

NETZSCH

Proven Excellence.



NETZSCH-BEADS®

The Right Grinding Media for Every Application!

Business Unit
GRINDING & DISPERSING

NETZSCH-BEADS®

Always the Right Choice



Take Advantage of the Benefits

The selection of suitable grinding media is an excellent optimization feature in dispersing and wet-grinding processes with agitator mills. With the NETZSCH-*BEADS*® you will achieve optimum results.

- Grinding beads ideally adapted to NETZSCH agitator bead mills
- All important qualities are available in the desired sizes
- Optimum combination of machine, grinding tool and application
- Improved product quality
- Process optimization and increase in capacity
- Improved energy efficiency
- Excellent grinding bead quality
- One-source service worldwide

Our Special Service for you

We can run preliminary tests with you in our applications laboratories, in order to select the optimum grinding media and to determine the ideal operating parameters for the agitator bead mill. The tests can be performed on a laboratory scale as well as in the pilot plant. We invite you to join us in our lab to take part in the tests.

For perfect, efficient operation of your agitator bead mill, you should check diameter and shape of the NETZSCH-*BEADS*® you are using at regular intervals. If the grinding bead reaches its minimum size, there could be production problems with the mill, such as clogged screens, or the product quality will no longer be achieved in the usual operating time. There is the possibility to filter out grinding beads that are no longer within the specifications and replenish them with NETZSCH-*BEADS*®. We'll be happy to advise you!

With the use of the ideal type of grinding media, you can improve the energy efficiency and the performance of your agitator bead mill. Of course, in addition to density and grinding bead size, we also consider wear, mill speed and energy consumption during the selection process.

If you have additional questions, our experts will be happy to help you.

Expert Advice Anytime

	<i>STEELBEADS Q</i>	<i>STEELBEADS MICRO</i>	<i>GLASSBEADS</i>	<i>ZETABEADS® NANO</i>	<i>ZETABEADS® PLUS</i>	<i>CERABEADS</i>
Abrasive media						
Agricultural chemicals					 	
Printing inks					 	
Dyestuffs						
Ferrites		 			  	
Inkjet						
Cocoa	 					
Lacquers					 	
Minerals / Fillers						 
Nano products						
Pharmaceuticals						
Pigment production		 			 	
Abrasives / CMP				 	 	
Chocolate / Compounds	 					

Typical Applications for NETZSCH-BEADS®



Horizontal disk mill type *Discus*



Nano mill *ZETA® RS*



Agitator bead mil *ALPHA® ZETA®*



Agitator bead mill *ALPHA® DISCUS*



Vertical disk mill type *KE-SK/C*



Agitator bead mill *ALPHA® MACRO*



Pharma mill *DELTA VITA®*

NETZSCH Steel Grinding Beads

STEELBEADS Q

High material density, also for applications in the foods industry

General

STEELBEADS Q are food-grade chromium steel grinding beads with very good sphericity. The high density of 7.85 kg/l facilitates the dispersion of high-viscosity products. Q SteelBeads are available with diameters ranging from 2 mm to 6.35 mm.

Recommended Machines

- Horizontal disk mill type LME
- Vertical agitator bead mill type KE SK
- CHOCO EASY® / RUMBA®
- SALSA®
- Agitator bead mill ALPHA® DISCUS
- Agitator bead mill MASTER REFINER

Applications

- Printing inks
- Chocolate / Compound chocolates
- Carbon black preparations



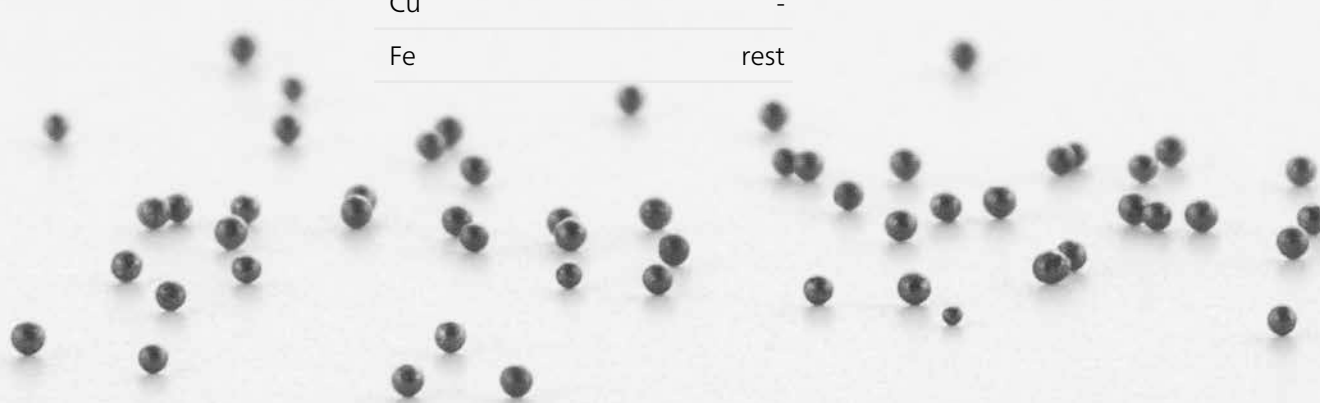
SALSA® System for compound masses

Technical Data

Available standard qualities Type	Ø [mm]
STEELBEADS Q 2	2.0
STEELBEADS Q 3	3.0
STEELBEADS Q 4	4.0
STEELBEADS Q 5	4.8
STEELBEADS Q 6	6.35

Chemical composition about [in weight %]	
C	1
Mn	0.3
P	-
S	-
Si	0.2
Cr	1.4
Ni	-
Cu	-
Fe	rest

Mechanical properties	
Density	7.85 kg/l
Bulk density	~ 4.8 kg/l
Rockwell	60 - 66 RW



STEELBEADS MICRO

High Material Density with extremely small Diameters

General

STEELBEADS MICRO are spherical cast steel grinding beads of tempered carbon steel. The fine-grained microstructure of the grinding beads give them a long lifetime and high breakage resistance. The STEELBEADS MICRO are available with diameters ranging from 0.25 mm to 1.4 mm.

Recommended Machines

- Circulation mill system ZETA®
- Agitator bead mill ALPHA® MACRO

Applications

- Ferrites
- Pigment production (e.g. phthalocyanine blue)



Agitator bead mill ALPHA® MACRO

Technical Data

Available standard qualities		Chemical composition		Mechanical properties	
Type	Ø [mm]	about [in weight %]			
STEELBEADS MICRO 0.25	0.25	C	1	Density	7.85 kg/l
STEELBEADS MICRO 0.5	0.5	Mn	0.9	Bulk density	~ 4.8 kg/l
STEELBEADS MICRO 1.0	1.0	P	-		
STEELBEADS MICRO 1.2	1.2	S	-		
STEELBEADS MICRO 1.4	1.4	Si	0.5		
		Fe	rest		



NETZSCH Glass Grinding Beads

GLASSBEADS

For Low to Medium Viscosity Products

General

GLASSBEADS are bubble-free glass grinding beads with a density of 2.5 kg/l. They are especially recommended for wet grinding applications in the low to medium viscosity range. This is also true for applications for which the use of high-quality zirconium oxide grinding beads is no real alternative due to the high costs.

Recommended Machines

- Circulation mill system ZETA®
- Agitator bead mill ALPHA® DISCUS

Applications

- Agricultural chemicals
- Dyestuffs
- Lacquers



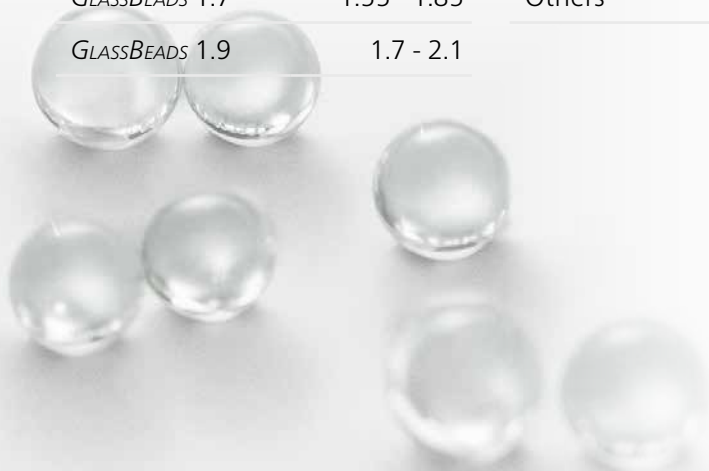
Agitator bead mill ALPHA® DISCUS

Technical Data

Available standard qualities	
Type	Ø [mm]
GLASSBEADS 0.5	0.4 - 0.6
GLASSBEADS 0.6	0.5 - 0.75
GLASSBEADS 0.9	0.75 - 1.0
GLASSBEADS 1.2	1.0 - 1.3
GLASSBEADS 1.5	1.25 - 1.65
GLASSBEADS 1.7	1.55 - 1.85
GLASSBEADS 1.9	1.7 - 2.1

Chemical composition about [in weight %]	
SiO ₂	72.5
Na ₂ O	13
CaO	9
MgO	4
Al ₂ O ₃	< 0.6
Others	rest

Mechanical properties	
Density	2.5 kg/l
Bulk density	~ 1.5 kg/l



NETZSCH Ceramic Grinding Beads

ZETABEADS® PLUS

Wear-resistant and available in a wide Variety

General

ZETABEADS® PLUS are yttrium-stabilized high-end zirconium oxide grinding beads of a high density and hardness. In addition, the very good sphericity and polished surface of the grinding beads contribute to an extremely high wear-resistance which prevents product contamination. ZETABEADS® PLUS grinding media are ideal for dispersion processes and true comminution of high-quality products.

Recommended Machines

- Circulation mill system ZETA®
- Nano mill system ZETA® RS
- Agitator bead mill ALPHA® ZETA®

Applications

- Abrasive products
- Inkjet
- Nano products
- Abrasives / CMP
- Battery compounds
- Ceramic products
- Printing inks
- Dyestuffs
- Lacquers
- Pigment production



Agitator bead mill ALPHA® ZETA®

Technical Data

Available standard qualities		Chemical composition		Mechanical properties	
Type	Ø [mm]	about [in weight %]			
ZETABEADS® PLUS 0.07	0.07 - 0.12	ZrO ₂ + HfO ₂	94	Density	6.0 kg/l
ZETABEADS® PLUS 0.1	0.1 - 0.2	Y ₂ O ₃	5	Bulk density	~ 3.6 kg/l
ZETABEADS® PLUS 0.2	0.2 - 0.3	Others	< 1	Vickers hardness	> 1150 HV
ZETABEADS® PLUS 0.3	0.3 - 0.4			Young modulus	> 200 GPa
ZETABEADS® PLUS 0.38-0.42	0.38 - 0.42				
ZETABEADS® PLUS 0.4	0.4 - 0.5				
ZETABEADS® PLUS 0.5	0.5 - 0.6				
ZETABEADS® PLUS 0.6	0.6 - 0.7				
ZETABEADS® PLUS 0.8	0.7 - 0.9				
ZETABEADS® PLUS 1.0	0.9 - 1.2				
ZETABEADS® PLUS 1.3	1.2 - 1.5				
ZETABEADS® 1.7	1.5 - 2.0				
ZETABEADS® 2.2	2.0 - 2.5				
ZETABEADS® 3.0	2.6 - 3.3				

NETZSCH Ceramic Grinding Beads

ZETABEADS® NANO

Wear-resistant with extremely small Diameters

General

ZETABEADS® NANO are made of yttrium-stabilized, high-purity zirconium oxide powder. Thanks to their high density and extreme hardness, product contamination is avoided. With diameters ranging from 30 µm to 200 µm, ZETABEADS® NANO are particularly suited for dispersion and wet grinding of high-tech products into the nano-meter range.

Recommended Machines

- Nano mill system ZETA® RS
- Agitator bead mill ALPHA® ZETA®

Applications

- Inkjet
- Nano products
- Abrasives / CMP
- Pharmaceuticals



Nano mill system ZETA® RS

Technical Data

Available standard qualities		Chemical composition about [in weight %]		Mechanical properties	
Type	Ø [mm]				
ZETABEADS® NANO 0.03	0.015 - 0.05	ZrO ₂ + HfO ₂	95	Density	6.0 kg/l
ZETABEADS® NANO 0.05	0.03 - 0.08	Y ₂ O ₃	5	Bulk density	~ 3.6 kg/l
ZETABEADS® NANO 0.1	0.08 - 0.13			Vickers hardness	> 1 200 HV
ZETABEADS® NANO 0.2	0.17 - 0.27			Young modulus	> 200 GPa

CERABEADS

Wear-resistant and Iron-free

General

CERABEADS are cerium-stabilized zirconium oxide grinding beads of a high density and hardness. They are suitable for a wide variety of applications that require iron-free processing. CERABEADS optimize your costs and deliver very high grinding efficiency.

Recommended Machines

- Horizontal disk mill type LME
- Agitator bead mill ALPHA® DISCUS

Applications

- Abrasive products
- Agricultural chemicals
- Lacquers
- Minerals



Horizontal disk mill type LME

Technical Data

Available standard qualities		Chemical composition about [in weight %]		Mechanical properties	
Type	Ø [mm]				
CERABEADS 0.4	0.4 - 0.6	ZrO ₂	82	Density	6.2 kg/l
CERABEADS 0.6	0.6 - 0.8	CeO ₂	16	Bulk density	~ 3.8 kg/l
CERABEADS 1.0	0.9 - 1.1	Others	2	Vickers hardness	1 180 HV
CERABEADS 1.2	1.2 - 1.4				
CERABEADS 1.4	1.4 - 1.6				
CERABEADS 1.6	1.6 - 1.8				
CERABEADS 1.8	1.8 - 2.0				
CERABEADS 2.0	2.0 - 2.2				
CERABEADS 2.5	2.3 - 2.7				
CERABEADS 3.0	2.6 - 3.3				



NETZSCH Ceramic Grinding Beads

ZsBEADS

Wear-resistant and Iron-free

General

ZsBEADS are sintered zirconium silicate grinding beads with a high sphericity. In contrast to grinding beads that are produced in a melting process, ZsBEADS are practically free of bubbles and pores. These properties increase wear-resistance and prevent breakage. They are available in various fractional sizes ranging from 0.6 mm to 1.8 mm.

Recommended Machines

- Horizontal disk mill type LME
- Agitator bead mill ALPHA® DISCUS

Applications

- Minerals
- Fillers
- Pesticides



Agitator bead mill ALPHA® DISCUS

Technical Data

Available standard qualities		Chemical composition about [in weight %]		Mechanical properties	
Type	Ø [mm]				
ZsBEADS 0.7	0.6 - 0.8	ZrO ₂	64	Density	4.0 kg/l
ZsBEADS 0.9	0.8 - 1.0	SiO ₂	33	Bulk density	~ 2.5 kg/l
ZsBEADS 1.1	1.0 - 1.2	Others	3	Vickers hardness	900 HV
ZsBEADS 1.3	1.2 - 1.4				
ZsBEADS 1.5	1.4 - 1.6				
ZsBEADS 1.7	1.6 - 1.8				
ZsBEADS 1.9	1.8 - 2.0				
ZsBEADS 2.1	2.0 - 2.2				
ZsBEADS 2.3	2.0 - 2.5				

VITABEADS® NANO

The first Choice for Pharmaceutical Applications

General

VITABEADS® NANO are made of high-end yttria - stabilized zirconia powder and exhibit high compressive strength, sphericity, surface quality and wear-resistance. These properties reduce contamination of pharmaceutical preparations during the grinding process to a minimum. A comprehensive documentation package is available for the VITABEADS® NANO, which allows our customers to make a quick and easy risk assessment.

Recommended Machines

- Pharma mill DELTAVITA®

Applications

- Pharmaceuticals



Pharma mill DELTAVITA®

Technical Data

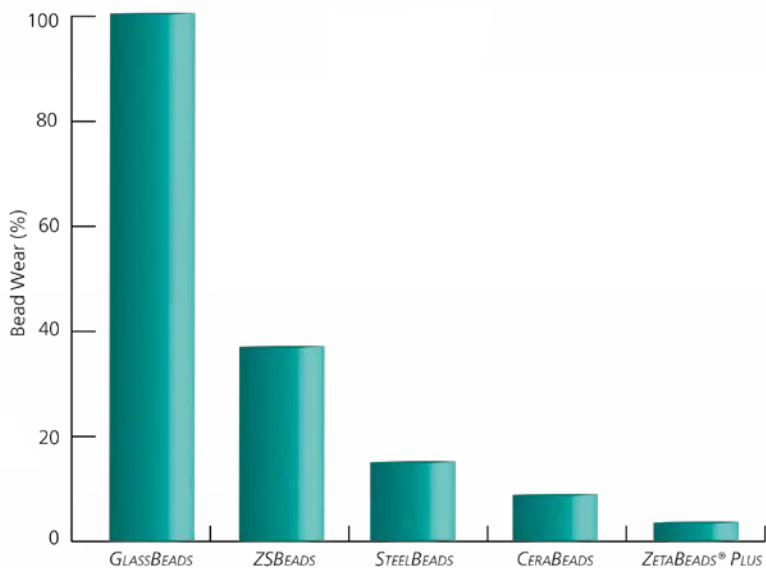
Available standard qualities	
Type	Ø [mm]
VITABEADS® NANO 0.1	0.1
VITABEADS® NANO 0.2	0.2
VITABEADS® NANO 0.3	0.3
VITABEADS® NANO 0.4	0.4
VITABEADS® NANO 0.5	0.5
VITABEADS® NANO 0.65	0.65
VITABEADS® NANO 0.8	0.8
VITABEADS® NANO 1.0	1.0

Chemical composition about [in weight %]	
ZrO ₂ + HfO ₂	95
Y ₂ O ₃	5

Mechanical properties	
Density	6.0 kg/l
Bulk density	~ 3.6 kg/l
Vickers hardness	>200 GPa
Young modulus	>1 200 HV

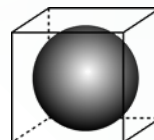
Technical & Process-relevant View of NETZSCH-BEADS®

Comparative View of Grinding Bead Wear

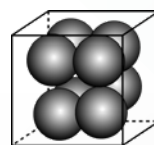


Number of Grinding Beads per Liter Grinding Chamber Volume

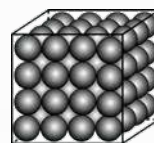
Ø 1 mm
1 piece / mm³



Ø 0.5 mm
8 pieces / mm³

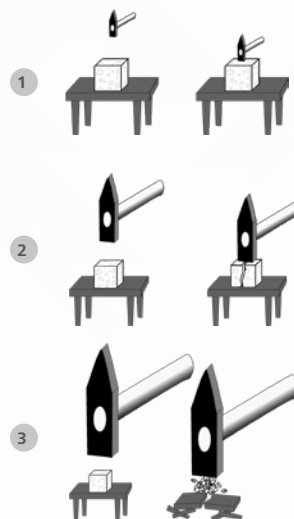
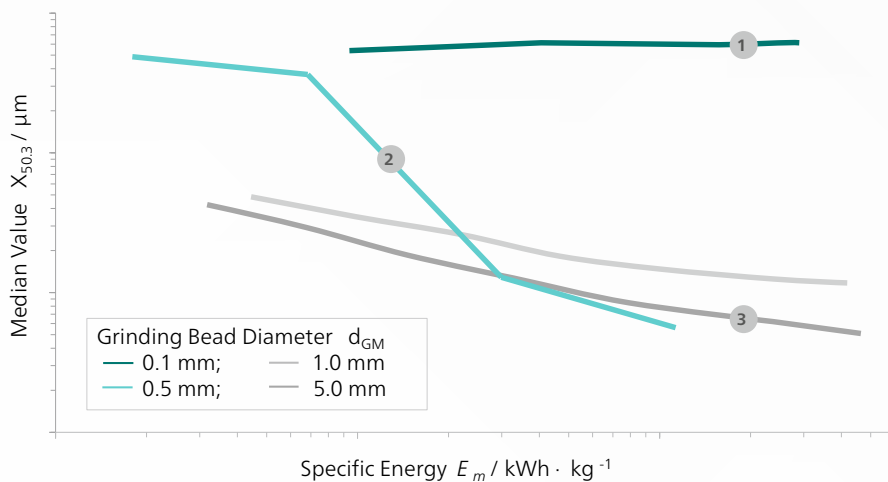


Ø 0.25 mm
64 pieces / mm³



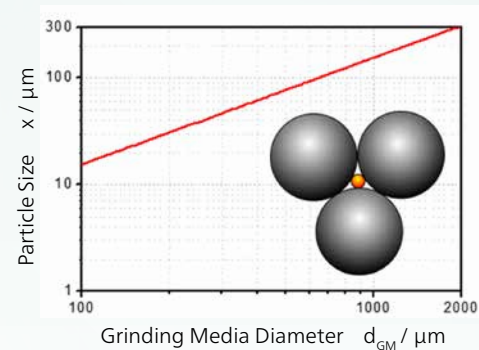
$$\text{Number} \propto \left(\frac{d_{GM,large}}{d_{GM,small}} \right)^3$$

Effect of Grinding Bead Size on Degree of Comminution

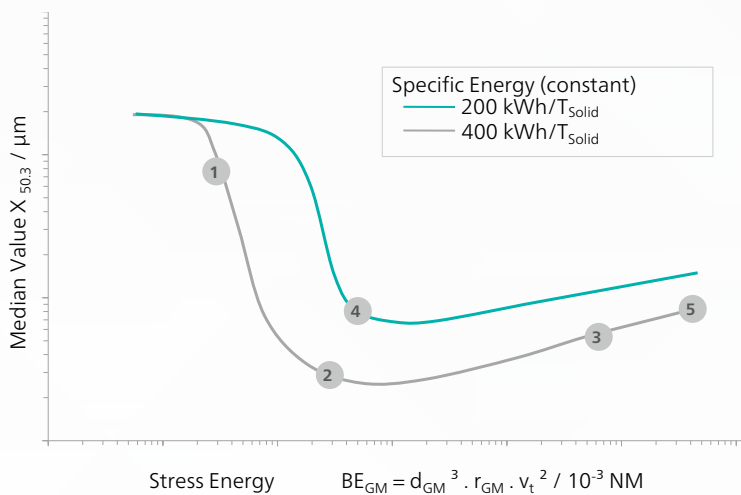


Process Stress Number

- The applicable grinding media diameter is limited by the ratio to the particles
- The particles should be smaller than the void volume between the grinding beads
- The following practical rules can be used as guidelines:
 - d_{GM} approx. 20 - 50 times greater than the d_{99} particle
 - $1/1000 d_{GM} - d_{50}$ final particle size
- The comminution properties of the particles must be considered (hardness, grain shape, agglomerate/primary grain)



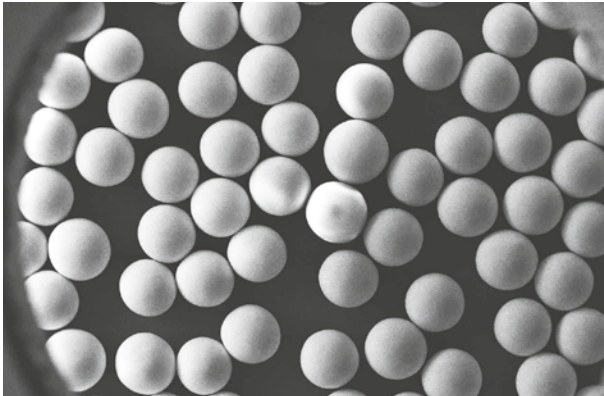
Effect of Stress Energy



- 1 Low Stress Energy**
 - low grinding efficiency
- 2 Optimum**
 - optimum stress energy
 - minimum wear on beads and mill
 - highest production capacity
- 3 High Stress Energy**
 - low grinding efficiency
 - high wear on beads and mill
- 4 Uniform Fineness**
- 5**
 - with smaller grinding beads
 - lower time/energy requirement
 - stress energy corresponds to grinding bead size

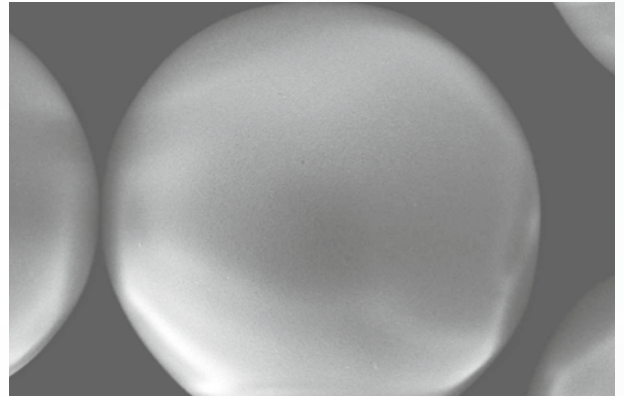
Comparison of Grinding Beads

Size distribution of grinding media | Magnification x 50

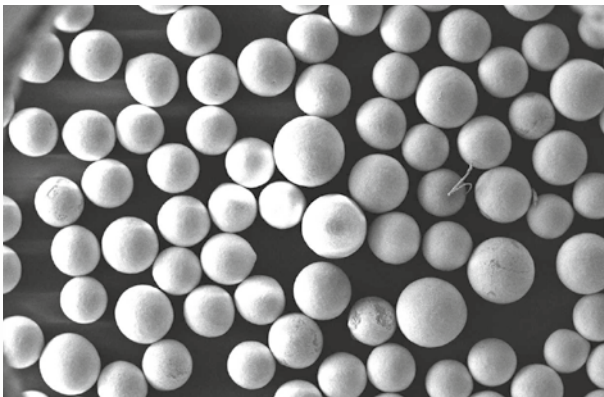


ZETA BEADS PLUS

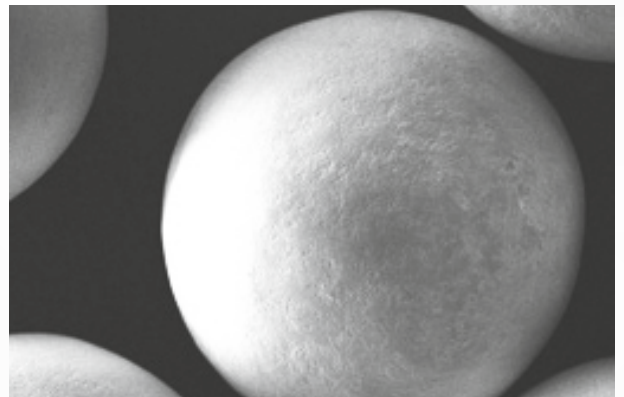
Surface of the bead | Magnification x 300



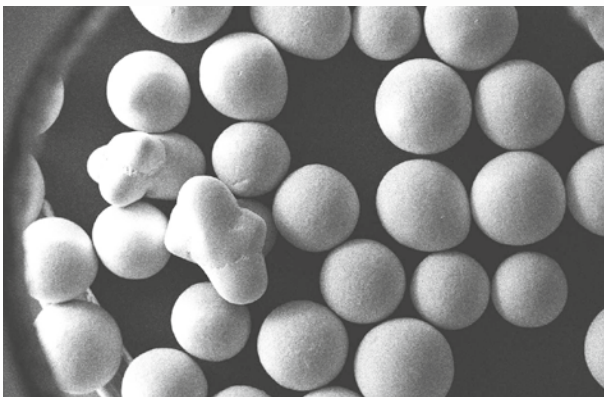
ZETA BEADS PLUS



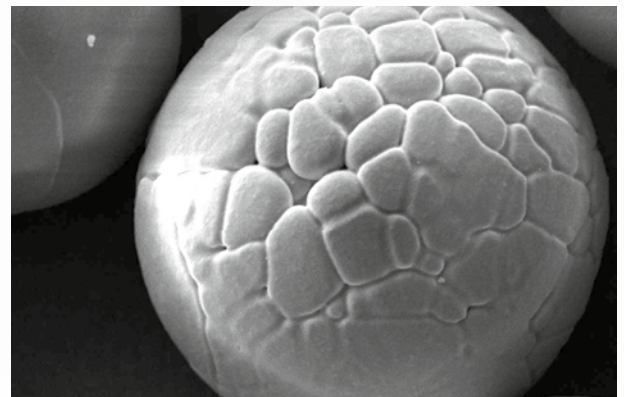
Product A



Product A

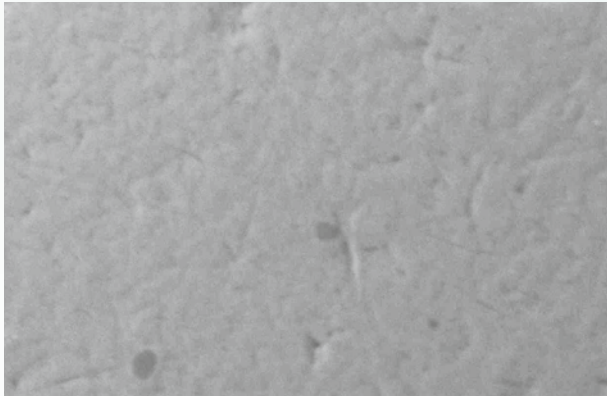


Product B



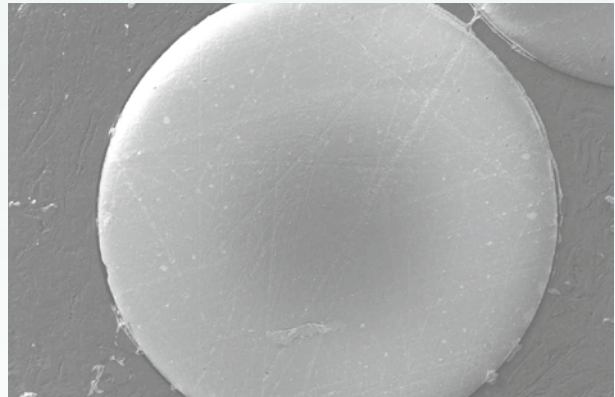
Product B

Surface of the bead | Magnification x 5 000

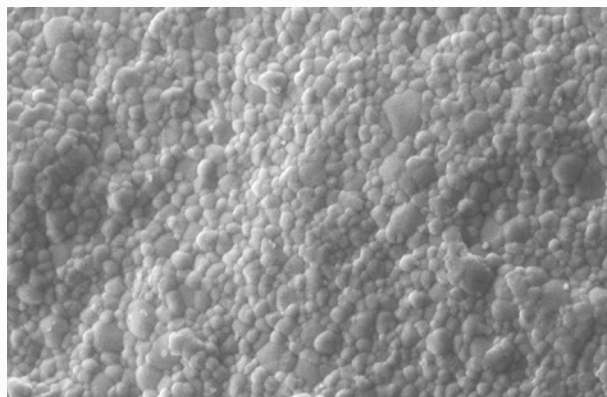


ZETA BEADS PLUS

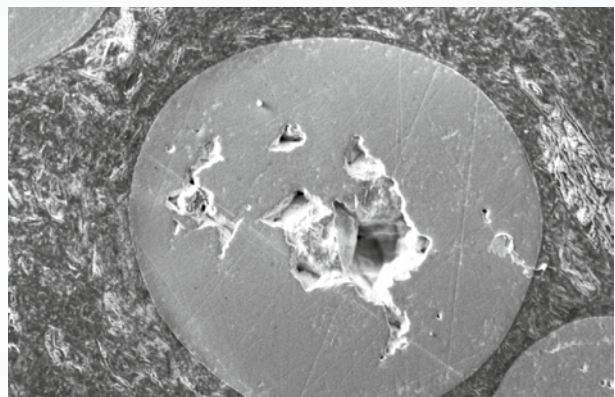
Micro Section | Magnification x 300



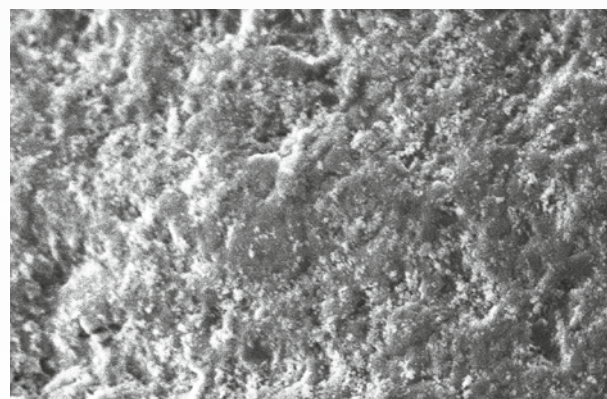
ZETA BEADS PLUS



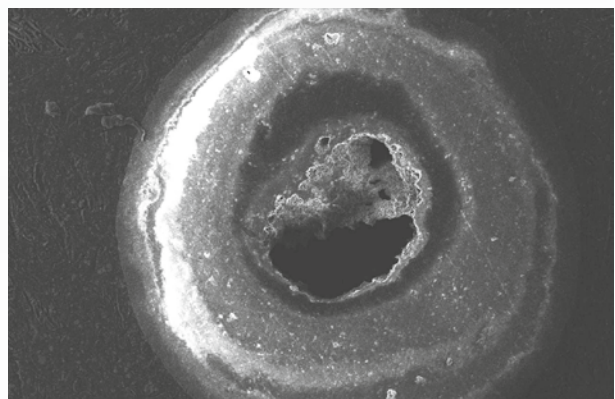
Product A



Product A

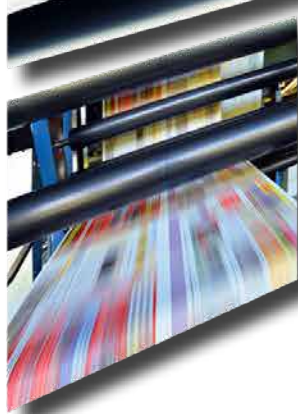
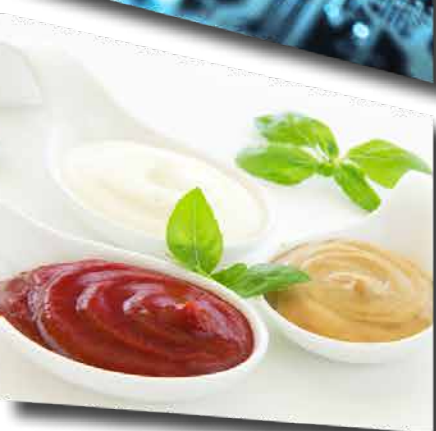
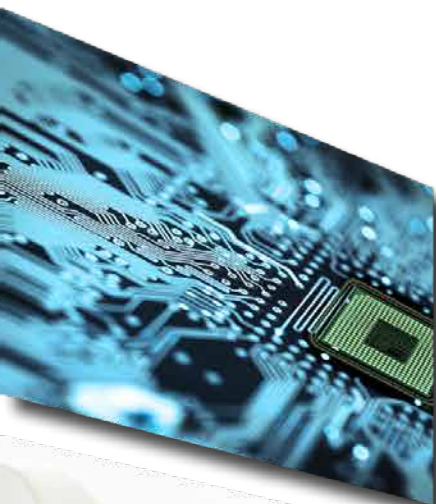


Product B



Product B

An Assortment of Applications for NETZSCH-BEADS®



- Minerals
- Fillers
- Pesticides
- Inkjet
- Nano products
- Abrasives / CMP
- Pharmaceuticals
- Abrasive products
- Agricultural chemicals
- Lacquers
- Minerals
- Dyestuffs
- Pigment production
- Battery compounds
- Ceramic products
- Ferrites
- Printing inks
- Cocoa
- Hard ferrites
- Chocolate
- Compound chocolates
- Carbon black preparations

AFTERSALES Service

Close to the Heart of NETZSCH!

In NETZSCH, we are totally convinced that *AFTERSALES* service really matters to our customers. When you acquire NETZSCH equipment, it is our commitment to keep it in operation under optimal performance through the rest of its lifetime. Our promise is to minimize downtimes by using an agile and reliable full program of preventive maintenance, remote assistance, and field service support, using, when needed, high quality original spare parts at fair prices in a short and reliable delivery time. But that is not enough; in our ongoing search for excellence, we also promise to keep your production process at an optimal and efficient state of the art operation condition, giving process advice and machine improvements.

INSTALLATION SUPPORT

To obtain and ensure the best performance from any equipment, it is essential to plan and execute the installation and supervise the commissioning and start-up of the equipment.

Our *AFTERSALES* service technicians are ready to support you in:

- Installation & Assembly
- Dry Commissioning (without product)
- Wet Commissioning (with product)
- Site Acceptance Tests (SAT)

OPTIMIZATION SERVICES

At NETZSCH we have been designing, supplying, commissioning, and servicing Grinding & Dispersing equipment for more than 140 years. Let us share some of this knowledge and experience with you.

- Upgrades
- Calibration y Certification
- Training & Education
- Process optimization

SPARE PARTS

At some point your machine may require replacement broken or worn-out parts. Ensure smooth operation your equipment by using NETZSCH original spare parts.

FIELD SERVICE & SUPPORT

To ensure that your equipment is always in perfect condition, trust in NETZSCH support for all field services.

We help you in all areas of *AFTERSALES*:

- Inspections
- Repairs at your site
- Repairs at NETZSCH
- Remote Support
- Service Agreements
- Re-commissioning

NETZSCH-BEADS®

Grinding beads influence the performance, the consumption of energy used by the mill, and the resulting quality of the product. They can be very influential for the calculation of your manufacturing cost. We advise you on the most suitable size and material for your equipment and process parameters.



CUSTOMER PORTAL

The new digital platform and online shop for NETZSCH customers. Check the service history of your equipment, open a new service case, and buy online grinding beads at the best price.

EXPLORE: mynetzsch.com

The NETZSCH Group is an owner-managed, international technology company with headquarters in Germany. The Business Units Analyzing & Testing, Grinding & Dispersing and Pumps & Systems represent customized solutions at the highest level. A worldwide sales and service network ensure customer proximity and competent service.

Our performance standards are high. We promise our customers Proven Excellence – exceptional performance in everything we do, proven time and again since 1873.

Proven Excellence. ■

Business Unit Grinding & Dispersing – The World’s Leading Grinding Technology

NETZSCH-Feinmahltechnik | Germany
NETZSCH Trockenmahltechnik | Germany
NETZSCH Vakumix | Germany
NETZSCH Lohnmahltechnik | Germany
NETZSCH Mastermix | Great Britain
NETZSCH FRÈRES | France
NETZSCH España | Spain
ECUTEK | Spain

NETZSCH Machinery and Instruments | China
NETZSCH India Grinding & Dispersing | India
NETZSCH Tula | Russia
NETZSCH Makine Sanayi ve Ticaret | Turkey
NETZSCH Korea | Korea
NETZSCH Premier Technologies | USA
NETZSCH Equipamentos de Moagem | Brazil

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