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NAGAMORI

振动粉碎机

The Vibration Mill

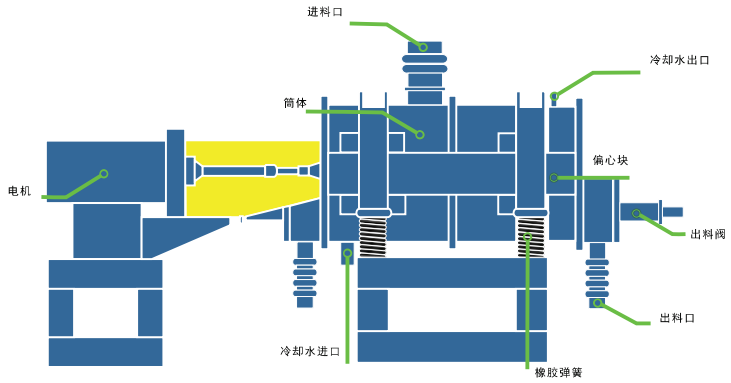
上海森永工程设备股份有限公司

Shanghai Nagamori Machinery Co.,Ltd.

振动粉碎机研磨机理
GRINDING MECHANISM

振动粉碎机与传统球磨机在工作原理和效率上存在显著差异：球磨机依靠滚筒旋转带动研磨介质产生约1G的冲击力进行粉碎；而振动粉碎机通过偏心块旋转产生离心力，驱动研磨筒高频振动，使介质产生6-10G的强冲击力，配合摩擦作用实现高效粉碎，其研磨效率可达球磨机的10-20倍。

The vibratory mill differs significantly from the traditional ball mill in working principle and efficiency: The ball mill relies on the rotation of a drum to drive grinding media, generating an impact force of about 1G for crushing; whereas the vibratory mill utilizes the centrifugal force generated by rotating eccentric weights to drive high-frequency vibration of the grinding chamber, enabling the media to produce strong impact forces of 6-10G. Combined with frictional effects, this achieves highly efficient crushing, with grinding efficiency reaching 10-20 times that of a ball mill.



结 构 图
Structural Model Diagram

主要特点
FEATURES

研磨时间短，球磨机的十分之一到二十分之一。 Short grinding time which is one-tenth to one twentieth of that of ball roller mills.	破碎到精细研磨的研磨范围。 Wide range grinding from crushing to fine grinding.	粉碎、混合和分散可以同时进行。 Simul taneous execution of grinding,mixing.
干式和湿式研磨。 Availability of both dry and wet process.	不产生灰尘，不需要集尘器。 No generation of fine particles no need for dust collectors.	研磨筒上的夹套可冷却或加热。 Cooling or heating by installing a grinding cylinder with a jacket.
由于其密封结构，可以进行惰性气体密封等特殊粉碎。 Sealed design allows special pulverization in inert gas atmoslheres.	磨筒内衬可选择任意介质SS, SUS, 氧化铝, 氧化锆, 橡胶, 尼龙等。 Free choise of lining in a grinding cylinder and media(SS, SUS, alumins,xirvonis,urethane .	研磨筒更换方便。 Easy replacement of grinding cylinders.

型式 MODEL

Model CD 5P

双筒双驱动连续式振动粉碎机

Dual-drive continuous vibration mill with the upper and lower cylinders.

Model FV 6P

单筒双驱动、侧排料型批次型振动粉碎机

One cylinder dual-drive, non inversion discharge type batch process vibration mill.

Model MB 8P

单筒单驱动翻转排料型振动粉碎机

One cylinder single drive, inversion discharge type batch process vibration mill.

Model CD Case. 9P

CD连续型振动粉碎机案例

Case study of CD continuous vibration mill.

Model FV, MB Case. 10P

FV. MB 批次型振动粉碎机案例

Case study of FV.MB batch vibration mill.

用途 MAIN USES

- 金属 Metal

  铝粉、铝镁粉、纯铁粉、碳化钨、特种钢、铜合金、非晶合金、金属硅、金属铬、金属锰、海绵钛、稀土金属铝、锰铁、铬铁。

  Al powder, Al Mg powder, pure iron powder, WC, SCM, copper alloy, amorphous alloy, metallic silica, metallic chrome, metallic manganese, molybdenum sponge titanium, rareearhth metal, ferromanganese, ferrochrome.

- 陶瓷 Ceramic

  各种氧化铝、锆、氮化硅、碳化硅、黑铅、氟铝、合成莫来石、氧化镁熟料、碎玻璃、熔块、萤石石灰石。

  Various alumina, zirconium, silicon nitride, silicon carbide, black lead, fluoric aluminum, synthetic mullite, magnesia clinker, cullet, frit, fluorite lime stone.

- 电子、磁性材料、磨料
  Electric and magnetic materials, polishing materials

  铁氧体、氧化铝、钛酸钡、氧化钛、金刚砂、碳化硅、氮化硼、二氧化锰、氧化锑、氟碳铈矿、石英、各种陶瓷粉、混合研磨。

  Ferrite, alumina, titanic acid barium, titanic oxide, carborundum, silicon carbide, boron nitride, manganese dioxide, antimony oxide, bastnasite, quartz, various ceramic powder, mixed grinding.

- 填充料 、颜料 、涂料 Fillers, pigments and paints

  红色氧化物、浆料、碳酸钾、有机颜料、荧光颜料、玻璃纤维、炭 黑、白碳黑。

  Red oxide, paste, calium carbonate, organic pigment, fluorescent pigment, glass fiber, carbon black, white carbon.

- 食品 Foods

  植物纤维、茶粉、青紫菜、大蒜粉、洋葱粉、鲸骨粉、乳糖。

  Vegetable fiber, powdered tea, green laver, garlic powder, onion powder, whale powdered bones, milk sugar.

- 医药、工业 Pharmaceuticals, Industrial

  活性炭，硫磺，草药生药，草药提取物，药物，干燥剂，硫酸铵，氯化钾。

  Activated charcoal, sulfur, herb crude drug, herb extract, pharmaceutical, dried entails, ammonium sulfate, potassium chloride.

- 建 筑、能源材料 Housing materials, energy

  特种水泥、石膏、消石灰、煤、还原铀颗粒、反应堆废灰、山砾石。

  Special cement, gypsum, slaked lime, coal, reduced uranium pellet, radioactive waste ash, mountain gravel.

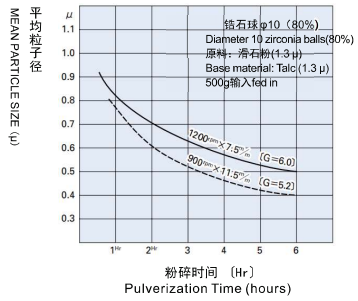
- 与现有其他振动粉碎机对比 Comparison with the existing vibration mills

经实验证实，振动磨的粉碎效率通常随振幅增大而提升，而非依赖高频振动。为此，本公司在振动磨设计中采用较传统机型更低的频率与更大的振幅，在保持相同功率条件下，既能实现更精细的研磨效果，又可提升整体性能表现。

针对中小型机型（大型机型无需配置），特别加装自主研发的专用控制器，可有效抑制设备启停阶段的剧烈晃动。

Our various experiments show that the efficiency of grinding by a vibration mill in general increases when the amplitude is big rather than when the frequency is high. Therefore we have adopted lower frequency and bigger amplitude compared with the existing mills in our vibration mills, which enable more fine grinding and better performance under the same power.

Although it is not needed with large models, our originally developed special controller is attached with medium and small models so that the big shaking at starting and stopping can be controlled.



- 填 充 率 Filling Up Ratio

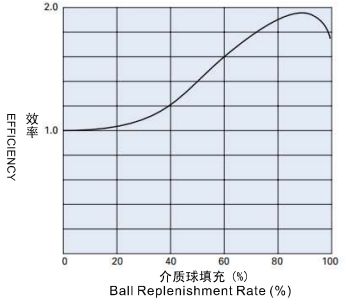
当球填充率达到30%时，球填充率与研磨效率之间的关系没有变化。但在30%~80%之间，填 充比越大，效率越好，因此两者之间呈线性关系。

制备的材料的标准量是100%填充球空间的材料。数量越少，研磨时间就越短。

在连续模型中，较小的供应量使停留时间更长，粒度分布转向细磨。

There is no change in the relation between the ball filling ratio and the grinding efficiency up to the ball filling ratio of 30%. But between 30% to 80%, the bigger the filling ratio is, the better the efficiency becomes, thus showing the linear relation between the two.

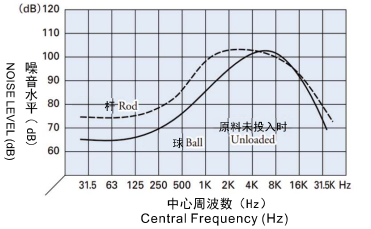
The standard quantity of materials prepared is that which fills the space of the ball 100%.The less the quantity is, the shorter the grinding time becomes. In the continuous models, the smaller supply makes staying time longer, with the grain size distribution shifted toward fine grinding.



- 噪 音 Noise

尽管设备运行时会产生90至110分贝（相当于汽车喇叭声级）的噪声，但由于其高频特性（4千赫兹），噪声较易被吸收。加装吸音装置后，噪声可降低10至20分贝。此外，该噪声主要分布于低频段而非高频段，实际听觉感受比同等分贝值的高频噪声更为柔和。

Although the noise of 90 to 110 dB (almost equal to phon) is generated during the operation, it can be easily absorbed as the frequency is high (4KHz). Also it can be reduced by 10 to 20 dB by install- ing a noise absorption equipment. In addition, the noise is not in the high frequency range but in the low frequency range, and does not seem as loud as it would normally be for the high dB level.



- 污 染 Contamination

最近，电子零件等需要更多的细粉。但是，由于介质的磨损和旋转部 件中混合的外来物质，保持这种改进的细度是困难的。其中，磨削中磨损是不可避免的。但前体物质的混合不是振动研磨机的问题，因为它们在研磨室中没有旋转部件。我们可以使用高纯度氧化铝、氧化锆、聚氨酯和尼龙（MCN）作为衬里和介质，以及坚硬的高锰钢和特别的堆焊材料。

Recently more fine powder are required in electronic parts etc. But attaining such improved fineness is difficult because of the abrasion by media and the foreign substance mixing in rotating parts. Out of these, abrasion is unavoidable in grinding. But mixing of foreign substance is
not the problem with vibration milles as they have no rotating parts in grinding rooms. We can apply high purity alurina, zirconia, urethane and nylon (MCN) as liner and medium, as well as harding high manganese steel and especially bulky welding materials.

- 防 振 装 置 Vibration Control Equipment

振动粉碎机的大部分振动可以被弹簧吸收，但轻微的振动会传递到基础。因此，如果您在振动磨固定的地方附近使用精密仪器或测量，例如上层或相邻房间，您需要振动控制设备。

我们原创设计的特殊振动控制器可以将振动降低到1/10-1/40的水平 ,几乎消除了对精密设备的影响。

Most vibration of vibration mills can be absorbed by the spring but slight vibration is transmitted to the foundation. Therefore, if you use precise instruments or measures near the place where a vibration mill is fixed, such as upper floors or adjacent rooms, you need vibration control equipment.

Our originally designed special vibration controller can reduce the vibration to the level of 1/10 –1/40, virtually eliminating effects on precision equipment level.

CD 型振动粉碎机（连续式）

Model CD Vibration Mill (Continuous)

可拆卸粉碎筒
Movable Grinding Cylinder

粉碎筒可以轻松地从支架（支撑面板）上拆下。因此，它可以更换，也可以旋转90至180°，以避免特殊衬里的局部磨损，使粉碎筒的寿命是普通粉碎筒的两倍或三倍。通过设置夹套，可以保护耐热衬里，并且可以尽可能地防止产品温度的升高。

The grinding cylinder can be easily removed from the cradle (sup porting panel). Therefore it can be replaced and also rotated by 90 to 180˚ to avoid the local abrasion of special linings, making the life span of the cylinder twice or three times as long as that of the ordinary ones. Set up with the jacket, the thermolabile lining can be protected, and increase of the product temperature can be prevented as much as possible.

模块化激振器
Vibrator As One Unit Set

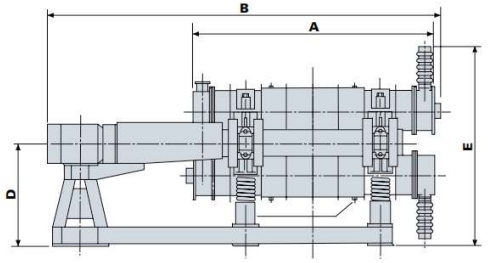
由轴承箱、轴承、轴和轴承盖组成的激振器单元用螺栓安装在支撑面板的左右两侧。轴承数量是现有类型的两倍，您可以采用小尺寸轴承并轻松维护驱动部件。
如果轴承损坏，您可以在一到两个小时内用备用激振器单元更换并重新开始运行。然后您可以稍后用新轴承更换损坏的轴承，当然这需要更多时间。

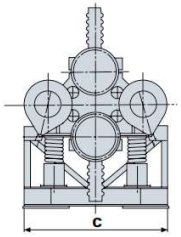
The vibrator units composed of bearing case, bearing, shaft and bearing cover are installed on the right and left sides of the supporting panel with bolts. Having twice as many bearings as the existing type, you can adopt small size bearings and maintain the driving parts easily.
In case a bearing is damaged, you can replace it with the spare unit and start operation again within one to two hours. Then you can also replace the damaged bearing with a new one later, taking ample time.

驱动部分无油污飞溅
Driving part Without Oil Scattering

驱动部件的润滑全部为润滑脂润滑，可在运行过程中通过可选的润滑脂泵均匀且集中地进行。用过的油脂通过密封盖自动流出到废油脂罐，可以在磨机外看到。因此，您可以在清洁的环境中运行，没有油污染。

Oiling to the driving parts is all grease lubrication, which can be done equally and concentratedly during the operation through the grease pump at option. Used grease automatically flows out through the sealing cover to the waste grease pot, which can be seen outside of the mill. Therefore you can operate in a clean environment without oil pollution.





► 主要型号 Main Specifications

型式 Model	容量 Effective Volume	钢球重量 Weight of Media	电机 Motor	本体重量(无媒体) Weight Without Media
CD-20	65ℓ	240 kg	3.7 kW×6 P×2台 units	750 kg
CD-40	550ℓ	2,000 kg	18.5 kW×6 P×2台 units	3,700 kg
CD-50	1,090ℓ	4, 000 kg	37 kW×6 P×2台 units	7,000 kg
CD-50L	1,280ℓ	4,700 kg	37 kW×6 P×2台 units	7,700 kg
CD-60	1,910ℓ	7,000 kg	55 kW×6 P×2台 units	10,500 kg
CD-70	3,040ℓ	11,000 kg	90 kW×6 P×2台 units	15,600 kg

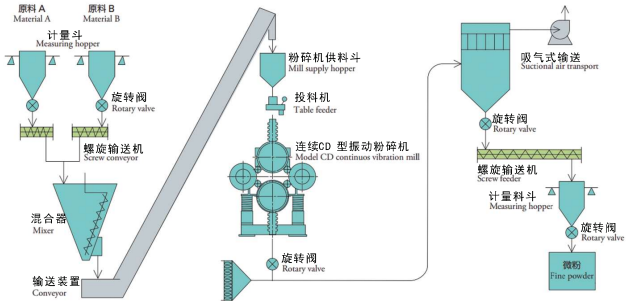
※ 由于产品改进，如有变更，恕不另行通知。
Specifications may be changed without notice for the purpose of product improvemest.

► 主要尺寸 Main Dimensions

型式 Model	A	B	C	D	E
CD-20	1,300 mm	2,000 mm	900 mm	530 mm	1,060 mm
CD-40	2,620 mm	3,930 mm	1,370 mm	970mm	1,900 mm
CD-50	3,240 mm	4,470 mm	1,740 mm	1,140 mm	2,210 mm
CD-50L	3,440 mm	4,850 mm	1,840 mm	1,135 mm	2,230 mm
CD-60	3,840 mm	5,540 mm	2,090 mm	1,240 mm	2,430 mm
CD-70	4,400 mm	6,330 mm	2,250 mm	1,320 mm	2,600 mm

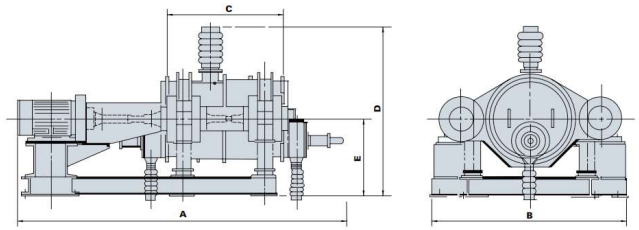
注意：电机容量和处理能力可能会根据产品所需的基材类型和颗粒介质重量而有所不同。
N.B: Motor capacity and processing abillity may vary according to base material type and granular media weight required for the product.

混合&研磨工艺流程示意图 Illustration of mixing and grinding



FV型振动粉碎机（间隙式）

Model FV Vibration Mill (Batch)



易于安装和更换衬里
Easy execution and replacement of lining

FV型振动粉碎机机是我公司独创的双驱动间歇式振动粉碎机机，其驱动部件从研磨筒内移出，固定在筒体两侧。这一设计与现有驱动轴贯穿筒体的机型不同，因此筒体内部不存在管道等凸出部件，既便于内衬的施工安装，也显著简化了更换流程。

Model FV vibration mill is our original dual-drive batch process vibration mill with the driving parts taken out of the griding cylinder and fixed on both sides of the cylinder. This is different from the existing types with the driving parts passing through the cylinder. Therefore it has no projection such as pipe inside of the cylinder, making the execution and replacement of the lining very easy.

物料进入到出料完全自动化
Complete automation from material input to discharge

研磨筒体两侧配置的自动卸料阀，可在无需翻转设备的情况下完成卸料作业。
从定量投料到研磨卸料的整个流程，均可实现全自动操作。

Automatic discharge valves set up on both sides of the grinding cylinder enable discharge without inversion.
You can operate the whole process completely automatically from material input in the quantity measured beforehand to grinding and discharging.

作为中型振动粉碎机
Works well as a continuouns vibration mill for intermediate crushers

振动粉碎机机作为能将物料研磨至微米乃至亚米级的高精度粉碎设备，已被公认为不可或缺的工业装备。当前，通过将FV型号研磨筒体长度增加近一倍，该设备应用领域正持续扩展，已成功转型为连续破碎与大规模处理设备。其筒体内均匀排布的环绕钢棒可对物料施加强力冲击实现瞬间破碎，同时采用特殊耐磨钢材制造的衬板显著延长了使用寿命。

Vibration mills are considered indispensable as fine grinding mills which grind materials into a micron or sub micron level. Recently their use has been widening to be used as a continuous crushing and mass-processing mill by making the length of the grinding cylinder of Model FV about double. Around steel rod is inserted and the materials are crushed at a stroke with strong force. The life of the liner is also extended as the special abrasion resistant steel is applied.

非常适用于精密混合
Best fit for precise mixing

钢球的高速运动可显著增强混合搅拌效果，使该设备成为铁氧体、陶瓷等材料的高性能精密混合设备。

High speed motion of balls brings a big effect in mixing and agitation, making the mill a very powerful precise mixer for ferrite, ceramics and soon.

► 主要型号 Main Specifications

型　式 Model	铁・不锈钢衬里 Iron・Stainless steel liner		氧化铝・MCN衬里 Alumina・MCNlining		电机 Motor	本体重量 Body Weight（Net）	处理能力 Standard process volume per batch
	内容量 Volume	钢　球 Steel ball	内容量 Volume	氧化铝 Alumina ball			
FV-20	65ℓ	235 kg	57ℓ	95 kg	2.2kW×6P×2台 units	720 kg	20ℓ
FV-200	645ℓ	2,370 kg	585ℓ	980 kg	18.5kW×6P×2台 units	3,700 kg	200ℓ
FV-300	970ℓ	3,560 kg	890ℓ	1,490 kg	30 kW×6 P×2台 units	5,100 kg	300ℓ
FV-500	1,600ℓ	5,900 kg	1,520ℓ	2,560 kg	37 kW×6 P×2台 units	7,800 kg	500ℓ

注：电机功率与处理能力将随物料种类及产品所需研磨介质配重而变化。
Motor capacity and processing abillity may vary according to base material type and granular media weight required for the product.

► 主要尺寸 Main Dimensions

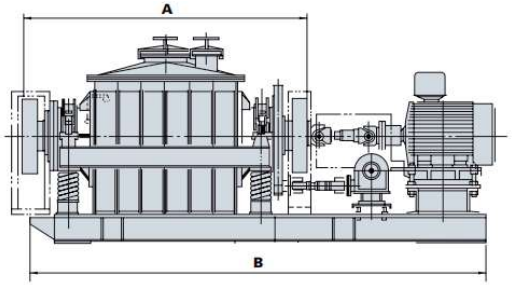
型式 Model	A	B	C	D	E
FV-20	1,600 mm	1,090mm	600mm	1,110 mm	455 mm
FV-200	3,230mm	2,140mm	1,340 mm	1,810 mm	870 mm
FV-300	3,640 mm	2,480mm	1,540mm	1,970mm	930mm
FV-500	4,070 mm	2,750 mm	1,800 mm	2,080 mm	950 mm

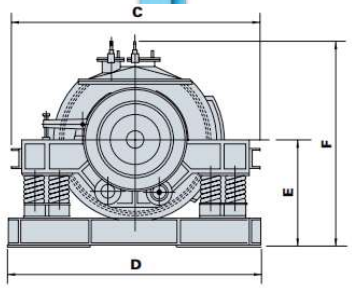
＊产品规格可能随时变更，恕不另行通知，此调整旨在实现产品改良之目的。
Specifications may be changed without notice for the purpose of product improvemest.

MB型振动粉碎机（间隙式）
Model MB Vibration Mill (Batch)

- 粉碎时间可自由选择;
- 可以在短时间内进行精细粉碎;
- 干式和湿式均可;

- Grinding time can be chosen freely.
- Fine grinding is possible in a short time.
- Dry and wet process specifications are both available.





► 主要型号 Main Specifications

型式 Model	容量 Effective Volume	钢球重量 Weight of Media	电机 Motor	本体重量(无媒体) Body weight	处理能力 Standard process volume per batch
MB-100	390ℓ	1,430 kg	18.5 kW×6P	2,700 kg	100ℓ
MB-250	790ℓ	2,900 kg	45 kW×6P	5,500kg	250ℓ

备注:1.主体重量是不含介质时的重量。 2.电机容量随介质重量而变化。
N.B: 1. Listed weight is the weight without media 2. Motor capacity varies according to media weight

► 主要尺寸 Main Dimensions

型式 Model	A	B	C	D	E
MB-100	1,730 mm	1,490 mm	1,520 mm	700 mm	1,220 mm
MB-250	2,200 mm	1,920 mm	1,960 mm	820 mm	1,570 mm

※为持续优化产品性能，相关规格可能随时变更，恕不另行通知。
Specifications may be changed without notice for the purpose of product improvemest.

CD型振动粉碎案例 Illusrtation of model CD vibration mill grinding

原料 Material	原料粒度 Grain size	机型 Model	介质 Media	方式 Proces	处理量 Process rate	成品粒度 Grain size
硬铁氧体 Hard ferrite	10 mm	CD-20	棒 Rod	干式 Dry	60 K/ H	D50 =2.5μ
硬铁氧体 Hard ferrite	10 μ	CD-35	钢球 Steel Ball	干式 Dry	100 K/ H	D50 =1.4μ
软磁铁氧体 Soft ferrite	5μ	CD-40	钢球 Steel Ball	湿式 Wet	680 K/ H	D50 =1.4μ
氧化物 Oxides	0.5 mmφ	CD-35	棒 Rod	湿式 Wet	1400 K/ H	–325 mesh 98%
铝粉 Alumina	60 mesh	CD-30	棒 Rod	干式 Dry	100 K/H	–10μ 90%
烧结氧化铝 Sintered alumina	100 mesh	CD-40	氧化铝球 Alumina	干式 Dry	76 K/ H	–325 mesh 98%
氧化镁 Magnesia clinker	3 mm	CD-50	氧化铝球 Alumina	干式 Dry	1000 K/ H	–200 mesh 98%
耐火材料 Fire-resistant material	3 ~ 4 mm	CD-40	棒 Rod	干式 Dry	900 K/ H	–200 mesh 70%
砂浆 Mortar	3 ~ 4 mm	CD-70	棒 Rod	干式 Dry	2300 K/ H	–200 mesh 60%
氧化铝 Alumina clinker	30 mm	CD-30	棒 Rod	干式 Dry	150 K/ H	6000 cm2/ g
电容氧化镁 Electromelting magnesia clinker	80 mesh	CD-20	棒 Rod	干式 Dry	38 K/ H	–325 mesh 98%
氧化硅 Silica alumina	40 ~80μ	CD-35	氧化铝球 Alumina	干式 Dry	300 K/ H	–10μ 50%
硅 Silica	9 mesh	CD-40	不锈钢球 Stainless steel ball	干式 Dry	950 K/ H	–200 mesh 60%
酞青蓝 Phthalocyanine Blue	不明	CD-50L	棒	干式 Dry	200 K/ H	机械力化学效应 Mechanochemical Effect
氢氧化锂 Lithium hydroxide	–1 mm	CD-40	氧化铝球 Alumina	干式 Dry	70 K/ H	D50 =15μm
氢氧化钙 Calcium hydroxide	–5 mm	CD-60	氧化铝球 Alumina	干式 Dry	1200 K/ H	50 m2/g
活性炭 Activated carbon	–5 mm	CD-30	棒 Rod	干式 Dry	200 K/H	–75μm 95%
钴 Cobalt	2 –3 mm	CD-60	棒 Rod	干式 Dry	525 K/ H	–150μm 63%
二氧化锰 Manganese dioxide	200 mesh 93%	CD-70	钢球 Steel ball	干式 Dry	2600 K/ H	–200 mesh 60%
氧化锡 Tin oxide	–30 mesh	CD-20	钢球 Steel ball	湿式 Wet	300 K/H	–325 mesh 90%
中碳锰铁 Carbon ferromanganese	–28 mesh	CD-20	钢球 Steel ball	干式 Dry	100 K/H	–100 mesh 80%
硅铁 Ferro silicon	2 ~3 mm	CD-40	钢球 Steel ball	干式 Dry	850 K/ H	–35 mesh 65%
锰铁 Ferromanganese	5 mm	CD-35	棒 Rod	干式 Dry	2500 K/ H	–45 mesh 50%
铬铁 Ferro chrom	10 mm	CD-20	棒 Rod	干式 Dry	360 K/ H	–100 mesh 50%
镍 Nickel mat	5 mm	CD-40	棒 Rod	湿式 Wet	300 K/H	325 mesh 90%
硫黄 Sulfur	20 mm	CD-20	棒 Rod	干式 Dry	100 K/H	–200 mesh 98%
肥料 Manure	1 mm	CD-20	棒 Rod	干式 Dry	120 K/ H	–100 mesh 95%
活性炭 Activated charcoal	5 mm	CD-20	棒 Rod	干式 Dry	120 K/H	–200 mesh 90%
焦炭 Coke	10 mm	CD-30	棒 Rod	干式 Dry	850 K/H	–35 mesh 65%
碳 Carbon	φ1 mm	CD-50	氧化铝球 Alumina	干式 Dry	200 K/H	D50 =9μm
炭 Carbon	10 mm	CD-20	棒 Rod	干式 Dry	110 K/ H	–150 mesh 90%
滑石 Talc	10 mm	CD-50	棒 Rod	干式 Dry	1500 K/ H	–325 mesh 70%
石灰 Lime	–200 mesh 35%	CD-20	钢球 Steel ball	干式 Dry	300 K/H	–325 mesh 65%
树脂 Resin	3 ~ 4mm	CD-20	棒 Rod	干式 Dry	180 K/ H	–250 mesh 62%
树脂 Vegetable fiber	3 mm	CD-35	氧化铝球 Alumina	干式 Dry	30 K/ H	–35μ
植物纤维 Herb medicine	纤维 Fiver	CD-30	棒 Rod	干式 Dry	130 K/ H	–150 mesh
中药 Chinese medicine	纤维 Fiver	CD-20	棒 Rod	干式 Dry	140 K/ H	–150 mesh
食品 Dried onion	50 mm 薄片 Flake	CD-20	钢球 Steel ball	干式 Dry	40 K/ H	–60 mesh 97%

FV型、MB型间歇式振动粉碎实例 Illusrtation of model FV, MB vibration mill grinding

原料 Material	原料粒度 Grain size	介质 Media	方式 Proces	处理时间 Process time	成品粒度 Grain size
二氧化锰 Manganese dioxide	D50 =22μm	氧化铝 Alumina	干式 Dry	20 min	D50 =8μm
氢氧化锂 Lithium hydroxide	D50 =250μm	氧化铝 Alumina	干式 Dry	4 Hr	D50 =10μm
钴 Cobalt	–500μm	钢球 Steel ball	湿式 Wet	13 Hr	D50 =30μm
金属铬 Metal chromium	D50 =6.3μm	氧化锆 Zirconia	湿式 Wet	80 Hr	D50 =1.99μm
铬、铜 Chromium, Copper	不 明	不锈钢球 Stainless steel ball	干式 Dry	7 Hr	机械合金化 Mechanical alloying
金刚石 Diamond	D50 =35μm	不锈钢球 Stainless steel ball	干式 Dry	10 Hr	D50 =5μm
铜粉 Copper	D50 =3.87μm	不锈钢球 Stainless steel ball	湿式 Wet	9 Hr	D50 =1.25μm
氧化铁 Hard ferrite	325 mesh	钢球 Steel ball	湿式 Wet	5 Hr	D50 =1.0μ
磨料 Polishing material	30 mesh	钢球 Steel ball	干式 Dry	1 Hr	–44μ 98%
独居石 Manazite	70 ~ 80 mesh	钢球 Steel ball	湿式 Wet	1 Hr	–44μ 99.8%
锆 Zirconsand	80 mesh	钢球 Steel ball	干式 Dry	1 Hr	–200 mesh 98%
熔块 Frit	5 mmφ	氧化铝 Alumina	干式 Dry	30 min	–100 mesh 90%
无机颜料 Inorganic pigment	–6 mesh	氧化铝 Alumina	干式 Dry	5 Hr	1.64μ
碳化硅 Carborundum	80 #	钢球 Steel ball	干式 Dry	3 Hr	–35μ 92%
硬质合金 Super-alloy	–10 mm	钢球 Steel ball	干式 Dry	1 Hr	–325 mesh 99%
特种钢 SCM	2 mm	钢球 Steel ball	干式 Dry	16 Hr	–200 mesh 60%
铁粉 Iron powder	28 mesh	钢球 Steel ball	干式 Dry	5 Hr	–325 mesh 90%
农药 Agriculturals chemicals	/	氧化铝 Alumina	干式 Dry	7 Hr	–1μ 98%
碳化硅 Silicon carbide	65 mesh	钢球 Steel ball	湿式 Wet	1 Hr	–325 mesh 90%
氧化铝 Alumina	40 μ	氧化铝 Alumina	干式 Dry	5 Hr	–5μ 92%
钛酸钡 Titanic acid barium	2.7 μ	氧化铝 Alumina	湿式 Wet	1 Hr	D50 =1.7μ
玻璃 Glass	4 mm	氧化铝 Alumina	干式 Dry	6 Hr	–10μ 70%
橄榄石 Olivinasand	42 mesh	钢球 Steel ball	干式 Dry	30 min	–325 mesh 96%
氧化铝 Alumina clinker	16 mesh	氧化铝 Alumina	干式 Dry	2 Hr	6,000 cm2/ g
抹茶 Green tea	茶叶	氧化铝 Alumina	干式 Dry	2 Hr	D50 =10μm
氮化硅 Si3N4	200um	氮化硅球 Si3N4 ball	干式 Dry	8h	D50=0.8um
氧化铝 Al2O3	10um	氧化铝球 Alumina ball	干式 Dry	4h	D50=0.65um
氢氧化铝 Al(OH)3	1mm	氧化铝球 Alumina ball	干式 Dry	10h	D50=1um
铝粉 AL	50um	钢球 steel ball	干式 Dry	5h	球状粉变为扁平状 flat-shape
锌粉 Zn	50um	钢球 steel ball	干式 Dry	5h	球状粉变为扁平状 flat-shape
玻璃 Glass	5mm	氧化铝球 Alumina ball	干式 Dry	0.5h	D50=8um
电池材料 Battery	0.5~5mm	氧化铝球 Alumina ball	干式 Dry	10min	D50=3um
三氧化二铬 Cr2O3	1mm	氧化铝球 Alumina ball	干式 Dry	15min	D50=2um