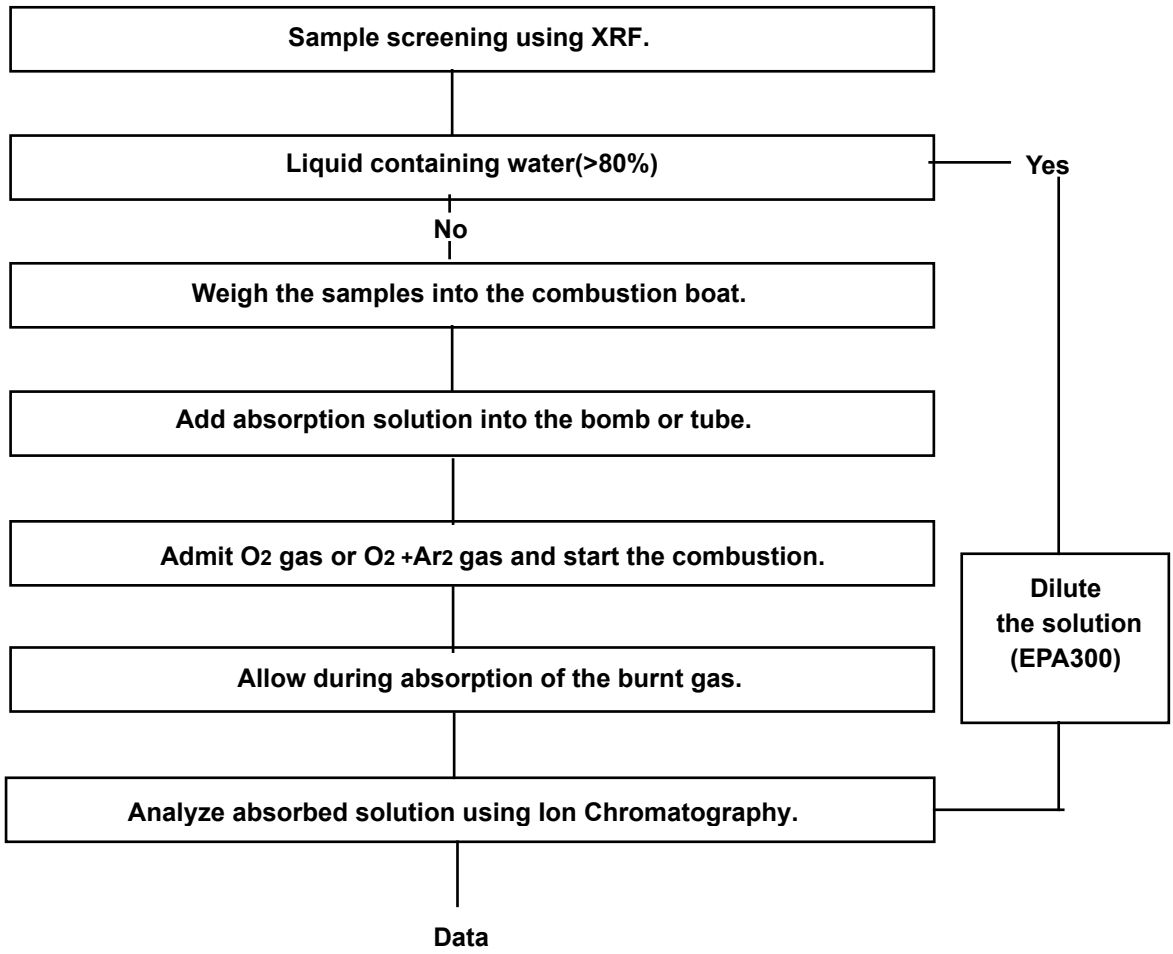
Major Inorganic Heavy Metals	Antimony(Sb) , Beryllium(Be) , Phosphorus(P) , Arsenic(As) etc.

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Flow Chart for Halogen Test

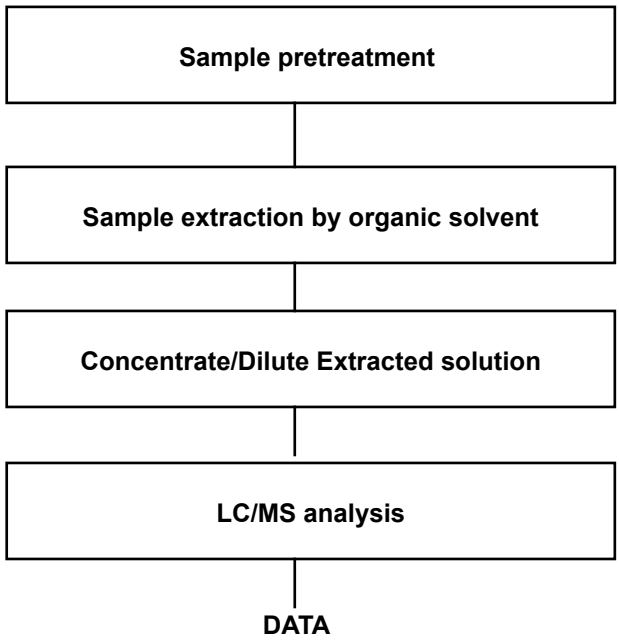


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Testing Flow Chart for HBCD

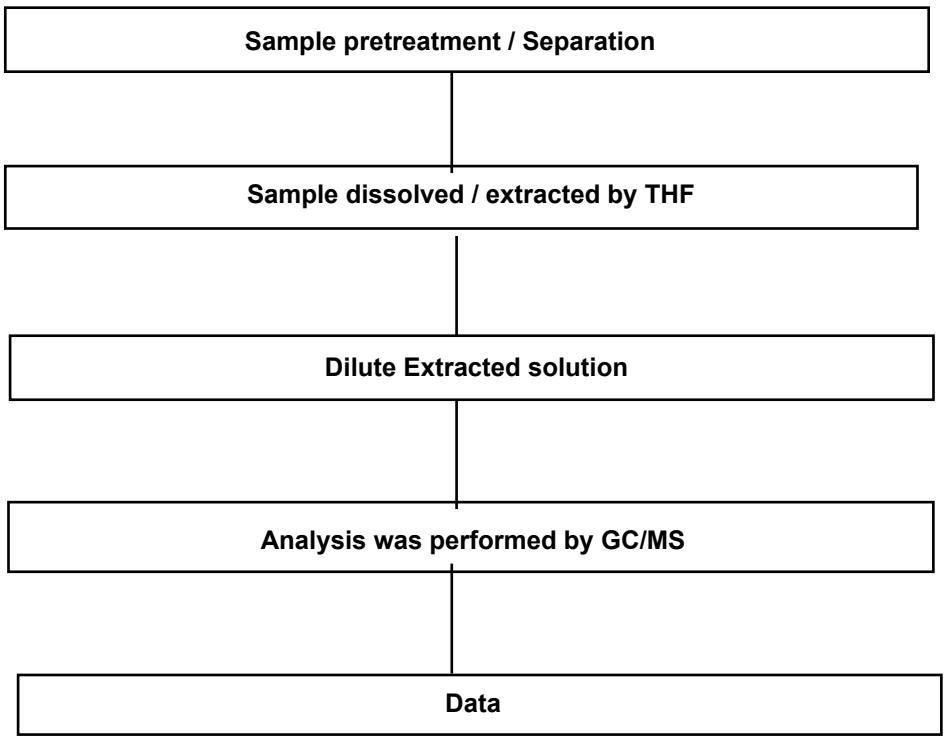


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Flow Chart for Phthalate Test



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Test Report No. F690101/LF-CTSAYAA20-17352

Issued Date : 2020. 03. 13

LG CHEMICAL LTD.
99, Seokam-ro
Iksan-si, Jeollabuk-do
Korea

The following sample(s) was/were submitted and identified by/on behalf of the client as:-

SGS File No.	:	AYAA20-17352
Product Name	:	LUMID GN1001BFY-NP
Item No./Part No.	:	N/A
Received Date	:	2020. 03. 10
Test Period	:	2020. 03. 10 to 2020. 03. 13
Test Results	:	For further details, please refer to following page(s)

SGS Korea Co., Ltd.

Tommy Oh / Chemical Lab Mgr

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Sample No. : AYAA20-17352.001
Sample Description : LUMID GN1001BFY-NP
Item No./Part No. : N/A
Materials : PA66

Heavy Metals

Test Items	Unit	Test Method	MDL	Results
Cadmium (Cd)	mg/kg	With reference to IEC 62321-5:2013 (Determination of Cadmium by ICP-OES)	0.5	N.D.
Lead (Pb)	mg/kg	With reference to IEC 62321-5:2013 (Determination of Lead by ICP-OES)	5	N.D.
Mercury (Hg)	mg/kg	With reference to IEC 62321-4:2013 (Determination of Mercury by ICP-OES)	2	N.D.
Hexavalent Chromium (Cr VI)*	mg/kg	With reference to IEC 62321-7-2:2017, determination of Hexavalent Chromium by Colorimetric Method using UV-Vis and Microwave system and /or with reference to IEC 62321-5:2013, determination of Chromium by ICP-OES.	8	N.D.
Antimony (Sb)	mg/kg	With reference to EPA 3052(1996), US EPA 6010B(1996), ICP	10	N.D.

Flame Retardants-PBBs/PBDEs

Test Items	Unit	Test Method	MDL	Results
Monobromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (GC-MS)	5	N.D.
Dibromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (GC-MS)	5	N.D.
Tribromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (GC-MS)	5	N.D.
Tetrabromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (GC-MS)	5	N.D.
Pentabromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (GC-MS)	5	N.D.
Hexabromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (GC-MS)	5	N.D.
Heptabromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (GC-MS)	5	N.D.
Octabromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (GC-MS)	5	N.D.
Nonabromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (GC-MS)	5	N.D.
Decabromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (GC-MS)	5	N.D.
Monobromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (GC-MS)	5	N.D.
Dibromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (GC-MS)	5	N.D.
Tribromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (GC-MS)	5	N.D.
Tetrabromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (GC-MS)	5	N.D.
Pentabromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (GC-MS)	5	N.D.
Hexabromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (GC-MS)	5	N.D.
Heptabromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (GC-MS)	5	N.D.
Octabromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (GC-MS)	5	N.D.
Nonabromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (GC-MS)	5	N.D.

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Sample No. : AYAA20-17352.001
Sample Description : LUMID GN1001BFY-NP
Item No./Part No. : N/A
Materials : PA66

Flame Retardants-PBBs/PBDEs

Test Items	Unit	Test Method	MDL	Results
Decabromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (GC-MS)	5	N.D.

Phthalates

Test Items	Unit	Test Method	MDL	Results
Di-(2-ethylhexyl) phthalate (DEHP)	mg/kg	With reference to IEC 62321-8 ; 2017 , GC/MS	50	N.D.
Di-butyl phthalate (DBP)	mg/kg	With reference to IEC 62321-8 ; 2017 , GC/MS	50	N.D.
Benzyl butyl phthalate (BBP)	mg/kg	With reference to IEC 62321-8 ; 2017 , GC/MS	50	N.D.
Di-isobutyl phthalate (DIBP)	mg/kg	With reference to IEC 62321-8 ; 2017 , GC/MS	50	N.D.
Di-isononyl phthalate (DINP)	mg/kg	With reference to IEC 62321-8 ; 2017 , GC/MS	50	N.D.
Di-isodecyl phthalate (DIDP)	mg/kg	With reference to IEC 62321-8 ; 2017 , GC/MS	50	N.D.
Di-n-octyl phthalate (DNOP)	mg/kg	With reference to IEC 62321-8 ; 2017 , GC/MS	50	N.D.
Di-n-hexyl phthalate (DNHP)	mg/kg	With reference to IEC 62321-8 ; 2017 , GC/MS	50	N.D.

Halogen Content

Test Items	Unit	Test Method	MDL	Results
Bromine(Br)	mg/kg	With reference to EN 14582:2016, IC	30	N.D.
Chlorine(Cl)	mg/kg	With reference to EN 14582:2016, IC	30	N.D.

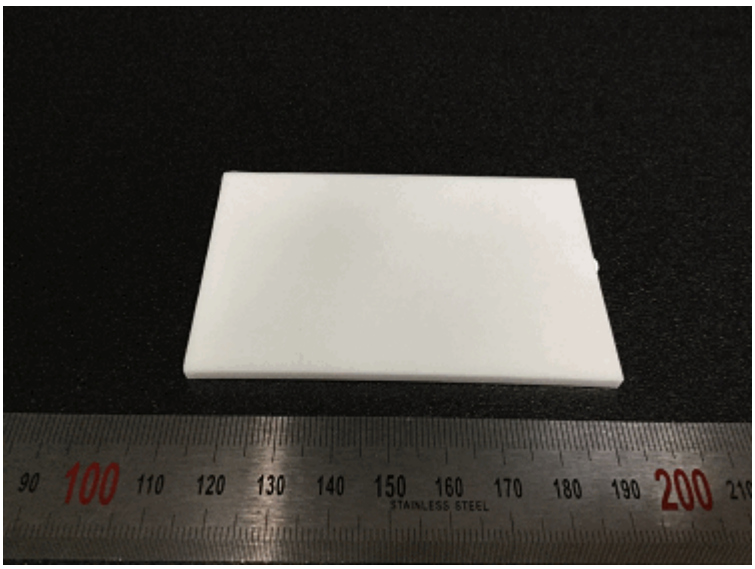
NOTE: (1) N.D. = Not detected.(<MDL)
(2) mg/kg = ppm
(3) MDL = Method Detection Limit
(4) - = No regulation
(5) Negative = Undetectable / Positive = Detectable
(6) ** = Qualitative analysis (No Unit)
(7) * = a. The result of Hexavalent Chromium (Cr(VI)) is "ND" as the result of Chromium (Cr) is "ND", and confirmation test of Hexavalent Chromium (Cr(VI)) is not required.
b. If the Chromium (Cr) content is greater than the MDL of Hexavalent Chromium (Cr(VI)), confirmation test of Hexavalent Chromium (Cr(VI)) is required.
(8) The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This test report is not related to Korea Laboratory Accreditation Scheme.

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Picture of Sample as Received:



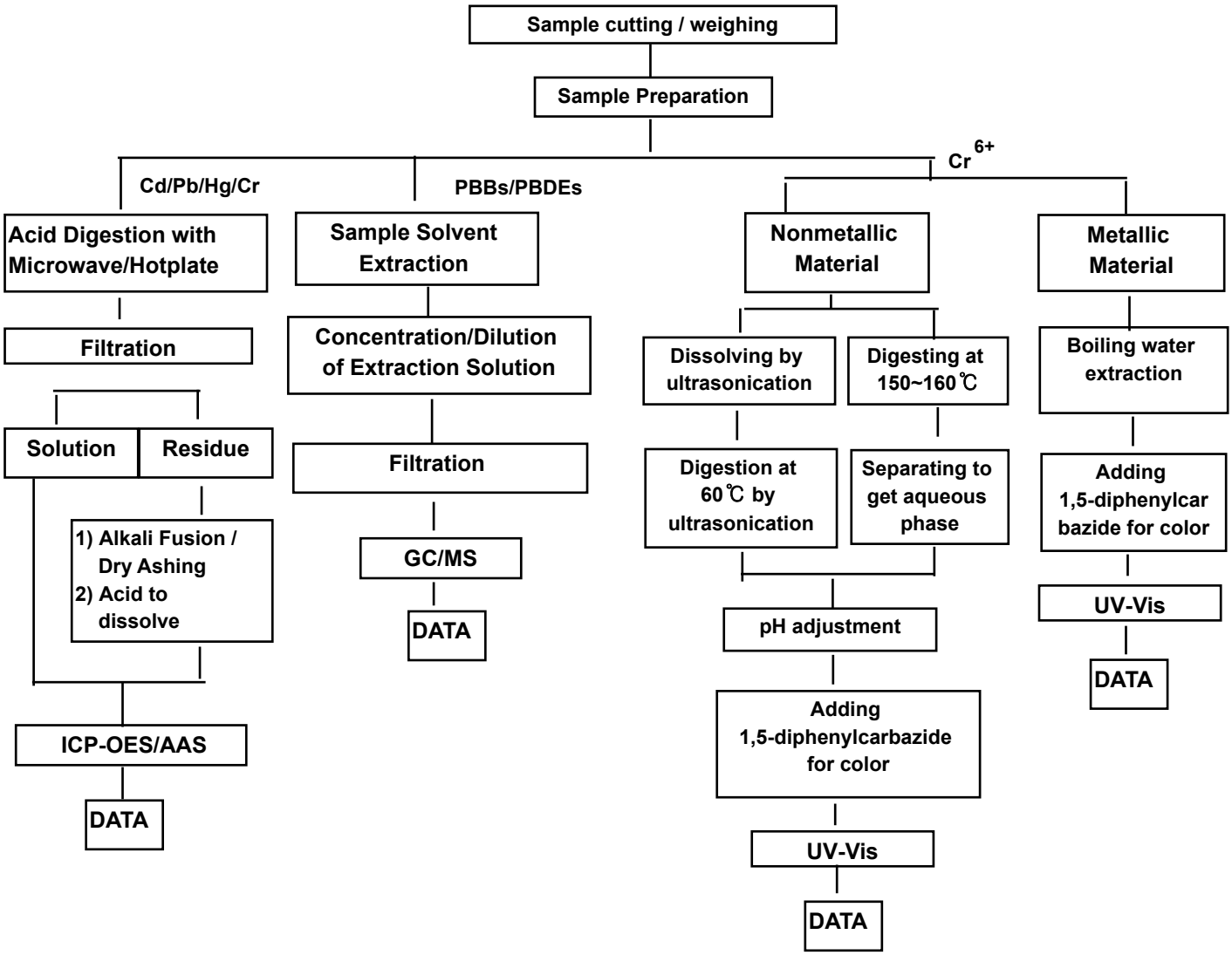
AYAA20-17352.001

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Testing Flow Chart for RoHS:Cd/Pb/Hg/Cr^{6+} /PBBs&PBDEs Testing



The samples were dissolved totally at the acid digestion step of the above flow chart for Cd,Pb,Hg
Section Chief : Timothy Jeon

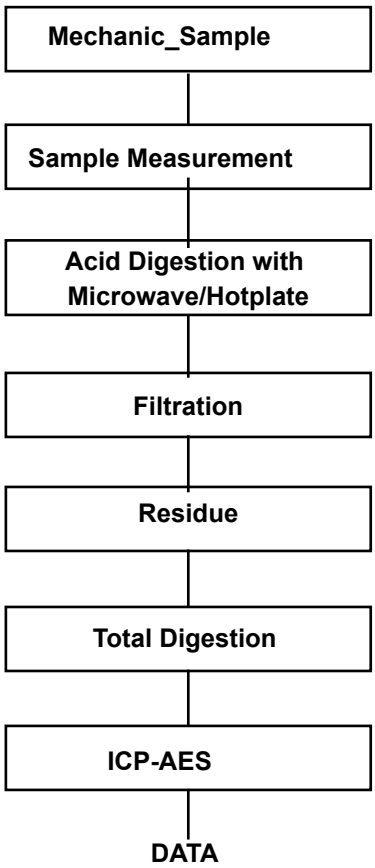
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Flow Chart for Inorganic Elements Testing

Inorganic Elements



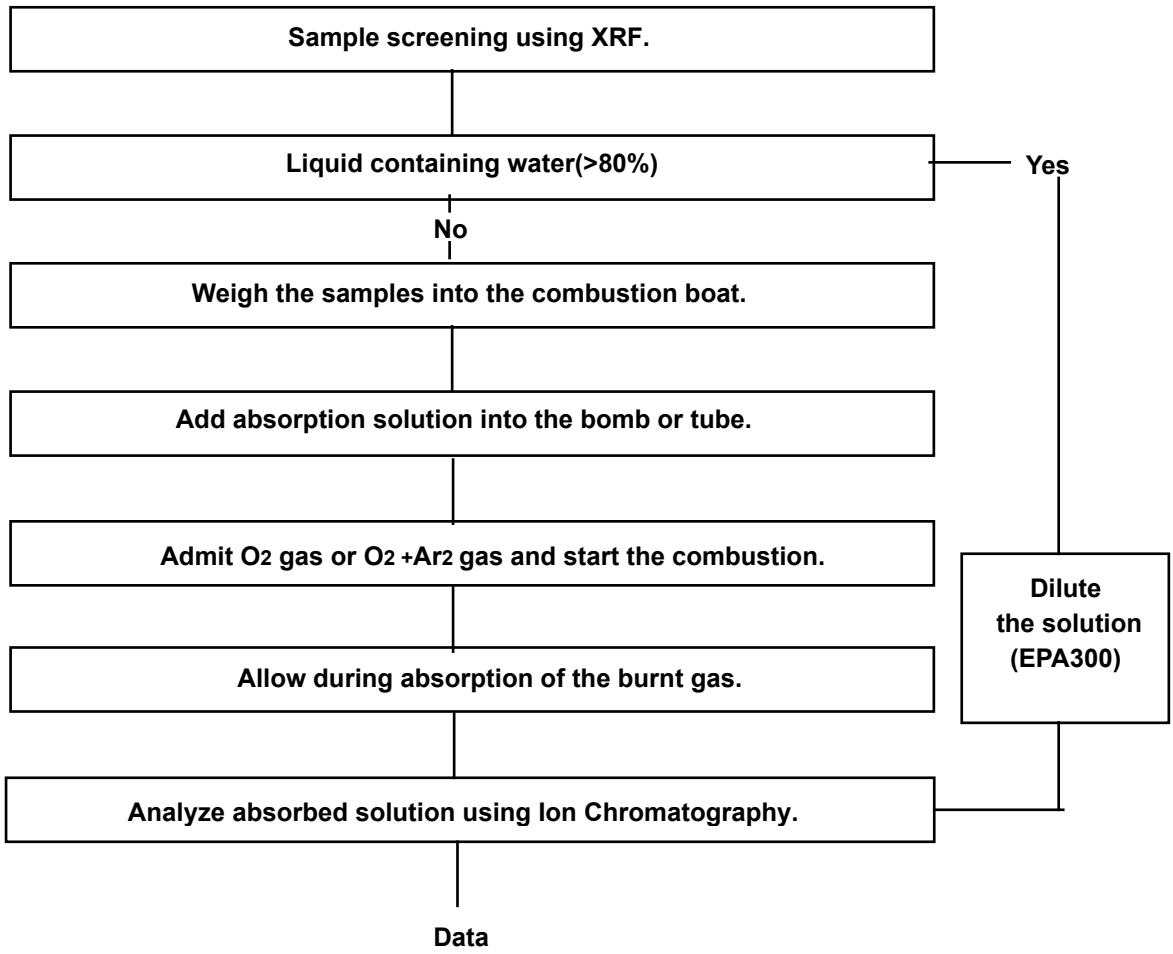
Major Inorganic Heavy Metals	Antimony(Sb) , Beryllium(Be) , Phosphorus(P) , Arsenic(As) etc.

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Flow Chart for Halogen Test

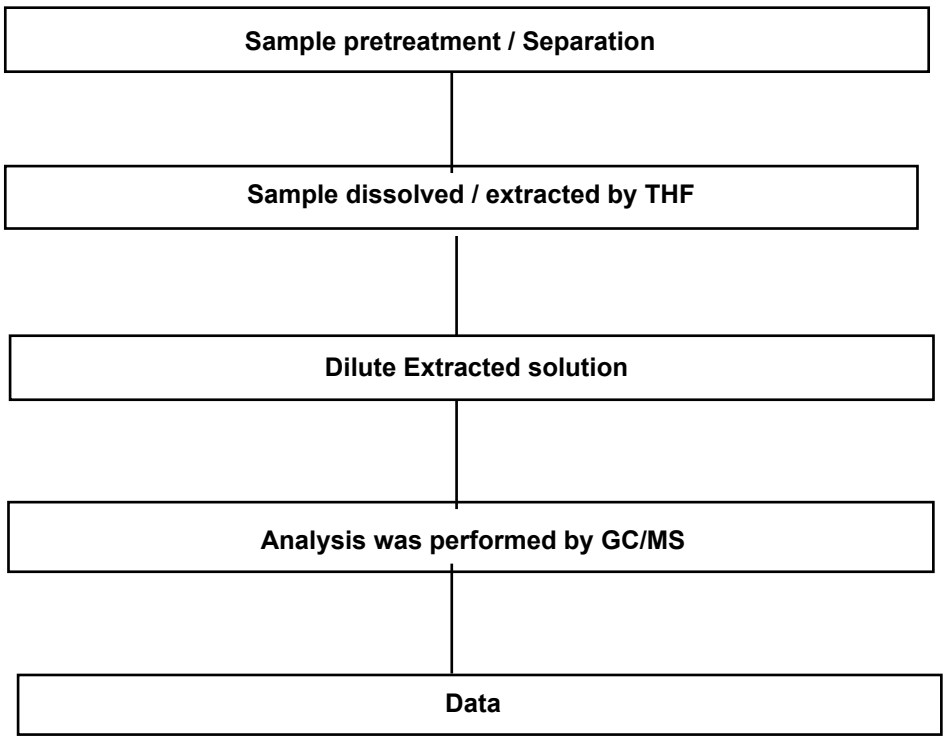


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Flow Chart for Phthalate Test



*** End of Report ***

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Test Report No. F690101/LF-CTSAYGU20-07299

Issued Date : 2020. 07. 22

POONGSAN CORPORATION
94 Sanam-ro,Onsan-eup
Ulju-gun,Ulsan
Korea

The following sample(s) was/were submitted and identified by/on behalf of the client as:-

SGS File No.	:	AYGU20-07299
Product Name	:	C2700
Item No./Part No.	:	Brass
Received Date	:	2020. 07. 02
Test Period	:	2020. 07. 02 to 2020. 07. 22
Conclusion	:	Based on the performed tests on selected part of submitted samples, the results of Cadmium, Lead, Mercury, Hexavalent chromium, Polybrominated biphenyls (PBB), Polybrominated diphenyl ethers (PBDE), Bis(2-ethylhexyl) phthalate (DEHP), Butyl benzyl phthalate (BBP), Dibutyl phthalate (DBP), and Diisobutyl phthalate (DIBP) comply with the limits as set by RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU.
Test Results	:	For further details, please refer to following page(s)

SGS Korea Co., Ltd.
/ LTS Busan Laboratory

Dongju Lee / Technical Manager

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Sample No. : AYGU20-07299.001
Sample Description : C2700
Item No./Part No. : Brass
Materials : N/A

Heavy Metals

Test Items	Unit	Test Method	MDL	Results
Cadmium (Cd)	mg/kg	With reference to IEC 62321-4 : 2013+A1:2017, With reference to IEC 62321-5 : 2013, by ICP-OES	0.5	N.D.
Lead (Pb)	mg/kg	With reference to IEC 62321-4 : 2013+A1:2017, With reference to IEC 62321-5 : 2013, by ICP-OES	5	18.1
Mercury (Hg)	mg/kg	With reference to IEC 62321-4 : 2013+A1:2017, With reference to IEC 62321-5 : 2013, by ICP-OES	2	N.D.
Hexavalent Chromium (Cr VI) *	μg/cm²	With reference to IEC 62321-7-1 : 2015, by UV-Vis	0.1	N.D.
Antimony (Sb)	mg/kg	With reference to EPA 3052 : 1996,With reference to EPA 6010B : 1996, by ICP-OES	10	N.D.
Beryllium (Be)	mg/kg	With reference to EPA 3052 : 1996,With reference to EPA 6010B : 1996, by ICP-OES	5	N.D.

Flame Retardants-PBBs/PBDEs

Test Items	Unit	Test Method	MDL	Results
Monobromobiphenyl	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Dibromobiphenyl	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Tribromobiphenyl	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Tetrabromobiphenyl	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Pentabromobiphenyl	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Hexabromobiphenyl	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Heptabromobiphenyl	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Octabromobiphenyl	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Nonabromobiphenyl	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Decabromobiphenyl	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Monobromodiphenyl ether	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Dibromodiphenyl ether	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Tribromodiphenyl ether	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Tetrabromodiphenyl ether	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Pentabromodiphenyl ether	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Hexabromodiphenyl ether	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Heptabromodiphenyl ether	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Octabromodiphenyl ether	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Nonabromodiphenyl ether	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Decabromodiphenyl ether	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.

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Sample No. : AYGU20-07299.001
Sample Description : C2700
Item No./Part No. : Brass
Materials : N/A

Phthalates

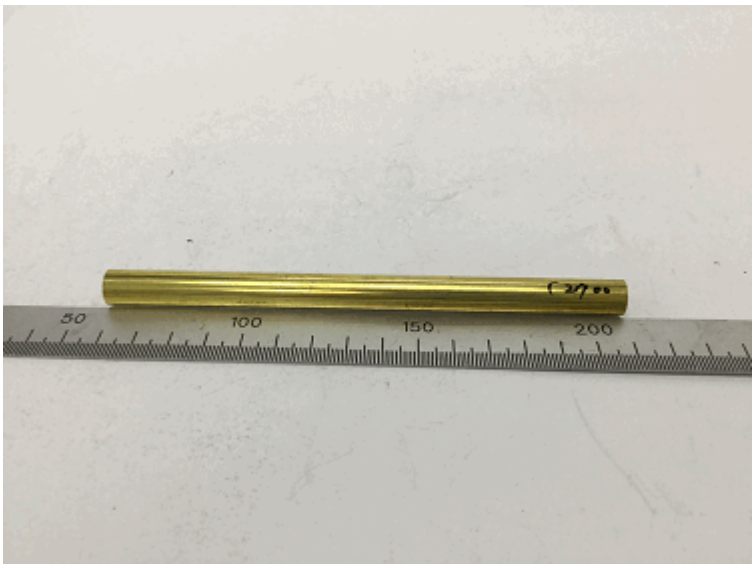
Test Items	Unit	Test Method	MDL	Results
Di-(2-ethylhexyl) phthalate (DEHP)	mg/kg	With reference to IEC 62321-8 : 2017, by GC-MS	50	N.D.
Di-butyl phthalate (DBP)	mg/kg	With reference to IEC 62321-8 : 2017, by GC-MS	50	N.D.
Benzyl butyl phthalate (BBP)	mg/kg	With reference to IEC 62321-8 : 2017, by GC-MS	50	N.D.
Di-isobutyl phthalate (DIBP)	mg/kg	With reference to IEC 62321-8 : 2017, by GC-MS	50	N.D.

NOTE:
(1) N.D. = Not detected.(<MDL)
(2) mg/kg = ppm
(3) µg/kg = ppb
(4) MDL = Method Detection Limit
(5) - = No regulation
(6) Negative = Undetectable / Positive = Detectable
(7) ** = Qualitative analysis (No Unit)
(8) * = a. The sample is positive for CrVI if the CrVI concentration is greater than 0.13 ug/cm2. The sample coating is considered to contain CrVI.
b. The sample is negative for CrVI if CrVI is n.d. (concentration less than 0.10 ug/cm2). The coating is considered a non-CrVI based coating.
c. The result between 0.10 ug/cm2 and 0.13 ug/cm2 is considered to be inconclusive - unavoidable coating variations may influence the determination.
(9) The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
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Picture of Sample as Received:



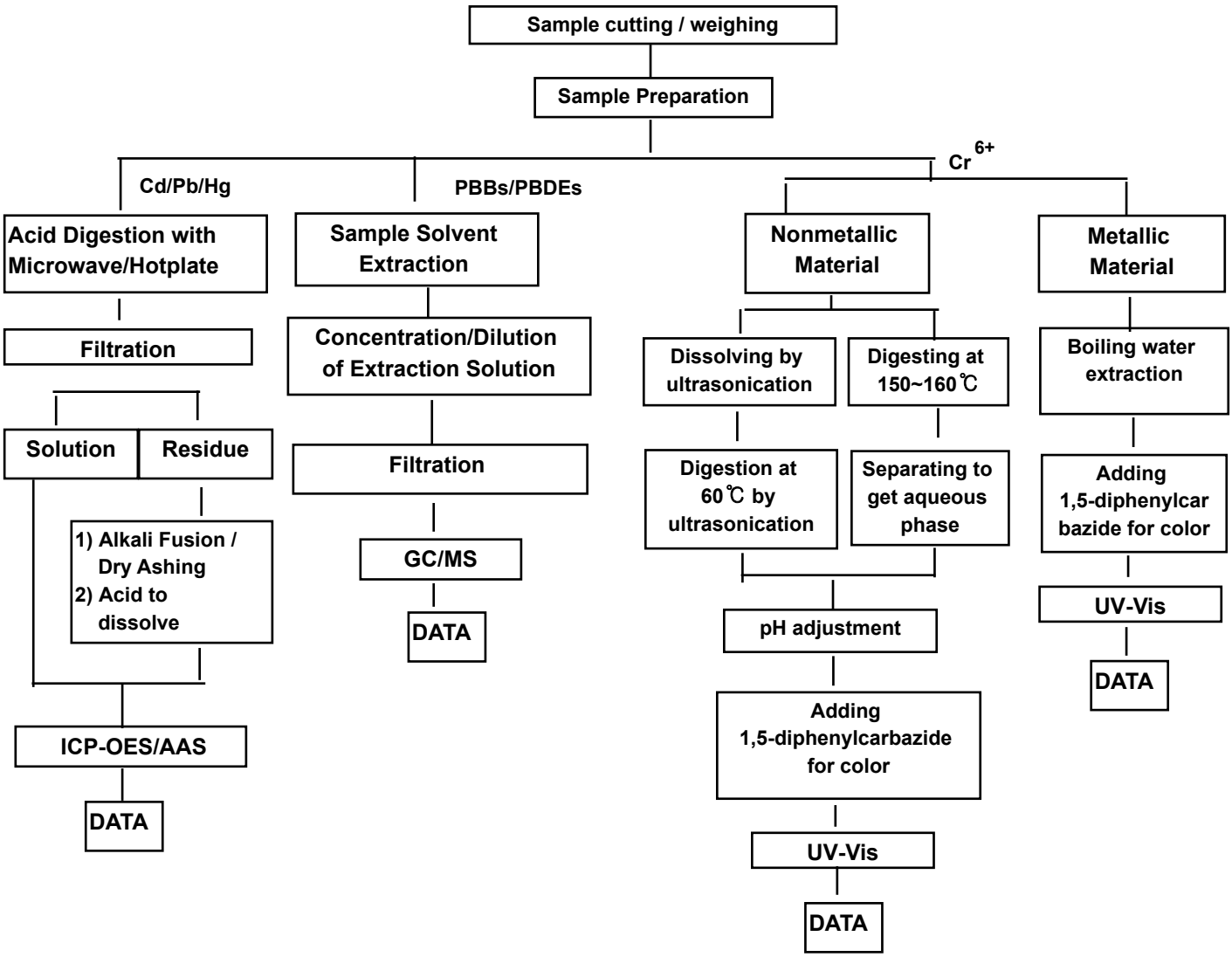
AYGU20-07299.001

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Testing Flow Chart for RoHS:Cd/Pb/Hg/Cr^{6+} /PBBs&PBDEs Testing



The samples were dissolved totally at the acid digestion step of the above flow chart for Cd,Pb,Hg

- **Technician : Gihwan Kim/Choah Jeong/Taehee Kang**
- **Supervisor : Dongju Lee**

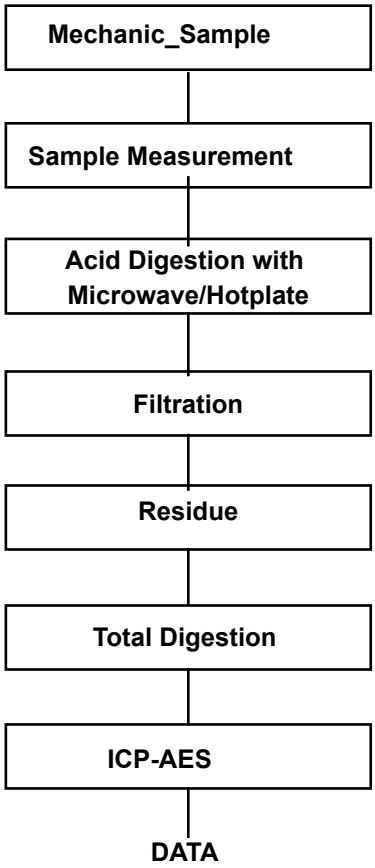
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Flow Chart for Inorganic Elements Testing

Inorganic Elements



Major Inorganic Heavy Metals	Antimony(Sb) , Beryllium(Be) , Phosphorus(P) , Arsenic(As) etc.

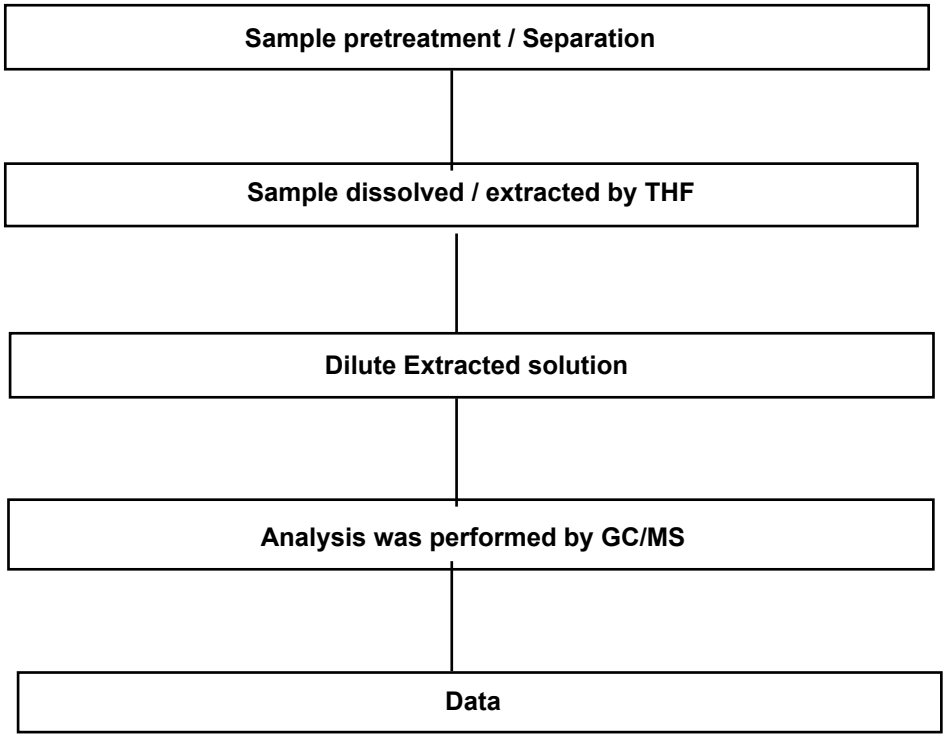
- Technician : Gihwan Kim
- Supervisor : Dongju Lee

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Flow Chart for Phthalate Test



- Technician : Yukyung Park
- Supervisor : Dongju Lee

*** End of Report ***

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Test Report No. F690101/LF-CTSAYGU20-07273

Issued Date : 2020. 07. 22

POONGSAN CORPORATION
94 Sanam-ro,Onsan-eup
Ulju-gun,Ulsan
Korea

The following sample(s) was/were submitted and identified by/on behalf of the client as:-

SGS File No.	:	AYGU20-07273
Product Name	:	C2680
Item No./Part No.	:	Brass
Received Date	:	2020. 07. 02
Test Period	:	2020. 07. 02 to 2020. 07. 22
Conclusion	:	Based on the performed tests on selected part of submitted samples, the results of Cadmium, Lead, Mercury, Hexavalent chromium, Polybrominated biphenyls (PBB), Polybrominated diphenyl ethers (PBDE), Bis(2-ethylhexyl) phthalate (DEHP), Butyl benzyl phthalate (BBP), Dibutyl phthalate (DBP), and Diisobutyl phthalate (DIBP) comply with the limits as set by RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU.
Test Results	:	For further details, please refer to following page(s)

SGS Korea Co., Ltd.
/ LTS Busan Laboratory

Dongju Lee / Technical Manager

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Sample No. : AYGU20-07273.001
Sample Description : C2680
Item No./Part No. : Brass
Materials : N/A

Heavy Metals

Test Items	Unit	Test Method	MDL	Results
Cadmium (Cd)	mg/kg	With reference to IEC 62321-4 : 2013+A1:2017, With reference to IEC 62321-5 : 2013, by ICP-OES	0.5	N.D.
Lead (Pb)	mg/kg	With reference to IEC 62321-4 : 2013+A1:2017, With reference to IEC 62321-5 : 2013, by ICP-OES	5	16.6
Mercury (Hg)	mg/kg	With reference to IEC 62321-4 : 2013+A1:2017, With reference to IEC 62321-5 : 2013, by ICP-OES	2	N.D.
Hexavalent Chromium (Cr VI) *	μg/cm²	With reference to IEC 62321-7-1 : 2015, by UV-Vis	0.1	N.D.
Antimony (Sb)	mg/kg	With reference to EPA 3052 : 1996,With reference to EPA 6010B : 1996, by ICP-OES	10	N.D.
Beryllium (Be)	mg/kg	With reference to EPA 3052 : 1996,With reference to EPA 6010B : 1996, by ICP-OES	5	N.D.

Flame Retardants-PBBs/PBDEs

Test Items	Unit	Test Method	MDL	Results
Monobromobiphenyl	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Dibromobiphenyl	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Tribromobiphenyl	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Tetrabromobiphenyl	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Pentabromobiphenyl	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Hexabromobiphenyl	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Heptabromobiphenyl	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Octabromobiphenyl	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Nonabromobiphenyl	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Decabromobiphenyl	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Monobromodiphenyl ether	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Dibromodiphenyl ether	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Tribromodiphenyl ether	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Tetrabromodiphenyl ether	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Pentabromodiphenyl ether	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Hexabromodiphenyl ether	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Heptabromodiphenyl ether	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Octabromodiphenyl ether	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Nonabromodiphenyl ether	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Decabromodiphenyl ether	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.

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Sample No. : AYGU20-07273.001
Sample Description : C2680
Item No./Part No. : Brass
Materials : N/A

Phthalates

Test Items	Unit	Test Method	MDL	Results
Di-(2-ethylhexyl) phthalate (DEHP)	mg/kg	With reference to IEC 62321-8 : 2017, by GC-MS	50	N.D.
Di-butyl phthalate (DBP)	mg/kg	With reference to IEC 62321-8 : 2017, by GC-MS	50	N.D.
Benzyl butyl phthalate (BBP)	mg/kg	With reference to IEC 62321-8 : 2017, by GC-MS	50	N.D.
Di-isobutyl phthalate (DIBP)	mg/kg	With reference to IEC 62321-8 : 2017, by GC-MS	50	N.D.

Halogen Contents

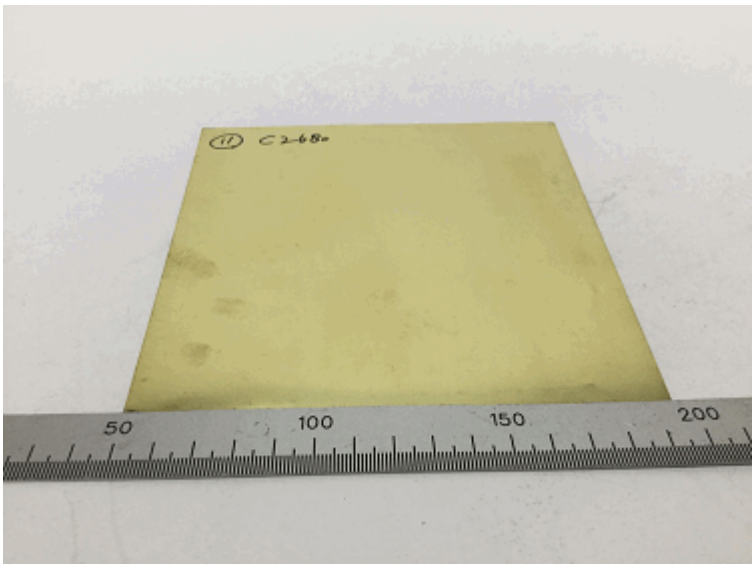
Test Items	Unit	Test Method	MDL	Results
Bromine(Br)	mg/kg	With reference to ASTM D 7359-14a : 2014 by IC	30	N.D.
Chlorine(Cl)	mg/kg	With reference to ASTM D 7359-14a : 2014 by IC	30	N.D.

NOTE:
(1) N.D. = Not detected.(<MDL)
(2) mg/kg = ppm
(3) µg/kg = ppb
(4) MDL = Method Detection Limit
(5) - = No regulation
(6) Negative = Undetectable / Positive = Detectable
(7) ** = Qualitative analysis (No Unit)
(8) * = a. The sample is positive for CrVI if the CrVI concentration is greater than 0.13 ug/cm2. The sample coating is considered to contain CrVI.
b. The sample is negative for CrVI if CrVI is n.d. (concentration less than 0.10 ug/cm2). The coating is considered a non-CrVI based coating.
c. The result between 0.10 ug/cm2 and 0.13 ug/cm2 is considered to be inconclusive - unavoidable coating variations may influence the determination.
(9) The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
This test report is not related to Korea Laboratory Accreditation Scheme.

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Picture of Sample as Received:



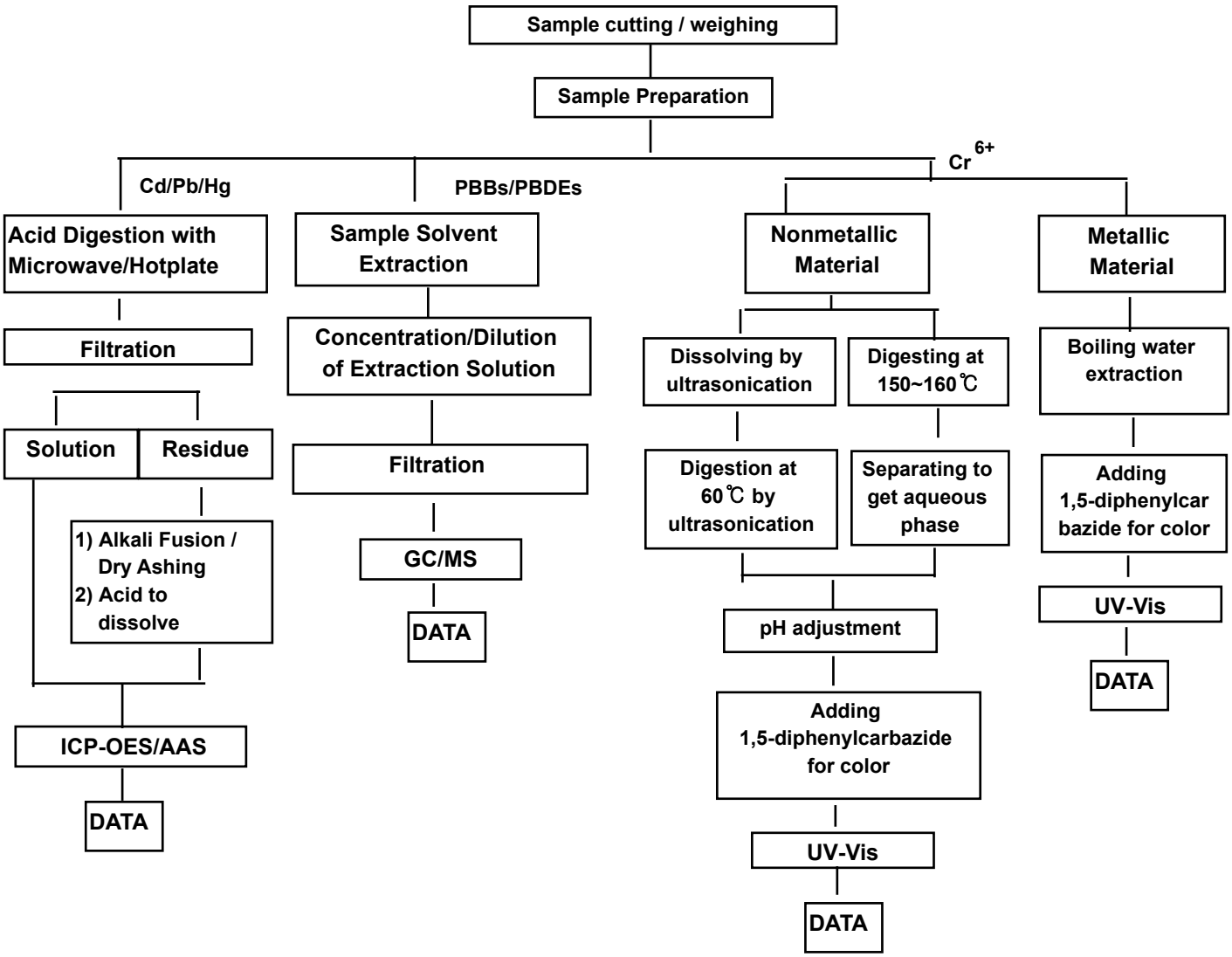
AYGU20-07273.001

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Testing Flow Chart for RoHS:Cd/Pb/Hg/Cr^{6+} /PBBs&PBDEs Testing



The samples were dissolved totally at the acid digestion step of the above flow chart for Cd,Pb,Hg

- Technician : Gihwan Kim/Choah Jeong/Taehee Kang
- Supervisor : Dongju Lee

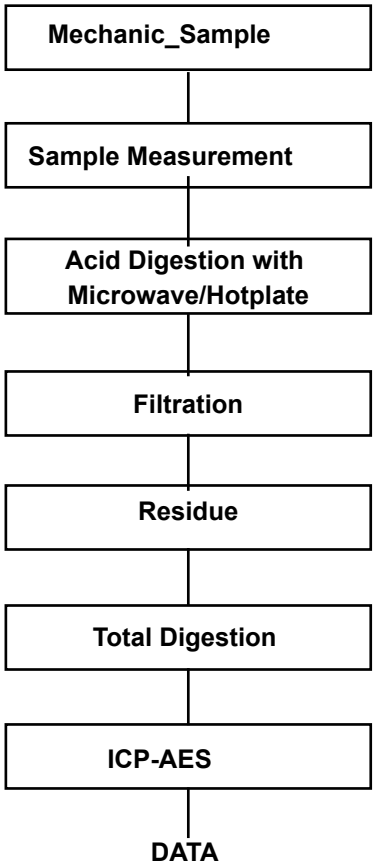
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Flow Chart for Inorganic Elements Testing

Inorganic Elements



Major Inorganic Heavy Metals	Antimony(Sb) , Beryllium(Be) , Phosphorus(P) , Arsenic(As) etc.

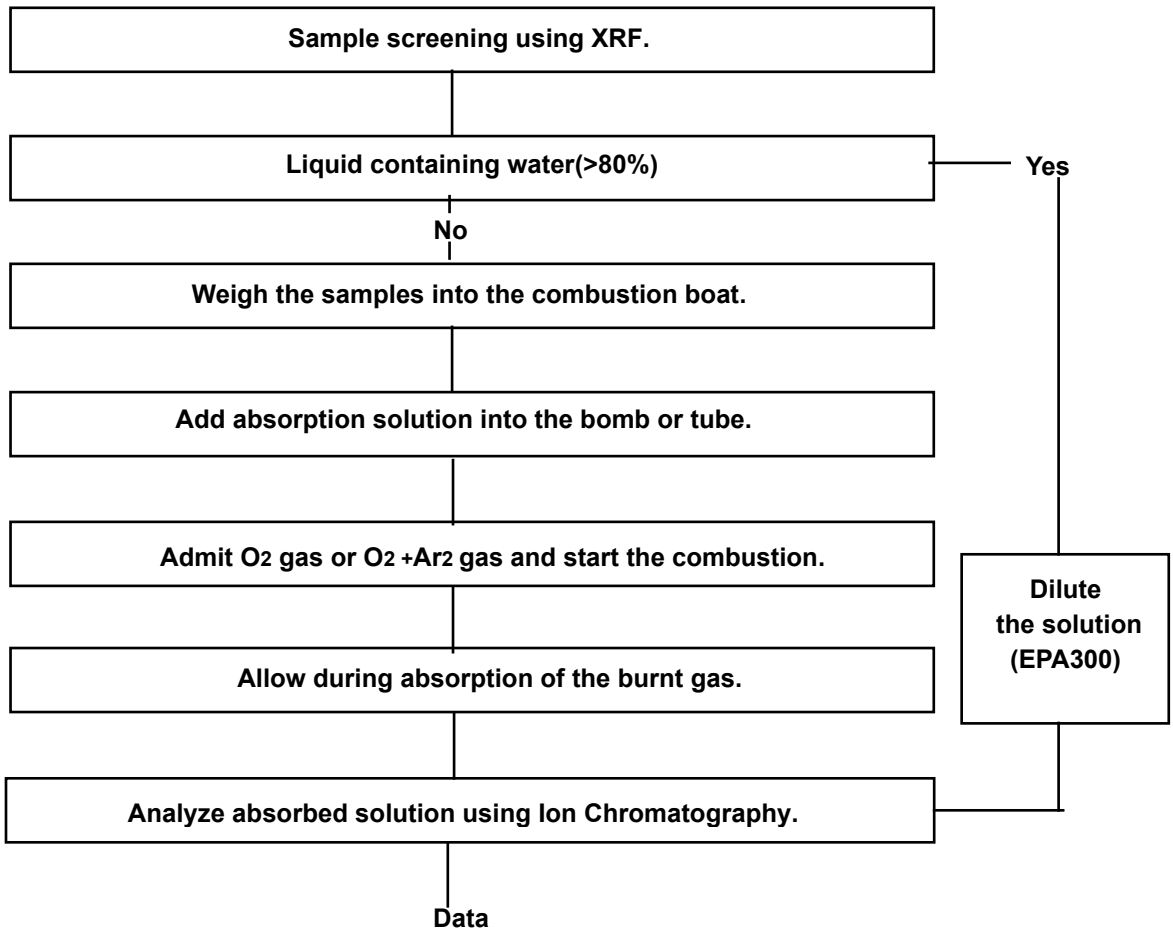
- Technician : Gihwan Kim
- Supervisor : Dongju Lee

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Flow Chart for Halogen Test



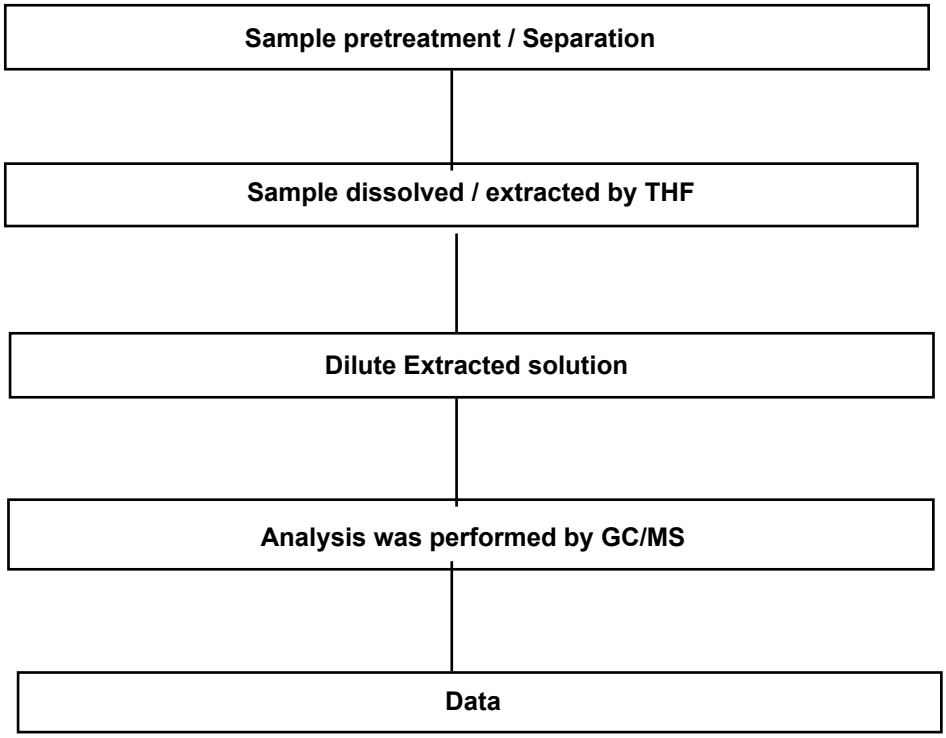
- Technician : Gihwan Kim
- Supervisor : Dongju Lee

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Flow Chart for Phthalate Test



- Technician : Yukyung Park
- Supervisor : Dongju Lee

*** End of Report ***

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Test Report No. F690101/LF-CTSAYGU20-07279

Issued Date : 2020. 07. 22

POONGSAN CORPORATION
94 Sanam-ro,Onsan-eup
Ulju-gun,Ulsan
Korea

The following sample(s) was/were submitted and identified by/on behalf of the client as:-

SGS File No.	:	AYGU20-07279
Product Name	:	C5191
Item No./Part No.	:	Phospher Bronze
Received Date	:	2020. 07. 02
Test Period	:	2020. 07. 02 to 2020. 07. 22
Conclusion	:	Based on the performed tests on selected part of submitted samples, the results of Cadmium, Lead, Mercury, Hexavalent chromium, Polybrominated biphenyls (PBB), Polybrominated diphenyl ethers (PBDE), Bis(2-ethylhexyl) phthalate (DEHP), Butyl benzyl phthalate (BBP), Dibutyl phthalate (DBP), and Diisobutyl phthalate (DIBP) comply with the limits as set by RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU.
Test Results	:	For further details, please refer to following page(s)

SGS Korea Co., Ltd.
/ LTS Busan Laboratory

Dongju Lee / Technical Manager

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Sample No. : AYGU20-07279.001
Sample Description : C5191
Item No./Part No. : Phospher Bronze
Materials : N/A

Heavy Metals

Test Items	Unit	Test Method	MDL	Results
Cadmium (Cd)	mg/kg	With reference to IEC 62321-4 : 2013+A1:2017, With reference to IEC 62321-5 : 2013, by ICP-OES	0.5	N.D.
Lead (Pb)	mg/kg	With reference to IEC 62321-4 : 2013+A1:2017, With reference to IEC 62321-5 : 2013, by ICP-OES	5	29.1
Mercury (Hg)	mg/kg	With reference to IEC 62321-4 : 2013+A1:2017, With reference to IEC 62321-5 : 2013, by ICP-OES	2	N.D.
Hexavalent Chromium (Cr VI) *	μg/cm²	With reference to IEC 62321-7-1 : 2015, by UV-Vis	0.1	N.D.
Antimony (Sb)	mg/kg	With reference to EPA 3052 : 1996,With reference to EPA 6010B : 1996, by ICP-OES	10	N.D.
Beryllium (Be)	mg/kg	With reference to EPA 3052 : 1996,With reference to EPA 6010B : 1996, by ICP-OES	5	N.D.

Flame Retardants-PBBs/PBDEs

Test Items	Unit	Test Method	MDL	Results
Monobromobiphenyl	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Dibromobiphenyl	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Tribromobiphenyl	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Tetrabromobiphenyl	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Pentabromobiphenyl	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Hexabromobiphenyl	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Heptabromobiphenyl	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Octabromobiphenyl	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Nonabromobiphenyl	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Decabromobiphenyl	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Monobromodiphenyl ether	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Dibromodiphenyl ether	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Tribromodiphenyl ether	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Tetrabromodiphenyl ether	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Pentabromodiphenyl ether	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Hexabromodiphenyl ether	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Heptabromodiphenyl ether	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Octabromodiphenyl ether	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Nonabromodiphenyl ether	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Decabromodiphenyl ether	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.

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Sample No. : AYGU20-07279.001
Sample Description : C5191
Item No./Part No. : Phospher Bronze
Materials : N/A

Phthalates

Test Items	Unit	Test Method	MDL	Results
Di-(2-ethylhexyl) phthalate (DEHP)	mg/kg	With reference to IEC 62321-8 : 2017, by GC-MS	50	N.D.
Di-butyl phthalate (DBP)	mg/kg	With reference to IEC 62321-8 : 2017, by GC-MS	50	N.D.
Benzyl butyl phthalate (BBP)	mg/kg	With reference to IEC 62321-8 : 2017, by GC-MS	50	N.D.
Di-isobutyl phthalate (DIBP)	mg/kg	With reference to IEC 62321-8 : 2017, by GC-MS	50	N.D.

Halogen Contents

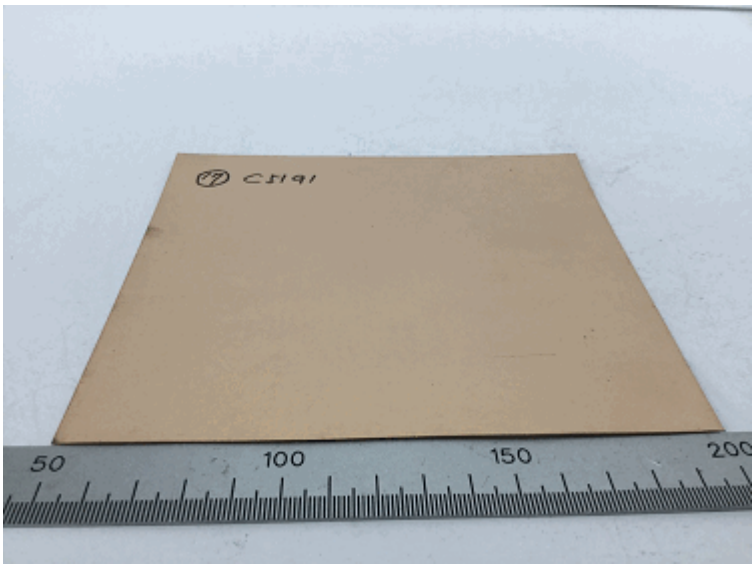
Test Items	Unit	Test Method	MDL	Results
Bromine(Br)	mg/kg	With reference to ASTM D 7359-14a : 2014 by IC	30	N.D.
Chlorine(Cl)	mg/kg	With reference to ASTM D 7359-14a : 2014 by IC	30	N.D.
Fluorine(F)	mg/kg	With reference to ASTM D 7359-14a : 2014 by IC	30	N.D.
Iodine(I)	mg/kg	With reference to ASTM D 7359-14a : 2014 by IC	50	N.D.

NOTE:
(1) N.D. = Not detected.(<MDL)
(2) mg/kg = ppm
(3) µg/kg = ppb
(4) MDL = Method Detection Limit
(5) - = No regulation
(6) Negative = Undetectable / Positive = Detectable
(7) ** = Qualitative analysis (No Unit)
(8) * = a. The sample is positive for CrVI if the CrVI concentration is greater than 0.13 ug/cm2. The sample coating is considered to contain CrVI.
b. The sample is negative for CrVI if CrVI is n.d. (concentration less than 0.10 ug/cm2). The coating is considered a non-CrVI based coating.
c. The result between 0.10 ug/cm2 and 0.13 ug/cm2 is considered to be inconclusive - unavoidable coating variations may influence the determination.
(9) The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
This test report is not related to Korea Laboratory Accreditation Scheme.

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Picture of Sample as Received:



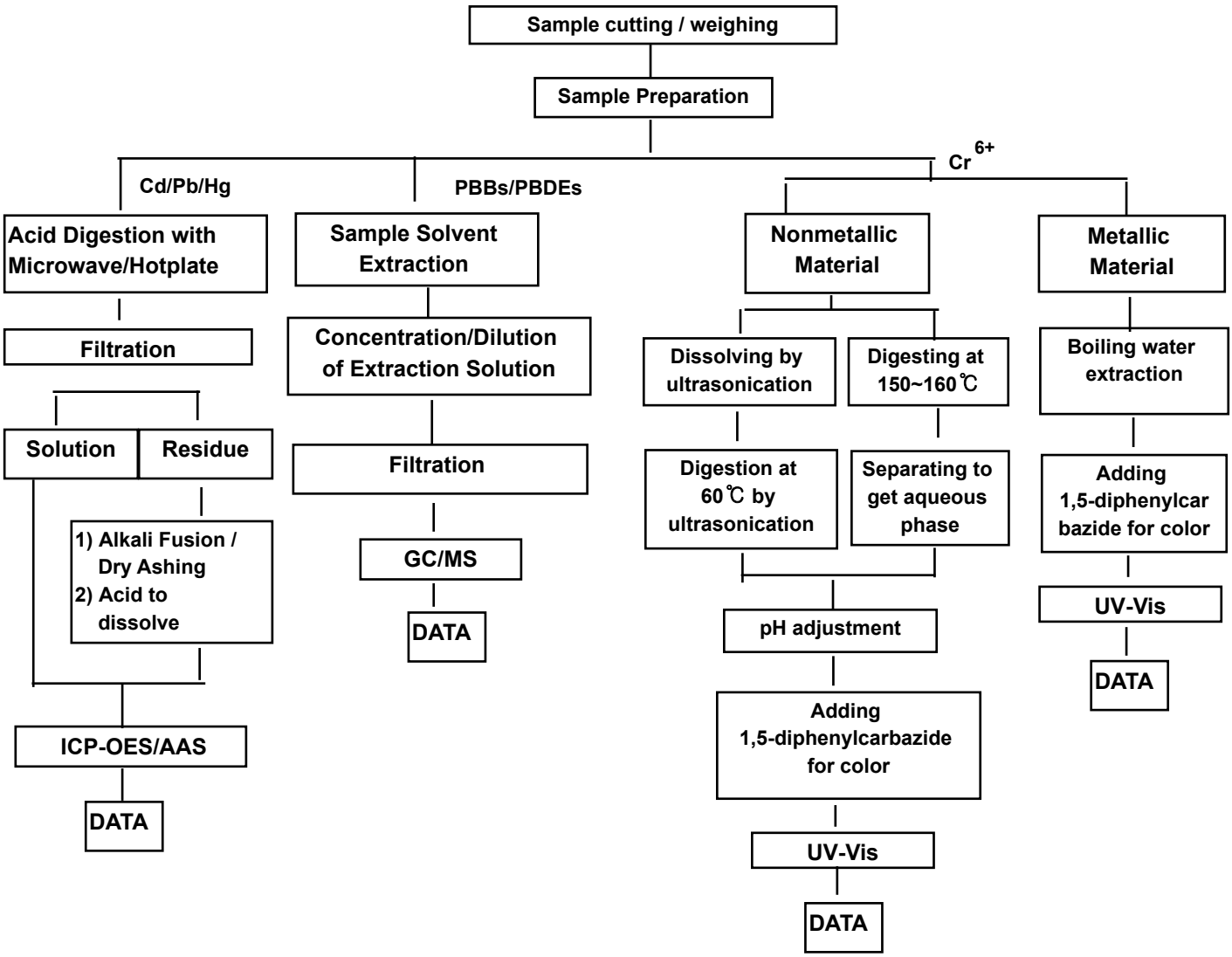
AYGU20-07279.001

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Testing Flow Chart for RoHS:Cd/Pb/Hg/Cr^{6+} /PBBs&PBDEs Testing



The samples were dissolved totally at the acid digestion step of the above flow chart for Cd,Pb,Hg

- **Technician : Gihwan Kim/Choah Jeong/Taehee Kang**
- **Supervisor : Dongju Lee**

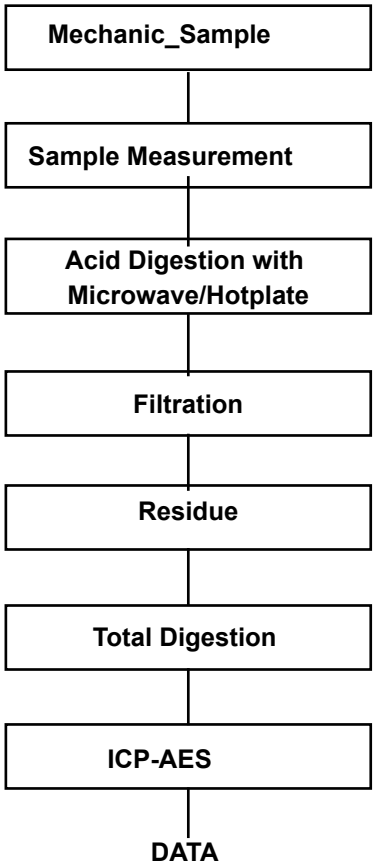
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Flow Chart for Inorganic Elements Testing

Inorganic Elements



Major Inorganic Heavy Metals	Antimony(Sb) , Beryllium(Be) , Phosphorus(P) , Arsenic(As) etc.

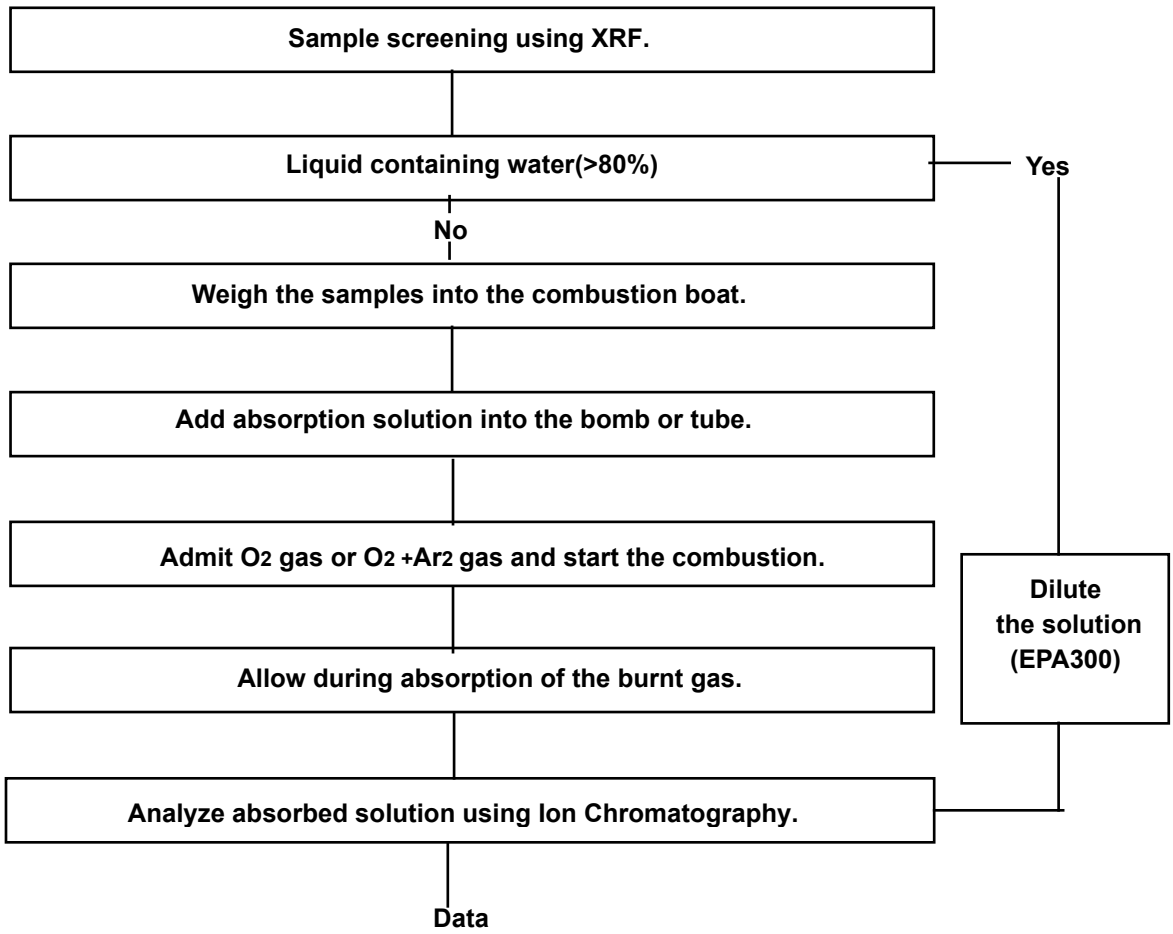
- Technician : Gihwan Kim
- Supervisor : Dongju Lee

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Flow Chart for Halogen Test



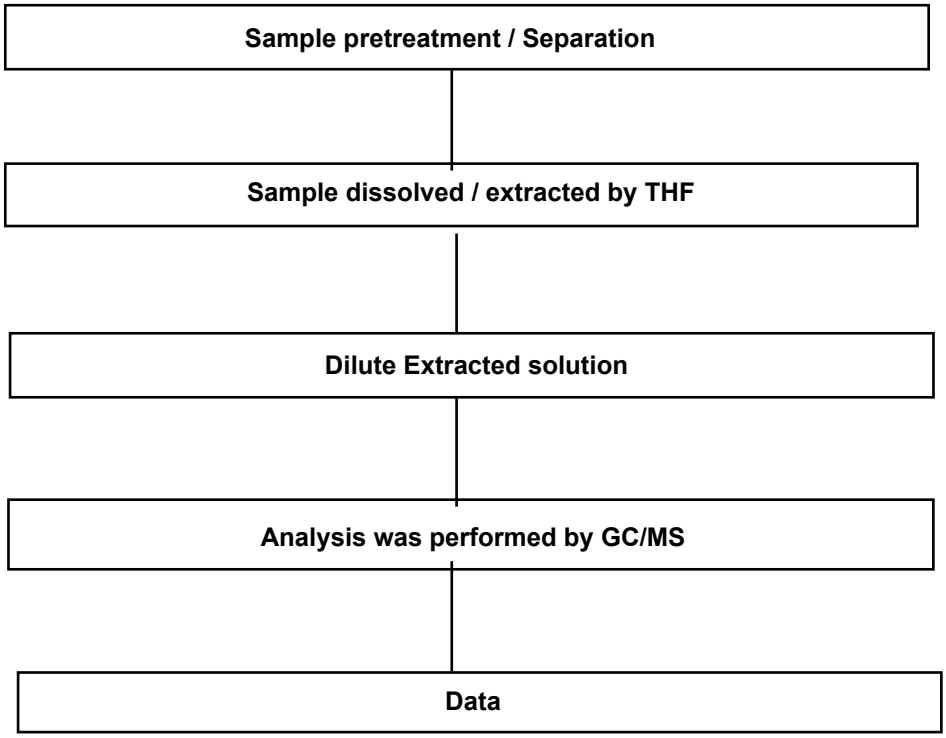
- Technician : Gihwan Kim
- Supervisor : Dongju Lee

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Flow Chart for Phthalate Test



- Technician : Yukyung Park
- Supervisor : Dongju Lee

*** End of Report ***

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MITSUI CHEMICALS,INC.
http://www.mitsuichem.com
Shiodome City Center 1-5-2, Higashi-Shimbashi, Minato-ku, Tokyo 105-7122, Japan

To : Yeonho Electronics

Date : September 2, 2019

SUBJECT : Certificate of Chemical Composition of ARLEN E430N(T5)

Dear Sirs and Madam,

This document is to certify the "Chemical Composition" of "ARLEN E430N(T5)". The country of origin is China.

Product Name : ARLEN E430N(T5)		
Chemical name	**CAS NO.**	**Cont.(%)**
1,4-Benzenedicarboxylic acid, polymer with 1,6-hexanediamine and hexanedioic acid	25776-72-1	40.0-50.0
Glass, oxide, chemicals	65997-17-3	30.0
Brominated ethenylbenzene homopolymer	88497-56-7	18.0-25.0
Sodium Antimonate	15432-85-6	1.5-4.0
Other compounds	-	1.0
TOTAL		100.0

Very Truly Yours,

Hiro Kou

Hiro KOU
Engineering Plastics Dept.
Performance Compound Div.
Mitsui Chemicals,Inc.

ARLEN (GF-reinforced, flame-proof grades) 3

1. PRODUCT AND COMPANY IDENTIFICATION

Product information

Trade name : ARLEN (GF-reinforced, flame-proof grades) 3

Company/Undertaking Identification

Company : Mitsui Chemicals, Inc.
Street address : Shiodome City Center, 1-5-2, Higashi-Shimbashi, Minato-ku, Tokyo, 105-7122, Japan
Responsible Department : Performance Compound Div.
Telephone : +81-3-6253-3494
Telefax : +81-3-6253-4219

SDS Number : P160380E

2. HAZARDS IDENTIFICATION

GHS Classification

Serious eye damage/eye irritation : Category 2
Carcinogenicity : Category 2
Specific target organ toxicity - single exposure : Category 3 (Respiratory tract irritation)
Specific target organ toxicity - repeated exposure : Category 2 (Lungs, Cardiovascular system)

*what does not have statement in the above are: not classified, no classification or classification not possible.

GHS label elements

Pictogram or Symbol :



Signal word : Warning

Hazard statements : H319 Causes serious eye irritation.
H335 May cause respiratory irritation.
H351 Suspected of causing cancer.
H373 May cause damage to organs (Lungs, Cardiovascular system) through prolonged or repeated exposure.

Precautionary statements : **Prevention:**
P201 Obtain special instructions before use.
P202 Do not handle until all safety precautions have been read and understood.
P260 Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
P264 Wash skin thoroughly after handling.
P271 Use only outdoors or in a well-ventilated area.
P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.
Response:
P304 + P340 IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy

to do. Continue rinsing.
P308 + P313 IF exposed or concerned: Get medical advice/ attention.
P337 + P313 If eye irritation persists: Get medical advice/ attention.
Storage:
P403 + P233 Store in a well-ventilated place. Keep container tightly closed.
P405 Store locked up.
Disposal:
P501 Dispose of contents/ container to an approved waste disposal plant.

Other hazards which do not result in classification : Powdered material may form explosive dust-air mixture.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance/mixture : Mixture

Chemical name (Synonyms)	CAS-No.	Concentration
polycondensation product of hexamethylenediamine and terephthalic acid as main components	-	-
glass fiber	-	-
brominated flame retardant	-	-
antimony compound	-	1.8 - 5.8%
other compounds	-	-

4. FIRST AID MEASURES

If inhaled : If you feel unwell, remove to fresh air immediately.
Get medical attention if cough or other symptoms develop.
If exposed to excessive levels of fumes, remove to fresh air.

In case of skin contact : Immediately remove contaminated clothing and shoes.
Flush skin with large amounts of water, clean off with soap and water.
Get medical attention if symptoms develop.
If molten polymer contacts the skin, cool immediately with cold water.
Do not attempt to peel polymer from the skin. Get medical attention for thermal burn.

In case of eye contact : If eye irritation persists, consult a specialist.
Immediately flush eyes with plenty of water for several minutes.
Part eyelids with fingers to assure complete flushing.
Check for and remove contact lenses if easily possible.

If swallowed : Do NOT induce vomiting.
Never give anything by mouth to an unconscious person.
Rinse mouth with water.

		Keep the affected person warm and at rest. Get medical attention immediately.
Protection of first-aiders	:	Wear appropriate personal protective equipment such as protective gloves, protective clothing, eye protection, face protection, respirator, safety shoes, etc.
Notes to physician	:	Treat symptomatically.

5. FIREFIGHTING MEASURES

Suitable extinguishing media	:	Water jet, Water mist, Foam, Dry chemical, Carbon dioxide (CO2)
Unsuitable extinguishing media	:	none
Specific hazards during firefighting	:	Emits toxic fumes under fire conditions.
Special protective equipment for firefighters	:	Respiratory and eye protection required for fire-fighting personnel. Full protective equipment and self-contained breathing apparatus (SCBA) should be used for all indoor fires and any significant outdoor fires.
Further information	:	Remove all sources of ignition. Keep unnecessary and unprotected personnel away. Remove containers to safe place if possible. Fight fire from an upwind position. Keep surrounding areas cool by spraying water.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures	:	Wear appropriate personal protective equipment such as protective gloves, protective clothing, eye protection, face protection, respirator, protective boots, etc. Keep unnecessary and unprotected personnel away. Keep upwind, evacuate downwind. Wear appropriate personal protective equipment as specified in Section 8. Evacuate immediate area. Warn personnel of health hazard.
Environmental precautions	:	Do not flush into sewer, river, or any body of water. Product is non-biodegradable; may cause long-term adverse effects in the aquatic environment.
Methods and materials for containment and cleaning up	:	Use only non-sparking tools. Vacuum or sweep up material and place in a disposal container. If the quantity is small, use an electric vacuum cleaner or broom to sweep and collect the product. If in molten state, allow it to cool and solidify before proceeding with disposal methods.

7. HANDLING AND STORAGE

Handling

Technical measures	:	Refer to the "Engineering measures" in Section 8. Avoid contact with eyes, skin, and clothing. Avoid ingestion and inhalation. Wear appropriate personal protective equipment. Provide hand and eye wash station near work area. Wash thoroughly after handling. Use only in well-ventilated area. Keep away from heat, sparks, and flame. Use explosion-proof electrical equipment. Take precautions against build-up of electrostatic charges. Use in well-ventilated area. Avoid dust formation.
Advice on safe handling	:	Do not handle until all safety precautions have been read and understood. Take precautionary measures against static discharge. Avoid dust formation. Do not breathe dust.
Avoidance of contact	:	Keep containers tightly closed in a dry, cool and well-ventilated place. Keep away from heat, flame, and all sources of ignition. Store in a segregated and approved area.
Hygiene measures	:	Wash hands thoroughly after handling. Do not eat, drink, or smoke when using this product.

Storage

Conditions for safe storage	:	Store locked up. The floor must be protected from water and impermeable. The inventory location must be fire-resisting. Make the roof from nonflammable materials, and do not install the ceiling. Install appropriate facilities for lighting/ventilating. Store indoors. Ground and bond containers and equipment to prevent build-up of electrostatic charges.
Suitable container and packaging materials for safe storage	:	Aluminum-lined paper bag

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Exposure Limit Values

USA. ACGIH Threshold Limit Values (TLV) [2015]

continuous filament glass fibers	:	TWA	1 fibers/cm3 5 mg/m3 Inhalable fraction
antimony compound	:	TWA	0.5 mg/m3 as Sb

Engineering measures	:	Provide safety shower and eye wash station near work area. Use closed system or local exhaust ventilation.

Personal protective equipment

Respiratory protection	:	Respirator with a particle filter

Hand protection	:	Protective gloves
Eye protection	:	Safety goggles, Eye shield, Face shield
Skin and body protection	:	Protective suit, Safety shoes, Safety helmet, Apron

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Physical state	:	solid
Form	:	pellets
Colour	:	colored (Varies by product)
Odour	:	characteristic

Safety data

pH	:	not applicable
Melting point/range	:	310 - 320 °C (Varies by product)
Boiling point/boiling range	:	no data available
Flash point	:	> 200 °C
Auto-ignition temperature	:	no data available
Lower explosion limit	:	no data available
Upper explosion limit	:	no data available
Vapour pressure	:	no data available
Relative vapour density	:	no data available
Evaporation rate	:	no data available
Relative density	:	1.30 - 1.80
Water solubility	:	insoluble
Partition coefficient: n-octanol/water	:	no data available
Decomposition temperature	:	no data available
Viscosity, kinematic	:	no data available

10. STABILITY AND REACTIVITY

Reactivity	:	no data available
Chemical stability	:	Stable under normal conditions.
Conditions to avoid	:	Heat, air, sunlight
Incompatible materials	:	no data available
Hazardous decomposition products	:	Nitrogen oxides, hydrogen bromide, Antimony oxide
Hazardous reactions	:	Dust or vapours may be ignite or explode by static electricity or other ignition sources.

11. TOXICOLOGICAL INFORMATION

Product:

Acute oral toxicity	:	Classification not possible
Acute dermal toxicity	:	Classification not possible

Acute inhalation toxicity	:	Classification not possible
Skin corrosion/irritation	:	Classification not possible Contact with dust can cause mechanical irritation or drying of the skin.
Serious eye damage/eye irritation	:	Category 2
Sensitisation	:	Respiratory sensitisation: Classification not possible Skin sensitisation: Classification not possible
Germ cell mutagenicity	:	Classification not possible
Carcinogenicity	:	Category 2
Reproductive toxicity	:	Classification not possible
STOT - single exposure	:	Category 3(Respiratory tract irritation)
STOT - repeated exposure	:	Category 2(Lungs, Cardiovascular system)
Aspiration toxicity	:	Classification not possible

Components:

glass fiber :

Serious eye damage/eye irritation	:	Result: Mild eye irritation
STOT - single exposure	:	Assessment: The substance or mixture is classified as specific target organ toxicant, single exposure, category 3 with respiratory tract irritation.

brominated flame retardant :

Acute oral toxicity	:	LD50 Rat: > 5000 mg/kg
Acute dermal toxicity	:	LD50 Rabbit: > 3000 mg/kg
Acute inhalation toxicity	:	LC50 Rat: > 5.2 mg/l Exposure time: 4 h Test atmosphere: dust/mist

12. ECOLOGICAL INFORMATION

Ecotoxicity

Product:

Acute toxicity

Acute aquatic toxicity	:	Classification not possible

Chronic toxicity

Chronic aquatic toxicity	:	Classification not possible

Bioaccumulative potential

Product:

Partition coefficient: n-octanol/water	:	no data available

Other adverse effects

Hazardous to the ozone layer : Not classifiable

13. DISPOSAL CONSIDERATIONS

Waste from residues : In accordance with local and national regulations.
Dispose of wastes in an approved waste disposal facility.
When outsourcing waste treatment, be sure to notify the treatment company regarding the hazards before outsourcing.

Contaminated packaging : Empty the container completely before disposal.
Do not reuse the container for any other purpose. Dispose of in accordance with applicable laws and regulations.

14. TRANSPORT INFORMATION

International transport regulations

IATA
Not dangerous goods

IMDG
Not dangerous goods

15. REGULATORY INFORMATION

Notification status

Japan	ENCS:	On the inventory, or in compliance with the inventory.
United States of America (USA)	TSCA:	On the inventory, or in compliance with the inventory.
European Union	REACH:	Contact us for information.
Canada	DSL,NDSL:	All components of this product are on DSL.
Australia	AICS:	Not in compliance with the inventory.
Korea	KECI:	On the inventory, or in compliance with the inventory.
China	IECSC:	On the inventory, or in compliance with the inventory.
New Zealand	NZIoC:	On the inventory, or in compliance with the inventory.
Philippines	PICCS:	On the inventory, or in compliance with the inventory.

16. OTHER INFORMATION

Sources of key data used to compile the Safety Data Sheet : In-house data
Information acquired by literature documentation

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the

specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

Appendix

This Safety Data Sheet covers these products :
E430N(T5), E430NHS(J), E430NS(J), E440N, E440NA, E630N, E630NA, E630NR

LG Chem	SAFETY DATA SHEET	Version: R0003.0001
		Date of issue: 2019-03-24
		Revision date: 2019-03-24
	LUMID GN1001BFY	Change List:

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1. IDENTIFICATION

A. Product name

- LUMID GN1001BFY

B. Recommended use and restriction on use

- General use : May be used to produce molded or extruded particles or as a component of other industrial products.
- Restriction on use : Not available

C. Manufacturer / Supplier / Distributor information

○ **Manufacturer information**

- Company name : LG Chem, Ltd.
- Address : 99, Seokam-ro, Iksan-si, Jeonbuk, 570-350, Korea
- Dept. : EP QA TEAM
- Telephone number : 82-63-830-4101
- Emergency telephone number :
- Fax number : 82-63-830-4007
- E-mail address :

○ **Supplier/Distributer information**

- Company name : LG Chem, Ltd.
- Address : LG Twin Towers 128, Yeoui-daero, Yeongdeungpo-gu, Seoul, 150-721, Korea
- Dept. : EP Division
- Telephone number : 82-2-3773-3517
- Emergency telephone number :
- Fax number : 82-2-3773-7983
- E-mail address : webmaster@lgchem.com

2. HAZARD IDENTIFICATION

A. GHS Classification

- Skin corrosion/irritation : Category2
- Serious eye damage/irritation : Category2A
- Specific target organ toxicity(Single exposure) : Category3(Respiratory tract irritation)

B. GHS label elements

○ **Hazard symbols**



○ **Signal words**

- Warning

○ **Hazard statements**

- H315 Causes skin irritation
- H319 Causes serious eye irritation
- H335 May cause respiratory irritation.

○ **Precautionary statements**

1) Prevention

- P261 Avoid breathing dust/fume.
- P264 Wash hands thoroughly after handling.

- P271 Use only outdoors or in a well-ventilated area.
- P280 Wear protective gloves/protective clothing/eye protection/face protection.

2) Response

- P302+P352 IF ON SKIN: Wash with plenty of soap and water.
- P304+P340 IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
- P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
- P312 Call a POISON CENTER or doctor/physician if you feel unwell.
- P321 Specific treatment
- P332+P313 If skin irritation occurs: Get medical advice/attention.
- P337+P313 If eye irritation persists: Get medical advice/attention.
- P362 Take off contaminated clothing and wash before reuse.

3) Storage

- P403+P233 Store in a well-ventilated place. Keep container tightly closed.
- P405 Store locked up.

4) Disposal

- P501 Dispose of contents/container in accordance with local/regional/national/international regulation

C. Other hazards which do not result in classification : (NFPA Classification)

○ **NFPA grade (0 ~ 4 level)**

- Health : 2, Flammability : 0, Reactivity : 0

3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Name	Trade names and Synonyms	CAS No.	Content(%)
Poly[imino(1,6-dioxo-1,6-hexanediyl)imino-1,6-	-	32131-17-2	80~90
Poly[imino(1-oxo-1,6-hexanediyl)]	Polycaprolactam	25038-54-4	5~10
1,3,5-Triazine-2,4,6(1H,3H,5H)-trione compd. with 1,3,5-triazine-2,4,6-triamine (1:1)	-	37640-57-6	5~10
Others	-	-	≤5

4. FIRST AID MEASURES

A. Eye contact

- Do not rub your eyes.
- Immediately flush eyes with plenty of water for at least 15 minutes and call a doctor/physician.
- Get medical attention immediately.
- Go to the hospital immediately if symptoms(flare, irritate) occur.
- Remove contact lenses if worn.

B. Skin contact

- Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes.
- Wash contaminated clothing thoroughly before re-using.
- Get medical attention immediately.
- Go to the hospital immediately if symptoms(flare, irritate) occur.
- Wash thoroughly after handling.

C. Inhalation contact

- When exposed to large amounts of steam and mist, move to fresh air.
- Take specific treatment if needed.
- Get medical attention immediately.

D. Ingestion contact

- Please be advised by doctor whether induction of vomit is demanded or not.
- Rinse your mouth with water immediately.
- Get medical attention immediately.

E. Delayed and immediate effects and also chronic effects from short and long term exposure

- Not available

F. Notes to physician

- Notify medical personnel of contaminated situations and have them take appropriate protective measures.

5. FIREFIGHTING MEASURES

A. Suitable (Unsuitable) extinguishing media

- Dry chemical, carbon dioxide, regular foam extinguishing agent, spray
- Avoid use of water jet for extinguishing

B. Specific hazards arising from the chemical

- Not available

C. Special protective actions for firefighters

- Notify your local firestation and inform the location of the fire and characteristics hazard.
- Avoid inhalation of materials or combustion by-products.
- Do not access if the tank on fire.
- Use appropriate extinguishing measure suitable for surrounding fire.
- Wear appropriate protective equipment.
- Keep containers cool with water spray.

6. ACCIDENTAL RELEASE MEASURES

A. Personal precautions, protective equipment and emergency procedures

- Wear proper personal protective apparatus as indicated in Section 8 and avoid skin contact and inhalation.
- Must work against the wind, let the upwind people to evacuate.
- Move container to safe area from the leak area.
- Avoid skin contact and inhalation.

B. Environmental precautions

- Prevent runoff and contact with waterways, drains or sewers.
- If large amounts have been spilled, inform the relevant authorities.

C. Methods and materials for containment and cleaning up

- Large spill : Stay upwind and keep out of low areas. Dike for later disposal.
- Notification to central government, local government. When emissions at least of the standard amount
- Dispose of waste in accordance with local regulation.
- Appropriate container for disposal of spilled material collected.
- Small liquid state spills: Appropriate container for disposal of spilled material collected.
- Put the spilled material in an appropriate containers and clean the contaminated area

7. HANDLING AND STORAGE

A. Precautions for safe handling

- Avoid direct physical contact.
- Since emptied containers retain product residue(vapor, liquid, solid) follow all MSDS and label warnings even after container is emptied.
- Avoid contact with incompatible materials.
- Get the manual before use.

B. Conditions for safe storage, including any incompatibilities

- Check regularly for leaks.
- Store according to current laws and regulations
- Avoid direct sunlight.
- Please pay attention to incompatibilities materials and conditions to avoid.
- Keep sealed when not in use.
- Collected them in sealed containers.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

A. Exposure limits

○ **ACGIH TLV**

- Not available

○ **OSHA PEL**

- Not available

B. Engineering controls

- Business owner is recommended to maintain below recommended exposure limits for the working place with general exhaust of gas/vapour/mist/fume.

C. Individual protection measures, such as personal protective equipment

○ **Respiratory protection**

- Under conditions of frequent use or heavy exposure, Respiratory protection may be needed.
- Respiratory protection is ranked in order from minimum to maximum.
- Consider warning properties before use.
- Dust, mist, fume-purifying respiratory protection
- Air-purifying respirator with high-efficiency particulate filtering
- Any respiratory protection with a electromotion fan(for dust, mist, fume-purifying)
- Self-contained breathing apparatus with a corpuscle filter of high efficiency
- For Unknown Concentration or Immediately Dangerous to Life or Health : Any supplied-air respirator with full facepiece and operated in a pressure-demand or other positive-pressure mode in combination with a separate escape supply. Any self-contained breathing apparatus with a full facepiece.

○ **Eye protection**

- Wear primary eye protection such as splash resistant safety goggles with a secondary protection face shield.
- Provide an emergency eye wash station and quick drench shower in the immediate work area.

○ **Hand protection**

- Wear appropriate glove.

○ **Skin protection**

- Wear appropriate clothing.

○ **Others**

- Not available

9. PHYSICAL AND CHEMICAL PROPERTIES

A. Appearance	
- Appearance	Solid(Pellets)
- Color	Not available
B. Odor	Not available
C. Odor threshold	Not available
D. pH	Not available
E. Melting point/Freezing point	260~270℃
F. Initial Boiling Point/Boiling Ranges	Not available
G. Flash point	Not available
H. Evaporation rate	Not available
I. Flammability(solid, gas)	Not available
J. Upper/Lower Flammability or explosive limits	Not available
K. Vapour pressure	Not available
L. Solubility	Not available
M. Vapour density	Not available
N. Specific gravity(Relative density)	1.10~1.20
O. Partition coefficient of n-octanol/water	Not available
P. Autoignition temperature	Not available
Q. Decomposition temperature	Not available
R. Viscosity	Not available
S. Molecular weight	Not available

10. STABILITY AND REACTIVITY

A. Chemical Stability

- This material is stable under recommended storage and handling conditions.

B. Possibility of hazardous reactions

- Hazardous Polymerization will not occur.

C. Conditions to avoid

- Avoid contact with incompatible materials and condition.
- Avoid : Accumulation of electrostatic charges, Heating, Flames and hot surfaces

D. Incompatible materials

- Not available

E. Hazardous decomposition products

- May emit flammable vapour if involved in fire.

11. TOXICOLOGICAL INFORMATION

A. Information on the likely routes of exposure

○ **(Respiratory tracts)**

- May cause respiratory irritation.

○ **(Oral)**

- Not available

○ **(Eye·Skin)**

- Causes serious eye irritation
- Causes skin irritation

B. Delayed and immediate effects and also chronic effects from short and long term exposure

○ **Acute toxicity**

*** Oral**

- Product (ATEmix) : 2000mg/kg < ATEmix <= 5000mg/kg
- [1,3,5-Triazine-2,4,6(1H,3H,5H)-trione compd. with 1,3,5-triazine-2,4,6-triamine (1:1)] : LD50 = 2500 ㎎/㎏ Rat

*** Dermal**

- Product (ATEmix) : >5000mg/kg
- [1,3,5-Triazine-2,4,6(1H,3H,5H)-trione compd. with 1,3,5-triazine-2,4,6-triamine (1:1)] : LD50 = 5520 ㎎/㎏ Rat

*** Inhalation**

- Product (ATEmix) : 5.0mg/L < ATEmix <= 12.5mg/L
- [Poly[imino(1,6-dioxo-1,6-hexanediyl)imino-1,6-hexanediyl]] : LC50 7.26 ㎎/ℓ 4 hr Rat (Micromedex)
- [Poly[imino(1-oxo-1,6-hexanediyl)]] : LC50 0.011 mg/L Mouse

○ **Skin corrosion/irritation**

- Causes skin irritation

○ **Serious eye damage/irritation**

- Causes serious eye irritation

○ **Respiratory sensitization**

- Not available

○ **Skin sensitization**

- Not available

○ **Carcinogenicity**

*** IARC**

- [Poly[imino(1-oxo-1,6-hexanediyl)]] : Group 3

*** OSHA**

- Not available

*** ACGIH**

- Not available

*** NTP**

- Not available

*** EU CLP**

- Not available

○ **Germ cell mutagenicity**

- Not available

○ **Reproductive toxicity**

- Not available

○ **STOT-single exposure**

- May cause respiratory irritation.

○ **STOT-repeated exposure**

- Not available

○ **Aspiration hazard**

- Not available

12. ECOLOGICAL INFORMATION

A. Ecotoxicity

○ **Fish**

- [1,3,5-Triazine-2,4,6(1H,3H,5H)-trione compd. with 1,3,5-triazine-2,4,6-triamine (1:1)] : LC50 = 25042.387 ㎎/ℓ 96 hr (Estimate)

○ **Crustaceans**

- [1,3,5-Triazine-2,4,6(1H,3H,5H)-trione compd. with 1,3,5-triazine-2,4,6-triamine (1:1)] : LC50 = 40.299 ㎎/ℓ 48 hr (Estimate)

○ **Algae**

- [1,3,5-Triazine-2,4,6(1H,3H,5H)-trione compd. with 1,3,5-triazine-2,4,6-triamine (1:1)] : EC50 = 11.563 ㎎/ℓ 96 hr (Estimate)

B. Persistence and degradability

○ **Persistence**

- [1,3,5-Triazine-2,4,6(1H,3H,5H)-trione compd. with 1,3,5-triazine-2,4,6-triamine (1:1)] : log Kow = -1.37 (NLM/HSDB)

○ **Degradability**

- Not available

C. Bioaccumulative potential

○ **Bioaccumulative potential**

- [1,3,5-Triazine-2,4,6(1H,3H,5H)-trione compd. with 1,3,5-triazine-2,4,6-triamine (1:1)] : BCF = 3 (NLM/HSDB)

○ **Biodegration**

- Not available

D. Mobility in soil

- Not available

E. Other adverse effects

- Not available

13. DISPOSAL CONSIDERATIONS

A. Disposal methods

- Since more than two kinds of designated waste is mixed, it is difficult to treat separately, then can be reduction or stabilization by incineration or similar process.
- If water separation is possible, pre-process with Water separation process.
- Dispose by incineration.

B. Special precautions for disposal

- The user of this product must dispose by oneself or entrust it to a waste disposer, a person who recycles other’s waste or establishes and operates waste disposal facilities.
- Dispose of waste in accordance with all applicable laws and regulations.

14. TRANSPORT INFORMATION

A. UN No. (IMDG)

- Not applicable

B. Proper shipping name

- Not applicable

C. Hazard Class

- Not applicable

D. IMDG Packing group

- Not applicable

E. Marine pollutant

- Not available
- Not applicable

F. Special precautions for user related to transport or transportation measures

- Local transport follows in accordance with Dangerous goods Safety Management Law.
- Package and transport follow in accordance with Department of Transportation (DOT) and other regulatory agency requirements.
- Air transport(IATA): Not subject to IATA regulations.

15. REGULATORY INFORMATION

A. National and/or international regulatory information

○ **POPs Management Law**

- Not applicable

○ **Information of EU Classification**

*** Classification**

- Not applicable

○ **U.S. Federal regulations**

*** OSHA PROCESS SAFETY (29CFR1910.119)**

- Not applicable

*** CERCLA Section 103 (40CFR302.4)**

- Not applicable

*** EPCRA Section 302 (40CFR355.30)**

- Not applicable

*** EPCRA Section 304 (40CFR355.40)**

- Not applicable

*** EPCRA Section 313 (40CFR372.65)**

- Not applicable

○ **Rotterdam Convention listed ingredients**

- Not applicable

○ **Stockholm Convention listed ingredients**

- Not applicable

○ **Montreal Protocol listed ingredients**

- Not applicable

16. OTHER INFORMATION

A. Reference

- The information contained herein is believed to be accurate. It is provided independently of any sale of the product for purpose of hazard communication. It is not intended to constitute performance information concerning the product. No express warranty, or implied warranty of merchantability or fitness for a particular purpose is made with respect to the product or the information contained herein.
- This Safety Data Sheet was compiled with data and information from the following sources: KOSHA, NITE, ESIS, NLM, SIDS, IPCS

B. Issue date

- 2019-03-24

C. Revision number and Last date revised

- 2 times, 2019-03-24

D. Other

- This SDS is prepared according to the Globally Harmonized System (GHS).

POONGSAN CORP.

SDS (SAFETY DATA SHEET)	Control No	SDS-PS-005
	Date Issued	January 22, 2019
	Revision No	7
Product Names	Brass Strip, Bar, Wire, Coin	

SECTION 1 Product and company identification

a. Product Name: Copper & Brass Strip, Bar, Wire, Coin (Contain : Tin plating material)

Item Names: C2500, C2600, C2680, C2700, C2720, C2730, C2740, C2800, C2801

b. Recommended use and restrictions on use

Item recommended use: Electricity, Drawing, Decoration, Coin, Other Parts

Item restrictions on use: No data

c. Manufacturer/Supplier/Distributor Information

Company's Name: POONGSAN CORPORATION Ulsan Plant

Company's Address: 94, Sanam-ro, Onsan -eup, Ulju-gun, Ulsan, Korea

Phone / Fax Number: +82-52-231-9114 / +82-52-231-9400

SECTION 2 Harmfulness · riskiness

a. Classification of harmfulness and riskiness

Acute toxicity(oral) : classification 4

Specific Target Organ Toxicity (Single Exposure) : classification 3-respiratory tract irritation

Specific Target Organ Toxicity (Repeated Exposure) : classification 1

Acute aquatic toxicity: classification 1

Chronic aquatic toxicity : classification 1

b. GHS labels, including precautionary statements

Hazard Symbols



Signal word	Statements
Health Hazards	H301 Toxic if swallowed H335 May cause respiratory irritation H372 Causes damage to organs through prolonged or repeated exposure H400 Very toxic to aquatic life H410 Very toxic to aquatic life with long lasting effects

Precautionary statements

Prevention	P260 Do not breathe dust/fume/gas/mist/vapos/spray. P264 Wash ... thoroughly after handling P270 Do not eat, drink or smoke when using this product.
Response	P301+P310 If swallowed: Immediately call a poison center or doctor/physician. P304+P340 If inhaled: Remove victim to fresh air and keep at rest in a position comfortable for breathing. P312 Call a poison center or doctor/physician if you feel unwell P314 Get medical advice/attention if you feel unwell

Storage	Store in a well-ventilated place.
Disposal	P501 Dispose of contents/container to Waste Management Act

c. Other hazards which do not result in classification(NFPA)

Division	Health	Fire	Reactivity
Copper	No data	No data	No data
Zinc	No data	No data	No data

SECTION 3 Composition/Information on ingredients

Component	Synonyms	CAS number	Content (%)
Copper	-	7440-50-8	60.1-72.5
Zinc	-	7440-66-6	27.5-39.9

SECTION4 First aid measures

a. Eye contact	Flush eyes immediately with fresh water for at least 15 minutes while holding the eyelids open. If the chemicals is entering the eyes, immediately should receive the examination and treatment.
b. Skin contact	remove the chemicals immediately with soap and water for at the least 15minutes. If skin irritation persists or a rash develops as a result of excessive contact, see a doctor.
c. Inhalation	Give artificial respiration if victim is not breathing. avoid away from area of a risk.
d. Ingestion	If person is unconscious, do not feed anything and do not induce vomit. If person is vomiting spontaneously, Head place lower than hips in order to avoid possibility of inspiration in the lungs. If unconscious, turn head to side to prevent airway obstruction. contact the emergency medical treatment organization and evacuate immediately to the hospital.
e. Indication of immediate medical attention and notes for physician	consider gastric lavage when ingested chemicals. If breathing is difficult, give oxygen and continue to monitor antidote(copper) : potassium, natrium, edetate/glucose, intravenous administration ; penicillamine, oral administration

SECTION 5 Fire-fighting measures

a. Suitable (and unsuitable) extinguishing media

Suitable	Dolomite, dry chemical powder for metal fire, sand, graphite, soda ash, sodium chloride, lime
unsuitable	Foam extinguisher, Water
Large fire	No data

b. Specific hazards arising from the chemical

Toxicant from combustion	Zinc oxide
Fire and Explosion Hazards	in case of general conditions, you can ignore fire and explosion. but mixture of dust and air may have explosion or ignition.

c. Special protective equipment and precautions for fire-fighters

Protective equipment	Protective clothing
Prevention measure	Prevent people unconcerned from getting close to risk area, isolate and must prohibit approach. use appropriate extinguishing agent in surrounding fire. Avoid inhalation of combustion products Avoid direct contact with the water

SECTION 6 Accidental release measures

A. For personal precautions, protective equipment and emergency procedures	Avoiding direct contact, wear suitable protective equipment.

B. Environmental precautions and protective procedures

Air	No data
Soil	Dispose of leaked substances what put into a suitable container.
Water	Please be Collected using vacuum pump. absorb leaked substance with activated carbon.
	accumulated substance in activated carbon must be handled after inpour at waste water disposal plant using hose.

C. Methods and materials for containment and cleaning up

Small leak	Please be collected in a suitable container leak substance. implement cleaning by only those who have been trained about riskiness of leaked substance. Avoid direct contact with the water and leaked substance.
Large leak	Please notify the contents of the discharge to state and local government agencies when the recommended dose or more.

SECTION 7 Handling and storage

A. Precautions for safe handling	prevent a dust's creation and spread. residue in the container is dangerous, so dispose of container in accordance with safety instruction.
B. Conditions for safe storage (including any incompatibilities)	Please avoid contact with oxidizing substances. Be stored in a cool and dry place. please use and store in accordance with given laws from Government departments and local governments.

SECTION 8 Exposure controls & personal protection

A. Control parameters(e.g. occupational exposure limit values, biological limit values)

KOSHA	
Copper	Copper(Dusts and mists, as Cu) TWA - 1㎎/㎥ ,Copper(Dusts and mists, as Cu) STEL - 2㎎/㎥ Copper(Fume)TWA - 0.1㎎/㎥
Zinc	No data

ACGIH

Copper	TWA ppm 0.2 ㎎/㎥, 1 ㎎/㎥
Zinc	No data
Biological exposure limits	No data

B. Appropriate engineering controls

Engineering management	If the chemicals is a risk of explosion, Install ventilator equipped with explosion proof system. install ventilator (local ventilation system, etc) and wind speed must maintain appropriately.

C. Personal protective equipment

Respiratory protection	respiratory protection is unnecessary in general state, If dust or fumes are generated, use only respiratory equipment certified by KOSHA.
Eye protection	Install the emergency washing facilities so that workers use easily. You must use safety glasses to protect your eyes from dust or fumes.
Hands protection	You must use safety gloves to avoid direct contact.
Body protection	If there is exposed skin directly, you must wear protective clothing to protect your skin.

SECTION 9 Physical and chemical properties

a. appearance		j. Upper/lower flammability or explosive limits	No data
physical state	Solid	k. Vapor pressure	No data
color	Yellow	l. Solubility	(Insoluble)
b. Odor	Odorless	m. Vapor density	No data
c. Odor threshold	No data	n. Relative density	8.47
d. pH	No data	o. Partition coefficient: n-octanol/water	
e. Meting point/freezing point	1,045 ℃	p. Auto-ignition temperature	No data
f. Initial boiling point and boiling range		q. Decomposition temperature	No data
g. Flash point	No data	r. Viscosity	No data
h. Evaporation rate:	No data	s. Molecular mass	
i. Flammability (solid, gas):	No data		

SECTION 10 Stability and reactivity

a. Chemical stability and possibility of hazardous reactions	it is stabilized in the room temperature and normal pressure. no polymerization. minute particle(zinc) may react with water.
b. Conditions to avoid	Inhibit dust creation. Avoid heat, flames, sparks and other of ignition source. Be stored in dry place.
c. Materials to avoid	Incompatible materials : acid, base, metal, oxidizer, reducer, halogen-carbon compound, metallic salts, halogen, combustibles, amine, metallic oxide.
d. Hazardous decomposition products	Pyrolysate : decompositon materials, etc.

SECTION 11 Toxicological information

a. Information on the likely routes of exposure

routes of exposure	Oral/Inhalation : respiratory inhalation or ingestion of dust,mist,hume Absorption : absorption of skin or eyeball of dust,mist,hume

b. Information on the likely routes of exposure

Acute toxic	
Oral	LD50 630 ㎎/㎏ Rat(Elemental)(zinc)
Dermal	No data
Inhalation	No data
Skin corrosive/irritant	No data(Zinc/body/No irritation)
Serious eye damage/eye irritation	No data
Respiratory sensitization	No data
Skin sensitization	No data
Carcinogenicity	
Occupation Safety and Health Acts	No data
Ministry of Labor Notice	No data
IARC	No data
OSHA	No data
ACGIH	No data
NTP	No data
Germ Cell Mutagenicity	No data
Reproductive toxicity	No data
Specific target organ toxicity (single exposure)	Hume stimulate the upper airway (Copper)
Specific target organ toxicity (repeated exposure)	Cause liver damage in people(Copper)
Aspiration hazard	No data

SECTION 12 Ecological Information

a. Aquatic and terrestrial ecotoxicity

Fish	
Copper	LC50 0.37 ㎎/ℓ 96 hr
Zinc	LC50 0.24 ㎎/ℓ 96 hr Oncorhynchus mykiss
Crustacea	
Copper	EC50 0.0318 ㎎/ℓ 48 hr
Zinc	EC50 0.0354 ㎎/ℓ 48 hr Daphnia magna
Algea	
Copper	LC50 0.092 ㎎/ℓ 15 hr
Zinc	EC50 0.0106 ㎎/ℓ 72 hr (Pseudokirchneriella subcapitate)

b. Persistence and degradability

Persistence	
Copper	log Kow -0.57 (estimation)
Zinc	log Kow -0.47
Degradability	No data

c. Bioaccumulative potential

Biodegradability	
Copper	BCF 5830
Zinc	BCF 600 (fish)
Bioaccumulation	No data

d. Mobility in soil No data

e. Other adverse effects No data

SECTION 13 Disposal considerations

a. Disposal method	Classify and dispose of waste in accordance with Waste Control Act and characteristic. Please entrust with company licensed in accordance with Wastes Control Act.
b. Disposal precaution	Please comply with the standard and methods about waste's collection,transportation, storage, handling specified by Waste Control Act.

SECTION 14 Transport information

a. UN number

Copper	3089
Zinc	1436

b. UN proper shipping name Not applicable

c. Transport hazard class

Copper	4.1
Zinc	4.3

d. Packing group, if applicable

Copper	2
Zinc	I

e. Environmental hazards No data

f. Special precautions for user

Emergency management type of fire

Copper	F-G
Zinc	F-G

Eemergency management type of leak

Copper	S-G
Zinc	S-O

POONGSAN CORP.

SECTION 15 Regulatory information

a. Industrial Safety and Health Act

Copper	Controlled substances : Rules on occupational health (Asterisk 7) Material working environment measurement (Measurement cycle : 6Months) : Occupation safety and health Acts enforcement regulations (Asterisk 11-4) Special medical examination material (Measurement cycle : 12 Months) : Occupation safety and health Acts enforcement regulations (Asterisk 12-2) Substance exposure limits set : Exposure standard to physical agents and chemical (Ministry of Labor Notice)
Zinc	Controlled substances : Rules on occupational health (Asterisk 7) Material working environment measurement (Measurement cycle : 6Months) : Occupation safety and health Acts enforcement regulations (Asterisk 11-4) Special medical examination material (Measurement cycle : 12Months) : Occupation safety and health Acts enforcement regulations (Asterisk 12-2) Substance exposure limits set : Exposure standard to physical agents and chemical (Ministry of Labor Notice)

b. Toxic Chemical Control Act	Not applicable
c. Dangerous Material Safety Control Act	Not applicable
d. Wastes Control Act	Not applicable
e. Other requirements in domestic and other countries	No data

SECTION 16 Other information

a. Information source and references

1. National Institute of Environmental Health Sciences Country hazardous materials information system : NCIS
2. National Emergency Management chemical substances information system
3. POONGSAN CORP. Test Data(Ulsan Plant Q.A)
4. Ministry of Labor Notice
5. Others Regulations and Notice

b. first version of the SDS: April 17, 2006

c. Revision number and date

Revised frequency: 7th

latest version of the SDS: January 22, 2019

d. Others

Safety data sheet(SDS) was written in accordance with Chemical classification and indication and SDS standard from Korea Occupational Safety and Health Agency refer to SDS Editing Program.

this document is not quality assurance about products,but which described about safety, health, environment at the normal situation. if characteristics change by heating and processing, you should use after check a additional Health and Safety Act. Also, this information may be revised without notice, and you can be provided in our company's website. Other details, please contact us at Safety & Environment Team or Quality Assurance.

POONGSAN
POONGSAN CORP.

SDS (SAFETY DATA SHEET)	Control No	SDS-PS-013
	Date Issued	January 22, 2019
	Revision No	8
Product Names	Phosphorus bronze	

SECTION 1 Product and company identification

a. Product Name: Phosphorus bronze (Contain : Tin plating material)

Item Names: C5100, C5101, C5102, C5103, C5111, C5191, C5210, C5212, C5240

b. Recommended use and restrictions on use

Item recommended use: Electricity, Socket, Decoration, Structure, Other Parts

Item restrictions on use: No data

c. Manufacturer/Supplier/Distributor Information

Company's Name: POONGSAN CORPORATION Ulsan Plant

Company's Address: 94, Sanam-ro, Onsan-eup, Ulju-gun, Ulsan, Korea

Phone / Fax Number: +82-52-231-9114 / +82-52-231-9400

SECTION 2 Harmfulness · riskiness

a. Classification of harmfulness and riskiness

Inflammable material : classification 2

Acute toxicity(oral) : classification 2

Acute toxicity(percutaneous) : classification 2

Specific target organ – toxicity(single exposure) : classification 3-respiratory tract irritation

Specific target organ – toxicity(repeated exposure) : classification 1

Acute aquatic toxicity : classification 1

Chronic aquatic toxicity : classification 1

b. GHS labels, including precautionary statements

Hazard Symbols



Signal word	Risk
Health Hazards	H300 Deadly if swallowed H335 May stimulate respiratory organs. H372 Liver may damage with long-term or repeated exposure. H410 Very toxic to aquatic life with long lasting effects

Precautionary statements

Prevention	P264 Wash your hands thoroughly after handling product. P270 When using the product, do not breathe and smoking.
Response	P301+P310 If swallowed, Immediately see a doctor. P302+P352 If contact with skin, wash cleanly. P314 Get medical advice/attention if you feel unwell
Storage	No data
Disposal	P501 Dispose of container to Waste Management Act

c. Other hazards which do not result in classification(NFPA)

Division	Health	Fire	Reactivity
Copper	No data	No data	No data
Tin	No data	No data	No data
Phosphorus	No data	No data	No data

SECTION 3 Composition/Information on ingredients

Component	Synonyms	CAS number	Content (%)
Copper	-	7440-50-8	89.3-96.9
Tin	-	7440-31-5	3.0-10.5
Phosphorus	Copper Phosphide (Cu_3P)	No data	0.1~0.2

SECTION4 First aid measures

a. Eye contact	Flush eyes immediately with fresh water for at least 15 minutes while holding the eyelids open. Immediately wash the eyes when be exposed. If the chemicals is entering the eyes, immediately should receive the examination and treatment.
b. Skin contact	remove the chemicals immediately with soap and water for at the least 15minutes. Polluted clothes and shoes in chemicals, should wash before used again. If skin ailment is developed, see a doctor.
c. Inhalation	If affected about exposure, move a patient into non pollution area. If inhaled chemicals, immediately see a doctor.
d. Ingestion	If person is unconscious, do not feed anything and do not induce vomit. If person is conscious, rinse one's mouth and slowly feeds water or milk 2 to 4 cups If unconscious, turn head to side to prevent airway obstruction. contact the emergency medical treatment organization and evacuate immediately to the hospital.
e. Indication of immediate medical attention and notes for physician	consider gastric lavage when ingested chemicals. If breathing is difficult, give oxygen and continue to monitor antidote(copper) : potassium, natrium, edetate/glucose, intravenous administration ; penicillamine, oral administration

SECTION 5 Fire-fighting measures

a. Suitable (and unsuitable) extinguishing media

Suitable	Dolomite, dry chemical powder for metal fire, sand, graphite, soda ash, sodium chloride, lime
unsuitable	No data
Large fire	Use a fine water spray and fire extinguishing agent

b. Specific hazards arising from the chemical

Toxicant from combustion	Tin oxide
Fire and Explosion Hazards	in case of general conditions, you can ignore fire and explosion. but mixture of dust and air may have explosion or ignition.

c. Special protective equipment and precautions for fire-fighters

Protective equipment	Protective clothing
Prevention measure	Prevent people unconcerned from getting close to risk area, isolate and must prohibit approach. use appropriate extinguishing agent in surrounding fire. Avoid inhalation of combustion products Avoid direct contact with the water

SECTION 6 Accidental release measures

A. For personal precautions, protective equipment and emergency procedures	Avoiding direct contact, wear suitable protective equipment.

B. Environmental precautions and protective procedures

Air	No data
Soil	Dispose of leaked substances what put into a suitable container.
Water	Please be Collected using vacuum pump. absorb leaked substance with activated carbon. accumulated substance in activated carbon must be handled after inpour at waste water disposal plant using hose.

C. Methods and materials for containment and cleaning up

Small leak	Please be collected in a suitable container leak substance. implement cleaning by only those who have been trained about riskiness of leaked substance. Avoid direct contact with the water and leaked substance.
Large leak	Please notify the contents of the discharge to state and local government agencies when the recommended dose or more.

SECTION 7 Handling and storage

A. Precautions for safe handling	prevent a dust's creation and spread.
B. Conditions for safe storage (including any incompatibilities)	Be stored in a cool and dry place. Avoid contact with ignition source. please use and store in accordance with given laws from Government departments and local governments. Please avoid contact with oxidizing substances.

SECTION 8 Exposure controls & personal protection

A. Control parameters(e.g. occupational exposure limit values, biological limit values)

KOSHA	
Copper	TWA - 1㎎/㎥ , STEL - 2㎎/㎥ Copper(Dust and mist) TWA - 0.1㎎/㎥ Copper(Fume)
Tin	Tin(Metal)TWA -2㎎/㎥
Phosphorus	No data

ACGIH

Copper	TWA - 0.2㎎/㎥ , 1㎎/㎥
Tin	TWA 2 ㎎/㎥
Phosphorus	No data
Biological exposure limits	No data

B. Appropriate engineering controls

Engineering management	If dust or hume are generated, close up the working process or install ventilator. And manage in order that keep the appropriate wind speed. If dust or hume are generated, check working process which be allowable for standard and leakage threshold of Labor Department.

C. Personal protective equipment

Respiratory protection	respiratory protection is unnecessary in general state, If dust or fumes are generated, use only respiratory equipment certified by KOSHA.
Eye protection	Install the emergency washing facilities so that workers use easily. You must use safety glasses to protect your eyes from dust or fumes.
Hands protection	You must use safety gloves to avoid direct contact.
Body protection	If there is exposed skin directly, you must wear protective clothing to protect your skin.

SECTION 9 Physical and chemical properties

a. appearance		j. Upper/lower flammability or explosive limits	No data
physical state	Solid	k. Vapor pressure	No data
color	Red	l. Solubility	(Insoluble)
b. Odor	Odorless	m. Vapor density	No data
c. Odor threshold	No data	n. Relative density	8.8
d. pH	No data	o. Partition coefficient: n-octanol/water	
e. Meting point/freezing point	1230 ℃	p. Auto-ignition temperature	No data
f. Initial boiling point and boiling range		q. Decomposition temperature	No data
g. Flash point	No data	r. Viscosity	No data
h. Evaporation rate:	No data	s. Molecular mass	
i. Flammability (solid, gas):	No data		

SECTION 10	Stability and reactivity

a. Chemical stability and possibility of hazardous reactions	it is stabilized in the room temperature and normal pressure. no polymerization.
b. Conditions to avoid	Inhibit dust creation. Avoid heat, flames, sparks and other of ignition source.
c. Materials to avoid	Incompatible materials : acid, base, metal, oxidizer, reducer, halogen-carbon compound, metallic salts, halogen, combustibles, amine, metallic oxide.
d. Hazardous decomposition products	Pyrolysate : tin oxide, decompositon materials, etc.

SECTION 11	Toxicological information

a. Information on the likely routes of exposure

routes of exposure	No data

b. Information on the likely routes of exposure

Acute toxic	
Oral	LD50 481 ㎎/㎏ Rat (OECD TG 401, GLP)(Copper), LD50 > 2000 ㎎/㎏ Rat (OECD TG 423, GLP)(Tin)
Dermal	LD50 > 2000 ㎎/㎏ Rat (OECD TG 402, GLP)(Copper) LD50 > 2000 ㎎/㎏ Rat (OECD TG 402, GLP)(Tin)
Inhalation	Dust LC50> 5.11 ㎎/ℓ 4 hr Rat (OECD TG 436, GLP)(Copper) Dust LC50> 4.75 ㎎/ℓ 4 hr Rat (OECD TG 403, GLP)(Tin)
Skin corrosive/irritant	No data
Serious eye damage/eye irritation	No data
Respiratory sensitization	No data
Skin sensitization	No data
Carcinogenicity	
Occupation Safety and Health Acts	No data
Ministry of Labor Notice	No data
IARC	No data
OSHA	No data
ACGIH	No data
NTP	No data
Germ Cell Mutagenicity	No data
Reproductive toxicity	No data
Specific target organ toxicity (single exposure)	No data
Specific target organ toxicity (repeated exposure)	Cause liver damage in people(Copper) Lung damage appears Workers who handle a metal Tin (Tin)
Aspiration hazard	No data

SECTION 12 Ecological Information

a. Aquatic and terrestrial ecotoxicity

Fish	
Copper	LC50 0.37 ㎎/ℓ 96 hr
Tin	No data
Phosphorus	No data
Crustacea	
Copper	EC50 0.0318 ㎎/ℓ 48 hr
Tin	No data
Phosphorus	No data
Algea	
Copper	LC50 0.092 ㎎/ℓ 15 hr
Tin	No data
Phosphorus	No data

b. Persistence and degradability

Persistence	
Copper	log Kow −0.57 (estimation)
Tin	No data
Phosphorus	No data
Degradability	No data

c. Bioaccumulative potential

Condenasability	
Copper	BCF 5830
Tin	No data
Phosphorus	No data
Biodegradability	No data

d. Mobility in soil No data

e. Other adverse effects No data

SECTION 13 Disposal considerations

a. Disposal method	Classify and dispose of waste in accordance with Waste Control Act and characteristic. Please entrust with company licensed in accordance with Wastes Control Act.
b. Disposal precaution	Please comply with the standard and methods about waste's collection,transportation, storage, handling specified by Waste Control Act.

SECTION 14	Transport information

a. UN number

Copper	3089
Tin	(UN) There is not classification information of dangerous substance about transport.
Phosphorus	No data

b. UN proper shipping name: Not applicable

c. Transport hazard class

Copper	4.1
Tin	Not applicable
Phosphorus	No data

d. Packing group,

Copper	2
Tin	Not applicable
Phosphorus	No data

e. Marine pollutant: No data

f. user knows or who is necessary special safety measure about transport and transport means.

Emergency management type of fire.

Copper	F-G
Tin	Not applicable
Phosphorus	No data

Emergency management type of leak

Copper	S-G
Tin	Not applicable
Phosphorus	No data

SECTION 15	Regulatory information

a. Industrial Safety and Health Act

Copper	Controlled substances : Rules on occupational health (Asterisk 7) Material working environment measurement (Measurement cycle : 6Months) : Occupation safety and health Acts enforcement regulations (Asterisk 11-4) Special medical examination material (Measurement cycle : 12 Months) : Occupation safety and health Acts enforcement regulations (Asterisk 12-2) Substance exposure limits set : Exposure standard to physical agents and chemical (Ministry of Labor Notice) Material limits set : Occupation safety and health Acts enforcement regulations (Asterisk 11-3)

Tin	Controlled substances : Rules on occupational health (Asterisk 7) Material working environment measurement (Measurement cycle : 6Months) : Occupation safety and health Acts enforcement regulations (Asterisk 11-4) Special medical examination material (Measurement cycle : 12Months) : Occupation safety and health Acts enforcement regulations (Asterisk 12-2) Substance exposure limits set (Zinc oxide) : Exposure standard to physical agents and chemical (Ministry of Labor Notice)
Phosphorus	Not applicable

b. Toxic Chemical Control Act Not applicable

c. Dangerous Material Safety Control Act Not applicable

d. Wastes Control Act Not applicable

e. Other requirements in domestic and other countries No data

SECTION 16 Other information

a. Information source and references

1. National Institute of Environmental Health Sciences Country hazardous materials information system : NCIS

2. National Emergency Management chemical substances information system

3. POONGSAN CORP. Test Data(Ulsan Plant Q.A)

4. Revised research project of labor department about chemical exposure limit (2005)

5. Others Regulations and Notice

b. first version of the SDS April 17, 2006

c. Revision number and date

Revised frequency 8th

latest version of the SDS January 22, 2019

d. Others

Safety data sheet(SDS) was written in accordance with Chemical classification and indication and SDS standard from Korea Occupational Safety and Health Agency(www.kosha.or.kr)
refer to SDS Editing Program.
However, since it is Cu3P in phosphorus, the CAS No. is referenced as 12019-57-7 at www.echempotal.org, but the CAS No. is not retrieved in IMDS and CAMDS system including SDS system. As a result, CAS No. of Phosphorus is indicated as "No Data" in section 3.

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제정일자 ESTA. Date	2004. 03. 17
개정일자 REV. Date	
시행일자 EFFECT.Date	2004. 03. 17
문서번호 FILE. NO	Q - M - 002

W A F E R Q C 공 정 도
PRODUCT & PROCESS CHART (WAFER)

작성일자 : 2004. 03. 17 작성부서 : 품질관리실 작 성 자 : 서 홍 엽

D A T E : 2004. 03. 17 D E P T .: QUALITY CONTROL WRITTEN BY : MR.H Y SEO

결재 APR`D	작 성 WRIT`N	검 토 CHK`D	승 인 APR`D
	S.H.Y 03/17	B.J.S 03/17	S.S.S 03/17

NO	공정명 PROCESS NAME	흐름도 부공정 SUB PROCESS	흐름도 주공정 MAIN PROCESS	사용설비 및 장비 EQUIPMENT	공 정 관 리 (MGT OF PROCESS) 항 목 I T E M	관리기준 MGT.RULE	검 사 관 리 (MGT OF INSPECTION) 검사항목 ITEM	검사방식 METHOD	판정기준 JUDGEMENT	관련표준 STANDARDIZE
01	원자재 입고 INCOMING MATERIAL		▽							
02	수입 검사 INCOMING INSPECTION		◇				겉모양(Shape) 물성(Certificate of Propertied)	체크검사 CHECK	수입검사 규격 STD OF INCOMING INSPECTION	YSI-101-003
03	INJECTION		○	사 출 기 EJECTOR	형체력(Shape) DRY HOPPER온도(DRY HOPPER Temp) OIL 온도(OIL Temp)	작업표준 STD OF WORK				YSI-091-004
04	공정 및 최종검사 Process & Final Test		◇		OIL량(Quantity of Oil) AIR 공급량(Air Pressure)		겉모양(Shape)	체크검사 CHECK	공정 및 최종 검사 규격 STD OF PROCESS & FINAL TEST	YSI-102-001
05	포 장 PACKAGE		○	저울,SEALING기 Digital Scale Packer	수량(Quantity) 포장상태(State of Package)	포장관리규칙 Package Regulation				YSP-152
06	운 반 STORAGE		▽	운반차 Carrier						

제정일자 ESTA. Date	2004. 03. 17
개정일자 REV. Date	
시행일자 EFFECT.Date	2004. 03. 17
문서번호 FILE. NO	Q - P - 002

P I N Q C 공 정 도
PRODUCT & PROCESS CHART (PIN)

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작성일자 : 2004. 03. 17 작성부서 : 품질관리실 작 성 자 : 서 홍 엽

D A T E : 2004. 03. 17 D E P T .: QUALITY CONTROL WRITTEN BY : MR.H Y SEO

결재 APR`D	작 성 WRIT`N	검 토 CHK`D	승 인 APR`D
	S.H.Y 03/17	B.J.S 03/17	S.S.S 03/17

NO	공정명 PROCESS NAME	흐름도 부공정 SUB PROCESS	흐름도 주공정 MAIN PROCESS	사용설비 및 장비 EQUIPMENT	공 정 관 리 (MGT OF PROCESS) 항 목 I T E M	공 정 관 리 (MGT OF PROCESS) 관리기준 MGT.RULE	검 사 관 리 (MGT OF INSPECTION) 검사항목 ITEM	검 사 관 리 (MGT OF INSPECTION) 검사방식 METHOD	검 사 관 리 (MGT OF INSPECTION) 판정기준 JUDGEMENT	관련표준 STANDARDIZE
01	원자재 입고 INCOMING MATERIAL		▽							
02	수입 검사 INCOMING INSPECTION		◇				겉모양(Shape) 치수(Dimension) 물성(Certificate of Propertied)	체크검사 CHECK	수입검사 규격 STD OF INCOMING INSPECTION	YSI-102-004
03	CUTTING		○	CUTTING MACHINE	원재료 풀림상태(MATERIAL WINDING) CAM고정상태(STATE OF CAM) PUNCH고정상태(STATE OF PUNCH)	작업표준 STD OF WORK				YSI-091-007
04	공정 및 최종검사 Process & Final Test		◇	V/C	FEEDING 동작상태(FEEDING) CHIP가루발생(CHIP OCCURRENCE) BEARING 및 GEAR 동작상태 (BEARING, & GEAR)		겉모양(Shape)	체크검사 CHECK	공정 및 최종 검사 규격 STD OF PROCESS & FINAL TEST	YSI-102-004
05	포 장 PACKAGE		○	저 울 Digital Scale	수량(Quantity) 포장상태(State of Package)	포장관리규칙 Package Regulation				YSP-152
06	보 관 STORAGE		▽							
07	외주도금 PLATING VENDOR		○							

제정일자 ESTA. Date	2004. 03. 17
개정일자 REV. Date	
시행일자 EFFECT.Date	2004. 03. 17
문서번호 FILE. NO	Q - A - 001

W A F E R A S S `Y Q C 공 정 도
PRODUCT & PROCESS CHART (WAFER ASS`Y)

작성일자 : 2004. 03. 17 작성부서 : 품질관리실 작 성 자 : 서 홍 엽

D A T E : 2004. 03. 17 D E P T .: QUALITY CONTROL WRITTEN BY : MR.H Y SEO

결재 APR`D	작 성 WRIT`N	검 토 CHK`D	승 인 APR`D
	S.H.Y 03/17	B.J.S 03/17	S.S.S 03/17

NO	공정명 PROCESS NAME	흐름도 부공정 SUB PROCESS	흐름도 주공정 MAIN PROCESS	사용설비 및 장비 EQUIPMENT	공 정 관 리 (MGT OF PROCESS) 항 목 I T E M	관리기준 MGT.RULE	검 사 관 리 (MGT OF INSPECTION) 검사항목 ITEM	검사방식 METHOD	판정기준 JUDGEMENT	관련표준 STANDARDIZE
01	도금핀 입고 INCOMING Plated Pin									
02	수입 검사 INCOMING Inspection			납땜조(Solder Port) 도금두께측정기 (Coating Thickness Gauge), V/C			겉모양(Shape) 납땜성 (Solderability) 도금두께	체크검사 (CHECK)	수입검사 규격 STD OF INCOMING INSPECTION	YSI-101-005
03	조 립 ASS'Y			조립기(ASS'Y M/C)	PIN이송(State of Pin carried) WAFER 이송(State of Wafer carried) PIN휨(Pin Camber)	작업표준 STD OF WORK	(Coating Thickness 치수(Dimension)			YSI-091-006
04	공정 및 최종검사 PROCESS & FINAL TEST			공구현미경,V/C (Tool M/C),V/C Push Pull Gage 통전기 (Short Checker)	SENSOR 동작(Sensor function) PIN DETECTOR 동작상태 (Pin Detector Function)		겉모양(Shape) 치수(Dimension) 납땜성 (Solderability) PIN유지력	전수검사 (Test of Total CHECK) 체크검사 (CHECK)	공정 및 최종 검사 규격 STD OF PROCESS & FINAL TEST	YSI-102-003
05	포 장 PACKAGE			저울(Digital Scale) Sealing기(Packer)	수량(Quantity) 포장상태(State of Package)	포장관리규칙 Package Regulation	(Pin retention)			YSP-152
06	보 관 STORAGE									
07	출하검사 OUTGOING TEST			납땜조(Solder Port) P.P.Gage, V/C mΩ/MΩ meter 내전압 시험기 (Puncture Tester)			겉모양(Shape) 치수(Dimension) 형합성(Matching) 납땜성 (Solderability) PIN 유지력 (Pin retention)	체크검사(CHECK) 계수조정형샘플링 MIL-STD-105D	출하검사 규격 STD OF OUTGOING TEST	YSI-102-100