MANUFACTURERS OF
MACHINERY & EQUIPMENTS FOR

BULK DRUG
PHARMACEUTICAL
AYURVEDIC

WIDE RANGE FOR

FILTRATION  DRYING
MICRONIZATION
CONTAINMENT SOLUTION

MILLENNIUM EQUIPMENTS (P) LTD
HYDERABAD
Dear Customer

We take pleasure in introducing ourselves as manufacturers of machinery and equipments for Bulk Drug, Pharmaceutical, Ayurvedic and Food Industries as per cGMP standards.

Millennium Equipments (P) Ltd., has specialized and offers wide range of machinery and equipments under one roof for Filtration, Drying, Micronizing, Containment process with dedicated Commitment.

MEPL is promoted by technically qualified personal with vast experience in innovative machinery building.

Effective integration of Technology, modern infrastructure and adherence to well-defined standards and procedures with continuous monitoring are the key elements to MEPL success.

MEPL dedicates to quality standards, Timely delivery, Prompt Service, Customer satisfaction.

S. GIRIDHAR
Managing Director
Mobile No. : 09849012210
Email: girimepl@gmail.com
Specialized in . . .

- AGITATED NUTSCHE FILTER DRYER (ANFD)
- ROTO CONE VACUUM DRYER (RCVD)
- ROTORY VACCUM PADDLE DRYER (RVPD)
- VACUUM TRAY DRYER (VTD)
- MICRONIZER/AIRJET MILL
- CONTAINMENT ISOLATORS
Agitated Filter is a closed vessel designed to separate solid and liquid by filtration under pressure or vacuum. The closed operation ensures odorless, contamination free and nonpolluting working conditions maintaining product purity and hygiene. The advanced technology of agitation and hydraulics used in the equipment makes it versatile and user friendly. The resulting wet cake can be reslurried and washed thoroughly with water or solvents unlike in "NUTSCH" type filters or centrifuges. Wash liquid quantity can be controlled and recycled, reducing effluent load. The discharge of wet cake is automatic. If the process demands filtration in chilled or hot condition, it is also possible. Drying of wet cake is also possible when drying features are incorporated.

The equipment is functionally safe and easy to operate. It can carry out various phase of process operations, viz: Crystallization, filtration, extraction, Discoloration, Washing and drying. The number of conventional machines employed for filtration process are also reduced. It has multi-functional utility, saves on power, labor, floor space, material wastage and time.

The filter/filter dryer has wide field of applications in chemical, pharmaceutical, Agro chemicals, fine chemicals, and food industries. Sterilizable pharma versions are available for aseptic requirements.

CONSTRUCTION : Agitated Filter is a Cylindrical, Vertical closed vessel made as per pressure vessel codes. The vessel is fitted with plane filter media, either metallic or synthetic at the lower end of the vessel. Specially designed slow speed, robust Agitator assembly is mounted on vessel. The Agitator design adopted is advanced and unique to this system. The “S” Type self centering blades are made from heavy sections to handle liquid as well as solids. It has four movements; each movement, either single or in combination is designed to carry out specific operations.

The movements of agitator are:
1. **Clock wise rotation**: For smoothing cake surface and compacting it during filtration.
2. **Anticlock wise rotation**: For stirring near filter media to keep it clear of sedimentation, re-slurring while washing and atomized discharging.
3. **Upward movement**: Operated by hydraulic cylinders at constant speed to assist mixing.
4. **Down ward movement**: Operated by hydraulic cylinders with variable speed to assist squeezing and discharge.

OPERATION/PROCESS:

**CHARGING**: Slurry is charged into filter preferably by gravity flow from Reaction installed above the filter or by slurry pump.

**FILTRATION**: While charging the slurry into the filter, filtrate will start passing through filter cloth by gravity. To enhance filtration rate and to keep filter media clean from initial sedimentation, the agitator can be brought down most position and keep on rotating in forward direction. The cake height can be built up in successive steps.

**CAKE WASHING**: Wash liquids is sprayed into the chamber on cake through a spray ring. The stirrer blades are lowered to agitated the slurry to obtain good cake washing. The wash liquid is sprayed repeatedly though the filter cake by the same driving force as used during the first stage filtration.

**SMOOTHING AND COMPRESSION**: At the closing stage of the filtration process described above, the stirrer blades are lowered on the cake surface. The specially designed hydraulic system, takes over to perform a systematic, efficient and productive smoothing of the cracks which appear in the cake, leaving behind low residual moisture 10to 20% less as compared to other conventional filters. This results in energy saving in drying process at least by 40%.

**FILTER CAKE DRYING**: After the final wash, filtration and compression, the heating medium is fed into the limpet/jacket and the chamber below filter plate as well as Hollow shaft and Hallow Blade. The stirrer blades are lowered and the cake mass is agitated during the drying stage. The vapour can be removed under vacuum applied to the filter. Drying can be enhanced by purging a hot gas through cake.

**PRODUCT DISCHARGE**: The stirrer blades are rotated and lowered to cut away the upper surface off the filter cake. As the blades descend into the cake mass, the discharge value is opened and a controlled discharge of the cake is achieved.
**SALIENT FEATURES:**

Designed and Manufactured to suit critical hygienic conditions of pharma and food industries. (cGMP MODEL)

Detachable bottom is operated by hydraulic cylinders and held tightly with zero leakage. Offered in various materials of constructions, like stainless steel, carbon steel, rubber lined carbon steel and lead lined carbon steel.

Offered in a wide range of filtration area capacities.

Significant squeezing of filter cake is possible, thereby resulting in considerably lower residual moisture in the cake, resulting in reduction in energy requirement for drying of filter cake by up to 40% depending on cake characteristics.

Method of operation is totally enclosed, neat and hygienic. These conditions are excellent for solvent recovery, handling of toxic and hazardous materials without human intervention.

Enables easy, non-manual and automatic cake/solid discharge. Scraper blade is provided to scrap the material which may stay on shell.

The unit is designed with minimum maintenance feature.

Hallow shaft and Hallow Blade for thorough drying.

Specially designed tank cleaning nozzle is provided for thorough cleaning of inside of filter body.

**Hydraulic power pack:**

is a part of system. It has multiple functions viz:

1. Discharge valve operation for labour-free cake removal.
2. Lowering and lifting the Agitator.

<table>
<thead>
<tr>
<th>MEANFD</th>
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<th>MEANFD</th>
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<td>50G</td>
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<td>1500G</td>
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<td>5000G</td>
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</table>

**Vessel - Full Vacuum , Jacket/Limpet – 4bar**

DESIGN TEMP 150deg

FINISH Internal: 240gr Mirror finish, External 180gr Matt finish

3. Lowering the detachable bottom when provided.
4. Driving the Agitator, when hydraulic motor is used.

The above features along with precision in manufacturing give excellent process control viz. filtering, spreading, compacting, reslurrying, washing, discharging and drying.

**Filter Media:** Filter media is selected as per specific process requirements. They are textile cloth from natural or synthetic fibres, metal wire clothes of multi-layered sintered mesh.

**Detachable Bottom:** Filter/Filter dryer when supplied with detachable bottom can be lifted/lowered by hydraulic cylinders. Unique quick descending/ascending arrangement is also available where the bottom is held in position by hydraulic cylinders during pressure filtration. This arrangement can assist in quick changing of filter cloth and product change.

**Discharge Valve and Sampler:** Plug Type Side Discharge valve is provided near the filter plate. Designed as per customer requirements. Metal to Metal sealing, Polymer sealing, Quick openable doors Online Product sampler with Valve.

**Mechanical Seal:** Double/Single Mechanical Seal either dry or wet type can be fitted on filter/filter dryer. The mechanical seal has bellows extended on the shaft.
is suitable for drying of materials which cannot resist high temperature, material which are easily oxidized, volatile materials which should be retrieved, materials strong irritant and poisonous in nature. The roto cone dryer with improved technology integrates during operation under vacuum. The roto cone dryer facilitates enhanced drying efficiency, low temperature operation and economy of process by total solvent recovery. It helps cGMP based working by achieving optimum dust control, while offering advantages of efficient charging and discharging of materials. The drying unit equipped with lump breakers initially breaks large lumps and subsequently powders them (in single cone). The rotary action of the dryer together with mechanical action of the breakers cuts down drying time and gives a lump free product.

**ADVANTAGES:**

- Reduces drying time
- Eliminates need for re-drying of lumps
- Handling and exposure of final product is avoided
- Gives uniformity size dry product
- System can process crystalline or amorphous powders which are prone for lumps
- Easy to clean internal surface, thus ensuring purity of product
- Optimum and continuous vacuum maintenance during process
- Uniform material shuffling over the heated contact surface of the cone.

**SALIENT FEATURES / MOC (in GMP Model):**

- Inner shell/Cone and contact parts in SS 316.
- Steam/HW water Jacket in SS 304.
- Insulation with jacket in SS 304.
- Cyclone separator in SS 316.
- Condenser (shell&tube) and Receiver in SS304
- Butterfly valve (SS316) at discharge port with dummy and hand wheel.
- Stand and Structure in SS 304/MS with SS304 cladding.
- Drive unit enclosed with SS304 Covers
- Dry Mechanical Seal for vacuum side.
- Dry Mechanical Seal for Waterside.

- FLP Motor & FLP Control panel enclosed in SS304 panel
- Digital Temperature Indicators (FLP) at Hot Water inlet and outlet.
- Digital Temperature Indicator (FLP) and Dial Vacuum Gauge in vapor line.
- Digital Temperature Controller (FLP) with Pneumatic Valve at Hot water inlet.
- Provision for Nitrogen purging/Vacuum release with interlocking to isolation valve
- Temperature and Vacuum Gauges ( Dial Type) on Cone.
- Safety Guard/railing telescopic type with limit switch (FLP) with interlocking.
- Drain plug and safety valve on HW/Steam Jacket.
- Pulse jet type dust filter is provided in side the cone.
- Positioning wheel/inching button for cone
- DRIVE : Gear Box & Motor Direct Coupled and Gear Box to Cone Drive shaft Bull Gear-Pinion Gear Drive.
- Extended shaft (drive side) so that drive unit can be kept in service zone (if required)
- Vacuum loading system of wet material into the Cone.
- FINISH : Internal 320 Grit Mirror Polish and Outer 180 Grit Mat Finish.

**OPTIONALS:**

- Cantilever(One side base) construction.
- VFD for Drive Motor with RPM indicaor.
- Condenser and Receiver in SS316 instead of SS304.
- Lump breakers with FLP moter, Mechanical seals and electrical sliping joint.
- Auto Bin loading mechanisim with timer control and Bins.
- Vacuum pump with FLP moter.
- Hot water system (steam heated) with tank and circulation pump.
### TECHNICAL SPECIFICATIONS:

<table>
<thead>
<tr>
<th>MODEL</th>
<th>MERCVD 15</th>
<th>MERCVD 100</th>
<th>MERCVD 200</th>
<th>MERCVD 300</th>
<th>MERCVD 500</th>
<th>MERCVD 750</th>
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<td>10</td>
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<td>Lump Breaker motor</td>
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<td>0.5 HP</td>
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</tr>
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Design Temp: 200°C, Testing: Vacuum side Full vacuum upto 750 mm of Hg & Steam/Hot water jacket side 5 Kgs/cm² pressure test.

### OVER ALL DIMENSIONS (Approximately):

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<th>Parameter</th>
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<tr>
<td>Length in mm (with Cyclone)</td>
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<tr>
<td>Length in mm (with Cyclone, Condenser &amp; Receiver)</td>
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<td>2000</td>
<td>2250</td>
<td>2500</td>
<td>2750</td>
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<td>3600</td>
<td>4000</td>
<td>4500</td>
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<tr>
<td>Width In mm (with Safety Gaurds)</td>
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<td>1300</td>
<td>1450</td>
<td>1600</td>
<td>1800</td>
<td>2100</td>
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<tr>
<td>Height in mm</td>
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<td>1775</td>
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<td>1000</td>
<td>1200</td>
<td>1600</td>
<td>2000</td>
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<td>3200</td>
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</table>
Rotary vacuum paddle Dryer or Paddle Dryer is used to obtain dry Powder from wet cake or solutions. The efficiency is very high and the operating costs are low compared to other types of dryers. It is a closed system in which hot water, steam, or hot fluid is used as a heating medium in the jacket, in the hollow paddle and in the hallow shaft. Dust collector, condenser, receiver and vacuum pump are part of the system. The continuous agitation by means of heated rotating paddles and minimum clearance between scrapers and heated walls provide a good heat transfer to the wet feed. This results in the solvent/moisture evaporating off and renders the wet material dry, to the required degree. The vapors formed are removed by means of vacuum. Absence of large air flows virtually eliminates dust problems and also the energy consumption remains low. Some of the salient features of a Rotary vacuum paddle Dryer made by us are described below

**FEATURES**

- Common base frame is unique to this system. This eliminated the need of foundation cost and reduces the maintenance cost.
- Drying optimization, this is done by means of external and internal heating. External heating is by means of jacket or limpet coils, while internal heating through a hollow shaft and a set of hollow paddles. Hallow paddles are provided with scrapers having very low gap from wall to maximise heat transfer. Scrapers move material to all parts of the dryer and also help in discharging the material.
- The hollow rotating agitator shaft imparts heat to the product, scrapes the shell wall, tumble the product for maximum heat transfer and discharge product when required.
- The large heat transfer area available on the wide paddles and hollow shaft give maximum heat transfer efficiency to the product.
- Mechanical seals at Shell ends/Stuffing Box.
- The vessel is well design to take temperature stresses during vacuum drying. Low power consumption by the use of helical bevel box.

### Specifications

<table>
<thead>
<tr>
<th>MODEL</th>
<th>MERVPD 500</th>
<th>MERVPD 750</th>
<th>MERVPD 1000</th>
<th>MERVPD 1500</th>
<th>MERVPD 2000</th>
<th>MERVPD 3000</th>
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<tbody>
<tr>
<td>Total Volume in Ltrs</td>
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<td>Working Volume in Ltrs</td>
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<td>900</td>
<td>1200</td>
<td>1800</td>
<td>2400</td>
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<tr>
<td>Capacity in Kg (max)</td>
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<td>250</td>
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<td>500</td>
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<td>Shell Dia mm</td>
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<td>Discharging Size in mm</td>
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<td>7.5HP</td>
<td>7.5HP</td>
<td>10</td>
<td>15</td>
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<td>25</td>
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</tbody>
</table>

Design Temp: 200°C, Testing: Vacuum side Full vacuum upto 750 mm of Hg & Steam/Hot water jacket side 5 Kgs/cm² pressure test.

- Special floating bearing design to combat temperature stresses.
- To remove the condensate formed by steam heating in the hallow shaft, Special rotary joints are also designed to introduce heating media in the hallow shaft.
- Product Filter is very efficiently used to arrest valuable product carried away with the vapours in a filter bag. The arrested product particles are thrown back into the dryer by reverse flow of pulsating air. Generally the product filter are heated to avoid condensations of vapors in the filter bag.
- User friendly discharge valve design provides vacuum tight closing when the material is processed and quick opening lever facilities filling of bags when material discharge and packed.
- Breaker bars are incorporated in the RVPD to break the lumps where the product forms lumps during drying.
- Insulation with Cladding will provided on heating jacket/Limpet coil.
**PROCESS ADVANTAGES**

These dryers give optimum performance with very high heat transfer rates.

These dryers have been successfully used for reaction, crystallization, and extraction operations in addition to the primary function of drying.

Low temperature drying for heat sensitive products is possible.

Complete solvent recovery is possible with this Rotary vacuum paddle dryer.

The Cantilever Model have following versatile features:

- Full door opening for ease of operation, cleaning, and validation.
- Clean area installation possible with stainless steel partition wall between the process area and drives.
- The paddle dryer is also supplied with machined and mirror polished inside surfaces with PTFE Scrapers.

### Cantilever Model:

<table>
<thead>
<tr>
<th>MODEL</th>
<th>MERVPD 50</th>
<th>MERVPD 100</th>
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<th>MERVPD 750</th>
<th>MERVPD 1000</th>
<th>MERVPD 1500</th>
<th>MERVPD 2000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Volume in Ltrs</td>
<td>50</td>
<td>100</td>
<td>200</td>
<td>500</td>
<td>750</td>
<td>1000</td>
<td>1500</td>
<td>2000</td>
</tr>
<tr>
<td>Working Volume in Ltrs</td>
<td>30</td>
<td>60</td>
<td>120</td>
<td>300</td>
<td>450</td>
<td>600</td>
<td>900</td>
<td>1200</td>
</tr>
<tr>
<td>Capacity in Kg (max)</td>
<td>15</td>
<td>30</td>
<td>75</td>
<td>175</td>
<td>250</td>
<td>350</td>
<td>500</td>
<td>700</td>
</tr>
<tr>
<td>Shell Dia mm</td>
<td>400</td>
<td>475</td>
<td>600</td>
<td>800</td>
<td>900</td>
<td>1000</td>
<td>1100</td>
<td>1250</td>
</tr>
<tr>
<td>Shell Lenth mm</td>
<td>450</td>
<td>600</td>
<td>750</td>
<td>1000</td>
<td>1175</td>
<td>1300</td>
<td>1600</td>
<td>1650</td>
</tr>
<tr>
<td>RPM of Paddle</td>
<td>16</td>
<td>16</td>
<td>14</td>
<td>14</td>
<td>12</td>
<td>10</td>
<td>10</td>
<td>08</td>
</tr>
<tr>
<td>Heat transfer area in m²</td>
<td>1.1</td>
<td>1.5</td>
<td>2.1</td>
<td>4.0</td>
<td>5.0</td>
<td>7.5</td>
<td>9.0</td>
<td>10</td>
</tr>
<tr>
<td>Dust Filter Area m²</td>
<td>0.05</td>
<td>0.07</td>
<td>0.10</td>
<td>0.25</td>
<td>0.35</td>
<td>0.50</td>
<td>0.75</td>
<td>1.00</td>
</tr>
<tr>
<td>Condenser in m²</td>
<td>0.25</td>
<td>0.50</td>
<td>1.0</td>
<td>1.5</td>
<td>2</td>
<td>2.5</td>
<td>3.0</td>
<td>3.5</td>
</tr>
<tr>
<td>Receiver in Ltrs</td>
<td>15</td>
<td>25</td>
<td>50</td>
<td>75</td>
<td>100</td>
<td>150</td>
<td>200</td>
<td>250</td>
</tr>
<tr>
<td>Charging Ht in mm</td>
<td>1800</td>
<td>2000</td>
<td>2300</td>
<td>1750</td>
<td>1900</td>
<td>2000</td>
<td>2300</td>
<td>2550</td>
</tr>
<tr>
<td>Discharging Ht in mm</td>
<td>600</td>
<td>600</td>
<td>650</td>
<td>650</td>
<td>650</td>
<td>750</td>
<td>750</td>
<td>750</td>
</tr>
<tr>
<td>Charging Size in mm</td>
<td>150</td>
<td>175</td>
<td>175</td>
<td>100</td>
<td>125</td>
<td>125</td>
<td>125</td>
<td>150</td>
</tr>
<tr>
<td>Discharging Size in mm</td>
<td>125</td>
<td>150</td>
<td>175</td>
<td>200</td>
<td>225</td>
<td>250</td>
<td>275</td>
<td>300</td>
</tr>
<tr>
<td>Gear Box</td>
<td>2&quot;</td>
<td>3.5&quot;</td>
<td>3&quot;</td>
<td>4&quot;</td>
<td>4&quot;</td>
<td>5&quot;</td>
<td>5&quot;</td>
<td>6&quot;</td>
</tr>
<tr>
<td>Main drive motor</td>
<td>1HP</td>
<td>2HP</td>
<td>3HP</td>
<td>5HP</td>
<td>5HP</td>
<td>7.5HP</td>
<td>7.5HP</td>
<td>10</td>
</tr>
</tbody>
</table>

Design Temp: 2000°C, Testing: Vacuum side Full vacuum upto 750 mm of Hg & Steam/Hot water jacket side 5 Kgs/cm² pressure test.

<table>
<thead>
<tr>
<th>Length in mm</th>
<th>2900</th>
<th>3350</th>
<th>3750</th>
<th>4350</th>
<th>4750</th>
<th>5250</th>
<th>5500</th>
<th>5750</th>
</tr>
</thead>
<tbody>
<tr>
<td>Width In mm</td>
<td>600</td>
<td>750</td>
<td>900</td>
<td>1125</td>
<td>1200</td>
<td>1325</td>
<td>1500</td>
<td>1625</td>
</tr>
<tr>
<td>Height in mm</td>
<td>1800</td>
<td>2200</td>
<td>2500</td>
<td>2850</td>
<td>3000</td>
<td>3250</td>
<td>3700</td>
<td>3800</td>
</tr>
<tr>
<td>Weight in Kg (Aprox)</td>
<td>500</td>
<td>750</td>
<td>1000</td>
<td>1250</td>
<td>1500</td>
<td>1900</td>
<td>2500</td>
<td>3000</td>
</tr>
</tbody>
</table>
is suitable for drying of thermal sensitive materials easily resolved, polymerized or deteriorated under higher temperature. Sterilization can be conducted prior to the drying process, during which no matter is allowed to enter the product. Static vacuum dryer eliminates the configuration damage of the drying materials, therefore widely used in pharmaceutical, chemicals and foodstuff etc.,

**SALIENT FEATURES / MOC (in GMP Model):**

- Main Body/Vacuum chamber SS316 with heavy duty SS316 flange and stiffeners.
- Door SS316 (hemisphere shape) with heavy duty SS316 flange.
- Shelves Hollow Type pads SS316 with flow baffles.
- Condenser (Shell & tube) and Receiver in SS 304 with isolation valve and Flow Glass in between to monitor condensation.
- Trays (with out back folding) in SS316 rounded corners and edges.
- Explosion vent/rupture disc on vacuum chamber.
- Digital Temperature Controller (FLP) with solenoid controlled pneumatic operated valve at Hot Water inlet.
- Provision for validation port on body.
- Digital Temp., Indicator (FLP) at H.W. inlet & outlet.
- Dial type vacuum gauge and digital Temp., indicator (FLP) in vapor line.
- Pressure release valve in steam line.
- View glass/light glass provided on vacuum chamber door, body and receiver.
- Silicon transparent gasket for door.
- Nitrogen purging valve provided on vacuum chamber.

**FINISH:**

Internal 320 Grit Mirror Polish and Outer 180 Grit Mat Finish.

**OPTIONALS:**

- Heating shelves unit movable system fitted on SS316 trolley and SS304 external trolley.
- Condenser and receiver in SS316 instead of SS304.
- Limpet coil on vacuum chamber.
- Insulation on the vacuum chamber outer surface and door. The insulation is enclosed and covered with removable SS 304 panels.
- Skirting/wall panel all along the body/vacuum chamber flange.
- Hot water system (Steam heated) with tank (Insulated), SS304 steam radiator/electrical heaters, circulation pump with FLP motor and controls.

**Temperature Accuracy:** ± 2 to 30°C
### TECHNICAL SPECIFICATIONS:

<table>
<thead>
<tr>
<th>MODEL</th>
<th>MEVTD3G</th>
<th>MEVTD 6G</th>
<th>MEVTD 12G</th>
<th>MEVTD 24G</th>
<th>MEVTD 36G</th>
<th>MEVTD 48G</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. Of Trays</td>
<td>3</td>
<td>6</td>
<td>12</td>
<td>24</td>
<td>36</td>
<td>48</td>
</tr>
<tr>
<td>Capacity in Kg</td>
<td>03-May</td>
<td>Dec-18</td>
<td>25-35</td>
<td>50-75</td>
<td>75-100</td>
<td>100-150</td>
</tr>
<tr>
<td>Tray size : L W H in mm</td>
<td>406x406x31</td>
<td>812x406x31</td>
<td>812x406x31</td>
<td>812x406x31</td>
<td>812x406x31</td>
<td>812x406x31</td>
</tr>
<tr>
<td>No. of Heating Shelves</td>
<td>4</td>
<td>7</td>
<td>7</td>
<td>13</td>
<td>13</td>
<td>17</td>
</tr>
<tr>
<td>Shelf size in mm</td>
<td>430x430</td>
<td>430x835</td>
<td>835x835</td>
<td>835x1259</td>
<td>835x1250</td>
<td>835x1250</td>
</tr>
<tr>
<td>Distance between shelves in mm</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Trays on each self</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Condenser</td>
<td>0.2m2</td>
<td>0.5 m2</td>
<td>0.75m2</td>
<td>1m2</td>
<td>1.5m2</td>
<td>2m2</td>
</tr>
<tr>
<td>Receiver</td>
<td>10Ltrs</td>
<td>25 Ltrs</td>
<td>50 Ltrs</td>
<td>75 Ltrs</td>
<td>100 Ltrs</td>
<td>150 Ltrs</td>
</tr>
<tr>
<td>H.W. Distribution Pipes</td>
<td>1½”</td>
<td>1½”</td>
<td>1½”</td>
<td>1½”</td>
<td>1½”</td>
<td>1½”</td>
</tr>
<tr>
<td>Door Gasket (Silicon)</td>
<td>16mmSQ</td>
<td>16mmSQ</td>
<td>16mmSQ</td>
<td>16mmSQ</td>
<td>16mmSQ</td>
<td>16mmSQ</td>
</tr>
<tr>
<td>No. of Door Bolts (Φ 40)</td>
<td>4</td>
<td>6</td>
<td>8</td>
<td>10</td>
<td>12</td>
<td>12</td>
</tr>
</tbody>
</table>

Design Temperature : 1500C, TESTING : The vacuum dryer shelves are hydro-tested 5 Kg/Cm2 in Assembled condition. The vacuum chamber is tested for full vacuum.

### OVERAL DIMENSIONS (Approximately):

<table>
<thead>
<tr>
<th>Width in mm</th>
<th>900</th>
<th>1250</th>
<th>1700</th>
<th>1750</th>
<th>1800</th>
<th>1850</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depth in mm</td>
<td>900</td>
<td>1500</td>
<td>1500</td>
<td>1500</td>
<td>1900</td>
<td>1900</td>
</tr>
<tr>
<td>Height in mm</td>
<td>1100</td>
<td>1850</td>
<td>1900</td>
<td>2200</td>
<td>2200</td>
<td>2600</td>
</tr>
<tr>
<td>Weight in mm</td>
<td>400</td>
<td>700</td>
<td>1000</td>
<td>1500</td>
<td>2000</td>
<td>2500</td>
</tr>
</tbody>
</table>
Micronising is a process extensively used by the pharmaceutical, chemical, agro-chemical, pigment and cosmetic industries for the production of fine powders. The MEPL Micronising Mill is suitable for virtually any materials requiring ultra fine grinding, whether in campaign or continuous production. Special linings are available for cohesive and abrasive materials. This is best suited for heat sensitive materials, because the cooling effect of grinding fluid as it expands at the jets and material remains cool.

It is possible to produce powders that are predominantly below 5 micron for use in:
- Pharmaceuticals
- Fine Chemicals
- Antibiotics
- Cosmetics
- Animal Health
- Organic Products
- Inorganic Products
- Agro-chemicals
- Pigments
- Dyestuffs

**BENEFITS:**
The Micronising Mill has many advantages over conventional comminuting equipment.
- It can produce materials of low micron size.
- The product particle shape is uniformly spherical.
- It is easy to clean.
- It can be used for hygienic/sterile applications.
- It has no moving parts.

**OPERATING PRINCIPLE:** Feed material is inspirited by venturi into the cylindrical grinding chamber of the mill. Compressed gas jets, arranged tangentially around the grinding chamber, accelerate the particles, causing omter-particulate impact in the extremely turbulent zone close to the chamber wall. Intense velocity of the jets and the fluid energy is rapidly dissipated to the particles. Larger particles are retained within the outer circulating mass by centrifugal forces, while fine particles outgoing gas stream. The combination of centrifugal and drag forces operating within the grinding chamber provides an efficient classifying mechanism. An adjustable guard ring at the center of the chamber further restricts the passage of oversize particles before material and gas pass from the chamber, either to an integral cyclone or to a separate collector.

**SALIENT FEATURES/MOC (in GMP Model):**
- The Milling System consists of ONE MEPL Micronizer with a grinding chamber diameter of approximately 2”/4”/6”/8”/12”/20”. This unit has all contact parts in SS 316 material of construction. It includes a set of removable PTEE liners to minimise product build up and caking.
  - Included with a Venturi based powder injection system for delivering the powder to the milling chamber. This injection system is completely removable and cleanable along with the Grinding Chamber.
  - All seals and gaskets for the above are made from silicone rubber.
- ONE Reverse Pulse Jet Filtering Chamber fabricated from polished SS 316 parts on a movable SS 304 stand. This consists of SS 316 filter bag frames and a specially designed filter bags suitable for use with the powder. These bags are continuously dusted by a reverse pulse of air. An electronic timer with solenoid valves controls the frequency and duration of the air jet pulse.
- A powder feeding system for controlled dosing of the powder to the Jet Mill. This comprises of:
> ONE detachable screw spiral specially designed for conveying difficult-to-flow powders. This screw is completely detachable and cleanable.

> ONE geared Motor for driving the screw spiral in feeding the powder to the Mill. Precisely adjusting the rpm of the motor via VFD DRIVE controls feed rate of the powder.

> ONE geared Motor for driving the Agitator Assembly inside the Product Feed Hopper for prevention of rat holing and ensures the even flow of powder into the screw spiral.

> ONE Product Collector in SS 316 with its own spring loaded trolley in SS 304. The Collector Vessel is securely fastened to the Pulse Jet Filter by Triclamps.

> This vessel further breaks down into 2 sections for ease of cleaning. The spring-loaded trolley is also completely washable.

> All powder contact surfaces of the grinding chamber, pulsejet filter and product collector are crevice-free, smooth and polished for ease of cleaning.

> A unique Vacuum Balancing System with a sight glass at both the product feeding end as well as the filtered air outlet end of the Reverse Pulse Jet outlet. This system ensures virtual SILENT running of the complete system and also prevents personnel exposure to the powder in case of blowbacks caused by some powders.

> All Piping is in SS 316 material of construction, polished on the inside and fastened with Triclamps.

**SPARES / OPTIONALS:**

> Spare Product Collector in SS 316 with its own spring loaded trolley and Triclamp set.

> A COMPLETE set of spares for uninterrupted operation of the unit for a period of around 2 years. (This includes one extra set of ALL sealing gasket/O-rings, ONE extra set of PTEE liners for the grinding chamber, ONE extra Venturi tube, ONE extra Grinding jet ring and ONE extra electronic timer for the Pulse Jet diaphragm valve.

> FLP Control Panel.

> PLC Control Panel.

An Example of one product which is micronised in microniser model MEM 200G practical distributor.

90% < 5 micron

99% < 7 micron

100% < 10 micron

Max particle size = 9 micron in general input feed size of 100 mesh with air pressure of 7.5 kg/cm², adequate quantity of air and controlled feed gives better results. Setting of microniser also plays an important role.

However, final results can be delivered by trial. Fineness and output depend upon material characteristics and other factors.

### TECHNICAL SPECIFICATION:

<table>
<thead>
<tr>
<th>Model</th>
<th>Output (Kgs/Hr)(Input feed 100 Mesh Passed)</th>
<th>Air CFM</th>
<th>Compressor HP</th>
<th>Overall Dimensions ( L x W x H )</th>
<th>Approximate Wht. in Kgs</th>
</tr>
</thead>
<tbody>
<tr>
<td>MEM 50G(2&quot;)</td>
<td>0.5 90% &lt; 5 μ   1 90% &lt; 10μ   2 90% &lt; 20μ   4 90%&lt;30μ</td>
<td>15</td>
<td>5</td>
<td>1.25 x 0.50 x 1.20 m</td>
<td>100 Kgs</td>
</tr>
<tr>
<td>MEM100G(4&quot;)</td>
<td>3 90% &lt; 5 μ   1 90% &lt; 10μ   2 90% &lt; 20μ   4 90%&lt;30μ</td>
<td>40</td>
<td>10</td>
<td>1.60 x 0.60 x 1.50 m</td>
<td>400 Kgs</td>
</tr>
<tr>
<td>MEM150G(6&quot;)</td>
<td>6 90% &lt; 5 μ   1 90% &lt; 10μ   2 90% &lt; 20μ   4 90%&lt;30μ</td>
<td>70</td>
<td>20</td>
<td>2.30 x 1.00 x 2.00 m</td>
<td>700 Kgs</td>
</tr>
<tr>
<td>MEM200G(8&quot;)</td>
<td>10 90% &lt; 5 μ   2 90% &lt; 10μ   3 90% &lt; 20μ   5 90%&lt;30μ</td>
<td>100</td>
<td>25</td>
<td>2.40 x 1.10 x 2.30 m</td>
<td>800 Kgs</td>
</tr>
<tr>
<td>MEM300G(12&quot;)</td>
<td>20 90% &lt; 5 μ   2 90% &lt; 10μ   3 90% &lt; 20μ   5 90%&lt;30μ</td>
<td>150</td>
<td>40</td>
<td>3.00 x 1.30 x 2.50 m</td>
<td>1150 Kgs</td>
</tr>
<tr>
<td>MEM400G(16&quot;)</td>
<td>30 90% &lt; 5 μ   2 90% &lt; 10μ   3 90% &lt; 20μ   5 90%&lt;30μ</td>
<td>200</td>
<td>50</td>
<td>3.25 x 1.40 x 2.65 m</td>
<td>1250Kgs</td>
</tr>
<tr>
<td>MEM500G(20&quot;)</td>
<td>50 90% &lt; 5 μ   2 90% &lt; 10μ   3 90% &lt; 20μ   5 90%&lt;30μ</td>
<td>300</td>
<td>60</td>
<td>3.50 x 1.50 x 2.80 m</td>
<td>1400 Kgs</td>
</tr>
</tbody>
</table>

**NOTE:** Out put of the mill depends on a number of factors including particle size of feed and product, material characteristics, Air pressure and input feed size (100 Mesh passed suggested).

**NOTE:** Compressed Air System Required – suitable Air Compressor, Refrigerated Air Dryer with coalescing and Active Carbon Filter.
Isolation technology has shown tremendous potential due to various technological development such as transfer, filtration, granulation, ventilation systems etc. Isolator means a physical barrier between a process and its operator. An isolator is a closed system whose size and features vary according to the type of application. With this environment simple and complex operations can be carried out, either manually or automatically. These operations can be conducted in controlled atmospheres, at particle or microbiological levels. Control system, quality of air and type of gases used inside the isolator are important factors for the successful implementation of isolation system.

Isolator Applications Requirements for containment Processing

> Generally operated under negative pressure to ensure maximum operator safety.
> Negative pressure isolator is basically used for powder handling process and highly disperses products.
> Well designed capacity of motor and blower as per sufficient air flow requirement.

They must not exchange air with the surrounding environment (except through a HEPA filter)

> Equipped with nitrogen supply if required
> Negative pressure of -100Pa, Pneumatically controlled interlocked isolator door after start of operation.
> Visual display indicates permanent status of the isolator.
> Radii in the isolator chamber > 15nm
> Tightness test before each process
> "Push-Push" system for exhaust air filters
> Integrated rapid transfer ports (RTP) for loading and discharging without compromising the surrounding

Negative isolator basically used for sampling, Dispensing, Quality checking, Product charging, Filtration, Drying, Milling, Sieving, Blending, Solution Preparation, Weighing and R&D purpose.

### MEPL - Containment Isolators:

**Isolator Integrity Leak-Testing**

Four level Classification system of hourly leak rate

<table>
<thead>
<tr>
<th>Class</th>
<th>Hourly leak rate Rh h-1</th>
<th>Pressure integrity</th>
<th>Test methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>&lt;5x10⁴</td>
<td>High</td>
<td>Oxygen method, pressure change method or parjo method</td>
</tr>
<tr>
<td>2</td>
<td>&lt;2.5x10²</td>
<td>Medium</td>
<td>Oxygen method, pressure change method or parjo method</td>
</tr>
<tr>
<td>3</td>
<td>&lt;10⁴</td>
<td>Low</td>
<td>Oxygen method, pressure change method or constant pressure Method</td>
</tr>
<tr>
<td>4</td>
<td>&lt;10³</td>
<td></td>
<td>constant pressure Method</td>
</tr>
</tbody>
</table>

**OEL (OPERATOR EXPOSAL LIMITS) CATEGORIES:**

OEL LIMITS: Products are classified according to hazards level that correspond to these five OEL level as shown in the chart below:

<table>
<thead>
<tr>
<th>Categories</th>
<th>Hazard Description</th>
<th>Hazard Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OEL 1</td>
<td>Harmful, and/or low pharmacological activity</td>
<td>1000-5000ug/m³</td>
</tr>
<tr>
<td>OEL 2</td>
<td>Harmful, and moderate pharmacological activity</td>
<td>100-1000ug/m³</td>
</tr>
<tr>
<td>OEL 3</td>
<td>Moderately toxic and/or high pharmacological activity</td>
<td>10-100ug/m³</td>
</tr>
<tr>
<td>OEL 4</td>
<td>Toxic and/or very high pharmacological activity</td>
<td>1-1ug/m³</td>
</tr>
<tr>
<td>OEL 5</td>
<td>Extremely toxic and/or extremely high pharmacological activity</td>
<td>&lt;1ug/m³</td>
</tr>
</tbody>
</table>
### MEPL - Containment Isolators:

**Isolator for sampling and Dispensing:**
- Negative pressure with respect to atmosphere.
- Sampling Chamber: 1250Lx650/550WX900H mm.
- Dispensing chamber: 900Lx750/550WX900H mm.
- Turbulent Air Flow
- Push- push type safe changeable HEPA filters
- Digital pressure controller to maintain a constant pressure.
- Fully PLC controlled
- Fully washable.
- Integrated Weighing Scale
- Continuous liner port
- Drum loading chamber or drum loader

**Reactor Charging Isolator:**
- Negative pressure with respect to atmosphere.
- Chamber size: 1250Lx650/550WX900H mm.
- Turbulent Air Flow
- Digital pressure controller to maintain a constant pressure
- Push- push type safe changeable HEPA filters
- Fully PLC controlled
- Fully washable.
- Reactor charging port with flange end.

**Agitated Nutsche filter dryer (ANFD) Isolator:**
- Negative pressure with respect to atmosphere.
- Chamber size: 1250Lx650/550WX900H mm.
- Turbulent Air Flow under nitrogen atmosphere
- Push- push type safe changeable HEPA filters
- 02 monitoring
- Digital pressure controller to maintain a constant pressure
- Fully PLC controlled
- Fully washable.
- Hinged type flange for ANFD docking.

**Filtration Isolator:**
- Negative pressure with respect to atmosphere.
- Chamber size: 1250Lx650/550WX900H mm.
- Turbulent Air Flow
- Push- push type safe changeable HEPA filters
- O2 monitoring
- Digital pressure controller to maintain a constant pressure
- Fully PLC controlled
- Fully washable.
- Integrated with nutsche filter and mother liquor.

**Filtration and drying Isolator:**
- Negative pressure with respect to atmosphere.
- Chamber size: 1550Lx650/550WX1200H mm.
- Turbulent Air Flow under nitrogen atmosphere
- Push- push type safe changeable HEPA filters
- Digital pressure controller to maintain a constant pressure
- Fully PLC controlled
- Fully washable.
- Integrated with Nutsche filter and VTD

**Granulation Isolator:**
- Negative pressure with respect to atmosphere
- Chamber size: 1250Lx650/550WX1200H mm.
- Turbulent Air Flow
- Push- push type safe changeable HEPA filters
- Digital pressure controller to maintain a constant pressure
- Fully PLC controlled
- Fully washable.
- Integrated with Weighing scale, Sifter, Multi mill and Blender.

**Micronization Isolator:**
- Negative pressure with respect to atmosphere
- Chamber size: 1250Lx650/550WX900H mm.
- Turbulent Air Flow
- Push- push type safe changeable HEPA filters
- Digital pressure controller to maintain a constant pressure
- Fully PLC controlled
- Fully washable.
- Integrated with Micronizer (Airjet mill)
- Integrated with Weighing scale, Sifter, Multi mill and Blender

**R & D Isolator:**
- Negative pressure with respect to atmosphere
- Turbulent Air Flow
- Push- push type safe changeable HEPA filters
- Digital pressure controller to maintain a constant pressure
- Fully washable.

**Rapid Transfer Port (RTP):**
- Rapid transfer port used as the contamination free transfer of product into and out of an isolator:
- RTP (Interlocked, rotate type) active Alpha port bolted to the chamber at suitable location and passive with Beta canister is movable.
- MOC: AISI316L
- Beta Canister: AISI316L/HDPE

**Wash Gun:**
- SS316/PTFE wash gun
- Reach every corner of chamber
- Flexible silicones/ SS barded hose pipe

**Validation**
- We provide following documentation
  - Functional Design Specification (FDS)
  - Design qualification (DQ)
  - Factory Acceptance Test (FAT)
  - Installation Qualification (IQ)
  - Operation Qualification (OQ)
  - MOC Certificates
  - Site Acceptance Test (SAT)
  - Operation and Maintenance Manual (OMM)

**Documentation will cover the following Tests**
- Finishing Check
- Levelling Check
- Electrical Components Check
- Utilities Check
- Leak Tightness Test
- Area classification Check
- Recovery Time Determination Test
- Glove Breach Test
- HEPA Filter Integrity Check
- RTP Operation Test
- Dimensional Check
- Drain ability Check
- Lighting Level Check
- Fan Control Check
- Air Change Rate Test
- Noise Level Check
- Oxygen Reduction Check
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* Due to continuous improvement in designs – Dimensions and Specifications are subject to change without any prior intimation.