

Test Report (SVHC)

No. : CR/2010/C0099 Date : 2010/12/31 Page : 1 of 15

JAZZ SEMICONDUCTOR
4321 JAMBOREE RD., NEWPORT BEACH, CA 92660



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

Sample Description : SEMICONDUCTOR WAFERS
Style/Item No. : 0.35 MICRON TECHNOLOGY TOWER SEMICONDUCTOR. 150mm WAFER
Sample Receiving Date : 2010/12/27
Testing Period : 2010/12/27 TO 2010/12/31

=====
Test Requested : Forty-six (46) Substances of Very High Concern (SVHC) screening. SVHC candidate list based on the publication by European Chemicals Agency (ECHA) on 2010 December 03, regarding Regulation (EC) No 1907/2006 concerning the REACH.

Test Method : Please refer to next page(s).

Test Result(s) : Please refer to next page(s).

Summary : According to the specified scope and analytical technique, concentrations of all SVHC are <0.1% in the submitted sample(s).



Chenyu Kung / Operation Manager
Signed for and on behalf of
SGS TAIWAN LTD.
Chemical Laboratory – Taipei

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Test Sample : WAFER

Test Method : SGS In-House method-RSTS-EE-SVHC-003, RSTS-EE-SVHC-004. Analyzed by ICP-AES, UV-VIS, GC/MS, LC/MS and GC/FPD.

Remark:

1. The chemical analysis of 46 SVHC is performed by means of currently available analytical techniques against the list published by ECHA on 2010 December 03. This list is under evaluation by ECHA and may subject to change in the future.

Refer to: http://echa.europa.eu/news/pr/201012/pr_10_24_msc_20101203_en.asp

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.
4. 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.

Test Result(s)

Substance Name	Unit	Concentration of Article	RL	Classification
Anthracene (CAS No.: 000120-12-7)	%	n.d.	0.005	PBT
4,4' - Diaminodiphenylmethane (CAS No.: 000101-77-9)	%	n.d.	0.005	Carcinogen Category 2
DBP (Dibutyl phthalate) (CAS No.: 000084-74-2)	%	n.d.	0.005	Toxic to Reproduction Category 2
BBP (Benzyl butyl phthalate) (CAS No.: 000085-68-7)	%	n.d.	0.005	Toxic to Reproduction Category 2
DEHP (Di- (2-ethylhexyl) phthalate) (CAS No.: 000117-81-7)	%	n.d.	0.005	Toxic to Reproduction Category 2

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Substance Name	Unit	Concentration of Article	RL	Classification
5-tert-butyl-2,4,6-trinitro- m-xylene (Musk Xylene) (CAS No.: 000081-15-2)	%	n.d.	0.005	vPvB
Hexabromocyclododecane (HBCDD) and all major diastereoisomers identified (α -HBCDD, β - HBCDD, γ - HBCDD) (CAS No.: 025637-99-4 and 003194-55-6 (134237-51-7, 134237-50-6, 134237-52-8))	%	n.d.	0.005	PBT
Alkanes, C10-13, chloro (Short Chain Chlorinated Paraffins) (CAS No.: 085535-84-8)	%	n.d.	0.01	PBT
Bis(tributyltin)oxide*** (CAS No.: 000056-35-9)	%	n.d.	-	PBT
Cobalt dichloride (CAS No.: 007646-79-9)	%	n.d.	0.05	Carcinogen Category 2
Diarsenic pentaoxide*** (CAS No.: 001303-28-2)	%	n.d.	-	Carcinogen Category 1
Diarsenic trioxide*** (CAS No.: 001327-53-3)	%	n.d.	-	Carcinogen Category 1
Triethyl arsenate*** (CAS No.: 015606-95-8)	%	n.d.	-	Carcinogen Category 1
Lead hydrogen arsenate*** (CAS No.: 007784-40-9)	%	n.d.	-	Carcinogen Category 1; Toxic to Reproduction Category 1
Sodium chromate*** (CAS No.: 007775-11-3)	%	n.d.	-	Carcinogenic Category 2; Mutagenic Category 2; Toxic to Reproduction Category 2
Ammonium dichromate*** (CAS No.: 007789-09-5)	%	n.d.	-	Carcinogenic Category 2; Mutagenic Category 2; Toxic to Reproduction Category 2
Potassium dichromate*** (CAS No.: 007778-50-9)	%	n.d.	-	Carcinogenic Category 2; Mutagenic Category 2; Toxic to Reproduction Category 2
Potassium chromate*** (CAS No.: 007789-00-6)	%	n.d.	-	Carcinogenic Category 2; Mutagenic Category 2

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Substance Name	Unit	Concentration of Article	RL	Classification
Sodium dichromate*** (CAS No.: 010588-01-9(*))	%	n.d.	-	Carcinogen Category 2; Mutagen Category 2; Toxic to Reproduction Category 2
Chromium trioxide*** (CAS No.: 001333-82-0)	%	n.d.	-	Carcinogen Category 1; Mutagen Category 2
Acids generated from chromium trioxide and their oligomers: Chromic acid*** (CAS No.: 007738-94-5)	%	n.d.	-	Carcinogen Category 2
Acids generated from chromium trioxide and their oligomers: Dichromic acid*** (CAS No.: 013530-68-2)	%	n.d.	-	Carcinogen Category 2
Acids generated from chromium trioxide and their oligomers: Oligomers of chromic acid and dichromic acid (Note 9)	%	n.d.	-	Carcinogen Category 2
Anthracene oil (CAS No.: 090640-80-5) (**)	%	n.d.	0.05	PBT; vPvB; Carcinogen Category 2
Anthracene oil, anthracene paste, distn. Lights (CAS No.: 091995-17-4) (**)	%	n.d.	0.05	PBT; vPvB; Carcinogen Category 2; Mutagen Category 2
Anthracene oil, anthracene paste, anthracene fraction (CAS No.: 091995-15-2) (**)	%	n.d.	0.05	PBT; vPvB; Carcinogen Category 2; Mutagen Category 2
Anthracene oil, anthracene-low (CAS No.: 090640-82-7) (**)	%	n.d.	0.05	PBT; vPvB; Carcinogen Category 2; Mutagen Category 2
Anthracene oil, anthracene paste (CAS No.: 090640-81-6) (**)	%	n.d.	0.05	PBT; vPvB; Carcinogen Category 2; Mutagen Category 2
Pitch, coal tar, high-temp. (CAS No.: 065996-93-2) (**)	%	n.d.	0.05	PBT; vPvB; Carcinogen Category 2
Aluminosilicate, Refractory Ceramic Fibres	%	n.d.	0.05	Carcinogen Category 2
Zirconia Aluminosilicate, Refractory Ceramic Fibres	%	n.d.	0.05	Carcinogen Category 2
DIBP (Di-isobutyl phthalate) (CAS No.: 000084-69-5)	%	n.d.	0.005	Toxic to Reproduction Category 2

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Substance Name	Unit	Concentration of Article	RL	Classification
2,4-Dinitrotoluene (CAS No.: 000121-14-2)	%	n.d.	0.005	Carcinogen Category 2
Tris(2-chloroethyl) phosphate (TCEP) (CAS No.: 000115-96-8)	%	n.d.	0.005	Toxic to Reproduction Category 2
Lead chromate (CAS No.: 007758-97-6)	%	n.d.	0.01	Carcinogen Category 2; Toxic to Reproduction Category 1
Lead chromate molybdate sulphate red (C.I. Pigment Red 104) (CAS No.: 012656-85-8)	%	n.d.	0.01	Carcinogen Category 2; Toxic to Reproduction Category 1
Lead sulfochromate yellow (C.I. Pigment Yellow 34) (CAS No.: 001344-37-2)	%	n.d.	0.01	Carcinogen Category 2; Toxic to Reproduction Category 1
Acrylamide (CAS No.: 000079-06-1)	%	n.d.	0.005	Carcinogen Category 2; Mutagen Category 2
Boric acid*** (CAS No.: 010043-35-3; 011113-50-1)	%	n.d.	-	Toxic to Reproduction Category 2
Disodium tetraborate, anhydrous*** (CAS No.: 001303-96-4, 001330-43-4, 012179-04-3)	%	n.d.	-	Toxic to Reproduction Category 2
Tetraboron disodium heptaoxide, hydrate (CAS No.: 012267-73-1) (Note 10)	%	n.d.	-	Toxic to Reproduction Category 2
Trichloroethylene (CAS No.: 000079-01-6)	%	n.d.	0.005	Carcinogenic Category 2
Cobalt(II) sulphate*** (CAS No.: 010124-43-3)	%	n.d.	-	Carcinogen Category 2; Toxic to Reproduction Category 2
Cobalt(II) dinitrate*** (CAS No.: 010141-05-6)	%	n.d.	-	Carcinogen Category 2; Toxic to Reproduction Category 2
Cobalt(II) carbonate*** (CAS No.: 000513-79-1)	%	n.d.	-	Carcinogen Category 2; Toxic to Reproduction Category 2
Cobalt(II) diacetate*** (CAS No.: 000071-48-7)	%	n.d.	-	Carcinogen Category 2; Toxic to Reproduction Category 2
Ethylene glycol monomethyl ether (CAS No.: 000109-86-4)	%	n.d.	0.001	Toxic to Reproduction Category 2
Ethylene glycol monoethyl ether (CAS No.: 000110-80-5)	%	n.d.	0.001	Toxic to Reproduction Category 2

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Note :

1. mg/kg = ppm; 0.1wt% = 1000ppm
2. n.d.= not detected = below Reporting Limit
3. RL = Reporting Limit
4. Definition of classification is listed in Appendix A of this report in accordance with 67/548/EEC and Regulation (EC) No 1907/2006.
5. Please refer to Appendix C to find the concentration and the weight of each tested unit.
6. " - " = Not Regulated
7. (*): conc. of Sodium dichromate dihydrate (CAS No.: 007789-12-0) = conc. of sodium dichromate × 1.1374
8. (**): The concentrations of above-mentioned mixtures are evaluated per the gained composition rate between the selected marks and the mixtures.
9. Oligomers of chromic acid and dichromic acid : since the oligomers are made of the unknown amount of chromic acid or dichromic acid that results in no fixed molecular weight, therefore the monomer of chromic acid or dichromic acid is relevant and considered.
10. Tetraboron disodium heptaoxide, hydrate: Only anhydrous form of disodium tetraborate is relevant and considered according to ECHA explanation (Ref no.: INC 000000032519).
11. ***: The substance was calculated by the test results of Tributyl Tin or element (Ex. Arsenic, Lead, Cr(VI), Boron or Cobalt respectively).

$$AX = A \times F$$

AX	A	F
Diarsenic pentaoxide	Arsenic	1.5339
Diarsenic trioxide		1.3203
Triethyl arsenate		3.0179
Lead hydrogen arsenate		4.6332
	Lead	1.6753
Bis(tributyltin)oxide	Tributyl Tin (TBT)	1.0276

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AX = A × F

AX	A	F
Sodium dichromate	Hexavalent Chromium Cr(VI)	2.5192
Sodium chromate		3.1151
Ammonium dichromate		2.4239
Potassium dichromate		2.8289
Potassium chromate		3.7347
Chromium trioxide		1.9231
Chromic acid		2.2696
Dichromic acid		2.0963
Boric acid		Boron (B)
Disodium tetraborate, anhydrous	4.6531	
Disodium tetraborate, pentahydrate	6.7361	
Disodium tetraborate, decahydrate	8.8191	
Cobalt(II) sulphate	Cobalt	2.63
Cobalt(II) dinitrate		3.1042
Cobalt(II) carbonate		2.0183
Cobalt(II) diacetate		3.0038

Regarding lead hydrogen arsenate lead and arsenic are tested and used for the calculation of the separated concentration of lead hydrogen arsenate. The final concentration of lead hydrogen arsenate for the report uses the minimum value of above-mentioned two concentration of lead hydrogen arsenate.

The test result is given as:

Substance Name	Unit	Concentration of Article	RL
Tributyl Tin (TBT) (CAS No.: 000688-73-3)	%	n.d.	0.005
Arsenic (As)	%	n.d.	0.005
Lead (Pb)	%	n.d.	0.005
Hexavalent Chromium Cr(VI)	%	n.d.	0.005
Boron (B)	%	n.d.	0.005
Cobalt (Co)	%	n.d.	0.005

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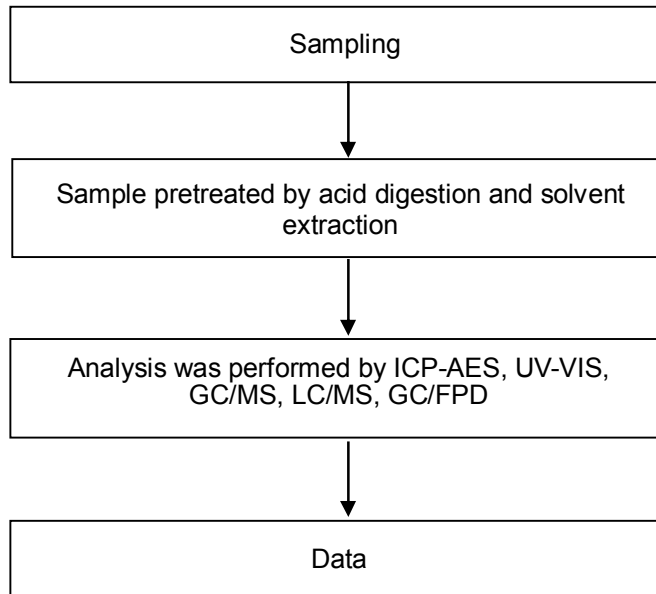
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Analytical flow chart of SVHC

- 1) Name of the person who made measurement: Roman Wong / Lydia Fu / Stacy Chou / Climbgreat Yang
- 2) Name of the person in charge of measurement: Chenyu Kung

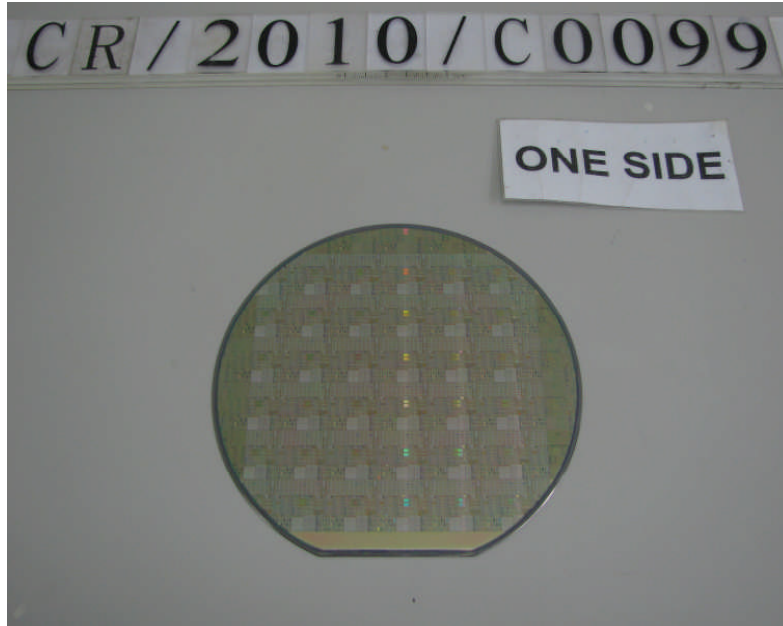


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【Appendix A】

Classification	Definition under 67/548/EEC and Regulation (EC) No 1907/2006
Carcinogen Category 1:	Substances known to be carcinogenic to man. There is sufficient evidence to establish a causal association between human exposure to a substance and the development of cancer.
Carcinogen Category 2:	Substances which should be regarded as if they are carcinogenic to man. 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:	Substances known to be mutagenic to man. There is sufficient evidence to establish a causal association between human exposure to a substance and heritable genetic damage.
Mutagen Category 2:	Substances which should be regarded as if they are mutagenic to man. 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:	Substances known to impair fertility in humans. There is sufficient evidence to establish a causal relationship between human exposure to the substance and impaired fertility. Substances known to cause developmental toxicity in humans. 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:	Substances which should be regarded as if they impair fertility in humans. 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. Substances which should be regarded as if they cause developmental toxicity to humans. 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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【Appendix B】

SVHC SURVEY FORM			
Company Name	JAZZ SEMICONDUCTOR		
Product Name	SEMICONDUCTOR WAFERS		
Product/Sampling weight	27.6 g		
Report No.	CR/2010/C0099		
Substance identification			
Substance name	Concentration of Article (%)	weight (mg)	providing information about safe use according to Article 33 is necessary
Anthracene	n.d.	N/A	No
4,4' - Diaminodiphenylmethane	n.d.	N/A	No
DBP (Dibutyl phthalate)	n.d.	N/A	No
BBP (Benzyl butyl phthalate)	n.d.	N/A	No
DEHP (Di- (2-ethylhexyl) phthalate)	n.d.	N/A	No
5-tert-butyl-2,4,6-trinitro- m-xylene (Musk Xylene)	n.d.	N/A	No
Hexabromocyclododecane (HBCDD) and all major diastereoisomers identified (α - HBCDD, β - HBCDD, γ - HBCDD)	n.d.	N/A	No
Alkanes, C10-13, chloro (Short Chain Chlorinated Paraffins)	n.d.	N/A	No
Bis(tributyltin)oxide	n.d.	N/A	No
Cobalt dichloride	n.d.	N/A	No
Diarsenic pentaoxide	n.d.	N/A	No
Diarsenic trioxide	n.d.	N/A	No
Triethyl arsenate	n.d.	N/A	No
Lead hydrogen arsenate	n.d.	N/A	No
Sodium chromate	n.d.	N/A	No
Ammonium dichromate	n.d.	N/A	No
Potassium dichromate	n.d.	N/A	No
Potassium chromate	n.d.	N/A	No
Sodium dichromate	n.d.	N/A	No
Chromium trioxide	n.d.	N/A	No

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Substance name	Concentration of Article (%)	weight (mg)	providing information about safe use according to Article 33 is necessary
Acids generated from chromium trioxide and their oligomers: Chromic acid	n.d.	N/A	No
Acids generated from chromium trioxide and their oligomers: Dichromic acid	n.d.	N/A	No
Acids generated from chromium trioxide and their oligomers: Oligomers of chromic acid and dichromic acid	n.d.	N/A	No
Anthracene oil	n.d.	N/A	No
Anthracene oil, anthracene paste, distn. Lights	n.d.	N/A	No
Anthracene oil, anthracene paste, anthracene fraction	n.d.	N/A	No
Anthracene oil, anthracene-low	n.d.	N/A	No
Anthracene oil, anthracene paste	n.d.	N/A	No
Pitch, coal tar, high-temp.	n.d.	N/A	No
Aluminosilicate, Refractory Ceramic Fibres	n.d.	N/A	No
Zirconia Aluminosilicate, Refractory Ceramic Fibres	n.d.	N/A	No
DIBP (Di-isobutyl phthalate)	n.d.	N/A	No
2,4-Dinitrotoluene	n.d.	N/A	No
Tris(2-chloroethyl) phosphate (TCEP)	n.d.	N/A	No
Lead chromate	n.d.	N/A	No
Lead chromate molybdate sulphate red (C.I. Pigment Red 104)	n.d.	N/A	No
Lead sulfochromate yellow (C.I. Pigment Yellow 34)	n.d.	N/A	No
Acrylamide	n.d.	N/A	No
Boric acid	n.d.	N/A	No
Disodium tetraborate, anhydrous	n.d.	N/A	No
Tetraboron disodium heptaoxide, hydrate	n.d.	N/A	No
Trichloroethylene	n.d.	N/A	No
Cobalt(II) sulphate	n.d.	N/A	No
Cobalt(II) dinitrate	n.d.	N/A	No
Cobalt(II) carbonate	n.d.	N/A	No
Cobalt(II) diacetate	n.d.	N/A	No
Ethylene glycol monomethyl ether	n.d.	N/A	No

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Substance name	Concentration of Article (%)	weight (mg)	providing information about safe use according to Article 33 is necessary
Ethylene glycol monoethyl ether	n.d.	N/A	No

Note: N/A = Non-Available

【Appendix C】

Tested Unit No.1 : WAFER (Weight: 27.6g)

Substance Name	Concentration (%)	RL	Sample picture
Anthracene	n.d.	0.005	
4,4' - Diaminodiphenylmethane	n.d.	0.005	
DBP (Dibutyl phthalate)	n.d.	0.005	
BBP (Benzyl butyl phthalate)	n.d.	0.005	
DEHP (Di- (2-ethylhexyl) phthalate)	n.d.	0.005	
5-tert-butyl-2,4,6-trinitro- m-xylene (Musk Xylene)	n.d.	0.005	
Hexabromocyclododecane (HBCDD) and all major diastereoisomers identified (α - HBCDD, β - HBCDD, γ - HBCDD)	n.d.	0.005	
Alkanes, C10-13, chloro (Short Chain Chlorinated Paraffins)	n.d.	0.01	
Tributyl Tin (TBT)	n.d.	0.005	
Bis(tributyltin)oxide	n.d.	-	
Cobalt dichloride	n.d.	0.05	
Arsenic (As)	n.d.	0.005	
Diarsenic pentaoxide	n.d.	-	
Diarsenic trioxide	n.d.	-	
Triethyl arsenate	n.d.	-	
Lead (Pb)	n.d.	0.005	
Lead hydrogen arsenate	n.d.	-	
Hexavalent Chromium Cr(VI)	n.d.	0.005	
Sodium chromate	n.d.	-	
Ammonium dichromate	n.d.	-	

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Substance Name	Concentration (%)	RL	Sample picture	
Potassium dichromate	n.d.	-		
Potassium chromate	n.d.	-		
Sodium dichromate	n.d.	-		
Chromium trioxide	n.d.	-		
Acids generated from chromium trioxide and their oligomers: Chromic acid	n.d.	-		
Acids generated from chromium trioxide and their oligomers: Dichromic acid	n.d.	-		
Acids generated from chromium trioxide and their oligomers: Oligomers of chromic acid and dichromic acid	n.d.	-		
Anthracene oil	n.d.	0.05		
Anthracene oil, anthracene paste, distn. Lights	n.d.	0.05		
Anthracene oil, anthracene paste, anthracene fraction	n.d.	0.05		
Anthracene oil, anthracene-low	n.d.	0.05		
Anthracene oil, anthracene paste	n.d.	0.05		
Pitch, coal tar, high-temp.	n.d.	0.05		
Aluminosilicate, Refractory Ceramic Fibres	n.d.	0.05		
Zirconia Aluminosilicate, Refractory Ceramic Fibres	n.d.	0.05		
DIBP (Di-isobutyl phthalate)	n.d.	0.005		
2,4-Dinitrotoluene	n.d.	0.005		
Tris(2-chloroethyl) phosphate (TCEP)	n.d.	0.005		
Lead chromate	n.d.	0.01		
Lead chromate molybdate sulphate red (C.I. Pigment Red 104)	n.d.	0.01		
Lead sulfochromate yellow (C.I. Pigment Yellow 34)	n.d.	0.01		
Acrylamide	n.d.	0.005		
Boron (B)	n.d.	0.005		
Boric acid	n.d.	-		
Disodium tetraborate, anhydrous	n.d.	-		
Tetraboron disodium heptaoxide, hydrate	n.d.	-		
Trichloroethylene	n.d.	0.005		
Cobalt (Co)	n.d.	0.005		

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Substance Name	Concentration (%)	RL	Sample picture
Cobalt(II) sulphate	n.d.	-	
Cobalt(II) dinitrate	n.d.	-	
Cobalt(II) carbonate	n.d.	-	
Cobalt(II) diacetate	n.d.	-	
Ethylene glycol monomethyl ether	n.d.	0.001	
Ethylene glycol monoethyl ether	n.d.	0.001	

- Note:**
- The average concentration of a whole article can be calculated per the following formula.

$$C_{Average\ of\ Article} = \frac{\sum_{i=1}^n (C_i * W_i)}{\sum_{i=1}^n (W_i)}$$

C_i : Concentration of a SVHC item in each tested unit

W_i : Weight of each tested unit

C_{Average of Article} : Average concentration of a whole article

** End of Report **

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