



Device for supporting microsieving process: ultrasonic disintegrator UDS 751/UP 200S

Microsieving

In industry and science analysis of granulometric properties of used materials is of interest.

An approved method is microsieving particles smaller than 20 μm . It requires special sieve foils and additional equipment for dispersing the sample and removing clogging particles from the sieve meshes e.g. Topas provides both special precision microsieves and suitable equipment for microsieving down to 5 μm .

By means of an electromagnetic sieve vibrator series EMS 755 horizontal vibrations are applied to the microsieve which is held in sieve clamp. Ultrasonic waves transmitted by an ultrasonic processor series UDS 751/UP 200S additionally support the sieving process. The proposed analysing methods are related to microsieving and determination of parameters of bulk materials.

Applications

Characterization of fine powders by determining particle size distribution:

- In a wide measuring range
- For large samples
- Measuring the mass proportion of finest particles $>0 \mu\text{m}$

Fractionation of particle systems:

- Separation of extreme particle sizes
- Preparation of wide distributed particle systems

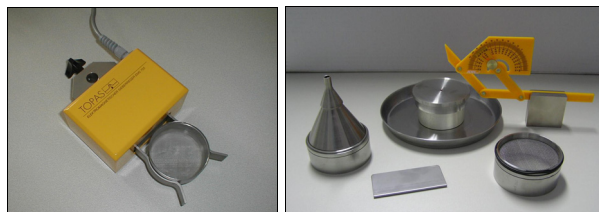
Special Applications

Micro sieving is used in various fields of industry, especially in chemistry, biology, ceramic technology, food industry, production of building materials, pharmaceutical industry and environmental technology. This method is used for

- Quality assurance of disperse particle systems
- Optimisation of grinding, agglomeration and separation processes

Special Advantages

- Analysis of large sample volumes
- No dependency on optical properties
- Improved accuracy and reproducibility
- Increasing separation efficiency
- Decreasing time of sieving especially for particle sizes down to 5 μm
- Easy to use
- Low-cost - inexpensive in comparison to optical particle sizing instruments



Electromagnetic Sieve Vibrator EMS 755 (left) and instruments for bulk material analytics (right)

Sieves

Electroformed Test Sieves

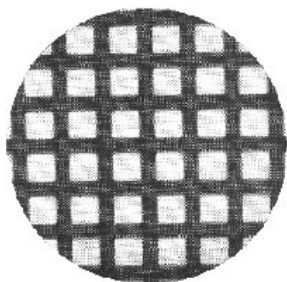
An especially developed electrolytical method enables the production of sieve sheets made of nickel with precise quadratic sieve meshes. The sieve frames (diameter 75 mm) are made of stainless steel.

Special advantages of electroformed sieves are given by

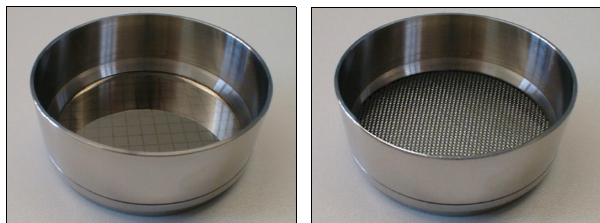
- Precise quadratic sieve meshes
- Large free sieve area
- Long service life
- Suitable for using solvents
- Sieving with bayonet catch available

The electroformed sieves fulfil the requirements of the standard DIN ISO 3310 and are available with following mesh sizes:

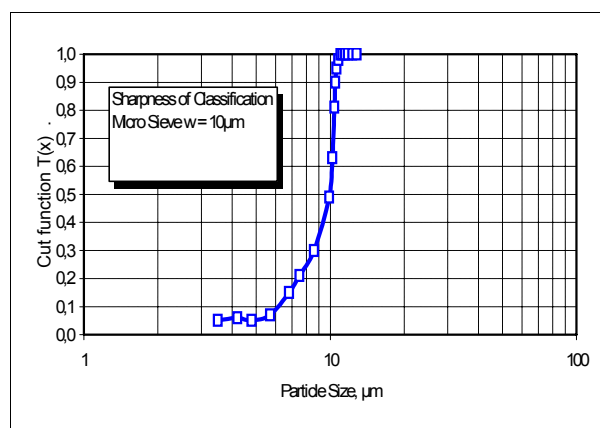
- 5, 10 ... 50 μm (5 μm steps)
- 50, 60 ... 100 μm (10 μm steps)
- Other mesh sizes on request



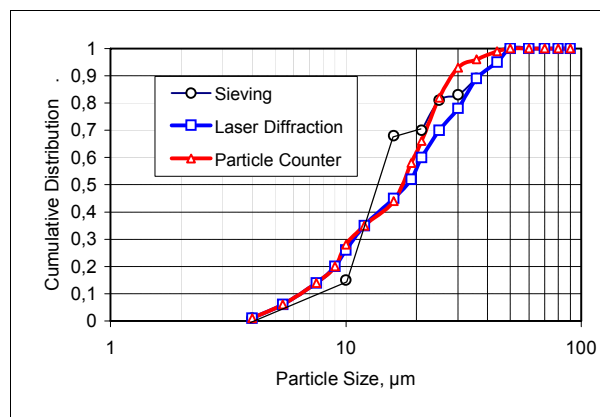
Zoomed picture of holes of an electroformed test sieve



Electroformed test sieve (left) und woven test sieve (right)



Cut function of a 10 μm test sieve determined with the optical particle counter FAS 362 (Topas)



Particle size distribution of a ceramic material measured by microsieving and two different optical methods (laser diffraction, single particle counter FAS 362)

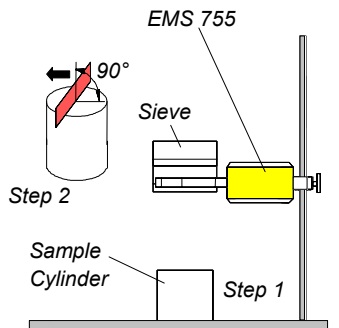
Woven Test Sieves

The woven sieves are provided in the same sieve frame like the electroformed test sieves. They complement the sieving program with larger sieve meshes (32 ... 1000 μm).

Evaluation of Flow Properties Angle of Repose and Loose Bulk Density



Determination of angle of repose with EMS 755



Determination of loose bulk density

Determination of Angle of Repose

The material will be reproducibly fed onto the plate by using the electromagnetic sieve vibrator EMS 755 and an oversized woven sieve. The angle of repose can easily be determined with the protractor.

Determination of Loose Bulk Density

After dispersing the material in an aluminium vessel (100 cm³) the weight can be measured and the loose bulk density can be calculated. Dispersing the powder into the vessel will be done by using the electromagnetic sieve vibrator EMS 755 and an oversized woven sieve.

Compressibility

For calculation the compressibility the loose and the packed bulk density (ρ_S and ρ_K) can be related to each other according to:

$$\text{Compressibility} = \frac{\rho_K - \rho_S}{\rho_K} 100\%$$

Uniformity Index

Uniformity index contains information about the particle size distribution of the material by relating the particle size of 60% mass to that of 10%.

$$\text{Uniformity Index} = \frac{d_{60,3}}{d_{10,3}} 100\%$$

Loose Bulk Density		Compressibility		Uniformity Index		Cohesion Index		FFI Index	Flow Property
Grad	Index	%	Index	%	Index	%	Index		Verbal Description
<25	34	<5	33	1	33			90-100	Best
26-29	32	6-9	31,5	2-4	31,5				Better
30	30	10	30	5	30				To
31	29	11	29	6	29			60-89	Good
32-44	25	12-24	25	11,5	25				To
45	20	25	20	17	20				Normal
46	19,5	26	19,5	18	19,5	6-9	19,5	20-59	Bad
47-64	13,5	27-36	13,5	19-26	13,5	10-54	13,5		To
65	7	37	7	27	7	55	7		Very bad

Table for Evaluation of the Flow Properties, Carr, R. Evaluating Flow Properties of Solids. Chemical Engineering, 72 (1965), 163-168

Specifications

Ultrasonic Desintegrator UDS 751/UP 200S

The UDS 751/UP 200S can be used for a lot of tasks in the laboratory and other sonochemistry applications. The control system includes automatic regulation of power output dependent on the volume of liquid being processed.

- Microsieving
- Dispersing powders, dyes, pigments
- Cells and bacteria disruption in biological and medical research
- Acceleration of chemical reactions
- Preparation, homogenization, mixing
- Cleaning processes in various fields

Technical Data UDS 751/UP 200S

Power supply	240 V AC, 48-63 Hz (optional: 115 V AC, 48-63 Hz)
Working frequency	24 kHz
Power density	max. 600 W/cm ²
Intensity range	20% - 100%
Efficiency	>90%

Sonotrodes

	S1	S2	S3	S7	S14	S40
Diameter [mm]	1	2	3	7	14	40
Immersion depth [mm]	10	90	90	90	90	20
Max. Amplitude [µm]	260	260	210	175	125	125
Power density [W/cm ²]	600	600	460	300	105	12



Sonotrodes for ultrasonic disintegrator UDS 751/UP 200S

Electromagnetic Sieve Vibrator EMS 755

The EMS 755 can be applied to

- Micro sieving
- Determination of angle of repose and loose bulk density

Technical Data EMS 755

Sieve clamp	For electroformed and woven sieves Ø75 mm
Vibration frequency	100 Hz
Vibration amplitude	max. 1 mm
Intensity range	10% ... 100%
Power supply	230 V AC, 50 Hz
Power consumption	max. 100 W
Size	70 x 140 x 270 mm ³ (Tripod Ø15 mm, 480 x 200 x 320 mm ³)
Weight	3,1 kg (Tripod: 3,7 kg)

QMS certified to
DIN EN ISO 9001.



12 100 11908 TMS

For more information please
visit our website at
www.topas-gmbh.de

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