Y H

Item And Code No.	
I T E M	C O N N E C T O R
S P E C	1.50㎜ Pitch Wire to Board SMD Type
M A K E R S P E C	15001WR-02
Code No.	

The Best Partner for Electronic Circuits Connections

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Specification Approval Sheet

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Pitch	1.50 mm
Special	Wire to Board
Type	SMD

15001 Series
Connector 제품규격
Product Specification

Indemnification

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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	2005.10.20	L.K.O	K.S.I	C.G.N	웨이퍼 : 몰드 들뜸방지 형상수정
6	2006.03.10	L.K.O	K.S.I	C.G.N	터미널 : 웨이퍼 핀과의 걸림방지 제품형상 수정
7	2007.11.08	L.K.O	K.S.I	C.G.N	캐리어 : 생산성 향상

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』

♠♠♠ 목 차 『Contents』 ♠♠♠

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6. Q.C 공정도 『QC Process Chart』

1. 적용 범위 『Scope』

본 사양서는 (주)연호전자 제품 15001 series SMD type connector에 한하여 적용한다.
『This specification covers the requirements for 15001 series SMD type connector』

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

15001 WR - NN

- NN : Number of Circuits
- WR : Parts : Right Angle Wafer
- 15001 : Series Name

15001 HS - NN

- NN : Number of Circuits
- HS : Parts : Housing
- 15001 : Series Name

15001 TS

- TS : Parts : Terminal

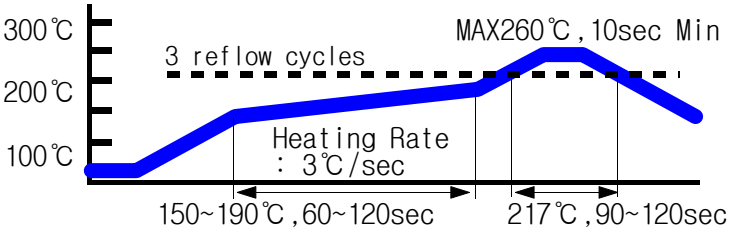
3. 원재료 『Material』

Item	Material	Maker	Over plated / Color
Wafer Material	PA6T	Mitsui	Natural
Housing Material	PA66	LG Chem	White
Pin Material	Brass	Poong San	* Over plating : Sn(2-6㎛)
Hook Material	Brass	Poong San	* Over plating : Sn(2-6㎛)
Terminal Material	Phosphor Bronze	Poong San	* Over plating : Pre-plated tin(1-2㎛)

4. 정 격 『Ratings』

항 목 (Item)	정 격 (Standard Data)
정격 전압 (Operating Voltage)	AC/DC 250V
정격 전류 (Current Rating)	AC/DC 1A
사용 온도 (Operating Temperature)	-25℃ ~ +85℃
적용 전선 (Applicable Wire)	AWG #26 ~ #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)	1000㏁ 이상
	2-1.Insulation Resistance	⦿ Measured between adjacent contacts ⦿ Test voltage : DC 500V ±5V / 1 min ±5 sec (Based upon MIL-STD-202G Method 302 Condition B)	1000㏁ 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 / 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	POS / Insertion (MAX) / Withdrawal (MIN) 02 / 2.5Kgf / 0.25Kgf 03 / 3.0Kgf / 0.30Kgf 04 / 3.5Kgf / 0.35Kgf 05 / 4.0Kgf / 0.40Kgf 05A01 / 3.5Kgf / 0.35Kgf
	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	06 / 4.5Kgf / 0.45Kgf 07 / 5.0Kgf / 0.50Kgf 07A01 / 4.5Kgf / 0.45Kgf 08 / 5.5Kgf / 0.55Kgf 09 / 6.0Kgf / 0.60Kgf 10 / 6.5Kgf / 0.65Kgf 12 / 7.5Kgf / 0.75Kgf
	3-6.내구성시험 3-6.Durability of Contact Resistance	⦿ 결합된 제품 Housing Ass`y과 Wafer Ass`y의 삽입 및 분리 동작을 10회/분 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 #26 : 1.5Kgf MIN AWG #28 : 1.0Kgf 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 없을것
	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(단,원자재: 2시간 적용함) 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. (But, material apply to 2hrs) 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 96 hours 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 96 hours 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) 포장 방법 『Packing Method』 :

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

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

3) 식별 표시 : 다음과 같은 사항을 제품포장 BOX에 명기한다.

『Identifications shall be marked as follows』

3-1. 제조회사, 제조자명 또는 상표 『Manufacture's LOGO』

3-2. 형명 또는 부품번호 『Part Number』

3-3. 수 량 『Quantity』

3-4. 제조 LOT NO 『Date Code』

3-5. 기타 상호 필요하다고 인정되는 사항
『Others agreed with manufacturer and customer』

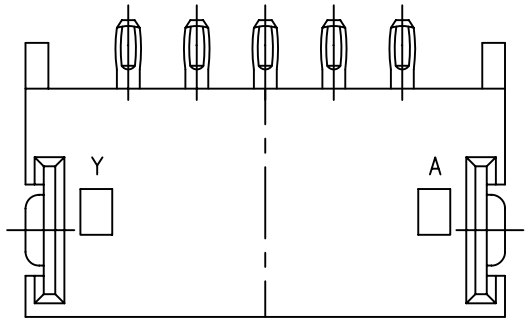
Reliability Test Report

APP`R	Writ`N	CHK`D	APR`D
	J.M.C	K.J.M	L.J.H

DESCRIPTION	CONNECTOR	MODEL NO	15001WR-02	TEST CONDITION	Temp:22℃,Humid:65%

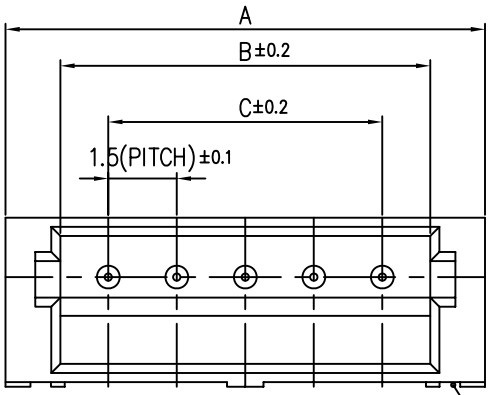
Test Title	Test Procedures	Specification		X1	X2	X3	X4	X5	Conclusion
1-1.Insulation Resistance	∘Test voltage : DC 500V±5V ∘Electrification time : 1min±5sec	1000㏁ MIN		1000㏁ MIN					GOOD
1-2.Dielectric Withstanding Voltage	∘Test voltage : AC 1000V ∘Electrification time : 1min±5sec	No damage		0.K	0.K	0.K	0.K	0.K	GOOD
1-3.Contact Resistance	∘Measured the resistance of mated connector, 20mV. 10mA	30mΩ MAX		4.2	4.3	4.1	4.5	4.4	GOOD
2-1.Solder Ability	∘SnAgCu 240±5℃, 3±0.5sec	90% MIN		0.K	0.K	0.K	0.K	0.K	GOOD
2-2.Solder Heat Resistance	∘MAX 260℃, 10sec(Min) ∘After reflow (3 reflow cycles)	GOOD		0.K	0.K	0.K	0.K	0.K	GOOD
2-3.Pin Retention Force	∘Measured withdrawal force that resin grips and supports pin	0.5Kgf MIN		1.78	1.75	1.83	1.80	1.65	GOOD
2-4.Total Insertion Force	∘Measured force to insert wafer ass'y into the housing ass'y which has same circuits	02P: 2.0Kgf MAX		1.02	1.12	0.98	0.96	1.06	GOOD
2-5.Total Withdrawal Force	∘Measured force to withdraw wafer ass'y from the housing ass'y which has same circuits	02P: 0.2Kgf MIN		1.30	1.28	1.26	1.25	1.32	GOOD
2-6.Durability of Contact Resistance	∘Measured contact resistance after 30 cycles of total insertion and withdrawal operation	Contact Resistance : 50mΩ MAX		4.7	4.5	4.3	4.4	4.6	GOOD
2-7.Insertion Force of Terminal	∘Insert a terminal into housing straightly and measure insertion force	1.0Kgf MAX		0.19	0.15	0.18	0.16	0.17	GOOD
2-8.Terminal Retention Force	∘Insert a terminal into the housing and measure the force to withdraw the terminal from housing	0.5Kgf MIN		1.02	1.13	1.22	1.08	1.15	GOOD
2-9.Crimp Tensile Strength	∘ Measured tensile strength of the crimped contact to conductor joint	AWG #26: 1.5Kgf MIN		3.45	3.52	3.66	3.57	3.75	GOOD
3-1.Vibration	∘ 100mA, 1.52㎜, 10-55-10Hz, 2hrs	Contact Resistance	50mΩ MAX	4.4	4.5	4.6	4.3	4.7	GOOD
		Discontinue	1μsec MAX	0.K	0.K	0.K	0.K	0.K	GOOD
3-2.Salt Spray	∘Salt solution : 5±1% ∘Exposed time : 48hrs ±4hrs (Material : 2hrs) ∘Temperature : 35±2℃	Contact Resistance	50mΩ MAX	5.2	5.4	5.1	5.3	5.5	GOOD
		Appearance	Not black rust	0.K	0.K	0.K	0.K	0.K	GOOD
3-3.Humidity	∘Chamber temperature: 40℃±2℃ ∘Relative humidity : 90~95% ∘Duration : 96hrs	Insulation Resistance	500㏁ MIN	500㏁ MIN					GOOD
		Contact Resistance	50mΩ MAX	5.1	5.0	4.8	4.9	5.2	GOOD
		Appearance	Good	0.K	0.K	0.K	0.K	0.K	GOOD
3-4.Resistance to High Temper	∘Chamber temperature : 85±2℃ ∘Exposed time : 96hrs	Contact Resistance	50mΩ MAX	4.6	4.5	4.3	4.7	4.4	GOOD
3-5.Altitude Low Temperature	∘Chamber temperature: -40±3℃ ∘Exposed time : 96hrs	Contact Resistance	50mΩ MAX	4.3	4.6	4.4	4.7	4.5	GOOD
3-6.Thermal Shock	∘1 Cycle is table #1 ∘After performing 5 cycles 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	Dielectric Strength	No damage	0.K	0.K	0.K	0.K	0.K	GOOD
		Contact Resistance	50mΩ MAX	5.1	4.8	5.0	4.7	4.9	GOOD
		Insulation Resistance	500㏁ MIN	500㏁ MIN					GOOD
		Appearance	Good	0.K	0.K	0.K	0.K	0.K	GOOD

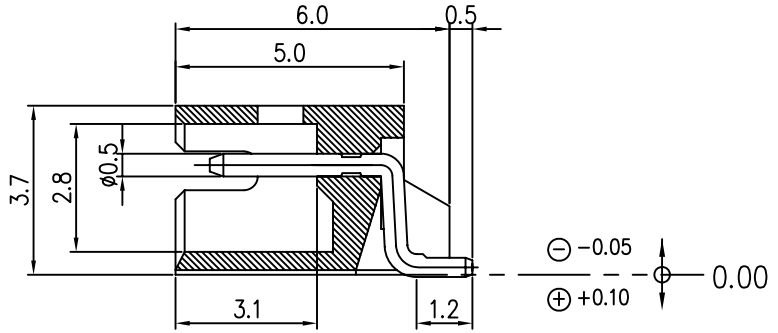
출 도 일	/ / /	연구소

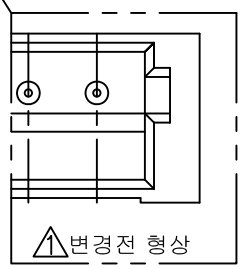


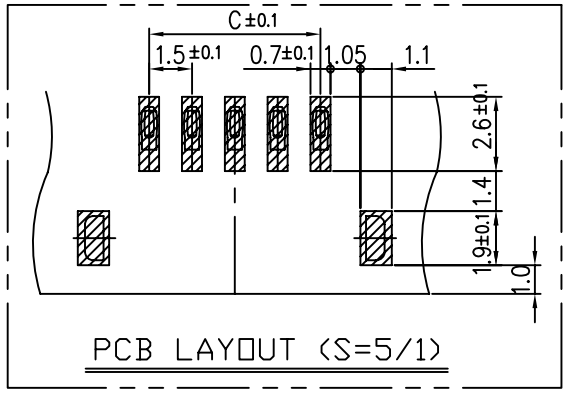
Circuits	Part NO	A	B	C
2	15001WR-02A00	6.0	3.6	1.5
3	15001WR-03A00	7.5	5.1	3.0
4	15001WR-04A00	9.0	6.6	4.5
5	15001WR-05A00	10.5	8.1	6.0
6	15001WR-06A00	12.0	9.6	7.5
7	15001WR-07A00	13.5	11.1	9.0
8	15001WR-08A00	15.0	12.6	10.5
9	15001WR-09A00	16.5	14.1	12.0
10	15001WR-10A00	18.0	15.6	13.5
11	15001WR-11A00	19.5	17.1	15.0
12	15001WR-12A00	21.0	18.6	16.5
13	15001WR-13A00	22.5	20.1	18.0
15	15001WR-15A00	25.5	23.1	21.0

NOTES:
1. MATING PARTS :
WAFER=15001WR
TERMINAL=15001TS
HOOK=15001LR
HOUSING = 15001HS
2. GENERAL TOLERANCE ±0.3









I/NO	DESCRIPTION	MATERIAL	QTY	REMARK
3	HOOK	BRASS	2	TIN PLATED
2	PIN	BRASS	NN	TIN PLATED
1	WAFER	PA6T	1	UL94V-0

LTR	REVISION RECORD	DATE	DR	CHK
1	몰드 들뜸방지 형상수정.	05.10.20	K.K.S	J.J.H

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YEONHO ELECTRONICS CO., LTD.

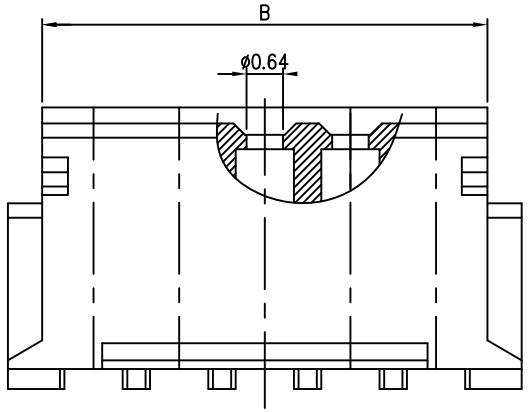
TITLE: 15001WR-NN

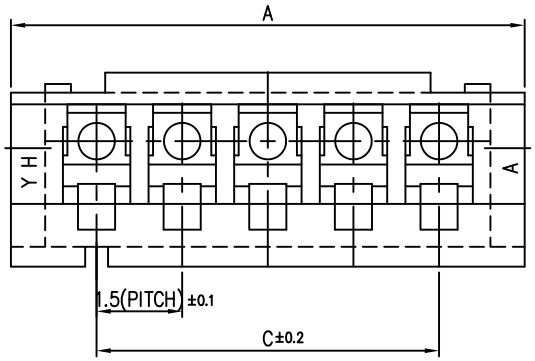
SCALE	DRAWN	DESIGN	CHECK	APPD
8/1	1999.7.2 N. K. D.		1999.7.2 H. S. K.	

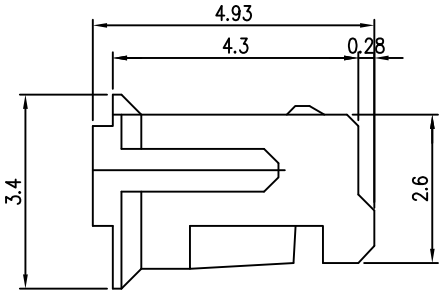
SIZE	DWG. NO	REV
A3	15001WR-00A-S	01

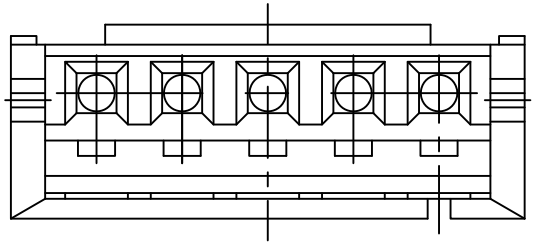
출 도 일	/ / /	연 구 소

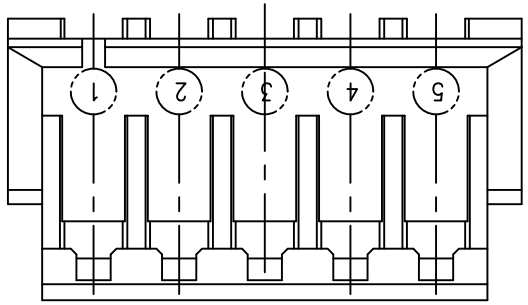
Circuits	Part NO	DIM.A	DIM.B	DIM.C
2	15001HS-02000	4.5	3.3	1.5
3	15001HS-03000	6.0	4.8	3.0
4	15001HS-04000	7.5	6.3	4.5
5	15001HS-05000	9.0	7.8	6.0
6	15001HS-06000	10.5	9.3	7.5
7	15001HS-07000	12.0	10.8	9.0
8	15001HS-08000	13.5	12.3	10.5
9	15001HS-09000	15.0	13.8	12.0
10	15001HS-10000	16.5	15.3	13.5
11	15001HS-11000	18.0	16.8	15.0
12	15001HS-12000	19.5	18.3	16.5
13	15001HS-13000	21.0	19.8	18.0











NOTES.
1. BURR최소화 할것.
2. MATING PARTS :
   WAFER=15001WR-NN
   15001WS-NN,15005WS-NN
   PIN=15001PR .
   HOOK=15001LR
   TERMINAL : 15001TS.
3. GENERAL TOLERANCE ±0.3

1	HOSING	NYLON66	UL94V-0	1	
I/NO	DESCRIPTION	MATERIAL	TREATMENT	QTY	REMARK

YEONHO ELECTRONICS CO., LTD.

TITLE: 15001HS-NN

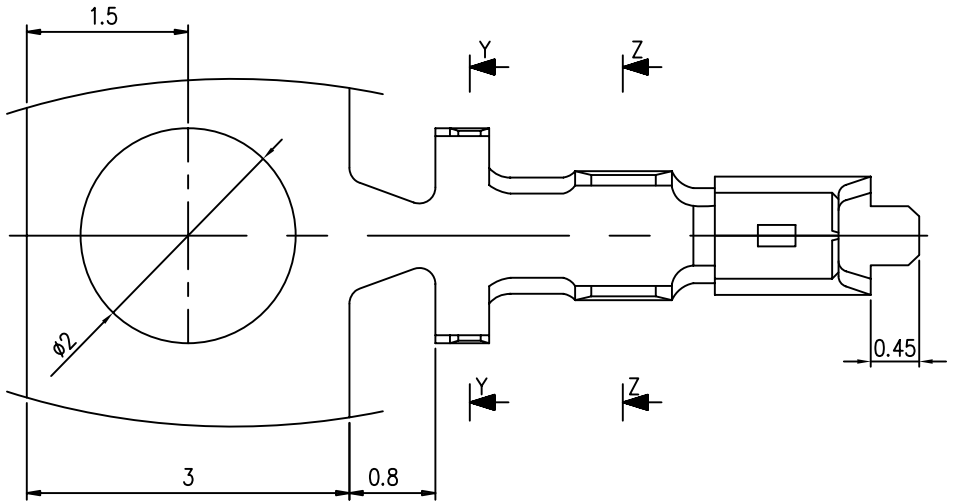
SCALE	DRAWN	DESIGN	CHECK	APPD
10/1	2000,06.05 C. B. H.		2000,06.05 H. S. K.	

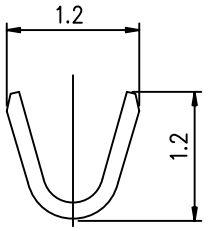
SIZE	DWG. NO	REV
A3	15001HS-00A-S	

LTR	REVISION RECORD	DATE	DR	CHK

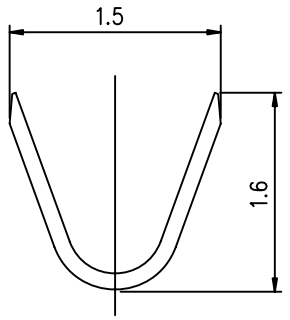
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출 도 일	/ / /	연구소

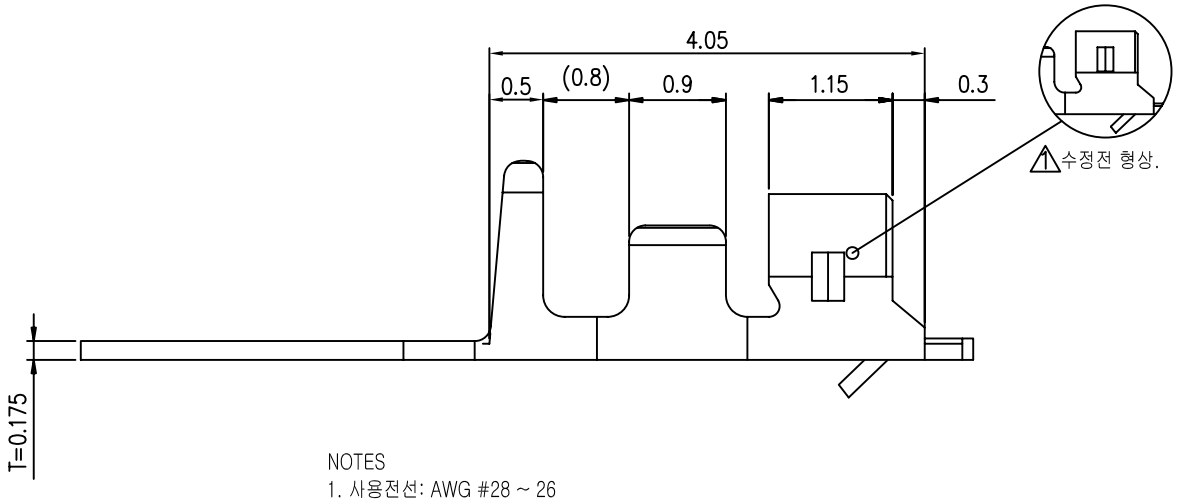


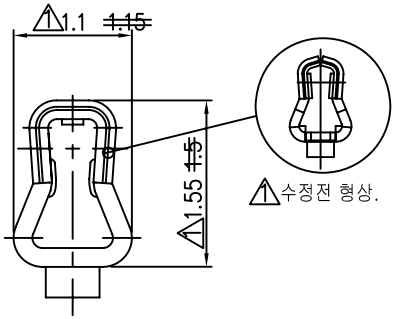


SECTION Y-Y



SECTION Z-Z





NOTES
1. 사용전선: AWG #28 ~ 26
2. GENERAL TOLERANCE ±0.3
3. INSULATION O.D.D(mm) =ø0.8~ø1.1.

I/NO	DESCRIPTION	MATERIAL	TREATMENT	QTY	REMARK
1	TERMINAL	Phospher Bronze	TIN / PLATED	1	

YEONHO ELECTRONICS CO., LTD.

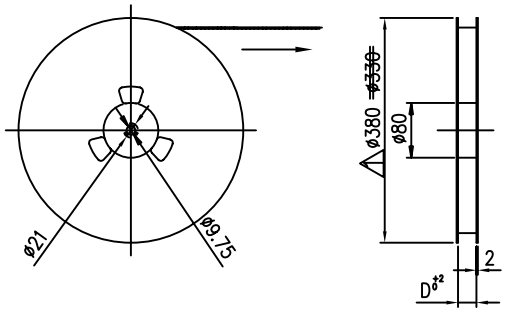
TITLE: 15001TS

SCALE	DRAWN	DESIGN	CHECK	APPD
20/1	1999.12.16 N. K.	0.	1999.12.16 H. S. K.	

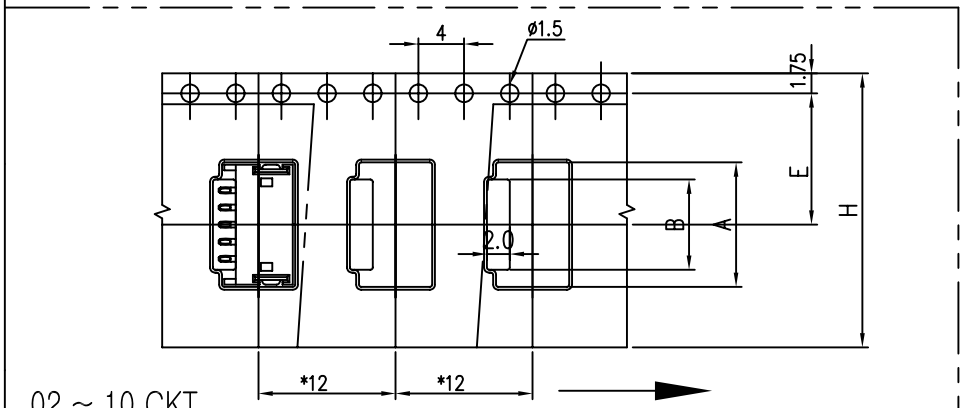
SIZE: A3 | DWG. NO: 15001TS-00S00 | REV:

LTR	REVISION RECORD	DATE	DR	CHK
⚠1	WAFER PIN과의 걸림방지 제품형상수정.	06.03.10	K.K.S	

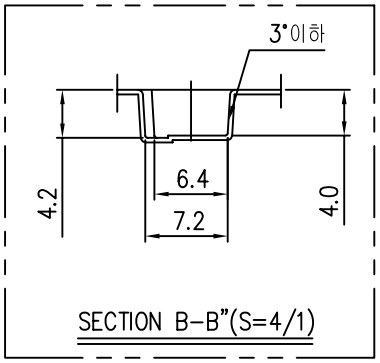
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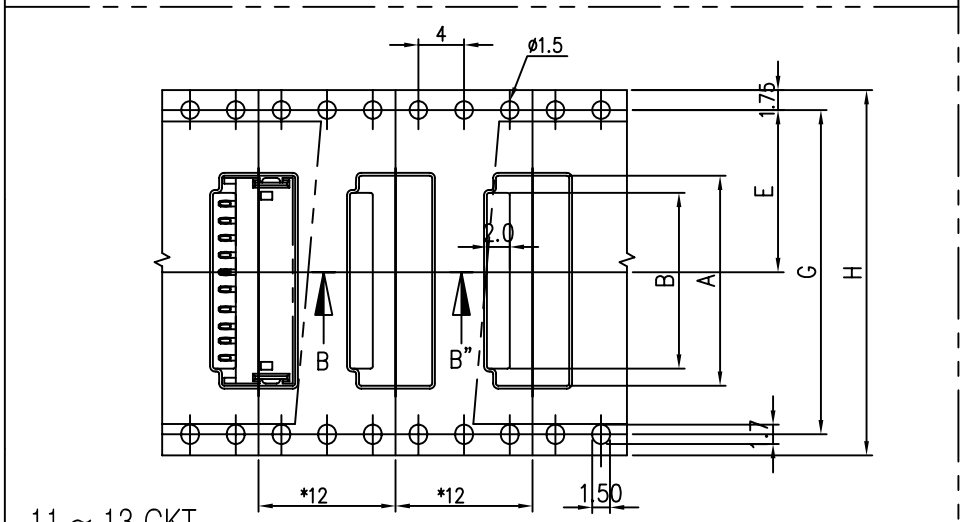
NO. OF POS.	A	B	C	D	E	F	G	H
02	6.40	3.40		17.5	7.5			16.0
03	7.90	4.9		17.5	7.5			16.0
04	9.40	6.40		17.5	7.5			16.0
05	10.9	7.90		25.5	11.5			24.0
06	12.4	9.40		25.5	11.5			24.0
07	13.9	10.9		25.5	11.5			24.0
08	15.4	12.4		25.5	11.5			24.0
09	16.9	13.9		25.5	11.5			24.0
10	18.4	15.4		25.5	11.5			24.0
12	21.4	18.4		33.5	14.2		28.4	32.0



02 ~ 10 CKT



SECTION B-B"(S=4/1)

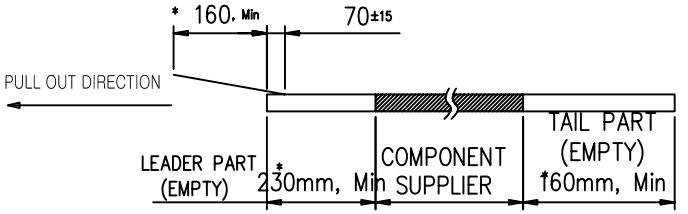


11 ~ 13 CKT

NOTES

1. NUMBER OF CONNECTOR: ~~1000~~ ⚠1500PCS/REEL

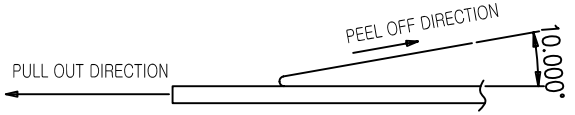
2. LEAD TAPE LENGTH(mm)



"*"표시는 CHIP MOUNT실과 별도 협의 한다.

3. TOP TAPE의 접착강도: 10 ~ 130gf(시험방법: 아래참?□

PEELING SPEED: 300mm/Min



4. 재료: CARRIER TAPE: PS

COVER TAPE: PET, PE, PEF

REEL: PS

5. 일반공차: ±0.2

I/NO	DESCRIPTION	MATERIAL	TREATMENT	QTY	REMARK	
	YEONHO ELECTRONICS CO., LTD.				TITLE 15001WR-NN EBOSS TAPING	
SCALE	DRAWN	DESIGN	CHECK	APPD	SIZE	DWG. NO / REV
NS		SUH, S. W. 1999.1.18	H. S. K. 1998.1.18		A3	15001CR-00S00 / 01

⚠	생산성 향상	07.11.08	L.S.H	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 : (주)연호엠에스
Sheet No. : C90422-020
Specification : KS D 5201 C2680R-H 0.25X17 (주)연호엠에스
Size : 0.250 (mm) X 17.000 (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
93P92FC	64.9200	R	0.0009	0.0036	467.777

- Blank Line -

	Elongation (%)	Hardness (Hv 1kg)	Thickness (Outdiameter) (mm)	Width (Thickness) (mm)	BendingTest (Badway)
SPEC. Min	12.000	140.000	0.240	16.920	(180°,
MAX		160.000	0.252	17.020	R/t=0.5)
93P92FC	21.000	150.000	0.240	16.950	Good
			0.245	16.970	

- Blank Line -

	Camber (mm) (1000mm)	Appearance	Weight (kg)
SPEC. Min			
MAX	1.000		
93P92FC	0.100	Good	1,318.000
	0.300		

- Blank Line -

Total Weight : 1,318.000 (kg)

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

* 1 kg/㎟ = 9.806 N/㎟

D. W. Lee

Manager of Quality Assurance Dept.

CERTIFICATE OF TEST

POONGSAN

Customer : 주연호전자(광주)
Sheet No. : C80306-038
Specification : KS D 5202 C5210R(TP)-H
Size : 0.175 (mm) X 10.000 (mm) X 0.000 (mm)
Date :

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	Sn
	(%)	(%)	(%)	(%)	(%)
SPEC. Min	R				7.0000
MAX		0.2000	0.0500	0.1000	9.0000
7AFH3P1	R	0.0027	0.0062	0.0038	7.5440
7AFH3P2	R	0.0027	0.0062	0.0038	7.5440
81QM1D1	R	0.0050	0.0050	0.0030	7.4590
81QM1D2	R	0.0050	0.0050	0.0030	7.4590

	P	Cu+Sn+P	Tensile Strength	Elongation	Hardness
	(%)	(%)	(N/㎟)	(%)	(Hv500g)
SPEC. Min	0.0300	99.7000	618.000	20.000	190.000
MAX	0.3500		667.000		210.000
7AFH3P1	0.1655	99.9838	646.258	21.000	210.000
7AFH3P2	0.1655	99.9838	646.258	21.000	210.000
81QM1D1	0.1599	99.9819	621.742	26.000	200.000
81QM1D2	0.1599	99.9819	621.742	26.000	200.000

	Kb	Thickness (Outdiameter)	Width (Thickness)	Sn Plating	BendingTest (Badway)
	(N/㎟)	(mm)	(mm)	(μm)	
SPEC. Min	392.000	0.167	9.920	1.000	(180°,
MAX		0.183	10.020	2.000	R/t=1.5)
7AFH3P1	402.073	0.176	9.950	1.240	Good
		0.178	9.980	1.250	
7AFH3P2	402.073	0.176	9.950	1.240	Good
		0.178	9.980	1.250	
81QM1D1	392.266	0.176	9.950	1.260	Good
		0.180	9.980	1.270	
81QM1D2	392.266	0.175	9.940	1.260	Good
		0.183	9.970	1.260	

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

BJ Lee

Manager of Quality Assurance Dept.

CERTIFICATE OF TEST

POONGSAN

Customer : ㈜현호전자(광주)
Sheet No. : C80306-038
Specification : KS D 5202 C5210R(TP)-H
Size : 0.175 (mm) X 10.000 (mm) X 0.000 (mm)
Date :

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

	Burr (%)	Camber (mm) (1000mm)	Appearance	Weight (kg)
SPEC. Min				
MAX	10.000	1.000		
7AFH3P1	1.600	0.200	Good	1,390.700
	3.700	0.800		
7AFH3P2	1.600	0.200	Good	1,389.200
	3.700	0.800		
81QM1D1	1.000	0.200	Good	926.000
	3.000	0.300		
81QM1D2	1.000	0.100	Good	1,511.200
	3.000	0.200		

- Blank Line -

- Blank Line -

Total Weight : 5,217.100 (kg)

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

BJ Lee

Manager of Quality Assurance Dept.

Test Report

Mitsui Chemicals Inc.

Shiodome City Center 1-5-2,Higashi-Shimbashi,Minato-ku,Tokyo 105-7117,Japan

The following sample(s) was/were submitted and identified on behalf of the clients as : Arlen

SGS Job No. :	SHIN1801001185PC - SH
Material and Mark :	E430N-T5
Date of Sample Received :	08 Jan 2018
Testing Period :	08 Jan 2018 - 12 Jan 2018
Test Requested :	Selected test(s) as requested by client.
Test Method :	Please refer to next page(s).
Test Results :	Please refer to next page(s).

Signed for and on behalf of
SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.

Helen Liu
Approved Signatory

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Test Results :

Test Part Description :

Specimen No.	SGS Sample ID	Description
SN1	SHA18-005272.001	Light yellow solid particles

Remarks :

(1) 1 mg/kg = 0.0001%

(2) MDL = Method Detection Limit

(3) ND = Not Detected (< MDL)

(4) "-" = Not Regulated

RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU

Test Method : With reference to IEC 62321-4:2013+AMD1:2017, IEC62321-5:2013, IEC62321-7-2:2017, IEC 62321-6:2015 and IEC62321-8:2017, analyzed by ICP-OES, UV-Vis and GC-MS.

Test Item(s)	Limit	Unit	MDL	*001*
Cadmium (Cd)	100	mg/kg	2	ND
Lead (Pb)	1000	mg/kg	2	4
Mercury (Hg)	1000	mg/kg	2	ND
Hexavalent Chromium (Cr(VI))	1000	mg/kg	8	ND
Sum of PBBs	1000	mg/kg	-	ND
Monobromobiphenyl	-	mg/kg	5	ND
Dibromobiphenyl	-	mg/kg	5	ND
Tribromobiphenyl	-	mg/kg	5	ND
Tetrabromobiphenyl	-	mg/kg	5	ND
Pentabromobiphenyl	-	mg/kg	5	ND
Hexabromobiphenyl	-	mg/kg	5	ND
Heptabromobiphenyl	-	mg/kg	5	ND
Octabromobiphenyl	-	mg/kg	5	ND
Nonabromobiphenyl	-	mg/kg	5	ND
Decabromobiphenyl	-	mg/kg	5	ND
Sum of PBDEs	1000	mg/kg	-	ND
Monobromodiphenyl ether	-	mg/kg	5	ND
Dibromodiphenyl ether	-	mg/kg	5	ND
Tribromodiphenyl ether	-	mg/kg	5	ND
Tetrabromodiphenyl ether	-	mg/kg	5	ND

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Test Item(s)	Limit	Unit	MDL	*001*
Pentabromodiphenyl ether	-	mg/kg	5	ND
Hexabromodiphenyl ether	-	mg/kg	5	ND
Heptabromodiphenyl ether	-	mg/kg	5	ND
Octabromodiphenyl ether	-	mg/kg	5	ND
Nonabromodiphenyl ether	-	mg/kg	5	ND
Decabromodiphenyl ether	-	mg/kg	5	ND
Di-butyl Phthalate (DBP)	1000	mg/kg	50	ND
Benzyl Butyl Phthalate (BBP)	1000	mg/kg	50	ND
Di-2-Ethyl Hexyl Phthalate (DEHP)	1000	mg/kg	50	ND
Diisobutyl Phthalates (DIBP)	1000	mg/kg	50	ND

Notes :

(1)The maximum permissible limit is quoted from RoHS Directive (EU) 2015/863. IEC 62321 series is equivalent to EN 62321 series http://www.cenelec.eu/dyn/www/f?p=104:30:1742232870351101::::FSP_ORG_ID,FSP_LANG_ID:1258637,25

(2)On 4 June 2015, Commission Directive (EU) 2015/863 was published in the Official Journal of the European Union (OJEU) to include the phthalates BBP, DBP, DEHP and DIBP into ANNEX II of the Rohs Recast Directive. The new law restricts each phthalate to no more than 0.1% in each homogeneous material of an electrical product.

(3)The restriction of DEHP, BBP, DBP and DIBP shall apply to medical devices, including in vitro medical devices, and monitoring and control instruments, including industrial monitoring and control instruments, from 22 July 2021.

(4)The restriction of DEHP, BBP, DBP and DIBP shall not apply to cables or spare parts for the repair, the reuse, the updating of functionalities or upgrading of capacity of EEE placed on the market before 22 July 2019, and of medical devices, including in vitro medical devices, and monitoring and control instruments, including industrial monitoring and control instruments, placed on the market before 22 July 2021.

(5)The restriction of DEHP, BBP and DBP shall not apply to toys which are already subject to the restriction of DEHP, BBP and DBP through entry 51 of Annex XVII to Regulation (EC) No 1907/2006.

Halogen

Test Method : With reference to EN 14582: 2016 , analysis was performed by IC.

Test Item(s)	Unit	MDL	*001*
Fluorine (F)	mg/kg	50	266
Chlorine (Cl)	mg/kg	50	ND
Bromine (Br)	mg/kg	50	58502*

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Test Item(s)	Unit	MDL	*001*
Iodine (I)	mg/kg	50	ND

Notes :

*The test result is only for reference

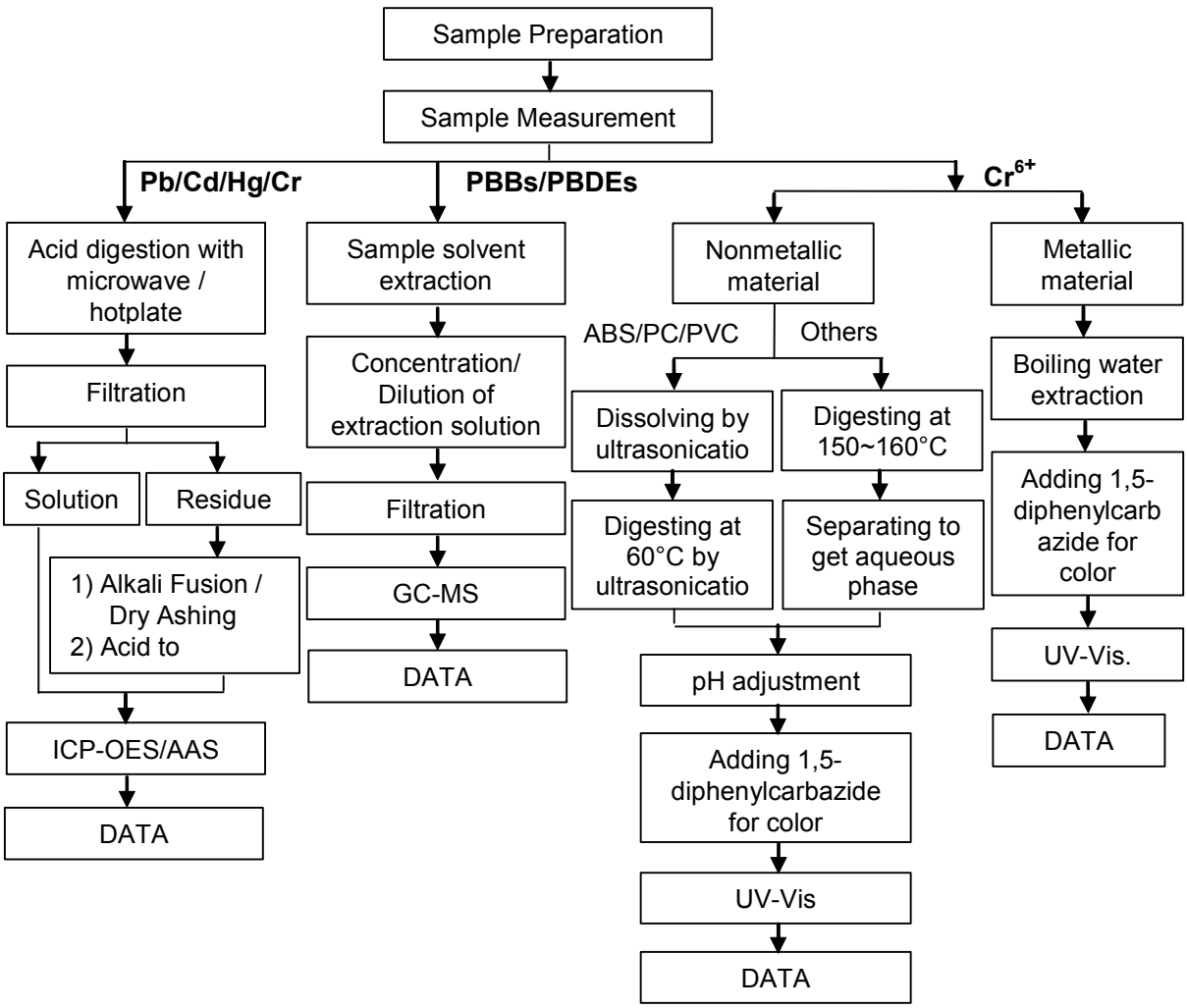
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Pb/Cd/Hg/Cr^{6+}/PBBs/PBDEs Testing Flow Chart

1) Name of the person who made testing: Meria Jin/Gary Xu/ Xiaolong Yang/Sielina Song
2) Name of the person in charge of testing: Jan Shi/Myra Ma/Luna Xu/Shara Wang
3) These samples were dissolved totally by pre-conditioning method according to below flow chart. (Cr^{6+} and PBBs/PBDEs test method excluded)

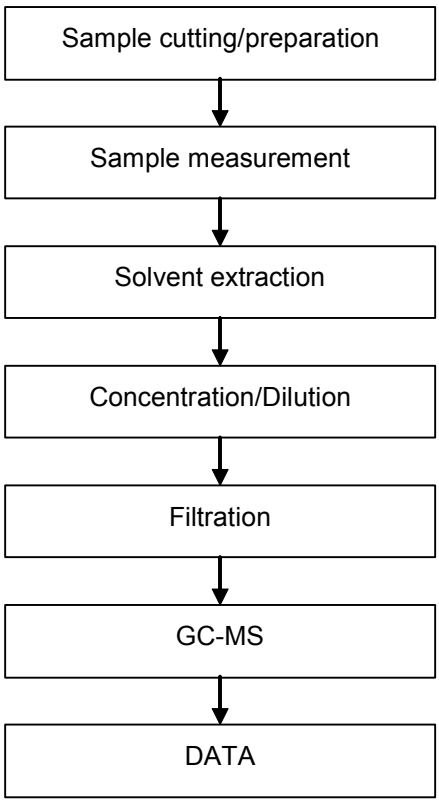


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ATTACHMENTS

Phthalates Testing Flow Chart

1) Name of the person who made testing: Sherlock Gao
2) Name of the person in charge of testing: Jessy Huang

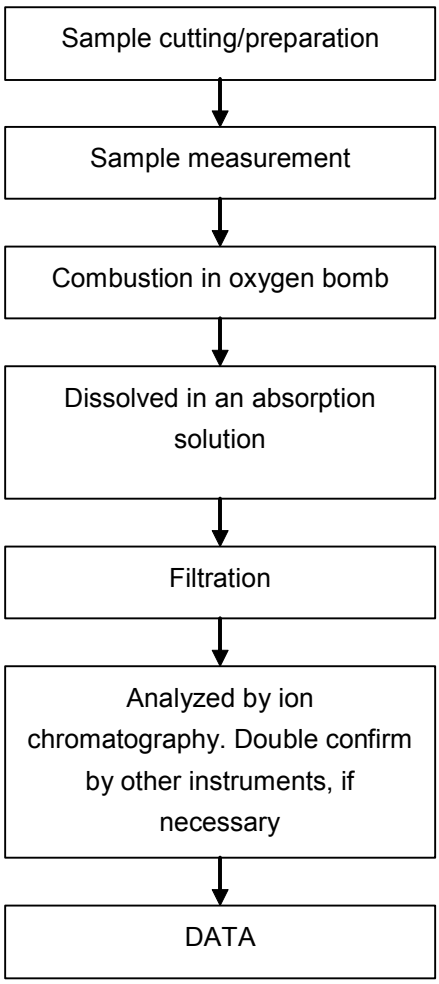


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Halogen Testing (oxygen bomb) Flow Chart

1) Name of the person who made testing: Kevin Xu
2) Name of the person in charge of testing: Sisily Yin



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Sample photo:



SHA18-005272.001

SGS authenticate the photo on original report only

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TEST REPORT

Applicant : LG Chem / Iksan Plant
Address : 99, Seokam-ro, Iksan-si,
Jeollabuk-do, Korea

Report No. RT17R-U0758-017-E Date: Apr. 20, 2017

Sample Description	: The following submitted sample(s) said to be:-
Name/Type of Product	: LUMID GN1001BF-NP
Sample ID No.	: RT17R-U0758-017
Manufacturer/Vendor	: LG Chem / Iksan Plant
Sample received	: Apr. 18, 2017
Testing Date	: Apr. 18, 2017 ~ Apr. 20, 2017
Test Type	: RoHS wet chemical analysis
Test Method(s)	: Please see the following page(s).
Test Result(s)	: Please see the following page(s).

* Note 1 : The test results presented in this report relate only to the object tested.

* Note 2 : This report shall not be reproduced except in full without the written approval of the testing laboratory.

Approved by,

E.Y.Lee / Lab. Technical Manager

Authorized by,

H.W.Yoo / Lab. General Manager

Authenticity check

Intertek Testing Services Korea Ltd.

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Web Site : www.intertek.co.kr
Seoul Lab. Address : 7, Achasan-ro 5-gil, Seongdong-gu, Seoul, 04793 Korea
Ulsan Lab. Address : 34, Yongam-gil, Chongryang-myeon, Ulju-gun, Ulsan 44989 Korea

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TEST REPORT

Report No. RT17R-U0758-017-E Date: Apr. 20, 2017

Sample ID No. : RT17R-U0758-017
Sample Description : LUMID GN1001BF-NP

Test Item	Unit	Test Method	MDL	Result
Cadmium (Cd)	mg/kg	With reference to IEC 62321-5 Edition 1.0 : 2013, by acid digestion and determined by ICP-OES	0.5	N.D.
Lead (Pb)	mg/kg		5	N.D.
Mercury (Hg)	mg/kg	With reference to IEC 62321-4 Edition 1.0 : 2013, by acid digestion and determined by ICP-OES	2	N.D.
Hexavalent Chromium (Cr^{6+}) (For non-metal)	mg/kg	With reference to IEC 62321 Edition 1.0 : 2008, by alkaline digestion and determined by UV-VIS Spectrophotometer	1	N.D.
Polybrominated Biphenyl (PBBs)				
Monobromobiphenyl	mg/kg	With reference to IEC 62321-6 Edition 1.0 : 2015, by solvent extraction and determined by GC/MS	5	N.D.
Dibromobiphenyl	mg/kg		5	N.D.
Tribromobiphenyl	mg/kg		5	N.D.
Tetrabromobiphenyl	mg/kg		5	N.D.
Pentabromobiphenyl	mg/kg		5	N.D.
Hexabromobiphenyl	mg/kg		5	N.D.
Heptabromobiphenyl	mg/kg		5	N.D.
Octabromobiphenyl	mg/kg		5	N.D.
Nonabromobiphenyl	mg/kg		5	N.D.
Decabromobiphenyl	mg/kg		5	N.D.
Polybrominated Diphenyl Ether (PBDEs)				
Monobromodiphenyl ether	mg/kg	With reference to IEC 62321-6 Edition 1.0 : 2015, by solvent extraction and determined by GC/MS	5	N.D.
Dibromodiphenyl ether	mg/kg		5	N.D.
Tribromodiphenyl ether	mg/kg		5	N.D.
Tetrabromodiphenyl ether	mg/kg		5	N.D.
Pentabromodiphenyl ether	mg/kg		5	N.D.
Hexabromodiphenyl ether	mg/kg		5	N.D.
Heptabromodiphenyl ether	mg/kg		5	N.D.
Octabromodiphenyl ether	mg/kg		5	N.D.
Nonabromodiphenyl ether	mg/kg		5	N.D.
Decabromodiphenyl ether	mg/kg		5	N.D.

Tested by : JH Jin, BJ Ha

Notes : mg/kg = ppm = parts per million
< = Less than
N.D. = Not detected (<MDL)
MDL = Method detection limit

Intertek Testing Services Korea Ltd.

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Seoul Lab. Address : 7, Achasan-ro 5-gil, Seongdong-gu, Seoul, 04793 Korea
Ulsan Lab. Address : 34, Yongam-gil, Chongryang-myeon, Ulju-gun, Ulsan 44989 Korea

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TEST REPORT

Report No. RT17R-U0758-017-E Date: Apr. 20, 2017

Sample ID No. : RT17R-U0758-017
Sample Description : LUMID GN1001BF-NP

Test Item	CAS No.	Unit	Test Method	MDL	Result
Phthalates					
Dibutyl phthalate (DBP)	84-74-2	mg/kg	With reference to IEC 62321-8 (111/321/CD), by solvent extraction and determined by GC/MS	50	N.D.
Di(2-ethylhexyl) phthalate (DEHP)	117-81-7	mg/kg		50	N.D.
Di-n-octyl phthalate (DNOP)	117-84-0	mg/kg		50	N.D.
Diisononyl phthalate (DINP)	28553-12-0 68515-48-0	mg/kg		100	N.D.
Diisodecyl phthalate (DIDP)	26761-40-0 68515-49-1	mg/kg		100	N.D.
Benzyl butyl phthalate (BBP)	85-68-7	mg/kg		50	N.D.
Diisobutyl phthalate (DIBP)	84-69-5	mg/kg		50	N.D.
Di-n-pentyl phthalate (DPP)	131-18-0	mg/kg		50	N.D.
Di-n-hexyl phthalate (DNHP)	84-75-3	mg/kg		50	N.D.

Tested by : JH Jin

Notes : mg/kg = ppm = parts per million
< = Less than
N.D. = Not detected (<MDL)
MDL = Method detection limit

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TEST REPORT

Report No. RT17R-U0758-017-E Date: Apr. 20, 2017

Sample ID No. : RT17R-U0758-017
Sample Description : LUMID GN1001BF-NP

Test Item	CAS No.	Unit	Test Method	MDL	Result
1,2-Benzenedicarboxylic acid, di-C6-8-branched alkyl esters, C7-rich (DIHP)	71888-89-6	mg/kg	With reference to IEC 62321-8 (111/321/CD), by solvent extraction and determined by GC/MS	50	N.D.
1,2-Benzenedicarboxylic acid, di-C7-11-branched and linear alkyl esters (DHNUP)	68515-42-4	mg/kg		50	N.D.
Di(2-methoxyethyl) phthalate (DMEP)	117-82-8	mg/kg		50	N.D.
Diisopentyl phthalate (DIPP)	605-50-5	mg/kg		50	N.D.
N-pentyl-isopentylphthalate (NPIP)	776297-69-9	mg/kg		50	N.D.
1,2-Benzenedicarboxylic acid, dihexylester, branched and linear	68515-50-4	mg/kg		50	N.D.
Hexahydromethylphthalic anhydride[1], Hexahydro-4-methylphthalic anhydride[2], Hexahydro-1-methylphthalic anhydride[3], Hexahydro-3-methylphthalic anhydride[4]*	25550-51-0 19438-60-9 48122-14-1 57110-29-9	mg/kg		100	N.D.
1,2-benzenedicarboxylic acid, di-C6-10-alkyl esters; 1,2-benzenedicarboxylic acid, mixed decyl and hexyl and octyl diesters with ≥ 0.3% of dihexyl phthalate	68515-51-5 68648-93-1	mg/kg		100	N.D.
Dicyclohexyl phthalate (DCHP)	84-61-7	mg/kg		100	N.D.

Tested by : JH Jin

Notes : mg/kg = ppm = parts per million
< = Less than
N.D. = Not detected (<MDL)
MDL = Method detection limit

* The individual isomers 2), 3) and 4) (including their cis- and trans- stereo isomeric forms) and all possible combinations of the isomers 1) are covered by this entry.

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TEST REPORT

Report No. RT17R-U0758-017-E Date: Apr. 20, 2017

Sample ID No. : RT17R-U0758-017
Sample Description : LUMID GN1001BF-NP

* View of sample as received;-



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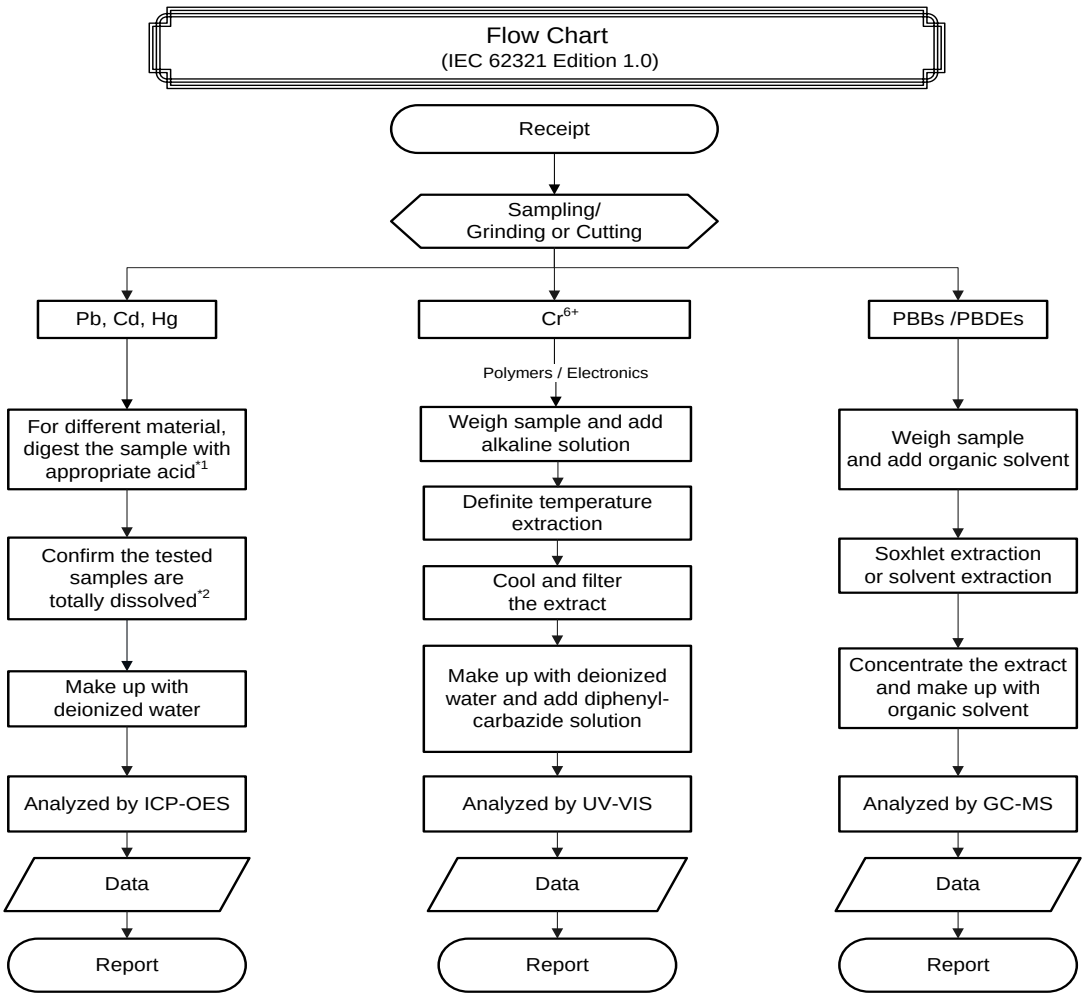
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TEST REPORT

Report No. RT17R-U0758-017-E Date: Apr. 20, 2017

Sample ID No. : RT17R-U0758-017

Sample Description : LUMID GN1001BF-NP



Remarks :

*1 : List of appropriate acid :

Material	Acid added for digestion
Polymers	HNO_3, HCl, HF, H_2O_2, H_3BO_3
Metals	HNO_3, HCl, HF
Electronics	HNO_3, HCl, H_2O_2, HBF_4

*2 : The samples were dissolved totally by pre-conditioning method according to above flow chart.

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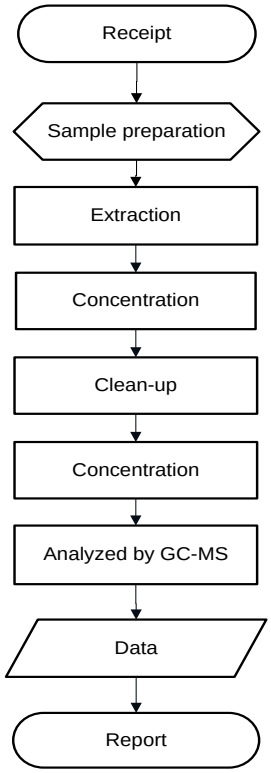
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TEST REPORT

Report No. RT17R-U0758-017-E Date: Apr. 20, 2017

Sample ID No. : RT17R-U0758-017
Sample Description : LUMID GN1001BF-NP

Flow Chart (Phthalates)



***** End of Report *****

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Test Report No. F690101/LF-CTSAYGU18-00532

Issued Date : 2018. 01. 10

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.	:	AYGU18-00532
Product Name	:	C2700
Item No./Part No.	:	Brass
Received Date	:	2018. 01. 03
Test Period	:	2018. 01. 03 to 2018. 01. 10
Test Results	:	For further details, please refer to following page(s)

SGS Korea Co., Ltd.
/ Gimhae Laboratory

Thomas Hwang / Lab Manager

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Sample No. : AYGU18-00532.001
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 62321-5:2013(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	20.0
Mercury (Hg)	mg/kg	With reference to IEC 62321-4:2013(Determination of Mercury by ICP-OES)	2	N.D.
Hexavalent Chromium (Cr VI) *	μg/cm²	With reference to IEC 62321-7-1:2015 (Determination of CrVI by UV-Vis)	0.1	N.D.
Antimony (Sb)	mg/kg	With reference to EPA 3052(1996), US EPA 6010B(1996), ICP	10	N.D.
Beryllium (Be)	mg/kg	With reference to EPA 3052(1996), US EPA 6010B(1996), ICP	1	N.D.

Flame Retardants-PBBs/PBDEs

Test Items	Unit	Test Method	MDL	Results
Monobromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Dibromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Tribromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Tetrabromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Pentabromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Hexabromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Heptabromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Octabromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Nonabromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Decabromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Monobromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.

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Sample No. : AYGU18-00532.001
Sample Description : C2700
Item No./Part No. : Brass
Materials : N/A

Flame Retardants-PBBs/PBDEs

Test Items	Unit	Test Method	MDL	Results
Dibromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Tribromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Tetrabromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Pentabromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Hexabromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Heptabromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Octabromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Nonabromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Decabromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.

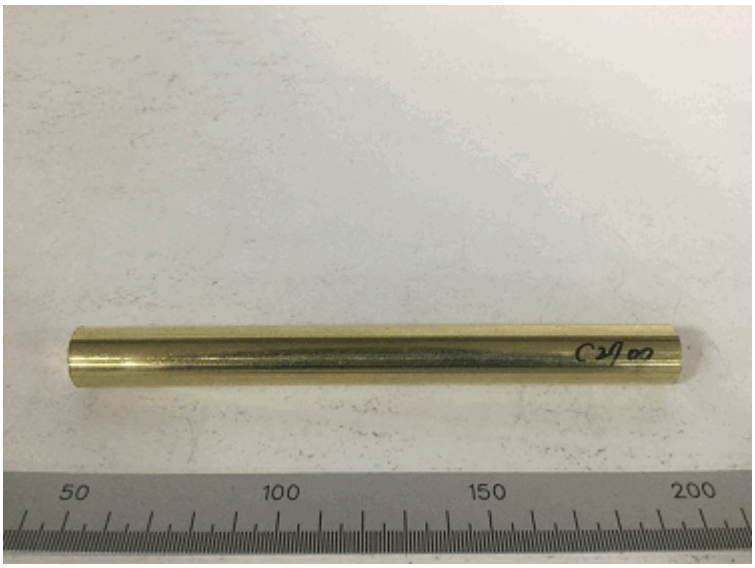
NOTE:
(1) N.D. = Not detected.(<MDL)
(2) mg/kg = ppm
(3) MDL = Method Detection Limit
(4) - = No regulation
(5) Negative = Undetectable / Positive = Detectable
(6) ** = Qualitative analysis (No Unit)
(7) * = a. The sample is positive for CrVI if the CrVI concentration is greater than 0.13 ug/cm2. The 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.

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Picture of Sample as Received:



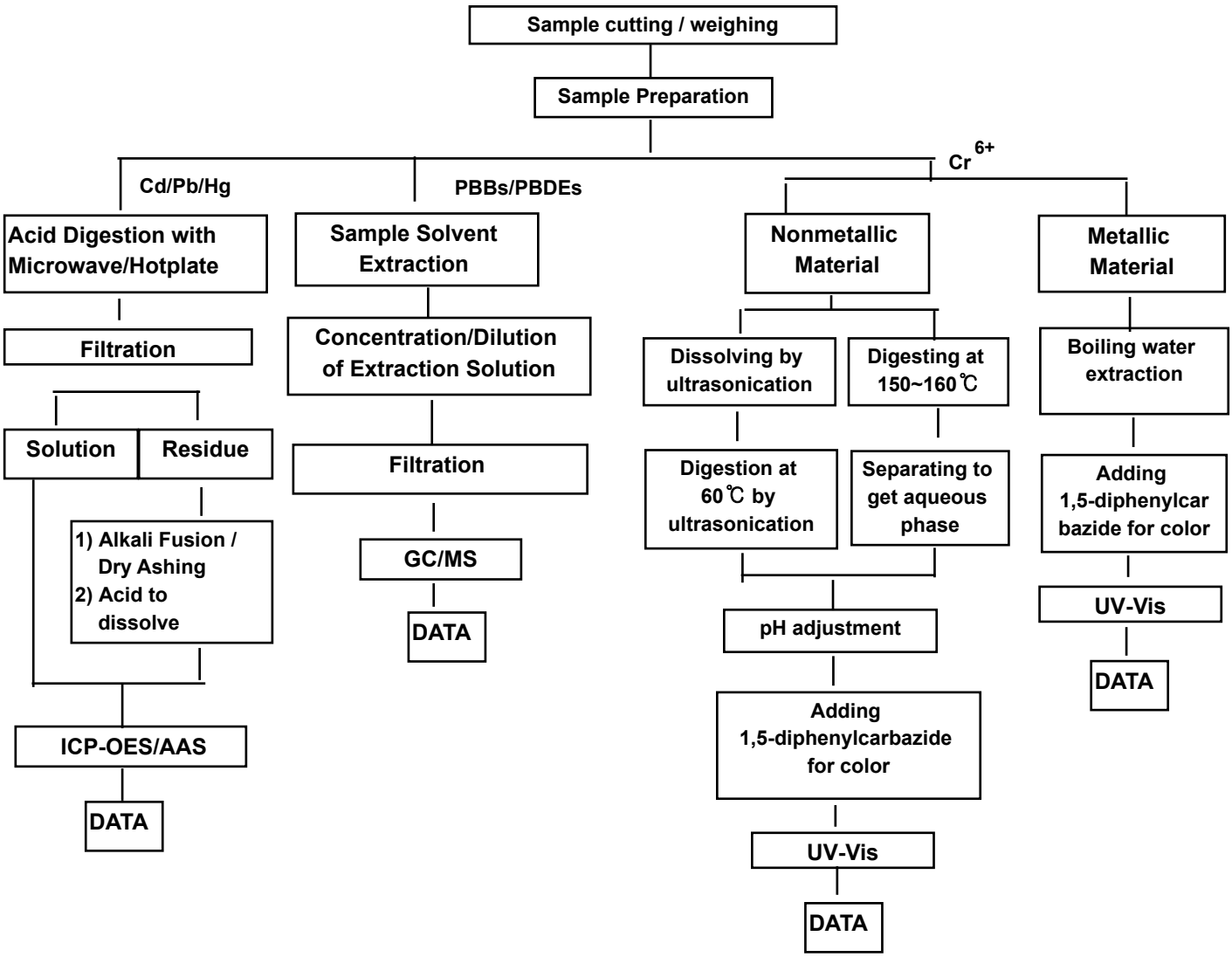
AYGU18-00532.001

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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 : Sharpless Park

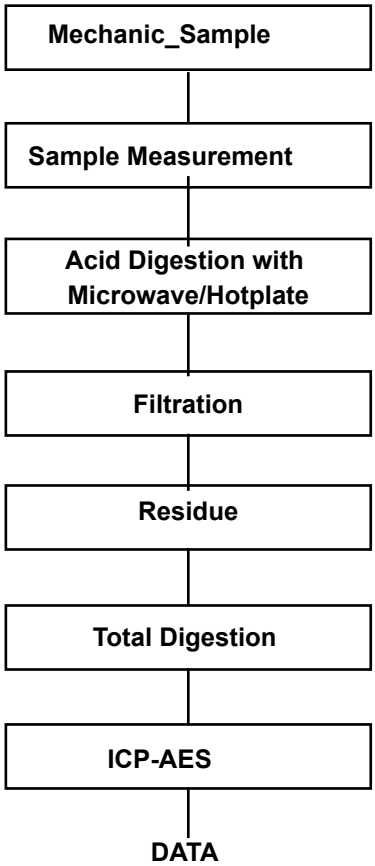
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Flow Chart for Inorganic Elements Testing

Inorganic Elements



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

*** End of Report ***

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Test Report No. F690101/LF-CTSAYGU18-00511

Issued Date : 2018. 01. 10

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.	:	AYGU18-00511
Product Name	:	C2680
Item No./Part No.	:	Brass
Received Date	:	2018. 01. 03
Test Period	:	2018. 01. 03 to 2018. 01. 10
Test Results	:	For further details, please refer to following page(s)

SGS Korea Co., Ltd.
/ Gimhae Laboratory

Thomas Hwang / Lab Manager

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Sample No. : AYGU18-00511.001
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 62321-5:2013(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	21.0
Mercury (Hg)	mg/kg	With reference to IEC 62321-4:2013(Determination of Mercury by ICP-OES)	2	N.D.
Hexavalent Chromium (Cr VI) *	μg/cm²	With reference to IEC 62321-7-1:2015 (Determination of CrVI by UV-Vis)	0.1	N.D.
Beryllium (Be)	mg/kg	With reference to EPA 3052(1996), US EPA 6010B(1996), ICP	1	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 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Dibromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Tribromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Tetrabromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Pentabromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Hexabromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Heptabromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Octabromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Nonabromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Decabromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Monobromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.

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Sample No. : AYGU18-00511.001
Sample Description : C2680
Item No./Part No. : Brass
Materials : N/A

Flame Retardants-PBBs/PBDEs

Test Items	Unit	Test Method	MDL	Results
Dibromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Tribromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Tetrabromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Pentabromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Hexabromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Heptabromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Octabromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Nonabromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Decabromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.

Halogen Contents

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

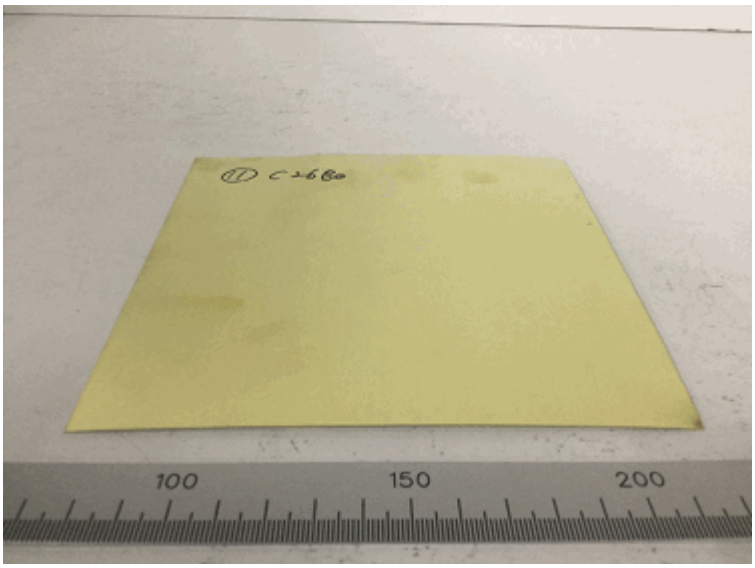
NOTE:
(1) N.D. = Not detected.(<MDL)
(2) mg/kg = ppm
(3) MDL = Method Detection Limit
(4) - = No regulation
(5) Negative = Undetectable / Positive = Detectable
(6) ** = Qualitative analysis (No Unit)
(7) * = a. The sample is positive for CrVI if the CrVI concentration is greater than 0.13 ug/cm2. The 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.

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Picture of Sample as Received:



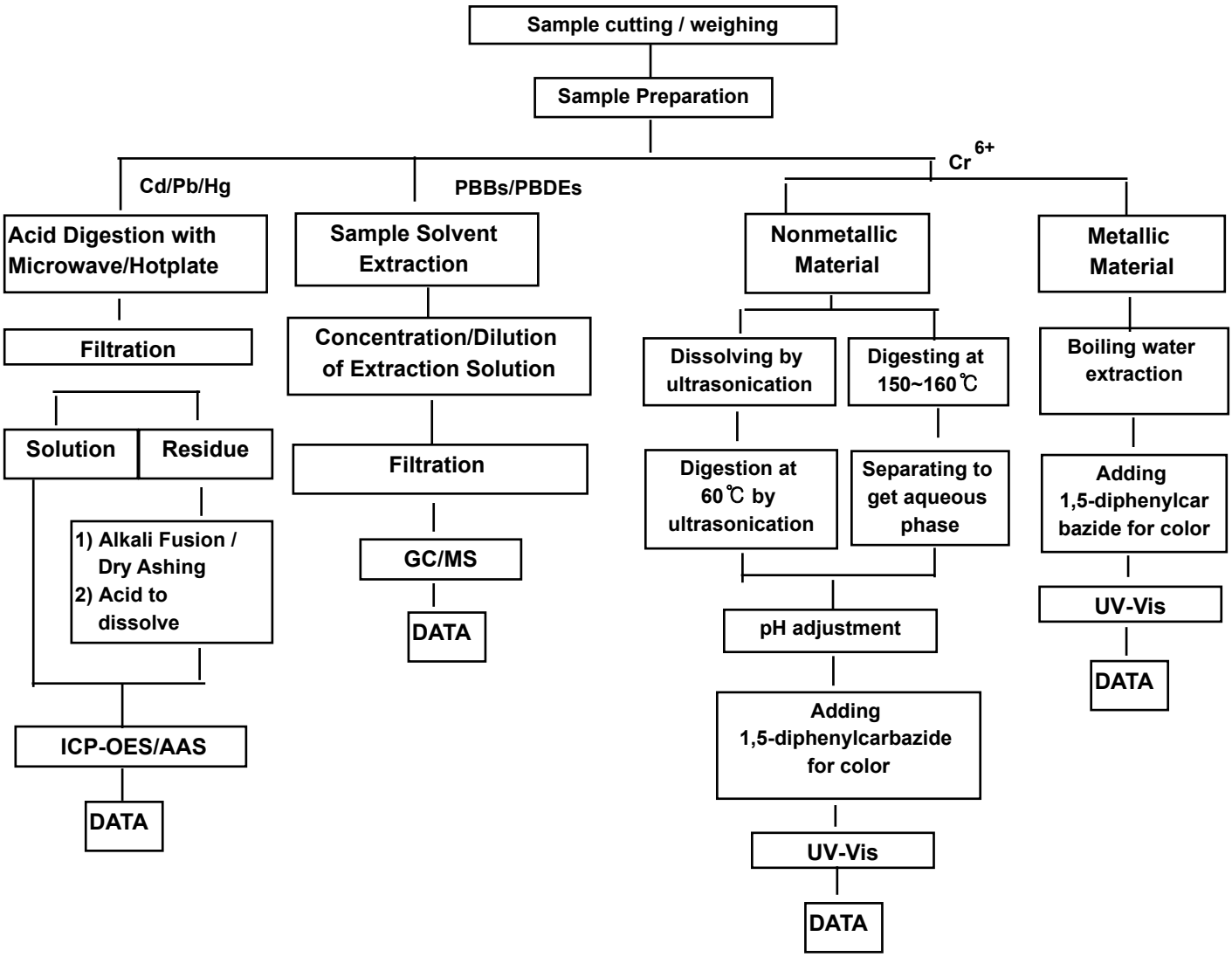
AYGU18-00511.001

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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 : Sharpless Park

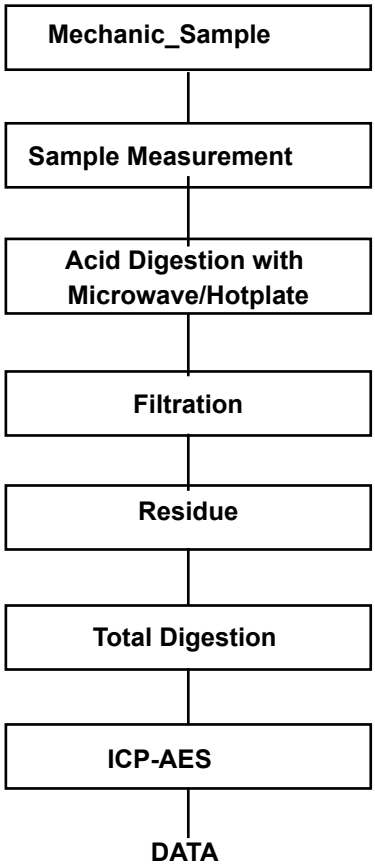
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Flow Chart for Inorganic Elements Testing

Inorganic Elements



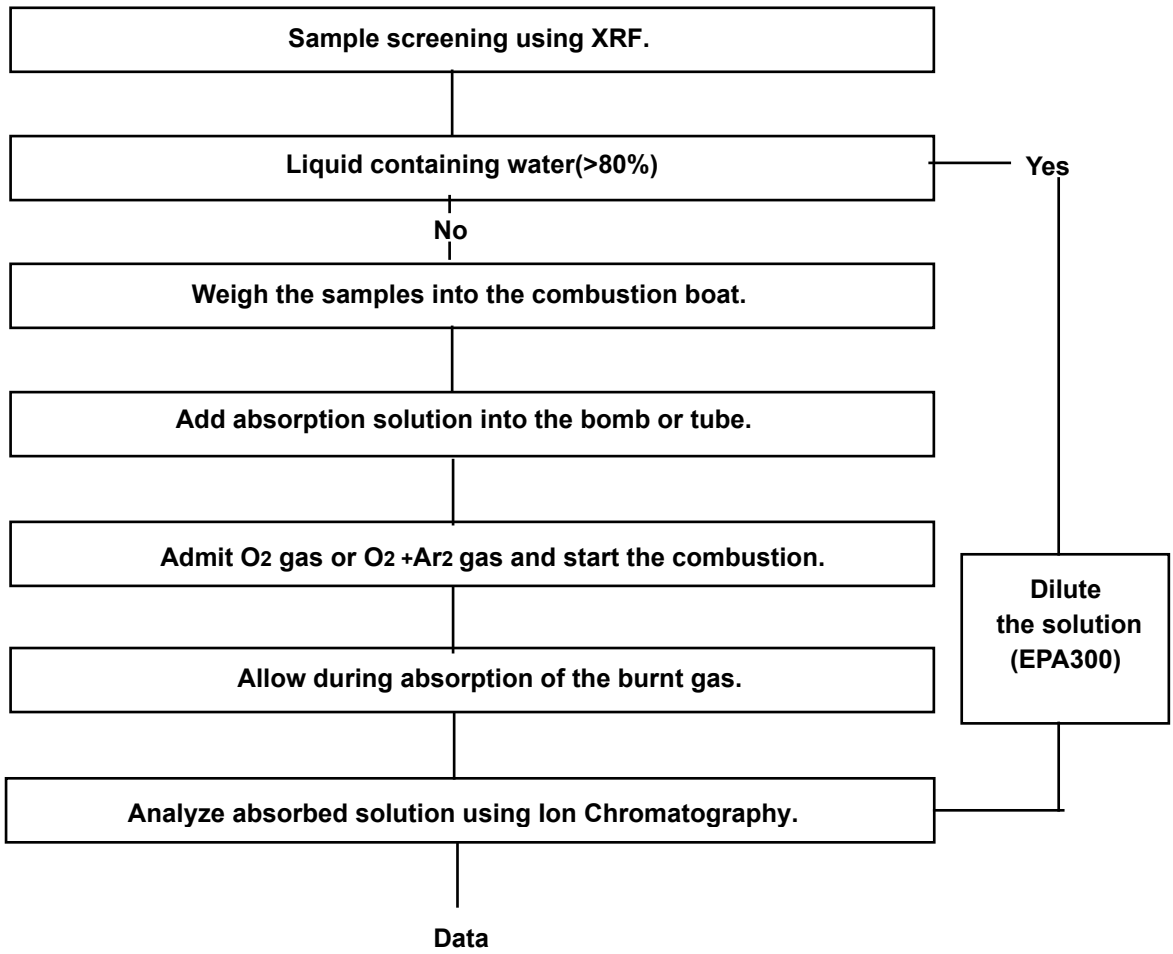
Major Inorganic Heavy Metals	Antimony(Sb) , Beryllium(Be) , Phosphorus(P) , Arsenic(As) etc.

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Flow Chart for Halogen Test



*** End of Report ***

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Test Report No. F690101/LF-CTSAYGU18-00517

Issued Date : 2018. 01. 10

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.	:	AYGU18-00517
Product Name	:	C5210
Item No./Part No.	:	Phospher Bronze
Received Date	:	2018. 01. 03
Test Period	:	2018. 01. 03 to 2018. 01. 10
Test Results	:	For further details, please refer to following page(s)

SGS Korea Co., Ltd.
/ Gimhae Laboratory

Thomas Hwang / Lab Manager

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Sample No. : AYGU18-00517.001
Sample Description : C5210
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 62321-5:2013(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	48.0
Mercury (Hg)	mg/kg	With reference to IEC 62321-4:2013(Determination of Mercury by ICP-OES)	2	N.D.
Hexavalent Chromium (Cr VI) *	μg/cm²	With reference to IEC 62321-7-1:2015 (Determination of CrVI by UV-Vis)	0.1	N.D.
Beryllium (Be)	mg/kg	With reference to EPA 3052(1996), US EPA 6010B(1996), ICP	1	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 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Dibromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Tribromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Tetrabromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Pentabromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Hexabromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Heptabromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Octabromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Nonabromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Decabromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Monobromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.

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Sample No. : AYGU18-00517.001
Sample Description : C5210
Item No./Part No. : Phospher Bronze
Materials : N/A

Flame Retardants-PBBs/PBDEs

Test Items	Unit	Test Method	MDL	Results
Dibromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Tribromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Tetrabromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Pentabromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Hexabromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Heptabromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Octabromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Nonabromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Decabromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.

Halogen Contents

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

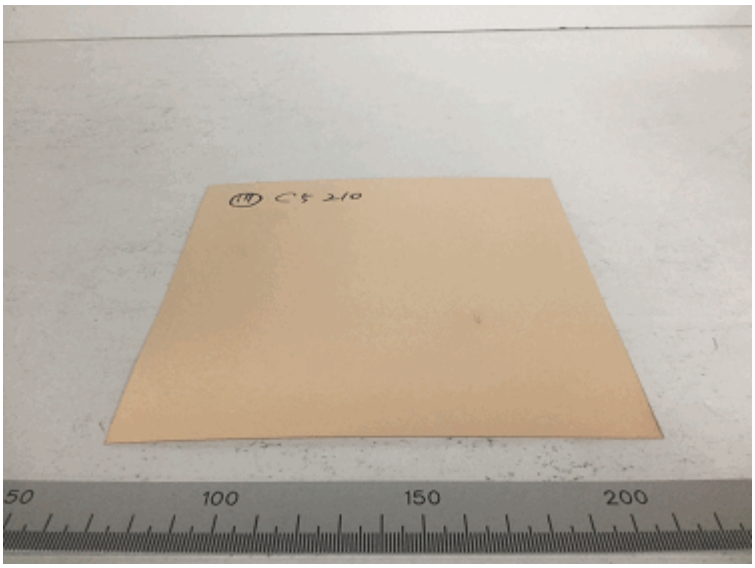
NOTE:
(1) N.D. = Not detected.(<MDL)
(2) mg/kg = ppm
(3) MDL = Method Detection Limit
(4) - = No regulation
(5) Negative = Undetectable / Positive = Detectable
(6) ** = Qualitative analysis (No Unit)
(7) * = a. The sample is positive for CrVI if the CrVI concentration is greater than 0.13 ug/cm2. The 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.

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Picture of Sample as Received:



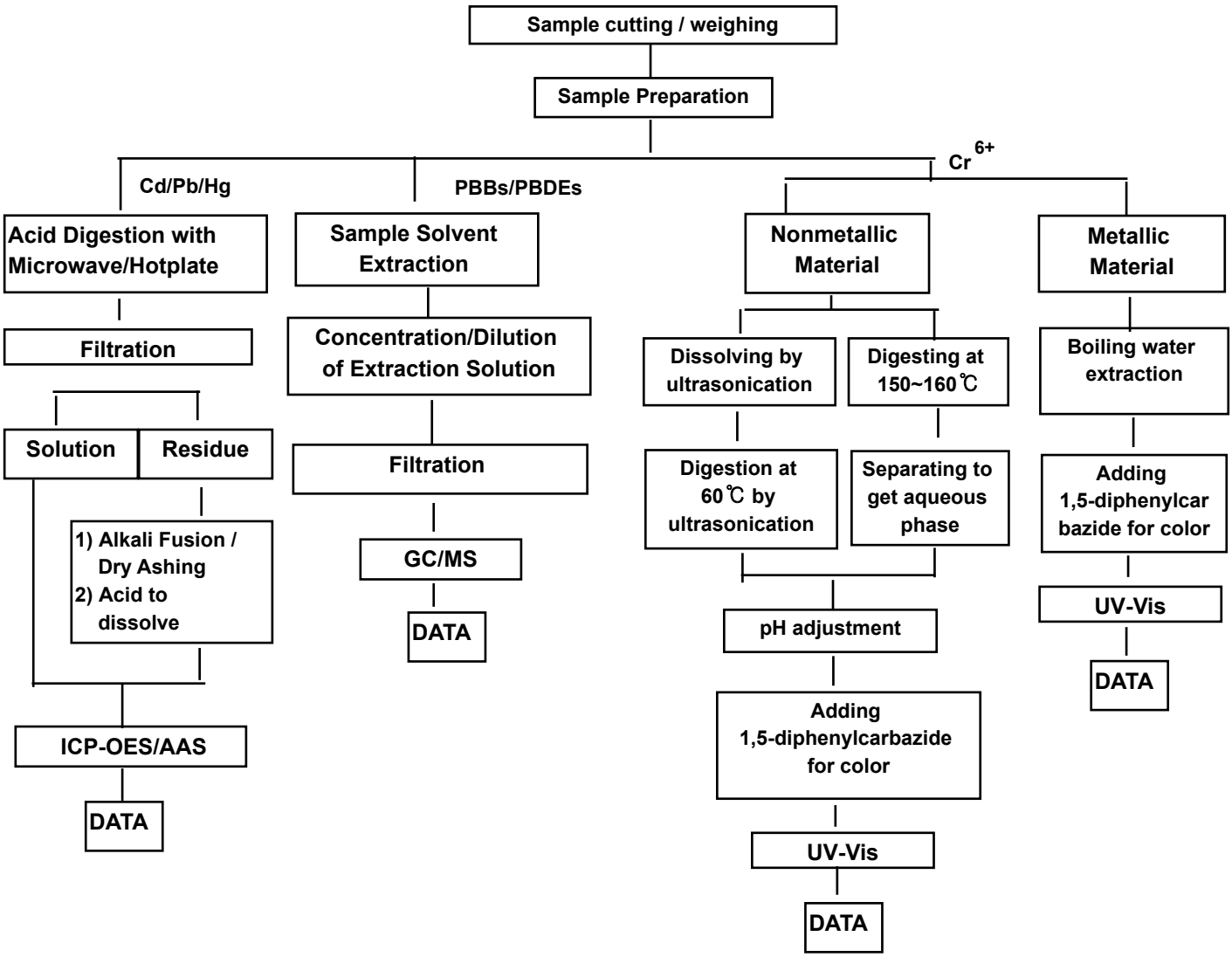
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Testing Flow Chart for RoHS:Cd/Pb/Hg/Cr^{6+} /PBBs&PBDEs Testing



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

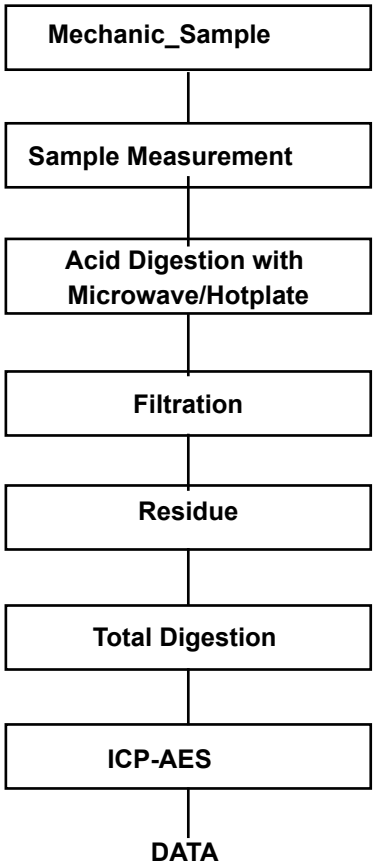
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Flow Chart for Inorganic Elements Testing

Inorganic Elements



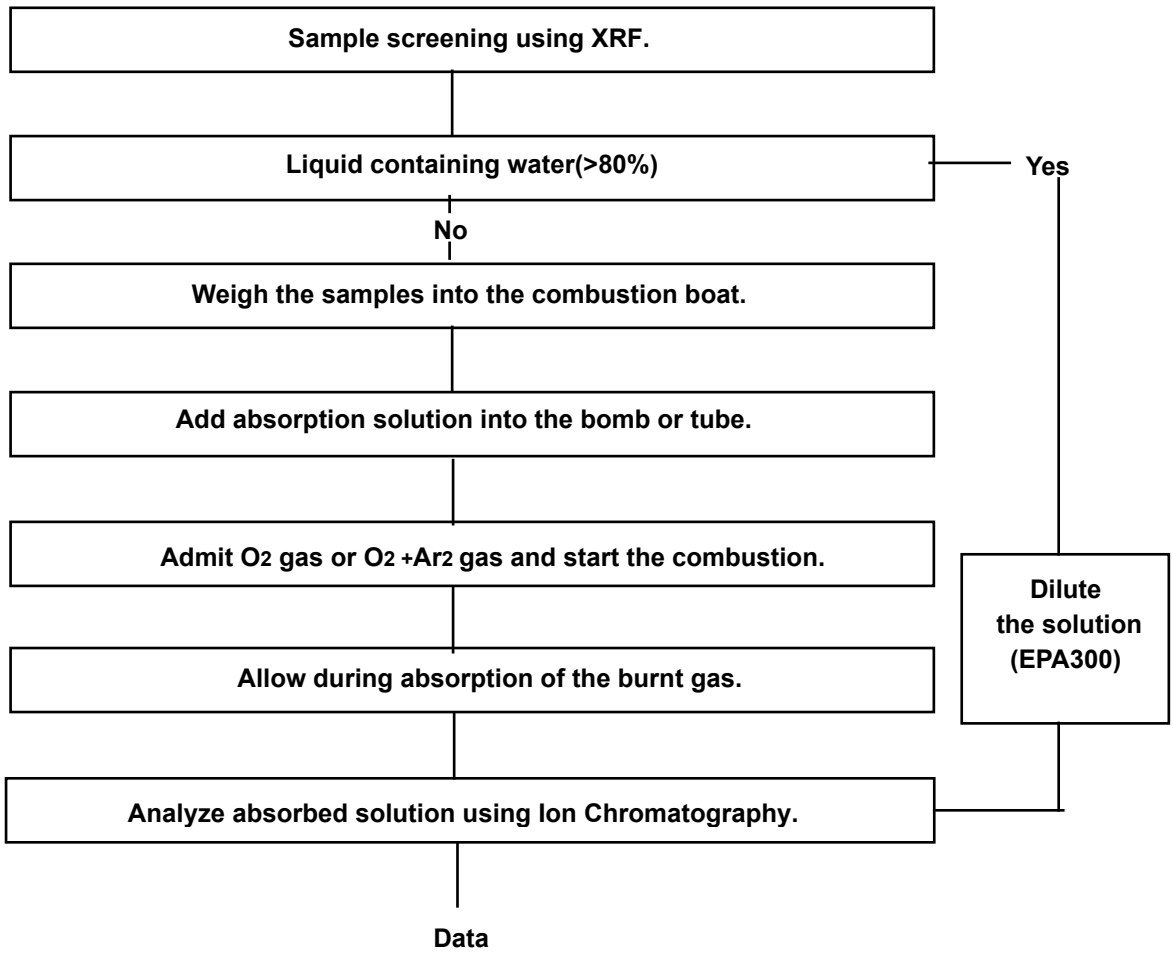
Major Inorganic Heavy Metals	Antimony(Sb) , Beryllium(Be) , Phosphorus(P) , Arsenic(As) etc.

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Flow Chart for Halogen Test



*** End of Report ***

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MATERIAL SAFETY DATA SHEET

Date April 1, 2007

1.CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name : **ARLEN**
(GF-reinforced, flame-proof grades)

Information & Electronics Materials Division
Mitsui Chemicals, Inc.
Shiodome City Center
1-5-2, Higashi-Shimbashi, Minato-ku
Tokyo 105-7117, Japan
Telephone: +81-3-6253-3494 Telefax: +81-3-6253-4221

Mitsui Chemicals America, Inc.
800 Westchester Avenue,
Suite N607, Rye Brook, NY 10573, USA
Telephone: 1-914-253-0777 Telefax: 1-914-253-0790

Mitsui Chemicals Europe GmbH
Oststrasse 10, 40211 Dusseldorf, Germany
Telephone: 49-211-173320 Telefax: 49-211-323487

2.COMPOSITION/INFORMATION ON INGREDIENTS

Component	%	CAS No.	EC No.
Hexamethylenediamine-terephthalic acid copolymer		-	-
Glass fiber	<45	-	-
Brominated flame retardant		-	-
Antimony flame retardant	2-4.2	-	-

Classification according to EC regulations
This product is not classified according to the EC regulations.

* Occupational exposure limits are, if available, listed in Section 8.

3.HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW :
Colored pellet.
Can burn in a fire.
Fumes from hot-molten resin may cause irritation to eyes and respiratory tract.
Slippery, can cause falls if walked on.

POTENTIAL HEALTH EFFECTS
Route(s) of Entry : Skin contact, eye contact, ingestion

INHALATION :
Pellet is not respirable as solid. Exposure to small amount of dust is not expected to present a hazard. At processing in high temperature, the material may produce fumes irritating to nose and throat.

INGESTION :
Small amounts swallowed during normal handling operations are not likely to cause injury; swallowing amounts larger than that may cause injury.

SKIN CONTACT :
Rubbing may cause irritation similar to sand or dust. Hot-molten polymer contacting the skin will cause thermal burns.

EYE CONTACT :
May cause irritation or scratch the surface of the eye. Contact with fumes in processing may cause eye irritation.

CARCINOGENICITY :
NTP : Not listed.
IARC: Not listed.
OSHA: Not regulated.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE :
No information found.

4. FIRST AID MEASURES

INHALATION :
If exposed to excessive levels of fumes, remove to fresh air. Get medical attention if cough or other symptoms develop.

EYE CONTACT :
Immediately flush eyes with plenty of water and get medical attention.
Part eyelids with fingers to assure complete flushing. Check for and remove contact lenses if easily possible.

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.

INGESTION :
Rinse mouth with water and give 1 or 2 glasses of water or milk. Get medical attention immediately. Induce vomiting as directed by medical personnel. Never give anything by mouth to an unconscious or convulsing person.

5. FIRE FIGHTING MEASURES

FIRE AND EXPLOSIVE PROPERTIES : See Section 9.

EXTINGUISHING MEDIA : water fog, foam, dry chemical, CO_2, dry sand
EXTINGUISHING MEDIA WHICH MUST NOT BE USED: Not available.

GENERAL HAZARD :
This material does not ignite easily, but will burn if involved in a fire. Products of combustion include irritating and poisonous gases.

FIRE FIGHTING INSTRUCTIONS
Keep unnecessary and unprotected personnel away. Remove containers to safe place if possible. Keep containers and surroundings cool by spraying with water. Fight fire from an upwind position.

FIRE FIGHTING EQUIPMENT :
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.

HAZARDOUS COMBUSTION PRODUCTS :
Carbon oxides, nitrogen oxides, hydrogen bromide, antimony oxides.

6. ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS:
Keep unnecessary and unprotected personnel away. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8.
This material forms slippery surfaces on floors, posing an accident risk.

ENVIRONMENTAL PRECAUTIONS:
Do not let this chemical enter the environment.

CLEAN-UP METHODS:
Use non-sparking tools and equipment. Vacuum or sweep up material and place in a disposal container.

7. HANDLING AND STRAGE

HANDLING
Technical Measures:
Use with adequate ventilation. Keep away from heat, sparks, and flame. Use explosion-proof electrical equipment. Take precautions against build-up of electrostatic charges. Avoid contact with eyes, skin, and clothing. Wear appropriate personal protective equipment. Provide hand and eye wash station near work area. Wash thoroughly after handling.

Precautions:
Use under local exhaust ventilation. Follow good industrial hygiene practices for clean-up.

STORAGE:
Storage Conditions:
Protect from direct sunlight. Keep away from heat, flame, and all sources of ignition. Store in dark, well-ventilated area. Keep indoors.

Packaging Material: Aluminum-lined paper bags.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

ENGINEERING CONTROLS :
Provide general ventilation. Use closed system or local exhaust ventilation. Provide safety shower and eye wash station near work area.

EXPOSURE LIMITS :
Particulates(Not otherwise regulated)
OSHA-PEL 15 mg/m^3, 8 Hr. TWA, total dust
5 mg/m^3, 8 Hr. TWA, respirable dust
Particulates(Not otherwise specified)
ACGIH-TLV 10 mg/m^3, 8 Hr. TWA, inhalable
3 mg/m^3, 8 Hr. TWA, respirable

[Continuous filament glass fibers]
ACGIH-TLV 1 fiber/cc (TWA) respirable fiber
5 mg/m^3 (TWA) inhalable fraction

[Antimony compound]
ACGIH-TLV 0.5 mg/m^3(TWA) as /Sb/
OSHA-PEL 0.5 mg/m^3(TWA) as /Sb/

PERSONAL PROTECTIVE EQUIPMENT
Respiratory protection : Dust respirator.
Hand protection : Protective gloves.
Eye protection : Safety glasses or goggles.
Protective clothing :
Safety helmet, protective clothing, safety boots.

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE : Colored pellet (See Appendix).
ODOR : Characteristic odor.
PH : Not applicable.
MELTING POINT : 295 – 320 ^oC (See Appendix)
FLASH POINT : 200 ^oC or higher
AUTOIGNITION TEMPERATURE : Not available.
FLAMMABLE LIMITS : Not available.
SPECIFIC GRAVITY : 1.30 - 1.80 (at 4 ^oC)
SOLUBILITY IN WATER : Insoluble.

10. STABILITY AND REACTIVITY

STABILITY : Stable under normal conditions.
INCOMPATIBLE MATERIALS AND CONDITIONS TO AVOID :
Not available.
HAZARDOUS DECOMPOSITION PRODUCTS :
Carbon oxides, nitrogen oxides, hydrogen bromide, antimony oxides in fire.
HAZARDOUS POLYMERIZATION : Will not occur.

11. TOXICOLOGICAL INFORMATION

No data is available on the product itself. Toxicological information of some components is known as follows:
[GLASS FIBER]
CARCINOGENICITY :
Classified 3 (Not classifiable as to carcinogenicity in humans) by IARC.

[ANTIMONY]
ACUTE TOXICITY :

Oral	rat	LD_{50}	7 g/kg
Intraperitoneal	rat	LD_{50}	100 mg/kg

CARCINOGENICITY :
Inhalation rat TCLo 50 mg/m^3/7hr/52W, intermittent

12. ECOLOGICAL INFORMATION

ECOTOXICITY : Not available.
DEGRADABILITY/PERSISTENCY : Not available.

13. DISPOSAL CONSIDERATIONS

WASTE FROM RESIDUES :
Whatever cannot be saved for recovery may be burned in an approved incinerator or disposed in approved waste facility. Ensure compliance with local, state, federal and national regulations.

CONTAMINATED PACKAGING :
Empty the container completely before disposal.

14. TRANSPORT INFORMATION

U.N. Class : Not a hazardous material.
U.N. Number : None

15. REGULATORY INFORMATION

UNITED STATES
OSHA STATUS :
This product is hazardous under the criteria of Federal OSHA Hazard Communication Standard 29 CFR 1910.1200.

TSCA STATUS :
All ingredients of this product are listed on the TSCA Inventory.

CERCLA Reportable Quantity :
Antimony compound: Hazardous substance that no RQ assigned.

SARA Title III :
SECTION 302 EXTREMELY HAZARDOUS SUBSTANCES: None
SECTION 311/312 HAZARDOUS CATEGORIES :
Immediate health hazard, delayed health hazard.
SECTION 313 TOXIC CHEMICALS: Antimony compound ≤4.2%

CALIFORNIA PROPOSITION 65 :
This product contains, no chemicals known to the state of California to cause cancer.

EUROPEAN UNION
EU STATUS:
All components of this product are listed on EINECS or exempt from EINECS registration.

Labeling according to EC Directive:
This product is not classified according to the EU regulations.

16. OTHER INFORMATION

This MSDS was prepared in compliance with EU Directive 91/155/EEC as amended by 2001/58/EC and USA OSHA Hazard Communication Standard (29 CFR 1910.1200).

To the best of our knowledge, the information contained herein is accurate.
However, we cannot assume any liability whatsoever for the accuracy or completeness of the information contained herein. Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

Appendix

This Material Safety Data Sheet covers these products :

Grade name	Appearance	Melting Point	Hazardous components under OSHA HCS	
CH230N	Light-yellow pellet	310 °C (590 °F)	Antimony compound Glass fiber	4.0 % 30 %
CH230NC	Brown pellet	310 °C (590 °F)	Antimony compound Glass fiber	4.0 % 30 %
CH230NS	Light-yellow pellet	310 °C (590 °F)	Antimony compound Glass fiber	4.0 % 30 %
C230N	Light-yellow pellet	310 °C (590 °F)	Antimony compound Glass fiber	4.0 % 30 %
C215N	Light-yellow pellet	310 °C (590 °F)	Antimony compound Glass fiber	6.0 % 15 %
C240N	Light-yellow pellet	310 °C (590 °F)	Antimony compound Glass fiber	3.5 % 40 %
CH230NH	Gray pellet	310 °C (590 °F)	Antimony compound Glass fiber	4.0 % 30 %
C430N	Light-yellow pellet	310 °C (590 °F)	Antimony compound Glass fiber	4.0 % 30 %
C430NC	Brown pellet	310 °C (590 °F)	Antimony compound Glass fiber	4.0 % 30 %
C430NH	Gray pellet	310 °C (590 °F)	Antimony compound Glass fiber	4.0 % 30 %
C630N	Light-yellow pellet	310 °C (590 °F)	Antimony compound Glass fiber	4.0 % 30 %
C645NC	Brown pellet	310 °C (590 °F)	Antimony compound Glass fiber	3.5 % 45 %
E430N	Light-yellow pellet	320 °C (608 °F)	Antimony compound Glass fiber	4.0 % 30 %
E430N(T5)	Light-yellow pellet	320 °C (608 °F)	Antimony compound Glass fiber	4.0 % 30 %
E430NHS	Light-yellow pellet	320 °C (608 °F)	Antimony compound Glass fiber	4.0 % 30 %
E430NS	Light-yellow pellet	320 °C (608 °F)	Antimony compound Glass fiber	4.0 % 30 %
E440N	Light-yellow pellet	320 °C (608 °F)	Antimony compound Glass fiber	3.0 % 40 %
E440N(C1)	Brown pellet	320 °C (608 °F)	Antimony compound Glass fiber	4.0 % 40 %
E630N	Light-yellow pellet	320 °C (608 °F)	Antimony compound Glass fiber	2.0 % 30 %

LG Chem	MATERIAL SAFETY DATA SHEET	Version: R0001.0001
		Date of issue: 2014-09-02
		Revision date: 2014-09-02
	DGN1001BF	Change List:

1. IDENTIFICATION

A. Product name

- DGN1001BF

B. Recommended use and restriction on use

- General use : Not available
- 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 Technology Team
- Telephone number : 82-63-830-4101
- Emergency telephone number : 82-63-830-4101
- Fax number : 82-63-830-4809
- 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 : Category2
- 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/gas/mist/vapours/spray.
- 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	70~80
Poly[imino(1-oxo-1,6-hexanediyl)]	Polycaprolactam	25038-54-4	15~25
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	5~15
Others	-	-	≤5

4. FIRST AID MEASURES

A. Eye contact

- Do not rub your eyes.
- Immediately flush eyes with plenty of water for at least 15minutes 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 wter for at least 15 minutes while removing contaminated clothing and shoes.
- Laundering enough contaminated clothing before reuse.
- 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

- About whether I should induce vomiting Take the advice of a doctor.
- 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

- Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
- Using a unattended and water devices in case of large fire and leave alone to burn if you do not imperative.
- Avoid inhalation of materials or combustion by-products.
- Do not access if the tank on fire.
- Use appropriate extinguishing measure suitable for surrounding fire.
- 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.
- Ventilate closed spaces before entering.
- Do not touch spilled material. Stop leak if you can do it without risk.
- Handling the damaged containers or spilled material after wearing protective equipment.
- 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.
- For disposal of spilled material in appropriate containers collected and clear surface.

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.
- Comply with all applicable laws and regulations for handling
- Dealing only with a well-ventilated place.

B. Conditions for safe storage, including any incompatibilities

- Save in cool, dry and well ventilated place.
- Do not apply direct heat.
- Do not apply any physical shock to container.
- Keep in the original container.
- Prevent static electricity and keep away from combustible materials or heat sources.
- Collected them in sealed containers.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

A. Exposure limits

○ **ACGIH TLV**

- Not available

B. Engineering controls

- A system of local and/or general exhaust is recommended to keep employee exposures above the Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. The use of local exhaust ventilation is recommended to control emissions near the source.

C. 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
- Any air-purifying respirator with a corpuscle filter of high efficiency
- 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
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	Not available
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**

- [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**

- [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**

- [Poly[imino(1,6-dioxo-1,6-hexanediyl)imino-1,6-hexanediyl]] : LC50 7.26 ㎎/ℓ 4 hr Rat
- [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

○ **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

○ **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

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

○ **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

○ **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 designaed waste is mixed, it is difficult to treat seperatly, 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 disposal by oneself or entrust to waste disposer or person who other’s waste recycle and dispose, person who establish and operate waste disposal facilities.
- Dispose of waste in accordance with all applicable laws and regulations.

14. TRANSPORT INFORMATION

A. UN number, (IMDG)

- Not available

B. Proper shipping name

- Not available

C. IMDG Class

- Not available

D. IMDG Packing group

- Not available

E. Marine pollutant

- 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.
- EmS FIRE SCHEDULE : Not available
- EmS SPILLAGE SCHEDULE : Not available

15. REGULATORY INFORMATION

A. National and/or international regulatory information

○ **POPs Management Law**

- Not applicable

○ **Information of EU Classification**

*** Classification**

- Not applicable

*** Risk Phrases**

- Not applicable

*** Safety Phrase**

- 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

- 2014-09-02

C. Revision number and Last date revised

- 2 times, 2014-09-02

D. Other

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

POONGSAN 주식회사풍산

물 질 안 전 보 건 자 료
(MATERIAL SAFETY DATA SHEET)

관리번호	MSDS-PS-005
작성일자	2016-06-25
개정번호	5 (GHS 기준)

제품명	황동 대, 봉, 선, Coin(brass Strip, Bar, Wire, Coin)

SECTION 1 화학제품과 회사에 관한 정보

가. 제품명 황동 대, 봉, 선, Coin(brass Strip, Bar, Wire, Coin)

제품규격 C2500, C2600, C2680, C2700, C2720, C2730, C2800, C2801

나. 제품의 권고 용도와 사용상의 제한

제품의 권고 용도 전기용, 드로잉용, 방열용, 장식용, 소전용, 기타부품용

제품의 사용상의 제한 자료없음

다. 제조자/수입자/유통업자 정보

회사명 ㈜ 풍산 울산 사업장

주소 울산광역시 울주군 온산읍 산암로 94

긴급전화번호 052) 231 – 9114 (대표전화), FAX : 231 – 9400

SECTION 2 유해성·위험성

가.유해성·위험성 분류

급성 독성(경구) : 구분3

특정표적장기 독성(1회 노출) : 구분3-호흡기계 자극

특정표적장기 독성(반복 노출) : 구분1

급성 수생환경 유해성 : 구분1

만성 수생환경 유해성 : 구분1

나. 예방조치문구를 포함한 경고표지 항목

그림문자



신호어	위험
유해・위험문구	H301 삼키면 유독함 H335 호흡기계 자극을 일으킬 수 있음 H372 장기간 또는 반복노출 되면 (신장, 심장혈관계)에 손상을 일으킴 H400 수생생물에 매우 유독함 H410 장기적인 영향에 의해 수생생물에게 고독성이 있음

예방조치문구

예방	P260 분진・흄・가스・미스트・증기・스프레이의 흡입을 피하시오. P264 취급 후에는 손을 철저히 씻으시오. P270 이 제품을 사용할 때에는 먹거나, 마시거나 흡연하지 마시오
대응	P304+P340 흡입하면 신선한 공기가 있는 곳으로 옮기고 호흡하기 쉬운 자세로 안정을 취하시오. P312 불편함을 느끼면 의료기관(의사)의 진찰을 받으시오. P314 불편함을 느끼면 의학적인 조치・조언을 구하시오.

저장	**P403+P223 용기는 환기가 잘 되는 곳에 단단히 밀폐하여 저장하시오.**
폐기	P501 (폐기물 관리법에 따라) 내용물을 폐기하시오.

다. 유해・위험성 분류기준에 포함되지 않는 기타 유해・위험성(NFPA)

구분	보건	화재	반응성
구리	자료없음	자료없음	자료없음
아연	1	1	1

SECTION 3 구성성분의 명칭 및 함유량

물질명	이명(관용명)	CAS 번호	함유량(%)
구리 (Copper)	-	7440-50-8	60.1-72.5
아연 (Zinc)	-	7440-66-6	27.5-39.9

SECTION4 응급조치요령

가. 눈에 들어갔을 때	화학물질 눈접촉시 15분 이상 많은 양의 물로 씻어내시오. 눈에 화학물질이 들어간 경우 즉시 의사의 진찰과 치료를 받으시오.
나. 피부에 접촉했을 때	즉시 15분 이상 비눗물로 씻어내어 화학물질을 제거하시오 피부질환 발생시 의사의 진찰을 받으시오.
다. 흡입했을 때	호흡이 없으면 인공호흡을 실시하시오. 노출원으로부터 멀리 피하시오.
라. 먹었을 때	의식이 없으면 구토 유도를 피하고 모든 섭취를 금하시오. 자연적인 구토 발생시 폐에 흡인 가능성을 피하기 위하여 머리를 둔부보다 낮춘 자세를 취하시오. 의식이 없으면 머리를 옆으로 돌려 기도폐쇄를 예방하시오. 119 또는 응급의료기관에 연락하고 즉시 병원으로 후송하시오.
마. 기타 의사의 주의사항	화학물질 섭취시 위세척을 고려하시오. 호흡이 곤란한 경우 산소 공급을 고려하시오. 해독제(구리) : 칼륨 나트륨 에데테이트/포도당, 정맥투여;페니실아민, 경구투여.

SECTION 5 폭발・화재시 대처방법

가. 적절한(부적절한) 소화제

적절한 소화제	백운석, 금속화재용 분말 소화약제, 모래, 흑연, 소다회, 염화 나트륨, 석회
부적절한 소화제	포말 소화약제. 물
대형 화재시	자료없음

나. 화학물질로부터 생기는 특정 유해성

열분해 생성물	아연 산화물
화재 및 폭발위험	일반적인 상태에서는 화재나 폭발위험을 무시할 수 있음. 분진과 공기의 혼합물은 발화하거나 폭발할 수도 있음.

다. 화재진압시 착용할 보호구 및 예방조치

보호구	방화복
예방조치	관계인 외의 접근을 막고 위험 지역을 격리하며 출입을 금지할 것. 주변화재에 적응한 소화제를 사용할 것. 물질자체 또는 연소 생성물의 흡입을 피할 것. 물질에 직접 물이 접촉되지 않도록 할 것.

SECTION 6 누출사고시 대처방법

가. 인체를 보호하기 위해 필요한 조치사항 및 보호구	직접적인 접촉을 피하고, 적절한 보호장구를 착용하시오.

나. 환경을 보호하기 위해 필요한 조치사항

대기	자료없음
토양	누출물질을 적당한 용기에 옮겨 수거하여 처리하시오.
수중	누출된 물질은 진공펌프를 사용하여 수거하시오.. 누출물질을 활성탄으로 흡착처리하시오. 호스를 사용하여 가두어 둔 물질을 흡입하여 폐수처리장 유입 후 적법처리하시오.

다. 정화 또는 제거 방법

소량 누출시	추후 처분을 위해 누출물질을 적당한 용기에 수거하여 처리하시오. 누출된 위험성에 대하여 사전에 교육훈련된 사람만 청소 및 폐기를 실시하도록 하시오. 누출물질과 물이 직접 닿지 않도록 하시오.
다량 누출시	기준량 이상 배출 시 정부부처 또는 지방자치단체에 배출 내용을 통지하시오.

SECTION 7 취급 및 저장방법

가. 안전취급요령	분진의 발생 및 비산을 방지하시오. 반용기내 잔여물질은 위험하므로 안전작업수칙에 따라 용기를 처리하시오.
나. 안전한 저장방법	산화성 물질, 산성 물질과 접촉을 피하시오. 서늘하고 건조한 장소에 저장하시오. 정부부처 및 지방자치단체의 법규 및 규정에 의하여 저장, 사용하시오

SECTION 8 노출방지 및 개인보호구

가. 화학물질의 노출기준, 생물학적 노출기준 등

화학물질의 노출기준(국내규정)	
구리	구리(분진 및 미스트)TWA - 1㎎/㎥ 구리(분진 및 미스트)STEL - 2㎎/㎥ 구리(흄)TWA - 0.1㎎/㎥
아연 (Zinc)	자료없음

화학물질의 노출기준(ACGIH 규정)

구리	TWA 0.2 ㎎/㎥, 1 ㎎/㎥ Copper(Fume), Copper(Dusts and mists, as Cu)
아연 (Zinc)	자료없음
생물학적 노출기준	자료없음

나. 적절한 공학적 관리

공학적 관리	폭발 위험이 있는 농도일 경우에는 방폭설비가 갖춰진 환기장치를 설치하시오. 국소배기장치 등의 환기장치를 설치하고 적정 제어풍속이 유지되도록 관리하시오.

다. 개인보호구

호흡기 보호	일반적인 상태에서는 호흡용보호구가 필요하지 않으나, 특정 작업조건의 변경에 의해 분진 또는 흄이 발생하는 경우에는 한국산업안전보건공단의 인증을 필한 호흡용보호구를 착용하시오.
눈 보호	근로자가 쉽게 사용이 가능하도록 긴급세척시설(샤워식) 및 세안설비를 설치하시오. 비산물로부터 눈을 보호하기 위하여 보안경을 착용하시오.
손 보호	직접적인 접촉을 피할 수 있는 보호장갑을 착용하시오.
신체 보호	직접적인 피부노출이 있는 경우에는 노출을 방지할 수 있는 보호의를 착용하시오.

SECTION 9 물리화학적 특성

가. 외관		**차. 인화 또는 폭발 범위의 상한/하한**	자료없음
성상	고체	**카. 증기압**	자료없음
색상	노랑색	**타. 용해도**	(불용성)
나. 냄새	무취	**파. 증기밀도**	자료없음
다. 냄새역치	자료없음	**하. 비중**	8.47
라. pH	자료없음	**거. n-옥탄올/물분배계수**	
마. 녹는점/어는점	1045 ℃	**너. 자연발화온도**	자료없음
바. 초기 끓는점과 끓는점 범위		**더. 분해온도**	자료없음
사. 인화점	자료없음	**러. 점도**	자료없음
아. 증발속도	자료없음	**머. 분자량**	
자. 인화성(고체, 기체)	자료없음		

SECTION 10 안정성 및 반응성

가. 화학적 안정성 및 유해 반응의 가능성	상온 상압에서 안정함. 중합 반응 : 중합하지 않음. 미세한 물질(아연)은 물과 반응할 수도 있음.
나. 피해야 할 조건	분진의 발생을 억제할 것. 열, 화염, 스파크 및 기타 점화원을 피할 것. 건조한 곳에 보관할 것.
다. 피해야 할 물질	혼합금질 물질 : 산, 염기, 금속, 산화제, 환원제, 할로 탄소 화합물, 금속염, 할로겐, 가연성 물질, 아민, 금속 산화물
라. 분해시 생성되는 유해물질	열분해생성물: 기타 분해생성물

SECTION 11 독성에 관한 정보

가. 가능성이 높은 노출 경로에 관한 정보

노출경로	경구/흡입 : 분진, 미스트(Mist), 흄(Hume)의 호흡기 흡입 또는 섭취 흡수 : 분진, 미스트(Mist), 흄(Hume)의 피부 또는 안구의 흡수

나. 건강 유해성 정보

급성독성	
경구	LD50 237 ㎎/㎏ Rat(아연)
경피	자료없음
흡입	자료없음
피부부식성 또는 자극성	인체/무자극(아연)
심한 눈손상 또는 자극성	자료없음
호흡기과민성	자료없음

피부과민성	**자료없음**
발암성	
산업안전보건법	자료없음
노동부고시	자료없음
IARC	자료없음
OSHA	자료없음
ACGIH	자료없음
NTP	자료없음
생식세포변이원성	자료없음
생식독성	자료없음
특정 표적장기 독성 (1회 노출)	흡은 상부 기도를 자극함(구리)
특정 표적장기 독성 (반복 노출)	사람에서 간 손상이 나타남(구리)
흡인유해성	자료없음

SECTION 12 환경에 미치는 영향

가. 생태독성

어류	
구리	LC50 0.37 ㎎/ℓ 96 hr
아연(ZINC)	LC50 0.24 ㎎/ℓ 96 hr Oncorhynchus mykiss
갑각류	
구리	EC50 0.0318 ㎎/ℓ 48 hr
아연(ZINC)	EC50 0.0354 ㎎/ℓ 48 hr Daphnia magna
조류	
구리	LC50 0.092 ㎎/ℓ 15 hr
아연(ZINC)	EC50 0.0106 ㎎/ℓ 72 hr (Pseudokirchneriella subcapitate)

나. 잔류성 및 분해성

잔류성	
구리	log Kow -0.57 (추정치)
아연(ZINC)	log Kow -0.47
분해성	자료없음

다. 생물농축성

농축성	
구리	BCF 5830
아연(ZINC)	BCF 600 (어류)
생분해성	
구리	자료없음
아연(ZINC)	자료없음

라. 토양이동성 자료없음

마. 기타 유해 영향 자료없음

SECTION 13 폐기시 주의사항

가. 폐기방법	폐기물관리법에 의거 폐기물을 분류하고 특성에 따라 처리하시오. 폐기물관리법에 따라 내용물은 허가를 받은 업체에 위탁 처리하시오.
나. 폐기시 주의사항	폐기물관리법에 명시된 폐기물의 수집, 운반, 보관, 처리에 관한 구체적 기준 및 방법을 준수하시오.

SECTION 14 운송에 필요한 정보

가. 유엔번호(UN No.)

구리	3089
아연(zinc)	1436

나. 적정선적명 해당없음

다. 운송에서의 위험성 등급

구리	4.1
아연(zinc)	4.3

라. 용기등급

구리	2
아연(zinc)	I

마. 해양오염물질 자료없음

바. 사용자가 운송 또는 운송수단에 관련해 알 필요가 있거나 필요한 특별한 안전대책

화재시 비상조치

구리	F-G
아연(zinc)	F-G

유출시 비상조치

구리	S-G
아연(zinc)	S-O

SECTION 15 법적규제 현황

가. 산업안전보건법에 의한 규제

구리	관리대상물질 : 산업보건에 관한 규칙 별표 7 작업환경측정물질 (측정주기 : 6개월) : 산업안전보건법 시행규칙 별표 11의 4 특수건강진단물질 (진단주기 : 12개월) : 산업안전보건법 시행규칙 별표 12의 2 노출기준설정물질 : 화학물질 및 물리적인자의 노출기준(노동부고시 제2008-26호)
아연(zinc)	관리대상물질 : 산업보건에 관한 규칙 별표 7 작업환경측정물질 (측정주기 : 6개월) : 산업안전보건법 시행규칙 별표 11의 4 특수건강진단물질 (진단주기 : 12개월) : 산업안전보건법 시행규칙 별표 12의 2 노출기준설정물질(산화아연) : 화학물질 및 물리적인자의 노출기준(노동부고시 제2008-26호)

나. 유해화학물질관리법에 의한 규제 해당없음

다. 위험물안전관리법에 의한 규제 해당없음

라. 폐기물관리법에 의한 규제 해당없음

마. 기타 국내 및 외국법에 의한 규제 자료없음

POONGSAN
주식회사풍산

SECTION 16 그 밖의 참고사항

가.자료의 출처	1. 국립환경과학원 화학물질정보시스템 : NCIS 2. 소방방재청 국가위험물정보시스템 3. 자체 시험분석 자료(울산사업장 품질보증팀) 4. 노동부 화학물질 노출기준 개정 연구 사업 (2005년) 5. 기타 관련법규 및 고시 자료 참고
나. 최초작성일	2006-04-17
다. 개정횟수 및 최종 개정일자	
개정횟수	5 회
최종 개정일자	2016년06월25일
라. 기타	이 물질안전보건자료(MSDS)는 화학물질 분류·표시 및 물질안전보건자료에 관한 기준 (노동부 고시 제2009-68호,2009.10.26)에 따라 GHS(Globally Harmonized System of Classification and Labelling of Chemicals) 기준에 맞춰 한국산업안전보건공단에서 제공하는 MSDS Editing Program을 참고하여 작성된 자료임. 이 자료는 제품의 품질을 보증하는 것이 아니며, 통상적인 상태에서의 취급에 대한 안전, 보건, 환경사항에 대하여 기술한 것입니다. 제품의 사용 방법에 따른 가열 또는 가공 등에 의해 성상이 변경되는 경우에는 추가적인 안전보건사항을 확인 후 사용하시기 바랍니다. 또한 이 정보는 사전에 예고 없이 개정될 수 있으며, 당사 홈페이지(www.poongsan.co.kr)를 통해서 자료를 제공받을 수 있습니다. 기타 자세한 사항은 당사 안전환경팀 또는 품질보증팀으로 문의하여 주시기 바랍니다.

POONGSAN
POONGSAN CORP.

MSDS (MATERIAL SAFETY DATA SHEET)

Control No	MSDS-PS-ENG-013
Date Issued	April 21, 2016
Revision No	5 (GHS)

Product Names	Phosphorus bronze

SECTION 1 Product and company identification

a. Product Name: Phosphorus bronze

Item Names: C5100R, C5101R, C5102R, C5103R, C5111R, C5191R, C5210R, C5212R, C5240R

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	H228 Inflammable material H300 Deadly if swallowed H310 If contact with skin, be fatal. H335 May stimulate respiratory organs. H372 Liver may damage with long-term or repeated exposure. H400 Very toxic to aquatic H410 Very toxic to aquatic life with long lasting effects

Precautionary statements

Prevention	P260 If dust and fumes is leaked, do not breathe and smoking. P262 Not be stained.(eyes, skin, clothes) 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 P361 All polluted clothes are remove.
Storage	P403+P223 Container should be Stored hardly in a well-ventilated place.
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	3	1	1

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	-	564483-18-7	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	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 3.03 ㎎/㎏ Rat(Phosphorus)
Dermal	LD50 100 ㎎/㎏ Rat(Phosphorus)
Inhalation	No data
Skin corrosive/irritant	Unstimulated(Phosphorus)
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) 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	LC50 0.006 ㎎/ℓ 96 hr
Crustacea	
Copper	EC50 0.0318 ㎎/ℓ 48 hr
Tin	No data
Phosphorus	EC50 0.03 ㎎/ℓ 48 hr
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	log Kow -0.27 (estimation)
Degradability	No data

c. Bioaccumulative potential

Condenasability	
Copper	BCF 5830
Tin	No data
Phosphorus	BCF 281000
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	1381

b. UN proper shipping name — Not applicable

c. Transport hazard class

Copper	4.1
Tin	Not applicable
Phosphorus	4.2(6.1)

d. Packing group,

Copper	2
Tin	Not applicable
Phosphorus	I

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	F-A

Emergency management type of leak

Copper	S-G
Tin	Not applicable
Phosphorus	S-J

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	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. Revised research project of labor department about chemical exposure limit _ copper, zinc(2005)

5. Others Regulations and Notice

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

c. Revision number and date

Revised frequency: 5th

latest version of the MSDS: April 21, 2016

d. Others

material safety data sheet(MSDS) was written in accordance with Chemical classification and indication and MSDS standard from Korea Occupational Safety and Health Agency refer to MSDS 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.

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