Eccentric vibrating mill

Mechanical-chemical activation and finest reduction of all brittle materials
Vibrating mills are suitable for the reduction of all brittle material. Depending on the grinding time and material, reduction of 20 mm feed material are possible. The attainable ultimate fineness is approximately 0...5 µm. Vibrating mills are specially suited for combined grinding and mixing, as well as for mixing, alone. A feed material consisting of many different components can be efficiently reduced and thoroughly mixed in one operation. Grinding in vacuum, under pressure and in inert gas is also possible.

The mills are very suitable for mechanical-chemical processes. The eccentric vibrating mill ESM is to use structural measures to increase the introduction of energy in vibrating mills, so that the size of the energy-depleted zone can be minimised and the upper limit of the grinding container diameter - hitherto determined by the size of the energy-depleted zone - or of the grinding tube diameter of 650 mm can be exceeded.

**Application**
The eccentric vibrating mill has one cylindrical grinding vessel with grinding elements, to which is solidly attached the exciter unit. The exciter unit is excited eccentrically on one side, that is outside the gravity axis and the mass centre of the grinding container.

The exciter mass is balanced by a parallel counterweight disposed on the opposite side of the grinding container. The cylindrical grinding vessel in welded construction is mounted on helical springs which are resting on the base frame. Both grinding container ends are closed with bolted on covers, one of which is fitted with an inspection cover.

The material to be ground is fed into the mill via a flanged connection at the highest point of the container. Ground material is discharged via an outlet in one of the covers. This outlet is fitted with a perforated plate, to retain the grinding elements inside the container.

Drive of the mill is a 3-phase motor via a cardan shaft. The inhomogeneous vibrations are generated by the exciter unit in form of the bearing pedestal with adjustable eccentric weights. The exciter unit is laterally flange mounted, with the counterweight on the opposing side also flange mounted.

The exciter unit is operated such that uneven swingings such as circular, elliptical and linear swingings are produced. Through this arrangement the direction movements of the mill filling are decisively altered. The extent of the linear swingings causes an increase in the speed of circulation of the mill filling (by approximately a factor of 4) compared to circular motion vibrating mills, so that apart from the increase in normal impact force, an increase in the frictional impact force is especially obvious.
Characteristic for the essentially one-sided excitement outside the gravity axis and the mass centre of the vibrating mill is that in comparison to the normal circular vibrating mills the circular movement of the mill filling is only carried out when the exciter is arranged on the right side and is driven in a clockwise rotation. The advantage of the one-sided excitement of the vibrating mill outside the gravity axis and of the mass centre is that the additional incidence of elliptical and linear vibrations contributes essentially to the improvement of the transport procedures by an increase in the speed of rotation, which is critical for the continuance of grinding. Also worth mentioning is the possibility to link modules of identical diameters. In such a case the grinding containers are flanged with screws while the eccentric masses are synchronized by means of cardan shafts. Up to 3 modules may be coupled this way thereby extending the grinding period and adjusting it to the grinding task. A possibly expansion of production at a later date is, due to this modular design no problem either.
To meet customer demands, we naturally are prepared to deliver special executions of eccentric vibrating mills. This generally concerns:

- Lining the mill with elastomers, ceramic and highly abrasion-resistant materials
- Grinding bodies made of steel, hard metals and ceramic of varying quality
- Additional cooling or heating of the grinding container
- Possibility of soundproofing
- Special solutions for filling and emptying
- Addition of additives during the milling process
- Grinding in a vacuum or an inert gas atmosphere
- Entire plants including the necessary accessories
Applications

Fields of applications are in general

- discontinuous dry and wet micro grinding
- mechanical-chemical activation of raw and residual materials
- dry homogenizing of powders and doping agents
- chemical-physical process management (reactor)

Plant for reaction of sulfur with metal powder

ESM 656-2ks for grinding of asbestos
### Technical Data

#### ESM 324 - 1 k s

<table>
<thead>
<tr>
<th>Wear Lining</th>
<th>Type of Process</th>
<th>Number of Modules</th>
<th>Number of Poles of the Three Phase Motor</th>
</tr>
</thead>
<tbody>
<tr>
<td>(s: steel, k: ceramic, G: rubber)</td>
<td>(k: continuous, b: batchwise - discontinuous)</td>
<td>4 (1500 rpm)</td>
<td>6 (1000 rpm)</td>
</tr>
</tbody>
</table>

| Name of Machine: Eccentric Vibrating Mill |

<table>
<thead>
<tr>
<th>Usable Volume (max.)</th>
<th>L = 5, 16, 70, 120, 190, 300</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Grinding Tube Volume</td>
<td>L = 19, 53, 220, 370, 597, 937</td>
</tr>
<tr>
<td>Grinding Media Volume</td>
<td>L = 15, 42, 176, 296, 478, 750</td>
</tr>
<tr>
<td>Weight of Steel Grinding Media</td>
<td>kg = 76, 190, 830, 1400, 2250, 3530</td>
</tr>
<tr>
<td>Weight of Ceramic Grinding Media</td>
<td>kg = 30, 84, 380, 650, 1050, 1600</td>
</tr>
<tr>
<td>Weight of Mill (without Grinding Media)</td>
<td>kg = 140, 550, 1700, 2600, 5300, 8500</td>
</tr>
<tr>
<td>Motor kW</td>
<td>1,1, 5, 50, 15, 22, 37, 55</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>D&lt;sub&gt;m&lt;/sub&gt; inside</th>
<th>L&lt;sub&gt;m&lt;/sub&gt;</th>
<th>L</th>
<th>B</th>
<th>H</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESM 234 236</td>
<td>235 mm</td>
<td>450 mm</td>
<td>648 mm</td>
<td>1370 mm</td>
<td>620 mm</td>
</tr>
<tr>
<td>ESM 326 326</td>
<td>307 mm</td>
<td>712 mm</td>
<td>1526 mm</td>
<td>1526 mm</td>
<td>743 mm</td>
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<tr>
<td>ESM 506 506</td>
<td>476 mm</td>
<td>1232 mm</td>
<td>2450 mm</td>
<td>2520 mm</td>
<td>1215 mm</td>
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<tr>
<td>ESM 656 656</td>
<td>620 mm</td>
<td>1246 mm</td>
<td>2520 mm</td>
<td>3100 mm</td>
<td>1340 mm</td>
</tr>
<tr>
<td>ESM 756</td>
<td>712 mm</td>
<td>1520 mm</td>
<td>3100 mm</td>
<td>4040 mm</td>
<td>1410 mm</td>
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<tr>
<td>ESM 856</td>
<td>814 mm</td>
<td>1800 mm</td>
<td>4040 mm</td>
<td>4040 mm</td>
<td>1675 mm</td>
</tr>
</tbody>
</table>

Vibrating Diameter: 6 - 8 mm with 1500 rpm motor (types with code ..4)
12 - 13 mm with 1000 rpm motor (types with code ..6)

We reserve the right for technical changes.
Screening Machines
Process Equipment
- circular motion screens
- double counterweight screens
- round screens
- jigs

Sample Taking
Size Reduction Machines
Laboratory Equipment
- individual units and complete installations for sample taking and preparation
- jaw crushers
- roller mills
- hammer and hammer impact mills
- vibrating mills and ball mills
- rotary shredders
- test grading machines
- analytical screening machines
- dividers
- testing drums

Centrifuges
- scroll-screen centrifuges
- pusher centrifuges
- sliding discharge centrifuges
- vibratory centrifuges
- decanter centrifuges