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Test Report
Nr. 452'883/1

Your research and test laboratory

Test Assignment:	**Leaching Test according to SEMI F40**
Test Objects:	Flow Sensors LFS-04-U L04T94004
Client Ref.:	Th. Eberle (Levitronix GmbH)
Order dated of:	May 25, 2009
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Attachments:	-

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Accreditation
STS 137
ISO / IEC 17'025

1. Sample description and instructions from the customer

One sample labelled with "LFS-04-U L04T94004" was delivered by the customer. The test object was a flow sensor.

Sample ID	Sample	Leachout
Flow sensor 1	LFS-04-U L04T94004	Immersed , 7 days, 85°C

The sample should be prewashed with ultrapure water according to SEMI F 40 at 85°C for 7 days. After the washing the flow sensor was tested for leachout according to SEMI F40 in ultrapure water at 85 °C for 7 days. Due to the missing of fitted end caps, a separate washing process of conical joint stoppers from of poly propylene from Plasticbrand™ was necessary. The stoppers were three times immersed in ultarpure water according to SEMI F40. A prequalification before using was necessary.

2. Methods

The leaching was carried out according to the instructions given by SEMI F40-0699. The flow sensor was pre-washed 10 times with ultra-pure water for 2 minutes. After that the sample was soaked in ultra-pure water for 7 days at 85°C. Five blanks were prepared in PFA vessels under the same conditions.

After leaching, the following analyses were performed:
- Elemental analysis by high resolution plasma mass spectrometry (HR-ICP-MS),
- Anions by ionic chromatography (IC),
- Total organic carbon (determined as "non purgeable organic carbon", NPOC) by TOC-analyser

The detection limits for the elements are defined as three times the standard deviation of the blank solutions. Values less than the detection limit were replaced by the term "<DL". Blanks were not subtracted from the sample results. The results, given in µg/m^2, were calculated based on the total wetted surface and the total volume listed in the following table. The sample surface was given by the costumer, the volume was directly determined after leachout. The following values were used for the calculations:

	Vessel Code	Wetted surface area (m^2)	Volume (L)
Blank solutions	201, 202, 203, 204, 205	0.005612 0.01498	0.153
Flow sensor LFS-04-U L04T94004	flow sensor 1	0.005612	0.006

The results are summarized in the following table, which also includes the SEMI limits according to SEMI F57-1000 which represents the specification limits for high purity piping components for a 7d at 85°C test. As required according to SEMI standards, the values are given in µg/m^2. Values less than the detection limits were replaced by the term "<DL". Blanks were subtracted from the sample results. The uncertainties of such tests usually range between 5 to 10 %, but higher uncertainties can occur for results close to detection limit.

3. Results

Sample ID Element	Detection Limits *DL µg/m^2	Flow sensor LFS-04-U L04T94004 µg/m^2	Limits according SEMI F57 µg/m^2
Al	0.06	<DL	10
B	0.05	0.54	10
Ba	0.001	0.019	15
Ca	0.05	2.08	30
Cr	0.002	0.002	1
Cu	0.004	0.06	15
Fe	0.01	<DL	5
K	0.79	1.26	15
Li	0.07	<DL	2
Mg	0.02	0.15	5
Mn	0.003	0.005	5
Na	0.05	0.23	15
Ni	0.015	0.017	1
Pb	0.003	0.024	1
Sr	0.001	0.016	0.5
Zn	0.01	0.71	10
NPOC	406	866	60000
Fluoride	1.1	246	60000
Chloride	1.3	10	3000
Nitrite	0.4	2	100
Bromide	0.1	17	100
Nitrate	0.3	58	100
Phosphate	11.8	17	300
Sulfate	0.4	12	300

* DL's determined with standard addition method instead of 3 Sigma of elution blanks

4. Discussion

The leachout results for the tested elements were all below SEMI limits given in SEMI F57.

The volume of the flow sensor LFS-04-U L04T94004 was to low to measure the sample directly. Samples had to be diluted to measure the anions and cations. The dilution of a sample has an effect of the limit of quantification. If the dilution factor is too high, the analyte concentrations are below the detection limits and are no longer detectable.