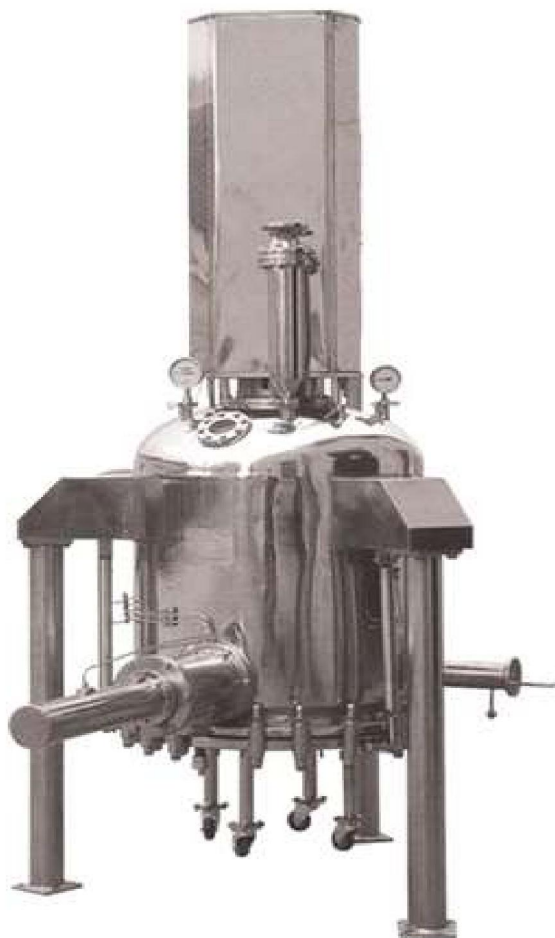


## AGITATED NUTSCHE FILTER DRYER :



Excellent in solids-liquid separation and vacuum drying for the pharmaceutical and fine chemical industries.

The product is discharged through a hydraulically operated side discharge valve, with the valve plug contoured to match the curvature of the vessel internal wall. The solids discharge valve is a metal to metal seal design with the sealing surfaces arranged outside the product flow path, with interchangeable seal rings. This assures proper sealing even after multiple operations during a batched discharge. Alternatively the product can be discharged through an active or passive isolator (glove box). On smaller filter units the isolator permits contained sampling, product discharge and heel removal all in one system.



RAVI – Agitated nutsche filter dryer are versatile units designed for multipurpose production facilities. To meet the demanding requirements for filters used in the manufacture of pharmaceutical ingredients, the filters are designed to meet stringent cGMP and FDA guidelines. To allow for good cleanability using CIP systems and to permit optimal inspection after the cleaning process all product wetted surfaces are designed without dead areas, with smooth transitions of internals and without any bolted connections. For good access to the filter internals for cleaning and inspection purposes the filters are equipped with an openable filter base. The overall attention to design details allows for simplified validation of the units. The agitator is supported from the top, with the agitator drive, the bearings and the shaft seal installed externally. Shaft sealing is with a double mechanical seal and a convoluted bellows. The agitator arms with specially designed bottom smooth surface and press the cake when rotated counter clockwise, and mix and agitate the cake when rotated clockwise.

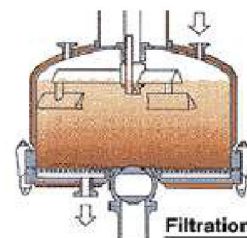
Simultaneous rotational and vertical agitator motions result in a very efficient and even mixing of the entire product mass for mixing and drying. The agitator arms are S-shaped for improved product discharge.

All product wetted surfaces are heated to obtain the largest possible heat exchange area for short drying times and a low attainable final humidity.

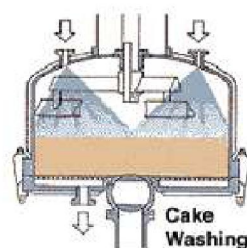


**OPERATIONAL SEQUENCE :** The operation of Nutsche Filters requires a complex manipulation of valves and hydraulics so present day installations are always semi or fully automated.

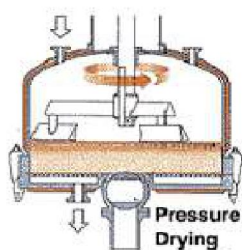
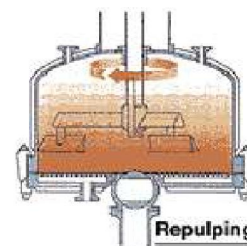
**Filtration:** The filter is charged with slurry and pressure is applied to displace the filtrate leaving the cake retained over the filter medium. For slurries with a wide distribution of coarse fast settling solids and slow settling fines there is a risk of segregation with the finer fraction settling over the coarse fraction. When this happens the fines seal the cake and slow down the cake formation so keeping the slurry in suspension with rotating arms during filtration assists in forming a homogeneous cake.



**Cake Washing:** In the washing stage a spray ring or connections on top of the cover introduce the wash liquid over the cake. This displaces the mother solution with the wash liquid but with such in-situ washing the efficiency may be quite low if the cake forms with an uneven thickness. Washing efficiency may be further improved if air or gas are not allowed to enter the cake in a "piston" like manner. This is achieved by a special detector that monitors the surface of the cake for moisture and once air or gas start entering the bed a signal is transmitted to close the filtrate valve and reopen it once next washing commences.

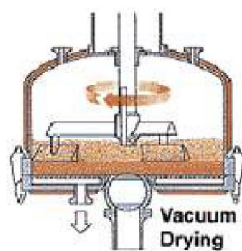


**Cake Repulping:** Many processes require high washing efficiency to remove the contaminating liquid from the product and washing the cake by repulping yields the most efficient product purity. This is done by resuspending the cake with the paddle arms for thorough mixing with the wash solution. During re-suspension the rotating arms are moving slowly downwards and are "shaving" the bed gradually layer after layer until the entire cake enters the slurry.

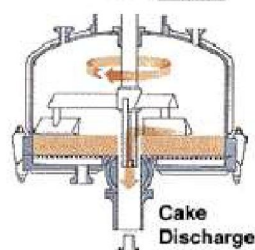


**Pressure Drying:** In the drying stage air or gas purges the cake until the captive moisture is reduced to an asymptotic level and in practical terms the cake is considered to be as dry as possible.

To obtain minimum moisture the cake is smoothed by reversing the rotation of the paddle or auger arms and exerting controlled pressure on its surface with the hydraulic system. This seals cracks in the cake so that air or gas will not bypass the bed.



**Vacuum Drying:** Further reduction in cake moisture may be obtained by slowly rotating and lowering the paddle arms to scrape and de-lump the cake. To take advantage of the drying ability of the Nutsche Filter it is worth considering the option of heating components such as the vessel, filter floor and paddles to enhance drying.



**Cake Discharge:** Once all the stages are completed the cake discharge valve opens and the paddle arms on the smaller machines or the auger arms on the larger ones are rotated and lowered to convey the dry cake towards the center. The same procedure also applies to side discharge machines however it should be noted that in this case the cake comes out intermittently and not continuously. This may have a layout impact on the downstream facility such as the conveyor that handles the product to storage. On some filters the cloth or woven mesh screen may be backwashed with water to dislodge and remove any cake residue that adhered to the medium after cake discharge.



### SALIENT FEATURES :

- Designed and Manufactured to suit critical hygienic conditions of pharma and food industries. (cGMP MODEL).
- Operated by hydraulic cylinders and held tightly with zero leakage.
- Offered in various materials of constructions, like stainless steel, Hastelloy, Titanium, carbon steel, rubber lined carbon steel and lead lined carbon steel.
- Offered in a wide range of filtration area capacities from 25 Lits upto 10000 Lits.
- Method of operation is totally enclosed, neat and hygienic. These conditions are excellent for solvent recovery, Hollow Shaft and Hollow Blades for thorough drying.
- Suitable for handling of sterile compounds or 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.
- Hollow Shaft and Hollow Blades for thorough drying.
- Specially designed tank cleaning nozzle is provided for thorough cleaning of inside of filter body. (CIP)

### TECHNICAL DESIGN PARAMETERS :

Design Pressure	Vessel -Full Vacuum, Jacket / Limpet - 4bar
Design Temp	150deg
Finish	Internal:240gr Mirror finish, External 180grit matt finish



**Excellent in solids-liquid separation and vacuum drying for the pharmaceutical and fine chemical industries.**

### TECHNICAL SPECIFICATIONS :

MODEL	CAPACITY IN LTRS.	FILTER AREA M2	CAKE VOLUMN LTR	DIMENSION DIA mm"D"	DIMENSION TOTAL HT mm "HT"	VERTICAL STROKE mm "S"	DRIVE MOTOR HP
RV-ANFD 500	500	0.56	200	900	3300	200	2.0
RV-ANFD 1000	1000	1	400	1200	3350	350	3.0
RV-ANFD 1500	1500	1.5	600	1500	3500	400	5.0
RV-ANFD 2000	2000	2	800	1600	3500	400	7.5
RV-ANFD 3000	3000	2.83	1200	2000	3700	400	7.5
RV-ANFD 4000	4000	3.33	1600	2200	3900	450	12.5
RV-ANFD 5000	5000	4.81	2000	2600	3900	500	15.0
RV-ANFD 7000	7000	6.43	2800	3000	4200	600	20.0
RV-ANFD 10000	10000	8.81	4000	3500	4350	600	25.0

**RAVI**

*.....the name of Quality,  
technology & innovation*

**RAVI INDUSTRIES  
RAVI INTERNATIONAL**

OFFICE : UNIT-B-17 & 19, ADKE COMPOUND, LBS MARG, VIKHROLI (WEST), MUMBAI -400083  
Call Us :- 91-9833297671 / 9819030056    WhatsApp :- 91-983329761  
eMail Us :- raviinternational01@gmail.com / info@ravipharma.in  
Website :- <https://www.ravipharma.in> / <https://ravipharma.online>

FACTORY : A9/B-23 &24, PADMINI COMPOUND, KALHER PIPE LINE ROAD, PURNA, BHIWANDI-406125