绍兴自立精细陶瓷有限公司 Shaoxing Zili Fine Ceramics Co.,Ltd.



精细陶瓷造粒粉

Spray-dried Powder for Fine Ceramics



精细陶瓷造粒粉生产线简介

Introduction of Spray-dried Powder Production Line

精细陶瓷造粒粉采用相应的陶瓷干粉和结合剂、分散剂、消泡剂、脱模剂等外加剂在高速搅拌磨中混合均匀后,然后泵送至同容积的慢速防沉淀搅拌罐,再泵送至喷雾造粒塔,通过热风干燥成一定粒度的球形造粒粉,然后通过筛分分离出所需粒度范围的产品。

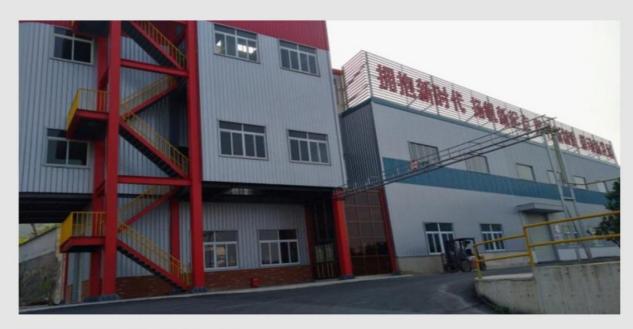
本公司所配造粒粉生产线,配置设备有双循环桶搅拌磨、喷雾造粒塔、料浆除铁器和旋振筛等,年产能在1800吨,产品包含不同档次的系列氧化铝造粒粉和ZTA造粒粉。

Spray-dried powder for fine ceramics is produced by mixing corresponding ceramic powder, binder, dispersant, defoamer and demolding agent in the high-speed stirring mill evenly, then pumped to the same volume of slow stirring and anti-settling tank, then pumped to the spray prilling tower, and then dried into a certain granularity of spherical granulating powder through hot air. After that, the products with the required particle size can be separated by sieving.

The company's spray-dried power production line is equipped with double circulation drum mixing mill, spray prilling tower, slurry iron remover and rotary vibrating screen with annual capacity of 1800 tons. The products contain different grades of spray-dried alumina powder and spray-dried ZTA powder.

精细陶瓷造粒粉生产线车间形貌

Workshop Appearance of Spray-dried Powder Production Line



(b) 外貌2 Workshop 2



(a) 外貌1 Workshop 1



(c) 内部设备布置 Internal plant equipment layout



99级氧化铝造粒粉 Grade 99 Spray-Dried Alumina Powder

99级氧化铝造粒粉具有高的生坯强度、低的烧结温度、成瓷具有均匀的微观组织结构,可直接用于干压和等静压工艺,适用于高端结构陶瓷、防弹陶瓷、工程陶瓷等。

R05SDP采用的原粉是本公司产品R05SG, R05SG是高纯度高活性的氧化铝粉, 通过将R05SG喷雾造粒生产的造粒粉R05SDP的氧化铝含量为99.7%。

R05LSDP采用的原粉是本公司产品R05LSG,R05LSG通过对R05SG进一步处理,具有超低Na2O含量和超高活性。通过将R05LSG喷雾造粒生产的造粒粉R05LSDP具有较高的烧结密度的同时具有较低的杂质含量。

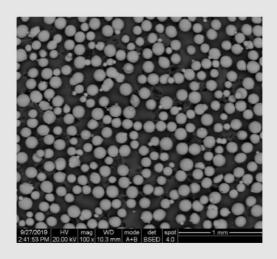
Grade 99 Spray-dried alumina powder behaves high green strength, low sintering temperature and uniform micro structure after turning into ceramics. It can be dry-pressed or isostatic pressed directly and can be applied to high-end structural ceramics, bullet-proof ceramics and engineering ceramics.

The raw powder of R05SDP is derived from our product R05SG, which is a kind of high purity reactive alumina powder. R05SG turns into R05SDP by spray granulating technology with 99.7% alumina content.

The raw powder of R05LSDP is derived from our product R05LSG, which displays ultra low Na2O content and extra high activity. So, R05LSDP also has higher fired density and lower impurity.

项目 Ite	单位 Unit	R05SDP	R05LSDP			
化学成分Chemical compositions						
Al_2O_3	Al ₂ O ₃			99.8		
Na₂O	%	0.08	0.02			
Fe_2O_3		%	0.02	0.02		
SiO ₂		%	0.02	0.02		
CaO	CaO		0.03	-		
MgO	MgO		0.10	0.05		
物理性能Physical properties						
比表面积Surface area	比表面积Surface area		7.0	7.3		
原晶粒度D50, Crystal sizeD50		μm	0.5~0.7	0.5~0.7		
粉体粒度Particle size	ticle size D50		110~130	110~130		
松堆密度Bulk density		g/cm³	0.9~1.2	0.9~1.2		
灼减 L.O.I.		%	0.8~1.0	0.8~1.0		
水分 Moisture		%	0.2~0.4	0.2~0.4		
陶瓷属性Ceramic Properties						
生坯密度(90MPa), Press de	g/cm³	2.30	2.32			
烧结密度(1520℃,2h), Fired density		g/cm³	3.90	3.92		
线收缩率 Shrinkage		%	16.2	16.2		

典型值Typical data





99级氧化铝造粒粉R05SDP的SEM照片 SEM photo of grade 99 spray-dried alumina powder R05SDP for electronic vacuum tube

92~98级氧化铝造粒粉

Grade 92~98 Spray-Dried Alumina Powder

98级造粒粉SP-AI98主要应用于防弹陶瓷、化工陶瓷、陶瓷结构件、电工陶瓷等,其特点是具有良好的粉体流动性、易于金属化、表面抛光效果好、成瓷机加工性能好。

96级造粒粉SP-AI96主要应用于陶瓷结构件、电工陶瓷、电子封装陶瓷等。

92级造粒粉SP-AI92主要应用于耐磨陶瓷(如研磨衬和研磨球)、陶瓷结构件和防弹陶瓷等。

Grade 98 spray-dried alumina powder SP-Al98 behaves good powder fluidity, easy metallization property, good surface polishing effect and good machinability. It can be applied to bullet-proof ceramics, chemical engineering ceramics, ceramic workpiece and electrical ceramics.

Grade 96 spray-dried alumina powder SP-Al96 can be applied to ceramic workpiece, electrical ceramics and electronic packaging ceramics.

Grade 92 spray-dried alumina powder SP-Al92 can be applied to wear-resistant ceramics (such as grinding lining and grinding ball), ceramic substrate and bullet-proof ceramics.

项目 Item		单位 Unit	SP-Al98	SP-Al96	SP-Al92
化学成分Chemical compositions					
AI_2O_3		%	98	96	92
Na₂O		%	0.1	0.1	0.1
物理性能Physical properties					
原晶粒度D50, Crystal size D50		μm	2	2	2
粉体粒度* Particle size	rticle size D50		80~180	80~180	80~180
松堆密度Bulk density		g/cm³	1.29	1.25	1.28
灼减L.O.I.		%	4.0	3.5	6.1
水分Moisture		%	0.4	0.1	0.4
陶瓷属性Ceramic Properties					
烧结密度Fired density		g/cm³	3.85	3.71	3.70
线收缩率Shrinkage		%	14.7	14.8	14.6
烧成温度Fired Temperature		°C	1650-2h	1620-1h	1580-2h

典型值Typical data

可根据客户需要对造粒粉粉体粒度进行定制。

The particle sizes could be produced upon the requests

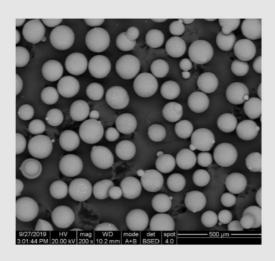


电子真空管用95级氧化铝造粒粉

Grade 95 Spray-dried Alumina Powder for Electronic Vacuum Tube

电子真空管用95级氧化铝造粒粉采用高纯氧化铝粉和低铁、低钠外加剂为原料,湿法球磨后再进行喷雾造粒干燥而制备。产品分三元系和四元系两大类,以该造粒粉制备的真空管无色斑、易金属化,成品合格率高。

Grade 95 spray-dried alumina powder for electronic vacuum tube is made from high purity alumina powder and low iron & low sodium admixture as the raw materials with the method of mixing by wet milling and then spray granulation drying. The products are divided into two categories: ternary system and quaternion system. The vacuum tube prepared with the granulated powder has no stain and is easy to be metallized, with a high qualified rate of the finished product.



电子真空管用95级氧化铝造粒粉的SEM照片 SEM photo of grade 95 spray-dried alumina powder for electronic vacuum tube

项目 Item	单位 Unit	SP-Al3-95 (三元, Ternary system)	SP-Al4-95 (四元, Quaternary system)		
化学成分Chemical compositions					
AI_2O_3	%	94.80	94.60		
Na₂O	%	0.08	0.08		
Fe ₂ O ₃	%	0.04	0.04		
物理性能Physical properties					
原晶粒度D50, Crystal size D50	μm	3.50	3.50		
粉体粒度* Particle size	μm	60~180	60~180		
松堆密度Bulk density	g/cm³	1.10	1.15		
灼减L.O.I.	%	2.6	2.5		
水分Moisture	%	0.2~0.4	0.2~0.4		
陶瓷属性Ceramic Properties					
烧结密度Fired density	g/cm³	3.65	3.67		
线收缩率Shrinkage	%	15.2	15.9		
烧成温度Fired Temperature	°C	1700-2h	1620-2h		

典型值Typical data

注:线收缩率计算公式: (烧前尺寸/烧后尺寸-1)*100

Mark: Shrinkage calculation formula=(Length of before firing/Length of after firing-1)*100

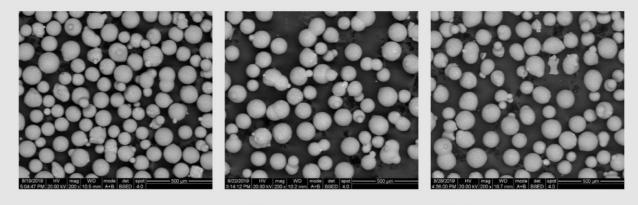


精细陶瓷行业用ZTA造粒粉

Spray-Dried Zirconia Toughened Alumina Powder for Fine Ceramic Applications

ZTA陶瓷造粒粉主要用于各种机械缸套、柱塞、轴、轴套、纺织陶瓷、医用 牙科和整形陶瓷等,其特点是生坯强度高、断裂韧性高、耐磨性能好、微观组织 均匀。

Spray-dried ZTA powder behaves high green strength, high fracture toughness, good wear resistance and uniform microstructure. It can be applied to various mechanical cylinder liner, plunger, axis, axle sleeve and textile ceramics, it can also be applied to medical dental and orthopedic bioceramics.



ZTA造粒粉SP-ZTA10(左)、SP-ZTA15(中)和SP-ZTA20(右)的SEM照片 SEM photos of spray-dried ZTA powder SP-ZTA10(left), SP-ZTA15(middle) and SP-ZTA20(right)

项目 Item		单位 Unit	SP-ZTA10	SP-ZTA15	SP-ZTA20	SP-ZTA25
化学成分Chemical compositions						
Al ₂ O ₃		%	87.02	83.13	77.73	73.70
ZrO ₂		%	11.05	15.40	20.99	25.60
Na₂O		%	0.07	0.06	0.06	0.06
SiO ₂		%	0.05	0.05	0.05	0.05
CaO		%	0.04	0.04	0.04	0.04
物理性能Physical properties						
原晶粒度D50, Crystal size D50		μm	<1	<1	<1	<1
粉体粒度*Particle size [50	μm	60~180	60~180	60~180	60~180
松堆密度Bulk density		g/cm³	1.17	1.21	1.26	1.31
灼减L.O.I.		%	1.0	1.0	1.0	1.0
水分Moisture		%	0.4	0.4	0.4	0.4
陶瓷属性Ceramic Properties						
烧结密度 Fired density		g/cm³	4.11	4.18	4.27	4.35
线收缩率Shrinkage		%	17.1	17.1	17.5	17.8
烧成温度Shrinkage		°C	1600-2h	1600-2h	1600-2h	1600-2h

典型值Typical data

可根据客户需要对造粒粉粉体粒度进行定制。

The particle sizes could be produced upon the requests





我们致力于精细结构陶瓷及相关造粒粉的研发及其在陶瓷行业中的应用研究。

自立精陶持续加大资金投入,配置先进、专业的等静压设备、大吨位液压机、精确控温高温炉、高速搅拌磨、喷雾造粒塔等生产设备和扫描电镜、物相分析、X-射线荧光分析、激光粒度分析仪等检测设备,同时聘请领域专家进行技术指导和提升,努力提高研发实力和生产工艺技术。

自立精陶与中科院上海硅酸盐研究所等研究院所建立合作,对精细结构陶瓷及相关造粒粉的应用进行评价,为客户提供最优化的陶瓷产品和全面的技术支持。

For SZFC (Shaoxing Zili Fine Ceramics Co., Ltd), we commit to the R&D of fine structural ceramics, correlative spray-dried powder and its applications in ceramics industry.

SZFC is enhancing its production technology and R&D capabilities. It configures advanced and professional production equipment such as ICP, large tonnage hydraulic press, precise high temperature furnace, high speed stirred ball, spray prilling tower and so on. As for laboratory, it also configures advanced test equipment such as SEM, XRD, XRF, laser particle size analyzer and so on. Further more, SZFC recruits technical experts to provide technical guidance and improvement.

SZFC establishes cooperation with the Institute of Ceramics, such as Shanghai Institute of Ceramics, Chinese Academy of Sciences, to evaluate the application of fine structural ceramics and correlative spray-dried powder, to provide customers with optimized productions and comprehensive technical support.

研发实力 SZFC R&D



扫描电子显微镜 Scanning electron microscope



X射线衍射仪 X-Ray Diffraction



X荧光光谱仪 X-Ray Fluorescence Analyzer



电感耦合等离子体发射光谱仪 ICP-OES Spectrometers



比表面积及孔隙度分析仪 Micromertics Gemini VII 2390 Surface Area Analyzer



马尔文3000激光粒度分析仪 Mastersizer 3000 Laser Particle Size Analyzer





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