Cleanliness analysis acc. to ISO 16232-10 on Article 88-12345

Test Report	**17 00 0000**		
Client	**Sample Company Corp.** **Birlenbacher Strasse 18** 57078 Siegen	***Date of order***	01-08-2017
		Receipt of sample	01-08-2017
Ordered by:	Mr. Doe	***Test period***	01-08-2017 to 03-08-2017

1. Test material and task

We received through Mr. Doe from Sample Company Corporation the sample material listed in table 1.

Table 1: Sample material

Sample	Description	Documentation
1	5 pcs.; Art.-No. 88-12345 / A_22222222 surface area: 422 cm²/ part	Fig. 1

As ordered, cleanliness analysis of the sample was carried out by pressure rinsing. Specifications are according to 12 514 61 P04:

- max. particle mass 2mg / part
- CCC=A(F9/G8/H7/I6/J00/K00)
- non-metallic fibers

2. Experimental procedure and parameters

Table 2: Conditions for cleanliness analysis

Extraction process	Pressure rinsing
Test environment	Clean room class 7 according to DIN EN ISO 14644-1, air-conditioned
Competence check of cabinet	RIO-Particle Standard: Charge: EP131107-95
Number of parts	2
Surface to be analyzed	entire part
Injection pressure	Pressure rinsing with 2 bar at the pressure tank
Nozzle shape	Flat, 2 mm
Volumetric flow rate [mL/min]	1400
Flushing volume per sample [mL]	4000
Post-flushing volume [mL]	3000
Test liquid	HAKUPUR 1025-810-1

Vacuum filtration	
Manufacturer of the filter	Heidland
Material of filter	Polyester
Filter diameter	47 mm
Filter cascade	no
Pore size	20 µm
Color	white
Drying and cooling	
Drying of the filter	Oven at 100 °C for 1 h; cooling in desiccator for 20 min
Gravimetry	
Laboratory scale	Kern ABT 120-5DM
Resolution of scale	0.01 mg
Accuracy of scale	± 0.05 mg
Last annual calibration	22-11-2016
Daily calibration	Target weight 100 mg
Microscopic analysis	
Particle counting	JOMESA Light microscope with automatic polarization filter
Scale	4.4 µm/Pxl.
Daily calibration	Particle standard JOMESA PN - 1.1 - 324
Latest planned maintenance via JOMESA service	16-01-2017

3. Test results

The subsequent tables 3 to 4 summarize all crucial test results. Figures 2a and 2b illustrate the documentation of the test specimen.

Table 3: Gravimetric results cleanliness analysis

Parameter	Mass	Specification
Blank of cleanliness analysis [mg]	0.03	-
Mass of filter-membrane (blank) [g]	0.07157	-
Mass of filter-membrane after test [g]	0.07191	-
Detached particle mass [mg]	0.34	-
Particle mass [mg / part]	**0.17**	**2**

Table 4: Results particle size distribution (metallic + non-metallic)

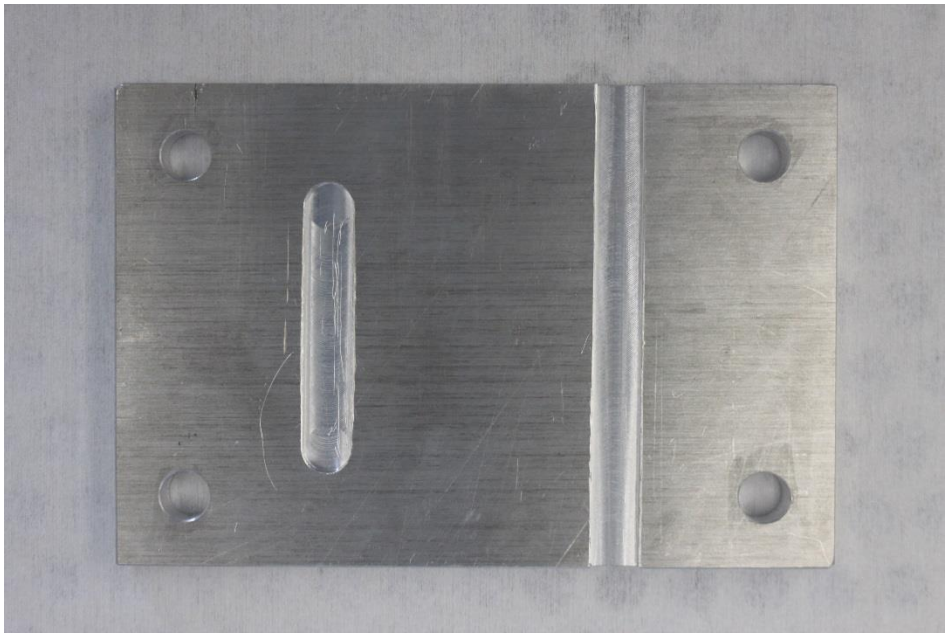
Particle size classification	F	G	H	I	J	K
Particle size [µm]	100-150	150-200	200-400	400-600	600-1000	1000 ≤ x
Blank	0	0	0	0	0	0
Number of particles	178	35	7	0	0	0
Particles / 1000 cm² **CCC_{test}=A(F8/G6/H3/I00/J00/K00)**	211	41	8	0	0	0
Permissible number of particles / 1000 cm² gem. specification **CCC_{spec}=A(F9/G8/H7/I6/J00/K00)**	500	250	130	64	0	0

4. Conclusion

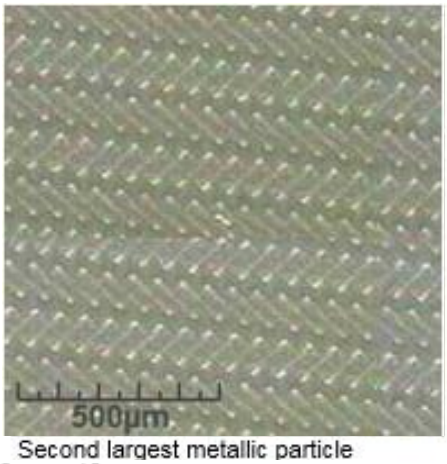
Based on the test results above the tested samples can be classified as **compliant** with the specification 12 514 61 P04.

The signer is project manager at RIO GmbH.
He is available at employee@rio.de or Tel.: +49271 / 8901 051

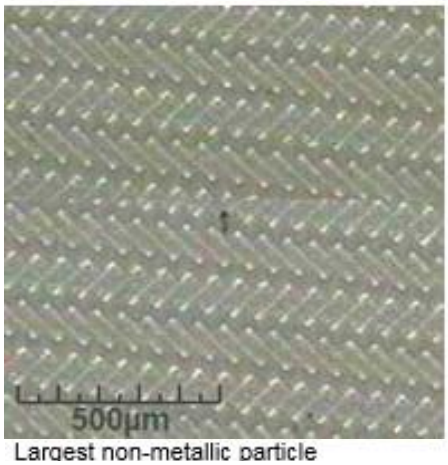
Appendix

	
Fig. 1	**Sample 1** (exemplarily)

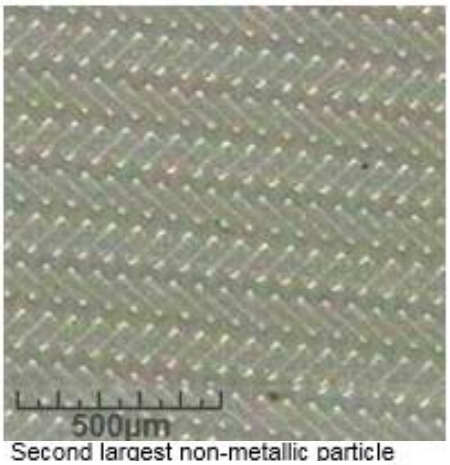
Largest metallic particle
41 µm x 16 µm



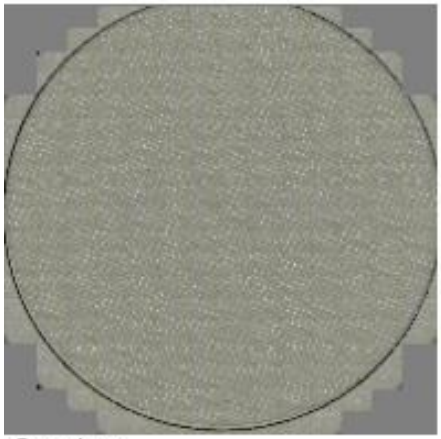
Second largest metallic particle
38 µm x 16 µm

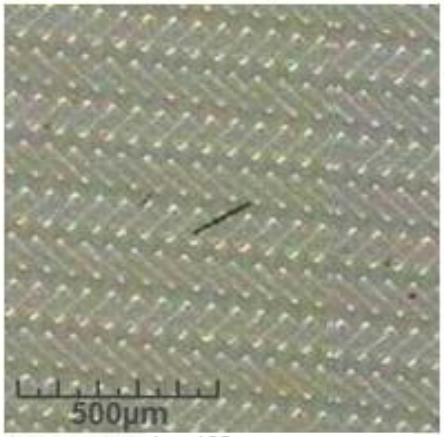


Largest non-metallic particle
49 µm x 17 µm



Second largest non-metallic particle
47 µm x 10 µm


Overview



Largest fibre L = 160 µm

Fig. 2a | Documentation of measurement: **Blank**

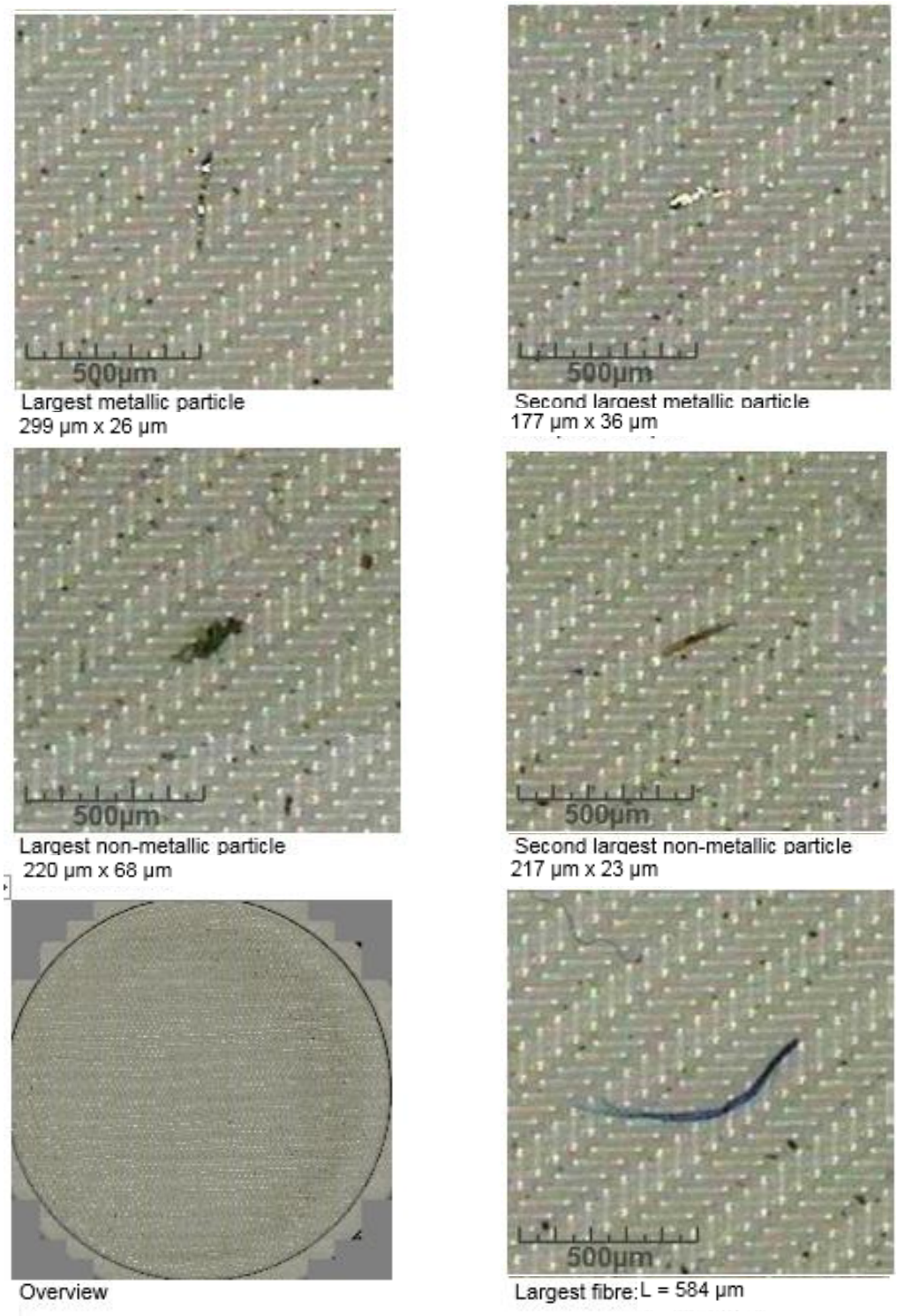


Fig. 2b | Documentation of sample measurements: **Sample 1**