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Determination of leachable contaminants according to Semi Specification F40/ 57

Sample received: July 27th, 2017 / ATU-Job-ID: # 1707 078 /
Analyst: M. Reutz

1. Subject / Sample description

For the determination of water-leachable contaminants we received 2 Titan discs, 1 stainless steel disc and 1 PTFE-Carbon-Cap. Specific test methods and required performance specification limits are described in SEMI F40 and SEMI 57 “Provisional specification for polymer components used in ultrapure water and liquid chemical distribution systems”.

Tab.1: Sample name and sample parameters

Sample description	Internal Sample number	Surface area [cm²]	Test Method Accord. F40/F57
Titan Disc Grade 5, 19x2 mm	1707 078 – **1**	6,645	Leachable Inorganics Leachable TOC
Titan Disc Grade 5 anodized, 19x2 mm	1707 078 – **2**	6,645	
Stainless Steel Disc 1.4435, 30x2 mm	1707 078 – **3**	12,756	
PTFE-Carbon-Cap	1707 078 – **4**	145,6019	

2. Preparation

All sample preparation steps were carried out in a class 1 cleanbench, located in a class 1000 cleanroom, in accordance to SEMI F40/F57. The content of leachable contaminants in the UPW (ultrapure water), which was used as extraction liquid, were below the SEMI F63 Spec. The conductivity of the UPW was 18.2 megohm-cm, the TOC level was approximately 2 ppb.

Nitric acid (HNO_3) which was used for dilution was of XLSI quality.

The samples were put in cleaned PFA-container, filled and drained with UPW 10 times. After each fill, the UPW was left for two minutes before draining. The 11^{th} fill was used for the test. After 7 days at 85°C the test-fluid (UPW) was analyzed for leachables.

Tab.2: preparation parameters

Test Method	Soaking solution	Soaking parameters
Leachable Inorganics	UPW	7 days at 85°C
Leachable TOC	UPW	7 days at 85°C

3. Analysis

3.1 Leachable Inorganics

The analysis was done by inductively coupled plasma-mass spectrometry [ICP-MS Agilent 7500 cs], Quantification was carried out by external calibration, using NIST reference and traceable standards, diluted in UPW.

3.2 Leachable TOC

The analysis is done with thin film UV-oxidation, using NIST reference and traceable standards for calibration.

4. Analysis results

Tab.3: results in µg/m²

Parameter	Titan Disc Grade 5, 19x2 mm	Titan Disc Grade 5 anodized, 19x2 mm	Stainless Steel Disc 1.4435, 30x2 mm	RL	Spec.
Al	280	13,1	138	0,50	10
Ba	19,8	2,6	8,9	0,25	15
B	8,5	6,6	14,7	1,00	30
Ca	512	607	162	0,50	20
Cr	<	<	0,48	0,25	1
Cu	<	<	0,92	0,25	15
Fe	28,7	0,68	41,3	0,25	5
Pb	<	<	0,12	0,05	1
Li	0,91	0,17	0,32	0,05	2
Mg	25,4	74	4,7	0,25	5
Mn	11,1	15,9	2890	0,05	5
Ni	45	57	1510	0,25	1
K	115	276	19,8	0,25	15
Na	79	4890	19,6	0,25	15
Sr	10,0	4,2	2,2	0,05	0,5
Zn	9,9	20,1	72	0,25	10
TOC	680	<	480	250	60.000

The results written in red are off Spec. RL = reported limit

Tab.4: results in µg/m²

Parameter	PTFE-Carbon-Cap	RL	Spec.
Al	1,5	0,2	10
Ba	<	0,1	15
B	1,7	0,5	30
Ca	5,2	0,2	20
Cr	<	0,1	1
Cu	0,46	0,1	15
Fe	0,64	0,1	5
Pb	<	0,05	1
Li	<	0,05	2
Mg	0,72	0,1	5
Mn	<	0,05	5
Ni	0,10	0,1	1
K	3,0	0,1	15
Na	5,3	0,1	15
Sr	<	0,05	0,5
Zn	1,3	0,1	10
TOC	4770	100	60.000

The results written in red are off Spec. RL = reported limit

With best regards

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signed: M. Reutz
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