THE AGITATED NUTSCHE FILTER DRYER

This is a combination of Filter and Dryer unit in single equipment to achieve economy in process and energy thereby improving profitability. This equipment can be used in manufacturing process of various Pharmaceutical and Food Products, Chemicals, Agro Chemicals, Pesticides, Insecticides, Dyes and Intermediates. It is also available for Sterile applications.

THE EQUIPMENT:
The Agitated Nutsche filter is a Nutsche type filter designed to separate solids from liquids under controlled conditions. It is totally enclosed and is normally operated under pressure or under vacuum. Additionally, the equipment is fitted with a stirrer mechanism which efficiently agitates the slurry during cake washing, smoothens and squeezes the cake during filtration and assists in the automatic discharge of the cake. The ANFD comprises of a pressure vessel in which a main shaft rotates and also moves in the

<table>
<thead>
<tr>
<th>MODEL NO.</th>
<th>BEW ANFD-1</th>
<th>BEW ANFD-2</th>
<th>BEW ANFD-5</th>
<th>BEW ANFD-10</th>
<th>BEW ANFD-20</th>
<th>BEW ANFD-30</th>
<th>BEW ANFD-40</th>
<th>BEW ANFD-50</th>
<th>BEW ANFD-60</th>
<th>BEW ANFD-80</th>
<th>BEW ANFD-100</th>
<th>BEW ANFD-150</th>
</tr>
</thead>
<tbody>
<tr>
<td>WORKING CAPACITY (LTS)</td>
<td>100</td>
<td>200</td>
<td>300</td>
<td>400</td>
<td>500</td>
<td>600</td>
<td>700</td>
<td>800</td>
<td>900</td>
<td>1000</td>
<td>1200</td>
<td>1500</td>
</tr>
<tr>
<td>FILTRATION AREA (M²)</td>
<td>0.2</td>
<td>0.25</td>
<td>0.28</td>
<td>0.32</td>
<td>0.37</td>
<td>0.44</td>
<td>0.51</td>
<td>0.60</td>
<td>0.71</td>
<td>0.82</td>
<td>1.00</td>
<td>1.25</td>
</tr>
<tr>
<td>AGITATOR (R.P.M)</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>MAIN MOTOR (H.P)</td>
<td>2</td>
<td>3</td>
<td>5</td>
<td>7.5</td>
<td>10</td>
<td>12.5</td>
<td>20</td>
<td>25</td>
<td>30</td>
<td>30</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>POWER PACK MOTOR (H.P)</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>VERTICAL STROKE (MM)</td>
<td>200</td>
<td>200</td>
<td>300</td>
<td>300</td>
<td>300</td>
<td>300</td>
<td>300</td>
<td>300</td>
<td>300</td>
<td>300</td>
<td>300</td>
<td>300</td>
</tr>
<tr>
<td>CAKE CAPACITY (LTS)</td>
<td>40</td>
<td>80</td>
<td>120</td>
<td>160</td>
<td>200</td>
<td>240</td>
<td>300</td>
<td>360</td>
<td>400</td>
<td>400</td>
<td>400</td>
<td>400</td>
</tr>
<tr>
<td>A (MM)</td>
<td>500</td>
<td>800</td>
<td>1000</td>
<td>1200</td>
<td>1600</td>
<td>2000</td>
<td>2300</td>
<td>2500</td>
<td>2800</td>
<td>3200</td>
<td>3600</td>
<td>4000</td>
</tr>
<tr>
<td>B (MM)</td>
<td>600</td>
<td>700</td>
<td>800</td>
<td>900</td>
<td>1000</td>
<td>1000</td>
<td>1000</td>
<td>1000</td>
<td>1000</td>
<td>1100</td>
<td>1200</td>
<td>1200</td>
</tr>
<tr>
<td>C (MM)</td>
<td>2400</td>
<td>2800</td>
<td>3000</td>
<td>3200</td>
<td>3400</td>
<td>3600</td>
<td>4000</td>
<td>4300</td>
<td>4500</td>
<td>4800</td>
<td>5000</td>
<td>5000</td>
</tr>
</tbody>
</table>

*Height reduction flexibility available in above.

NOTE: Design and dimensions above are subject to change without notice.
vertical direction. Specially designed stirrer blades are mounted on the shaft, capable of performing various functions. A side discharge arrangement is provided, closing and opening through hydraulic/mechanical means. A filter plate is located at the base of the vessel in level with the discharge port. The filter medium, usually a filter cloth, is fitted on the filter plate which is replaceable type. A multilayered filter plate construction can also be provided for filtration instead of filter cloth. In addition a special design of interchangeable arrangement between filter cloth and multilayered sintered plate can be provided in the same equipment.

CHARGING:
Slurry is charged into filter preferably by gravity flow from reactor 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 to its down most position and keep on rotating in forward direction. The cake height can be built up in successive steps.

CAKE WASHING:
Wash liquid is sprayed into the chamber on cake through a spray ring. The stirrer blades are lowered to agitate the slurry to obtain good cake washing. The wash liquid is sprayed repeatedly through the filter cake.

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 10 to 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 Hollow Blades. The stirrer blades are lowered and the cake mass is agitated during the drying stage. The vapor is removed under vacuum applied to the filter through dust catcher. 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 valve is opened and a controlled discharge of the cake is achieved.
SALIENT FEATURES:

- Method of operation is totally enclosed. These conditions are excellent for contamination free operations maintaining purity and hygiene. Also solvent recovery, handling of toxic and hazardous materials without human intervention is easily achieved.
- Designed and Manufactured to suit critical hygienic conditions of the pharmaceutical and food industries (GMP MODEL)
- Detachable bottom is operated by hydraulic cylinders and held tightly with zero leakage No bolting requirement.
- Offered in a wide range of filtration area capacities up to 15.5 sq. mtrs. (4.5 mt. dia)
- The filtration process is very fast.
- 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.
- Enables easy, non-manual and automatic cake / solid discharge. Scraper blade is provided to scrap the material which may stay on shall.
- The unit is designed with minimum maintenance features.
- Hollow Shaft and Hollow Blades for thorough drying.
- Specially designed tank cleaning nozzle is provided for thorough cleaning of inside of filter body.
- Metal to metal sealing discharge valve design available.
- Special online sampling valve available to take samples without stopping the equipment or releasing vacuum / pressure.
- Hinged type quick openable discharge valve cover provided.

USER FRIENDLY MACHINE

ENVIRONMENT PROTECTION

- No Toxic Emission.
- Solvent recovery to the maximum extent.
- Controlled quantity of wash water.
- Manual handling is almost nil.

SAVING

- Space Saving
- Energy Saving
- Labour Saving
- Product purity & Hygiene at its best.

MULTIFUNCTIONAL

- Filtration
- Washing
- Compacting / Dewatering
- Automatic discharge of wet cake
- Drying (On Request Only)

EASY FOR INSTALLATION

- Customers based nozzle orientation.
- Foundation not necessary.
- Easy installation & commissioning.

EASY FOR OPERATION

- Fully automatic operations.
- Single person can operate two/three nutsche filters.
- Semi-skilled person can operate the machine.
- All controls placed centralized.
- In built safety systems makes the machine safe.

EASY FOR MAINTENANCE

- Minimum maintenance required, due to the hydraulic system.
- Easy cleaning with hinged DV and detachable bottom.
- Detachable bottom version for toxic and frequent change of products.
- Quick changing filter cloth arrangement provided.
AGITATED PRESSURE NUTSCHE FILTER DRYER

DESIGN DATA

DESIGN PRESSURE : 5 Kg / Cm²

JACKET OR LIMPET COIL : 6 Kg / Cm²

DESIGN TEMPERATURE : 150°C

DESIGN CODES : ASME, IS, DIN

MATERIAL OF CONSTRUCTION: Stainless steel, Hastelloy, Monel, Titanium, Mild steel, Rubber Lining, FRP Lining, FRV Lining, Halar Lining, Lead Lining etc.

SHAFT SEALS:
1) Wet & Dry Mechanical Seals with metallic below.
2) Packed gland type stuffing box with antifriction bearing.

FILTER MEDIA:
1) Metallic Screens.
2) Multilayered Sintered wire mesh.
3) Filter cloth Natural or Synthetic fiber

VARIANTS

ANFD's are available in variants compatible with barrier isolation systems at the discharge. This allows handling of Cytotoxic / Potent products with operator safety. Additionally, these can be combined with automatic packing systems further downline. Also lab scale ANFD models are available for R&D purposes.

For sterile application, air filter cartridge can be installed. The equipment can perform as reactor-crystallizer, also in presence of catalysts.

NOTE: LAB SCALE MODELS ALSO AVAILABLE
**AGITATED PRESSURE NUTSCHE FILTER DRYER**

**SLURRY CHARGING**
Slurry is charged into filter preferably by gravity flow from reactor installed above the filter or by slurry pump. Vacuum is then applied in the filtrate receiver which is connected to the filtrate discharge nozzle.

**SEQUENCE OF OPERATION**
- **FILTRATE BEING EXPOSED OUT**: Cake deposited on filter bed.
- **WASHING BY SPRAYING WASH LIQUOR AND RESLURRING**: If necessary, after first filtration, wash liquor can be sprayed on filter bed, and cake can be reslurred by manipulation of agitator movement. Filtration can be then repeated. As many washing as necessary can be done till cake is free from all impurities and the quality is within acceptable limits.

**CAKE DRESSING AND SQUEEZING**
Further with manipulation of stirrer movement, cake can be pressed and squeezed and some quantity of filtrate can be removed thereby. Final moisture content may be between 5% to 25% depending on the characteristic of solids in the slurry.

**DRIYING**
Drying: Filter unit can be provided with heated coils or Jacket for heating of the vessel. In this process vacuum is applied on the top of the vessel through dust filter as well as on bottom of the vessel, which will accelerate the drying process. The slow movement of agitator helps faster drying. Vapors will be generated inside the filter which can be extracted and solvent recovery can be done by installing vapor condenser and receiver.

**MANHOLE**: Helps to change filter media and access to internals for maintenance.

**BIFRIENDS ENGINEERING WORKS**