



# Specification

<b>Product</b>	<b>SMD(Micro) Fuse</b>
<b>Type</b>	<b>N0603F Series</b>
<b>Approved by</b>	

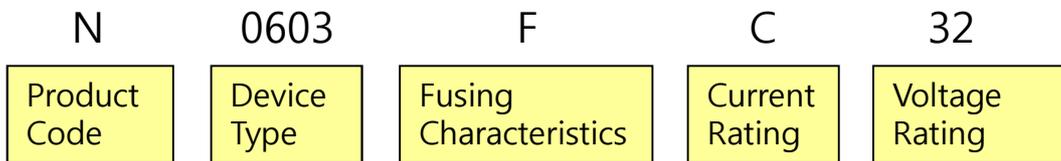
# 1. Scope

- This specification covers the detail requirements for SMD Micro fuse type of N0603F Series

# 2. Classification

- Type designation shall be the following form

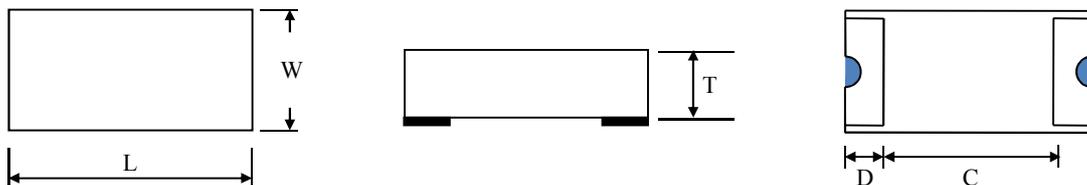
\* For Example



\* T : Time Delay for DC, F : Fast Acting for DC  
 A : Time Delay for AC, C : Fast Acting for AC

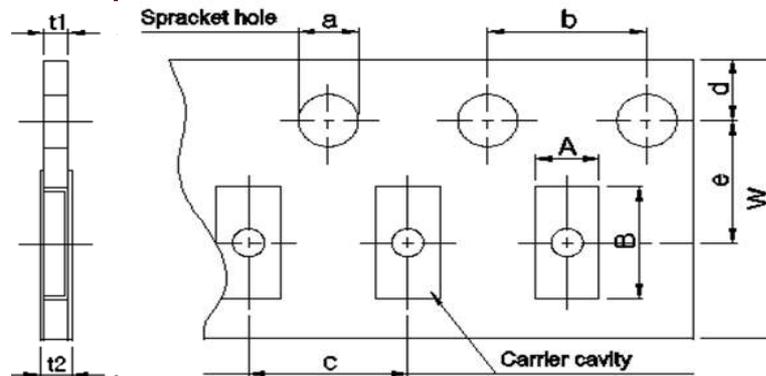
# 3. Dimensions

- The fuse shall be designed and dimensions in accordance with this figure



Device Type	Dimensions (mm) ± 0.1mm				
	L	W	T	C	D
N0603F Series	1.6	0.8	0.6	1.0	0.3

### 4. Taping dimension



Type	A	B	a	b	c	d	e	t1	t2	W
N0603	1.0 ±0.1	1.8 ±0.1	1.5 $\varnothing$ 0~+0.1	4.0 ±0.05	4.0 ±0.05	1.75 ±0.1	3.5 ±0.05	0.6 ±0.05	0.7 ±0.05	TP 8mm

\* TP : Paper Tape

### 5. Ratings

- The rating shall be in accordance with table

Type	Marking	Rated Current	Fusing Time	Rated Voltage	Op.Temp Range	Interrupting Rating (A)	Q'ty / Reel
N0603 F Series	FD	0.75 A	Open within 5Sec. Max. at 200% of rated Current.  Max 0.2 Sec. at 300% of rated Current	32VDC/63VDC	-40 °C ~ + 125 °C	35A	5000pcs
	FE	1.00 A		32VDC/63VDC		35A	
	FF	1.25 A		32VDC/63VDC		35A	
	FG	1.50 A		32VDC/63VDC		35A	
	FH	1.60 A		32VDC/63VDC		35A	
	FI	1.75 A		32VDC/63VDC		35A	
	FJ	2.00 A		32VDC/63VDC		35A	
	FK	2.50 A		32VDC/63VDC		35A	
	FL	3.00 A		32VDC/63VDC		35A	
	FM	3.15 A		32VDC/63VDC		35A	
	FN	3.50 A		32VDC/63VDC		35A	
	FO	4.00 A		32VDC/63VDC		35A	
	FP	4.50 A		32VDC/63VDC		35A	
FQ	5.00 A	32VDC/63VDC	35A				

- Typical value of fusing time for fast acting type is 100 ~ 1000 mSec  
Refer to attached Test report

## 6. Performance Characteristics

Unless otherwise specified, The standard range of condition for test is as follows :

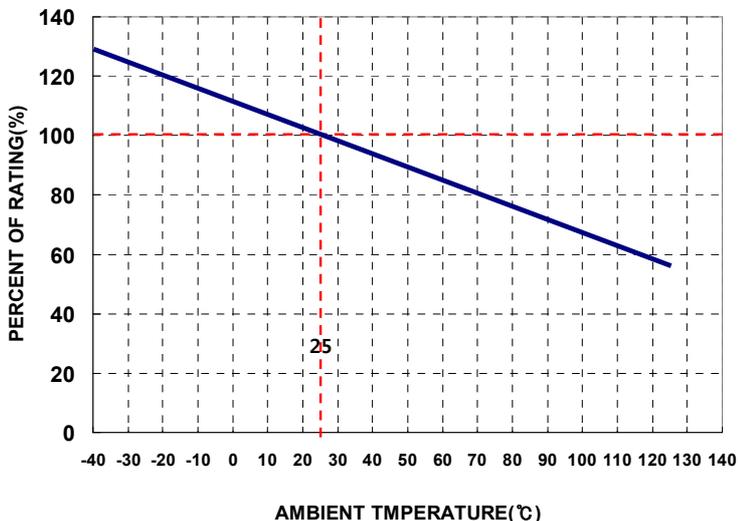
Ambient Temperature : 10°C - 50°C  
 Humidity : 45% - 85%

### Performance Test Table(1-2)

No	Test Item	Test Condition	Requirement
1	Resistivity Test	<ul style="list-style-type: none"> <li>Temp : Ambient</li> <li>Applied t for 1 hour and 15Min off at 110% of rated current</li> </ul>	Duration : 100 Hours ( Endurance Test) Measure Voltage drop. Do not exceed 10%
2	Time/Current Characteristic	<ul style="list-style-type: none"> <li>Apply 200% of rated current</li> </ul>	Fusing Time : Fast acting : 5sec Max Time Delay : 1 – 120 Sec
3	Temperature Rise	<ul style="list-style-type: none"> <li>Measure the temperature at surface of device</li> </ul>	75°C Max
4	Cycling Test	<ul style="list-style-type: none"> <li>Lower temperature : -40°C</li> <li>Upper temperature : +125°C</li> </ul>	No. of cycling Time : 5 No Open during Cycling
5	Surge Test	<ul style="list-style-type: none"> <li>Apply 135% of rated current with programmable Load On/Off time</li> </ul>	No. of Cycling : 30,000
6	Terminal bond strength of the face plating	<ul style="list-style-type: none"> <li><u>JIS C 0051:1994 Sub-clause 7.4.1</u></li> <li>(1) Bending value:3mm (Among the fulcrums:90mm)</li> <li>(2)Duration:10s ± 1s</li> </ul>	Change of internal resistance: ±3% No evidence of mechanical damage
7	Resistance to soldering Heat	<ul style="list-style-type: none"> <li>(1) Test by a piece</li> <li>(2) Temp. of solder bath:260°C ± 5°C</li> <li>(3) Immersion time: 10s ± 1s</li> <li>(4) After immersion into solder, leaving the room temp. for 1h or more, and then measure the internal resistance</li> </ul>	No evidence of appearance damage Electrical characteristics shall be satisfied

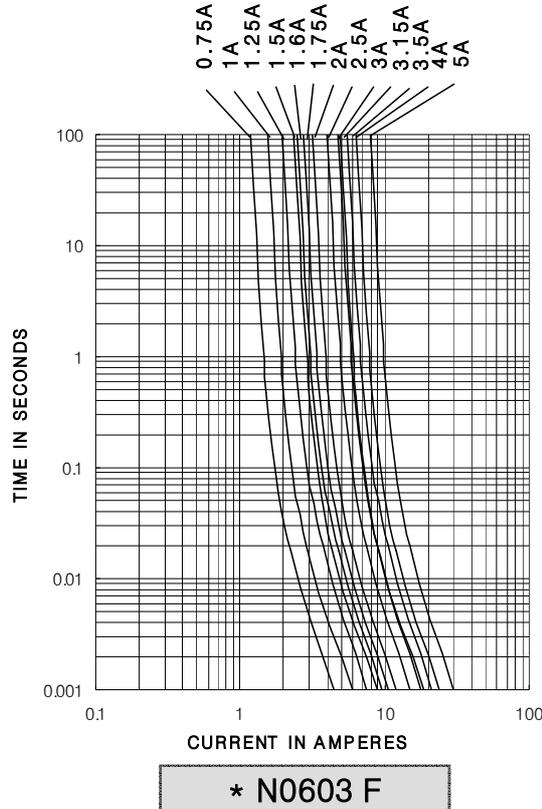
No	Test Item	Test Condition	Requirement
7		<ul style="list-style-type: none"> <li>Reflow soldering</li> <li>(1) Pre-heating: <math>150^{\circ}\text{C} \pm 5^{\circ}\text{C}</math>, 120s max</li> <li>(2) Peak: <math>240^{\circ}\text{C} \pm 5^{\circ}\text{C}</math>, 10s Max</li> <li>(3) After immersion into solder, leaving the room temp. for 1h or more, and then measure the internal resistance</li> </ul>	
8	Solderability	<ul style="list-style-type: none"> <li>JIS C 0054:1994</li> <li>(1) Test by a piece</li> <li>(2) Flux: Rosin-Methanol</li> <li>(3) Temp. of solder: bath: <math>235^{\circ}\text{C} \pm 5^{\circ}\text{C}</math></li> <li>(4) Immersion time: <math>2\text{s} \pm 0.5\text{s}</math></li> </ul>	The surface of terminal immersed shall be min. of 95% covered with a New coating of solder
9	Endurance test	<ol style="list-style-type: none"> <li>Test condition: Nominal ambient Temp. and Relative humidity</li> <li>Test potential:                             <ol style="list-style-type: none"> <li>Cycle of 1h "ON" and 15min. "OFF" at 1.05 times rated current for 100 cycles</li> <li>After above the test, 1.25 times rated current for 1h</li> </ol> </li> </ol>	The voltage drop across the fuse after the test shall not have increased by more than 10% of the value measured before test

## 7. Derating Curve



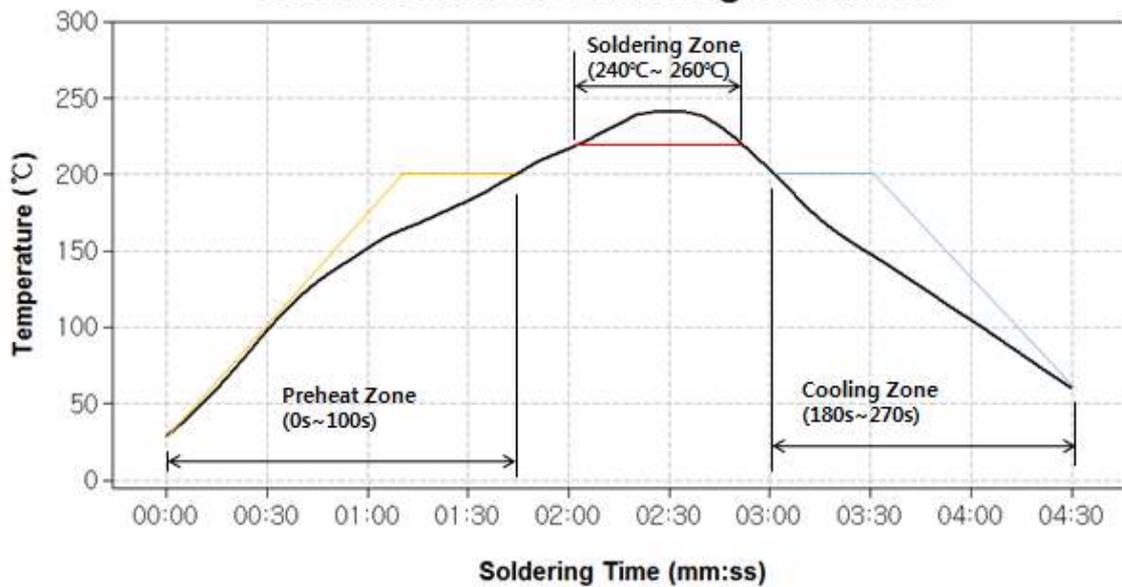
- For operation at ambient temperature in exceed  $70^{\circ}\text{C}$ , The Load shall be derated with Figure
- Normal derating should be 75% Max for all products

## 8. Time/Current Characteristics



## 9. Reflow condition

### Recommended soldering condition



Recommended Re-flow Temp & Speed  
Max 260 Degree 0.6m/Minute

## ● Certification (UL)



File E328408      Vol 1      Auth. Page 1      Issued: 2009-07-05  
 Revised: 2012-08-13

FOLLOW-UP SERVICE PROCEDURE  
 (TYPE R)

COMPONENT - FUSES, SUPPLEMENTAL  
 (JDYX2, JDYX8)

\*\*\*\*\*  
 Complementary Product Category

Manufacturer:      SEE ADDENDUM FOR MANUFACTURER LOCATIONS

Applicant:            1817204 (Party Site)  
 SM HI-TECH CO LTD  
 (100517-358)        974-5 GOYEONRI UNGCHONMYON  
                           ULJUGUN ULSAN 689-871 KOREA

Recognized Company:    1817204 (Party Site)  
 SAME AS APPLICANT  
 (100517-358)

This Follow-Up Service Procedure authorizes the above Manufacturer(s) to use the marking specified by UL LLC, or any authorized licensee of UL LLC, including the UL Contracting Party, only on products when constructed, tested and found to be in compliance with the requirements of this Follow-Up Service Procedure and in accordance with the terms of the applicable service agreement with UL Contracting Party and any applicable Service Terms. The UL Contracting Party for Follow-Up Services is listed on addendum to this Follow-Up Service Procedure ("UL Contracting Party"). UL Contracting Party and UL LLC are referred to jointly herein as "UL."

UL further defines responsibilities, duties and requirements for both Manufacturers and UL representatives in the document titled, "UL Mark Surveillance Requirements" that can be located at the following web-site: <http://www.ul.com/fus> and in the document titled "UL and Subscriber Responsibilities" that can be located at the following website: <http://www.ul.com/responsibilities>. Manufacturers without Internet access may obtain the current version of these documents from their local UL customer service representative or UL field representative. For assistance, or to obtain a paper copy of these documents or the applicable Service Terms, please contact UL's Customer Service at <http://www.ul.com/global/eng/pages/corporate/contactus>, select a location and enter your request, or call the number listed for that location.

The Applicant, the specified Manufacturer(s) and any Recognized Company in this Follow-Up Service Procedure must agree to receive Follow-Up Services from UL Contracting Party. If your applicable agreement is a Global Services Agreement ("GSA") with an effective date of January 1, 2012 or later and this Follow-Up Service Procedure is issued on or after that effective date, the Applicant, the specified Manufacturer(s) and any Recognized Company will be bound to a Service Agreement for Follow-Up Services upon the earliest by any Subscriber of use of the prescribed UL Mark, acceptance of the factory inspection, or payment of the Follow-Up Service fees which will incorporate such GSA, this Follow-Up Service Procedure and the Follow-Up Service Terms which can be accessed by clicking here: <http://www.ul.com/contracts/Terms-After-12-31-2011>. In all other events, Follow-Up Services will be governed by and incorporate the terms of your applicable service agreement and this Follow-Up Service Procedure.



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**JDYX2.E328408**  
**Fuses, Supplemental - Component**

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**Fuses, Supplemental - Component**

[See General Information for Fuses, Supplemental - Component](#)

**SM HI-TECH CO LTD**  
 174-5 GOYEONRI UNGCHONMYON  
 JLJUGUN, ULSAN 689-871 REPUBLIC OF KOREA

E328408

Cat. No.	Size	Amps	V ac/dc	Interrupting Rating (A)
N-1206 TC, N-1206 TD, N-1206 TE, N-1206 TF; N-1206 FC, N-1206 FD, N-1206 FE, N-1206 FF	1.6 x 3.2 x 0.8	0.5- 1.25	63 V dc	50
N-1206 TG, N-1206 TH, N-1206 TI, N-1206 TJ, N-1206 TK; N-1206 TL, N-1206 TM, N-1206 TO; N-1206 FG, N-1206 FH, N-1206 FI, N-1206 FJ, N-1206 FK; N-1206 FL, N-1206 FM, N-1206 FO	1.6 x 3.2 x 0.8	1.5-5	32 V dc	35
N-1206 CE, N-1206 CG, N-1206 CI, N-1206 CJ, N-1206 CK, N-1206 CL, N-1206 CM, N-1206 CN, N-1206 CO, N-1206 CP, N-1206 AE, N-1206 AG, N-1206 AI, N-1206 AJ, N-1206 AK, N-1206 AL, N-1206 AM, N-1206 AN, N-1206 AO	1.6 x 3.2 x 0.8	1 - 7	125/250Vac	35
N-0603 FD, N-0603 FE, N-0603 FF, N-0603 FG, N-0603 FH, N-0603 FI, N-0603 FJ, N-0603 FK, N-0603 FL, N-0603 FM, N-0603 FN, N-0603 FO, N-0603 FP, N-0603 FQ	1.6 x 0.8 x 0.5	0.75-5	32/63 Vdc	35
N-0603 TD, N-0603 TE, N-0603 TF, N-0603 TG, N-0603 TH, N-0603 TI, N-0603 TJ, N-0603 TK, N-0603 TL, N-0603 TM, N-0603 TN, N-0603 TO	1.6 x 0.8 x 0.5	0.75- 4.0	32/63 Vdc	35
N-6125 AE, N-6125 AI, N-6125 AK, N-6125 AM, N-6125 AO	6.1 x 2.5x 0.8	1 - 4	125/250 Vac	35
N-6125 CE, N-6125 CG, N-6125 CI, N-6125 CJ, N-6125 CK, N-6125 CL, N-6125 CM, N-6125 CN, N-6125 CO	6.1 x 2.5 x 0.8	1-5	125/250 Vac	35
N-6125 HCP, N-6125 HCQ, N-6125 HCR	6.1 x 2.5 x 0.8	6.3-10	65/125 Vdc125 Vac	35
N-6125 HCS	6.1 x 2.5 x 0.8	12	65/125 Vdc125 Vac	50
N-4524 CE, N-4524 CG, N-4524 CI, N-4524 CJ, N-4524 CK, N-4524 CL, N-4524 CM, N-4524 CN, N-4524 CO, N-4524 AE, N-4524 AG, N-4524 AI, N-4524 AJ, N-4524 AK, N-4524 AL, N-4524 AM, N-4524 AN, N-4524 AO	4.5 x 2.4 x 0.6	1 - 5	125/250 Vac	35

Marking: Company name or catalog designation. [Last Updated](#) on 2012-08-14

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# ● Certification (RoHS)



**Test Report No.** F690101/LF-CT\$AYAU12-04707

Issued Date: 2012. 08. 23 Page 2 of 4

Sample No. : AYAU12-04707.001  
 Sample Description : SMD Fuse  
 Item No./Part No. : N1206 FE63  
 Materials : N/A

**Heavy Metals**

Test Items	Unit	Test Method	MDL	Results
Cadmium (Cd)	mg/kg	With reference to IEC 62321:2008, ICP	1	N.D.
Lead (Pb)	mg/kg	With reference to IEC 62321:2008, ICP	5	N.D.
Mercury (Hg)	mg/kg	With reference to IEC 62321:2008, ICP	2	N.D.
Hexavalent Chromium (Cr VI)	mg/kg	With reference to IEC 62321:2008, UV-VIS	1	N.D.

**Flame Retardants-PBBs/PBDEs**

Test Items	Unit	Test Method	MDL	Results
Monobromobiphenyl	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Dibromobiphenyl	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Tribromobiphenyl	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Tetrabromobiphenyl	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Pentabromobiphenyl	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Hexabromobiphenyl	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Heptabromobiphenyl	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Octabromobiphenyl	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Nonabromobiphenyl	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Decabromobiphenyl	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Monobromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Dibromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Tribromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Tetrabromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Pentabromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Hexabromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Heptabromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Octabromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Nonabromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Decabromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, 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) \* = Boiling-water-extraction:  
 Negative = Absence of CrVI coating  
 Positive = Presence of CrVI coating; the detected concentration in boiling-water-extraction solution is equal or greater than 0.02 mg/kg with 50 cm<sup>2</sup> sample surface area.

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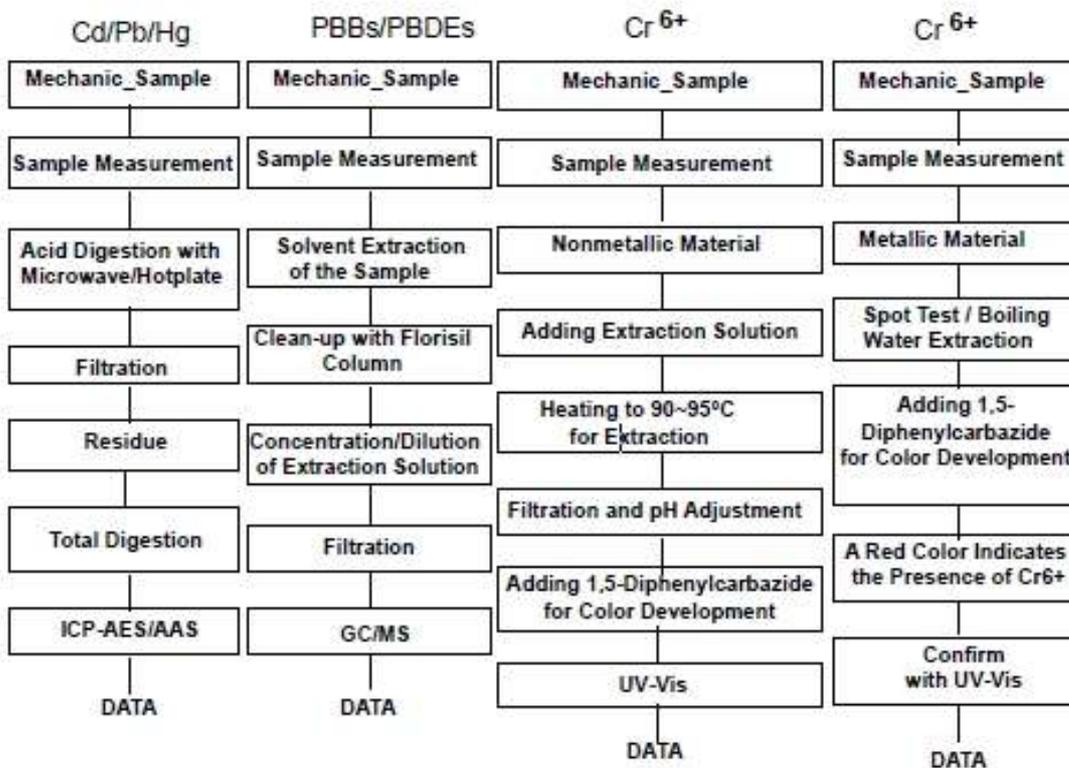




Test Report No. F690101/LF-CTSAYAU12-04707

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Testing Flow Chart for RoHS: Cd/Pb/Hg/Cr<sup>6+</sup> /PBBs&PBDEs Testing



The samples were dissolved totally by pre-conditioning method according to above flow chart for Cd,Pb,Hg.  
Section Chief : Shapless Park

\*\*\* End \*\*\*

- NOTE: (1) N.D. = Not detected, (<MDL)  
 (2) mg/kg = ppm  
 (3) MDL = Method Detection Limit  
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 (5) Negative = Undetectable / Positive = Detectable  
 (6) \*\* = Qualitative analysis (No Unit)  
 (7) \* = Boiling-water-extraction:  
 Negative = Absence of CrVI coating  
 Positive = Presence of CrVI coating; the detected concentration in boiling-water-extraction solution is equal or greater than 0.02 mg/kg with 50 cm<sup>2</sup> sample surface area.

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# ● Certification (Halogen Free-Br, Cl)



Test Report No. F690101/LF-CTSAYAU12-04935A

Issued Date: 2012. 09. 05 Page 1 of 3

To: SM HI-TECH  
16 Goyeongongdan1-gil,  
Uncheon-myun,  
Uiju-gun,  
Ulsan  
Korea

The following merchandise was submitted and identified by the client as :

SGS File No.	: AYAU12-04935A
Product Name	: SMD Fuse
Item No./Part No.	: SMD Fuse
Received Date	: 2012. 09. 03
Test Period	: 2012. 09. 04 to 2012. 09. 05
Test Results	: For further details, please refer to following page(s)
Test Performed	: SGS Korea tested the sample(s) selected by applicant with following results.
Test Comments	: By the applicant's specific request, the sampling and testing was performed only for the part indicated in the photo without disassembly.

SGS Korea Co. Ltd. / Gimhae Laboratory

Sharpless Park  
Jonadan Lee  
Taehee Kang  
Jongsir Lim/Testing Person

Thomas Hwang / Gimhae Lab. Mgr

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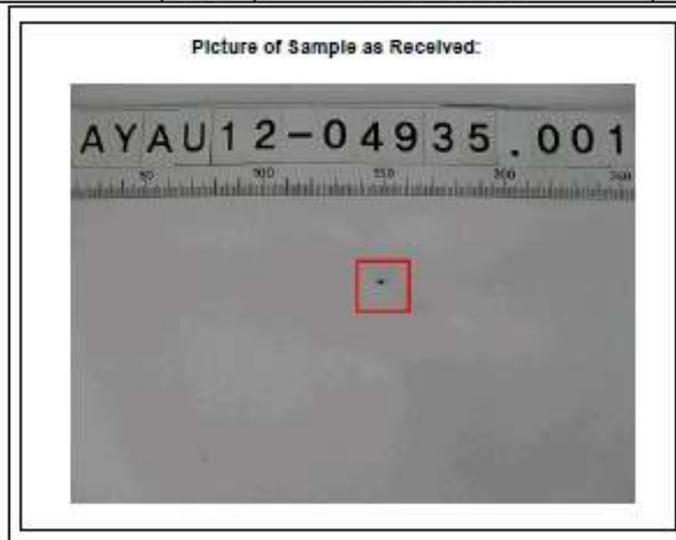
Test Report No. F690101/LF-CTSAYAU12-04935A

Issued Date: 2012. 09. 05 Page 2 of 3

Sample No. : AYAU12-04935A.001  
 Sample Description : SMD Fuse  
 Item No./Part No. : SMD Fuse  
 Materials : FR4 PCB, Copper wire, Thermosetting resin

**Halogen Contents**

Test Items	Unit	Test Method	MDL	Results
Bromine(Br)	mg/kg	EN 14582:2007 , IC	30	N.D.
Chlorine(Cl)	mg/kg	EN 14582:2007 , IC	30	180



- NOTE: (1) N.D. = Not detected.(<MDL)  
 (2) mg/kg = ppm  
 (3) MDL = Method Detection Limit  
 (4) - = No regulation  
 (5) \*\* = Qualitative analysis (No Unit)  
 (6) Negative = Undetectable / Positive = Detectable

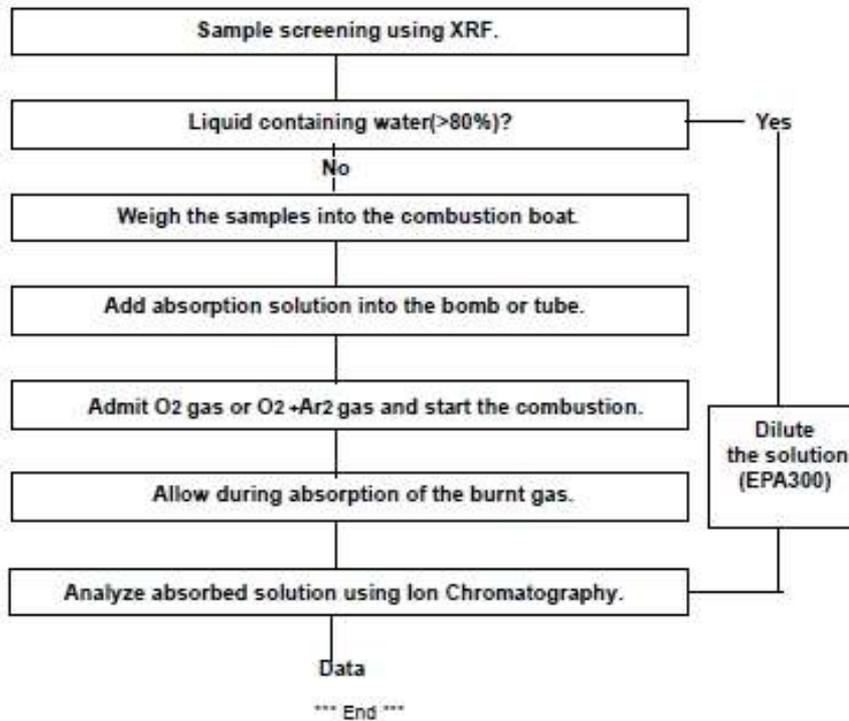
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Test Report No. F690101/LF-CTSAU12-04935A

Issued Date: 2012. 09. 05 Page 3 of 3

Flow Chart for Halogen Test



- NOTE: (1) N.D. = Not detected.(<MDL)  
 (2) mg/kg = ppm  
 (3) MDL = Method Detection Limit  
 (4) - = No regulation  
 (5) \*\* = Qualitative analysis (No Unit)  
 (6) Negative = Undetectable / Positive = Detectable

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# ● Certification (Halogen Free-F, I)



**Test Report No.** F690101/LF-CTSAYAU12-04935B

Issued Date: 2012. 09. 05 Page 1 of 3

To: **SM HI-TECH**  
16 Goyeongongdan1-gil,  
Uncheon-myun,  
Ulsan-gun,  
Ulsan  
Korea

The following merchandise was submitted and identified by the client as :

<b>SGS File No.</b>	: AYAU12-04935B
<b>Product Name</b>	: SMD Fuse
<b>Item No./Part No.</b>	: SMD Fuse
<b>Received Date</b>	: 2012. 09. 03
<b>Test Period</b>	: 2012. 09. 04 to 2012. 09. 05
<b>Test Results</b>	: For further details, please refer to following page(s)
<b>Test Performed</b>	: SGS Korea tested the sample(s) selected by applicant with following results.
<b>Test Comments</b>	: By the applicant's specific request, the sampling and testing was performed only for the part indicated in the photo without disassembly.

SGS Korea Co. Ltd. / Gimhae Laboratory

Sharpless Park  
Jonadan Lee  
Taehee Kang  
Jongsir Lim/Testing Person

Thomas Hwang / Gimhae Lab. Mgr

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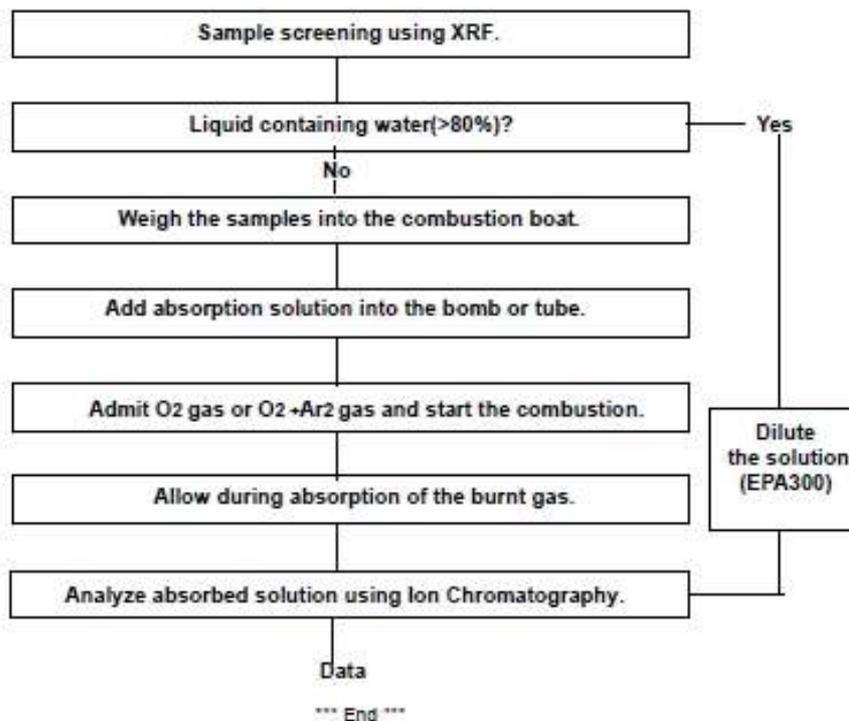




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Flow Chart for Halogen Test



- NOTE: (1) N.D. = Not detected.(<MDL)  
 (2) mg/kg = ppm  
 (3) MDL = Method Detection Limit  
 (4) - = No regulation  
 (5) \*\* = Qualitative analysis (No Unit)  
 (6) Negative = Undetectable / Positive = Detectable

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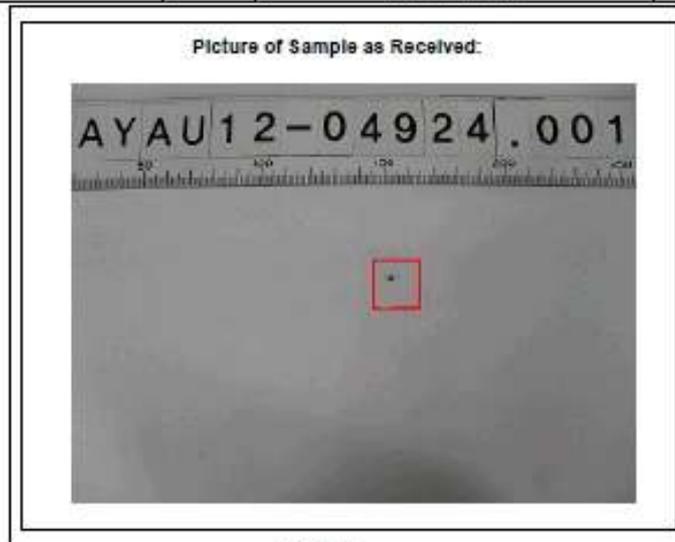
Test Report No. F690101/LF-CTSAYAU12-04924

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Sample No. : AYAU12-04924.001  
 Sample Description : SMD Fuse  
 Item No./Part No. : N/A  
 Materials : PCB, INK, Wire

**Heavy Metals**

Test Items	Unit	Test Method	MDL	Results
Antimony (Sb)	mg/kg	With reference to EPA 3052(1996), US EPA 6010B(1996), ICP	10	N.D.



- NOTE: (1) N.D. = Not detected.(<MDL)  
 (2) mg/kg = ppm  
 (3) MDL = Method Detection Limit  
 (4) - = No regulation  
 (5) \*\* = Qualitative analysis (No Unit)  
 (6) Negative = Undetectable / Positive = Detectable

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## ● Certification (REACH)



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**Test Method:**

SGS In-House method - Analyzed by ICP-OES, PLM, UVWIS, LC/MS ,GC/MS and colorimetric method

**Remarks:**

1. The chemical analysis of specified SVHC is performed by means of currently available analytical techniques against the following SVHC related documents published by ECHA:  
<http://echa.europa.eu/web/guest/candidate-list-table> (Candidate list)  
 These lists are under evaluation by ECHA and may subject to change in the future.
2. In accordance with Regulation (EC) No 1907/2006, any producer or importer of articles shall notify ECHA, in accordance with paragraph 2 of Article 7, if a substance meets the criteria in Article 57 and is identified in accordance with Article 59(1) of the Regulation, if (a) the substance is present in those articles in quantities totaling over one tonne per producer or importer per year; and (b) the substance is present in those articles above a concentration of 0.1% weight by weight (w/w).
3. Article 33 of Regulation (EC) No 1907/2006 requires supplier of an article containing a substance meeting the criteria in Article 57 and identified in accordance with Article 59(1) in a concentration above 0.1% weight by weight (w/w) shall provide the recipient of the article with sufficient information, available to the supplier, to allow safe use of the article including, as a minimum, the name of that substance in the Candidate List.
4. SGS adopts the interpretation of ECHA for SVHC in article unless indicated otherwise. Detail explanation is available at the following link:  
[http://webstage.contribute.sgs.net/corpreach/documents/SGS-CTS\\_SVHC-paper-EN-11.pdf](http://webstage.contribute.sgs.net/corpreach/documents/SGS-CTS_SVHC-paper-EN-11.pdf)
5. Test results in this report are based on the tested sample. This report refers to testing result of composite material group by equal weight proportion. The material in each composite test group may come from one article.
6. If a SVHC is found over the reporting limit, client is suggested to identify the component which contains the SVHC and the exact concentration of the SVHC by requesting further quantitative analysis from the laboratory.

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Test Result(s)

Substance Name	CAS number	EC number	Concentration (%)	Reporting Limit (%)	Classification
Alkanes, C10-13, chloro (Short Chain Chlorinated Paraffins)	85535-84-8	287-476-5	N.D.	0.05	PBT
Anthracene	120-12-7	204-371-1	N.D.	0.05	PBT
Benzyl butyl phthalate (BBP)	85-68-7	201-622-7	N.D.	0.05	Toxic for Reproduction
Bis (2-ethylhexylphthalate) (DEHP)	117-81-7	204-211-0	N.D.	0.05	Toxic for Reproduction
Bis(tri-butyltin)oxide	56-35-9	200-268-0	N.D.	0.05	PBT
Cobalt dichloride*	7646-79-9	231-589-4	N.D.	0.005	Carcinogen Toxic for Reproduction
4,4-Diaminodiphenylmethane	101-77-9	202-974-4	N.D.	0.05	Carcinogen
Diarsenic pentaoxide*	1303-28-2	215-116-9	N.D.	0.005	Carcinogen
Diarsenic trioxide*	1327-53-3	215-481-4	N.D.	0.005	Carcinogen
Dibutyl phthalate (DBP)	84-74-2	201-557-4	N.D.	0.05	Toxic for Reproduction
Hexabromocyclododecane (HBCDD) and all major diastereoisomers identified (α-HBCDD, β-HBCDD, γ-HBCDD)	25637-99-4 and 3194-55-6 (134237-51-7, 134237-50-6, 134237-52-8)	247-148-4 and 221-695-9	N.D.	0.05	PBT
Lead hydrogen arsenate*	7784-40-9	232-064-2	N.D.	0.005	Carcinogen Toxic for Reproduction
Sodium dichromate* (Sodium dichromate, dehydrate)	10588-01-9 (7789-12-0)	234-190-3	N.D.	0.005	Carcinogen Mutagen Toxic for Reproduction
5-tert-butyl-2,4,6-trinitro-m-xylene (musk xylene)	81-15-2	201-329-4	N.D.	0.05	vPvB
Triethyl arsenate*	15606-95-8	427-700-2	N.D.	0.005	Carcinogen

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Substance Name	CAS number	EC number	Concentration (%)	Reporting Limit (%)	Classification
Di-isobutyl phthalate(DIBP)	84-69-5	201-553-2	N.D.	0.05	Toxic for Reproduction
2,4-Dinitrotoluene	121-14-2	204-450-0	N.D.	0.05	Carcinogen
Tris(2-chloroethyl) phosphate	115-96-8	204-118-5	N.D.	0.05	Toxic for Reproduction
Anthracene oil	90640-80-5	292-602-7	N.D.	0.05	PBT; vPvB Carcinogen
Anthracene oil, anthracene paste; distn. Lights	91995-17-4	295-278-5	N.D.	0.05	PBT; vPvB Carcinogen Mutagen
Anthracene oil, anthracene paste, anthracene fraction	91995-15-2	295-275-9	N.D.	0.05	PBT; vPvB Carcinogen Mutagen
Anthracene oil, anthracene-low	90640-82-7	292-604-8	N.D.	0.05	PBT; vPvB Carcinogen Mutagen
Anthracene oil, anthracene paste	90640-81-6	292-603-2	N.D.	0.05	PBT; vPvB Carcinogen Mutagen
Coal tar pitch, high temperature	65996-93-2	266-028-2	N.D.	0.05	PBT; vPvB Carcinogen
Lead sulfochromate yellow (C.I. Pigment Yellow 34)*	1344-37-2	215-693-7	N.D.	0.005	Carcinogen Toxic for Reproduction
Lead chromate molybdate sulfate red (C.I. Pigment Red 104)*	12656-85-8	235-759-9	N.D.	0.005	Carcinogen Toxic for Reproduction
Lead chromate*	7758-97-6	231-846-0	N.D.	0.005	Carcinogen Toxic for Reproduction
Acrylamide	79-06-01	201-173-7	N.D.	0.05	Carcinogen Mutagen

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Substance Name	CAS number	EC number	Concentration (%)	Reporting Limit (%)	Classification
Cobalt(II) sulphate*	10124-43-3	233-334-2	N.D.	0.005	Carcinogen Toxic for Reproduction
Cobalt(II) dinitrate*	10141-05-6	233-402-1	N.D.	0.005	Carcinogen Toxic for Reproduction
Cobalt(II) carbonate*	513-79-1	208-169-4	N.D.	0.005	Carcinogen Toxic for Reproduction
Cobalt(II) diacetate*	71-48-7	200-755-8	N.D.	0.005	Carcinogen Toxic for Reproduction
2-Methoxyethanol	109-86-4	203-713-7	N.D.	0.05	Toxic for Reproduction
2-Ethoxyethanol	110-80-5	203-804-1	N.D.	0.05	Toxic for Reproduction
Chromium trioxide*	1333-82-0	215-607-8	N.D.	0.005	Carcinogen Mutagen
Acids generated from chromium trioxide and their oligomers:  Chromic acid Dichromic acid  Oligomers of chromic acid and dichromic acid	7738-94-5 13530-68-2 - -	231-801-5 236-881-5 - -	N.D.	0.005	Carcinogen
1-methyl-2-pyrrolidone	872-50-4	212-828-1	N.D.	0.05	Toxic for Reproduction
2-ethoxyethyl acetate	111-15-9	203-839-2	N.D.	0.05	Toxic for Reproduction
1,2-benzenedicarboxylic acid, di-C6-8-branched alkyl esters, C7-rich	71888-89-6	276-158-1	N.D.	0.05	Toxic for Reproduction
1,2-benzenedicarboxylic acid, di-C7-11-branched and linear alkyl esters	68515-42-4	271-084-6	N.D.	0.05	Toxic for Reproduction
1,2,3-trichloropropane	96-18-4	202-486-1	N.D.	0.05	Carcinogen Toxic for Reproduction
Hydrazine	7803-57-8 302-01-2	206-114-9	N.D.	0.05	Carcinogen
Strontium chromate*	7789-06-2	232-142-6	N.D.	0.005	Carcinogen

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Substance Name	CAS number	EC number	Concentration (%)	Reporting Limit (%)	Classification
1,2-Dichloroethane	107-06-2	203-458-1	N.D.	0.05	Carcinogenic
2,2'-dichloro-4,4'-methylenedianiline (MOCA)	101-14-4	202-918-9	N.D.	0.05	Carcinogenic
2-Methoxyaniline o-Anisidine	90-04-0	201-963-1	N.D.	0.05	Carcinogenic
4-(1,1,3,3-tetramethylbutyl)phenol, (4-tert-Octylphenol)	140-66-9	205-426-2	N.D.	0.05	Equivalent level of concern having probable serious effects to the environment
Aluminosilicate Refractory Ceramic Fibres* (RCF)	650-017-00-8 (Index no.)	-	N.D.	0.005	Carcinogenic
Arsenic acid*	7778-39-4	231-901-9	N.D.	0.005	Carcinogenic
Bis(2-methoxyethyl) ether	111-96-6	203-924-4	N.D.	0.05	Toxic for reproduction
Bis(2-methoxyethyl) phthalate	117-82-8	204-212-6	N.D.	0.05	Toxic for reproduction
Calcium arsenate*	7778-44-1	231-904-5	N.D.	0.005	Carcinogenic
Dichromium tris(chromate)*	24613-89-6	246-356-2	N.D.	0.005	Carcinogenic
Formaldehyde, oligomeric reaction products with aniline (technical MDA)	25214-70-4	500-036-1	N.D.	0.05	Carcinogenic
Lead diazide*	13424-46-9	236-542-1	N.D.	0.005	Toxic for reproduction
Lead dipicrate*	6477-64-1	229-335-2	N.D.	0.005	Toxic for reproduction
Lead styphnate*	15245-44-0	239-290-2	N.D.	0.005	Toxic for reproduction
N,N-dimethylacetamide (DMAC)	127-19-5	204-826-4	N.D.	0.05	Toxic for reproduction
Pentazinc chromate octahydroxide*	49663-84-5	256-418-0	N.D.	0.005	Carcinogenic
Phenolphthalein	77-09-8	201-004-7	N.D.	0.05	Carcinogenic
Potassium hydroxyoctaoxodizincatedichromate*	11103-86-9	234-329-8	N.D.	0.005	Carcinogenic
Trilead diarsenate*	3687-31-8	222-979-5	N.D.	0.005	Carcinogenic Toxic for reproduction
Zirconia Aluminosilicate Refractory Ceramic Fibres (Zr-RCF)*	650-017-00-8 (Index no.)	-	N.D.	0.005	Carcinogenic

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Substance Name	CAS number	EC number	Concentration (%)	Reporting Limit (%)	Classification
1,2-bis(2-methoxyethoxy)ethane (TEGDME; triglyme)	112-49-2	203-977-3	N.D.	0.05	Toxic for reproduction
1,2-dimethoxyethane;ethylene glycol dimethyl ether (EGDME)	110-71-4	203-794-9	N.D.	0.05	Toxic for reproduction
Diboron trioxide*	1303-86-2	215-125-8	NA.	0.005	Toxic for reproduction
Formamide	75-12-7	200-842-0	N.D.	0.05	Toxic for reproduction
Lead(II) bis(methanesulfonate)*	17570-76-2	401-750-5	N.D.	0.005	Toxic for reproduction
TGIC(1,3,5-tris(oxiranylmethyl)-1,3,5-triazine-2,4,6-(1H,3H,5H)-trione)	2451-62-9	219-514-3	N.D.	0.05	Mutagenic
β-TGIC (1,3,5-tris[[2S and 2R]-2,3-epoxypropyl]-1,3,5-triazine-2,4,6-(1H,3H,5H)-trione)**	59853-74-6	423-400-0	N.D.	0.05	Mutagenic
4,4'-bis(dimethylamino)benzophenone (Michler's ketone)	90-94-8	202-027-5	N.D.	0.05	Carcinogenic
N,N,N',N'-tetramethyl-4,4'-methylenedianiline (Michler's base)	101-81-1	202-959-2	N.D.	0.05	Carcinogenic
[4-[4,4'-bis(dimethylamino)benzhydylidene)cyclohexa-2,5-dien-1-ylidene]dimethylammonium chloride (C.I. Basic Violet 3)	548-62-9	208-953-8	N.D.	0.05	Carcinogenic
[4-[[4-anilino-1-naphthyl][4-(dimethylamino)phenyl]methylene]cyclohexa-2,5-dien-1-ylidene]dimethylammonium chloride (C.I. Basic Blue 26)	2580-56-5	219-943-8	N.D.	0.05	Carcinogenic
0,0-Bis[4-(dimethylamino)phenyl]-4(phenylamino)naphthalene-1-methanol (C.I. Solvent Blue 4)	6786-83-0	229-851-8	N.D.	0.05	Carcinogenic
4,4'-bis(dimethylamino)-4'-(methylamino)trityl alcohol	581-41-1	209-218-2	N.D.	0.05	Carcinogenic

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**Appendix A**

<b>Classification</b>	<b>Definition under 67/548/EEC and Regulation (EC) No 1907/2006</b>
Carcinogen Category 1:	<u>Substances known to be carcinogenic to man.</u> There is sufficient evidence to establish a causal association between human exposure to a substance and the development of cancer.
Carcinogen Category 2:	<u>Substances which should be regarded as if they are carcinogenic to man.</u> There is sufficient evidence to provide a strong presumption that human exposure to a substance may result in the development of cancer. Generally on the basis of: - appropriate long-term animal studies - other relevant information.
Mutagen Category 1:	<u>Substances known to be mutagenic to man.</u> There is sufficient evidence to establish a causal association between human exposure to a substance and heritable genetic damage.
Mutagen Category 2:	<u>Substances which should be regarded as if they are mutagenic to man.</u> There is sufficient evidence to provide a strong presumption that human exposure to the substance may result in the development of heritable genetic damage, generally on the basis of: - appropriate animal studies, - other relevant information.
Toxic to Reproduction Category 1:	<u>Substances known to impair fertility in humans.</u> There is sufficient evidence to establish a causal relationship between human exposure to the substance and impaired fertility. <u>Substances known to cause developmental toxicity in humans.</u> There is sufficient evidence to establish a causal relationship between human exposure to the substance and subsequent developmental toxic effects in the progeny.
Toxic to Reproduction Category 2:	<u>Substances which should be regarded as if they impair fertility in humans.</u> There is sufficient evidence to provide a strong presumption that human exposure to the substance may result in impaired fertility on the basis of: - clear evidence in animal studies of impaired fertility in the absence of toxic effects, or, evidence of impaired fertility occurring at around the same dose levels as other toxic effects but which is not a secondary nonspecific consequence of the other toxic effects, - other relevant information. <u>Substances which should be regarded as if they cause developmental toxicity to humans.</u> There is sufficient evidence to provide a strong presumption that human exposure to the substance may result in developmental toxicity, generally on the basis of: - clear results in appropriate animal studies where effects have been observed in the absence of signs of marked maternal toxicity, or at around the same dose levels as other toxic effects but which are not a secondary non-specific consequence of the other toxic effects, - other relevant information.
PBT & vPvB:	Substances which are persistent, bioaccumulative and toxic (PBT) or very persistent and very bioaccumulative (vPvB) pose a particular challenge to the chemicals safety management. For these substances a "safe" concentration in the environment cannot be established with sufficient reliability.

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