NSI EQUIPMENTS

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Agitated Nutsche Filter & Dryer (ANF/ANFD)

About Us

NSI Equipments Pvt. Ltd. is a fast emerging company specializing in the design and manufacture of **Agitated Nutsche Filter & Dryer (ANF/ANFD)** for industrial use for the past four decades. Over the years NSIE has consolidated its experience in its field and has developed its expertise. Our endeavor is to supply well engineered product to the specific need of our customers. Customer satisfaction is our paramount importance, which is the foundation to our business policy. We have excellent reputation for the quality of our product range as always endeavoring to advance technology, appropriate fabrication processes at all stages of manufacture.

This has been possible with the active participation of our management, staff and workers. Everyone has contributed in his own manner and ultimately it is teamwork that has won.

Vision

NSI Equipments Pvt. Ltd. vision is to excel and provide technology that is the most advanced in Asia and at par with the international league. We believe every satisfied customer is an asset and we target to satisfy each and every customer walking in through our door. We envisage achieving these ambitious growth plans as Green Progress meaning attaining the goals in symbiosis with environment and it's an integral part of our corporate vision.

Our credo is:-
Customer orientation to develop products (machines and auxiliaries) that seek to meet customer aspirations.
An organization reputation that instills confidence in the customer to seek pre-purchase counseling, validation through trials and service needs that may arise.

Mission

NSI Equipments Pvt. Ltd. mission is to consolidate at the forefront of our Product Lines in Asia. We believe everything is possible with right efforts and dedication. We are confident that we will achieve our goal by:

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Quality Policy

"To be passive and proactive in providing quality product and solutions to clients by continuously striving to exceed their expectations"
Our commitment to quality is unflinching. Our desire for growth is deep rooted and our capacity for details is amazing. We adhere to national and international standards across all operations: from sourcing the raw materials & till it transfers to the finished machinery and finally successful commissioning. All our suppliers operate quality management standards as dictated by specific markets. This measure undoubtedly reflects our royalty to quality assurance and our determination to provided the products and service our customers demand.

What set us apart is the depth of our commitment and the high level of our concern to deliver quality products, efficient services and total solutions.
And this is where our quality improvement comes from.

At NSIE, **quality is a way of life.**

Customer Satisfaction

Customer satisfaction is the foremost concern in our work culture. That is why a few of our products are very popular among users. We have met stringent delivery schedules and accepted challenges of precision manufacturing. We have extended our services to small scale and large-scale customers equally, and bagged repeat orders.

General Description

This is multi-utility equipment which is a combination of filter and dryer unit in single equipment to achieve economy in process, space, energy, Labour and cost, thereby improving profitability. It is suitable for filtration of liquids with a high solid content. ANF or ANFD 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 centrifuges. Wash liquid quantity can be controlled and monitored, reducing effluent load. The discharge of wet cake is automatic.

Drying of wet cake is also possible when heating is provided on shell by limpet. Vacuum is applied for fast and low temperature drying. The equipment is safe and easy to operate. It can carry out various phase of process operations, viz: Crystallization, filtration, extraction, Discoloration, Washing and drying. This equipment also reduces the validation documentation, which is very critical and cumbersome in Pharma industry, since it helps reducing the number of equipments downstream.

Material Of Construction

We offered various materials of constructios, like stainless steel, carbon steel, Hastelloy and rubber lined carbon steel and lead lined carbon steel.

Material Of Construction

The Agitated Nutsche Filter consists of a cylindrical shell with top dished and welded flat bottom made as per pressure vessel codes. The base plate is stiffened by supports welded under the base plate. The base plate is having arrangement of bolting bar to hold the filter cloth. Suitable support mesh is provided under filter cloth to facilitate the flow of filtrate. Suitable nozzles are provided including Manhole and Side discharge valve. A hydraulic/mechanical means provided for closing and opening side discharge valve arrangement. The Specially designed Agitator assembly is mounted on top of the vessel and the design adopted is advanced and unique to this system which improvises the degree of filtration. The 'S' shaped stirrer blades are mounted on the shaft, capable of performing various function such as cake smoothening, vigorous agitation and cake discharge. These 'S' curved blades are self centering made from heavy sections to take high torque generated during solid discharge and re-slurring operation. Agitator 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 movements:** 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.

Online Sampling Arrangement

Special valve for taking samples of the dry, semi dry product can be provided. Samples can be derived without stopping the machine or without releasing the vacuum or pressure inside the machine, hence making it 'Online Sampling'.

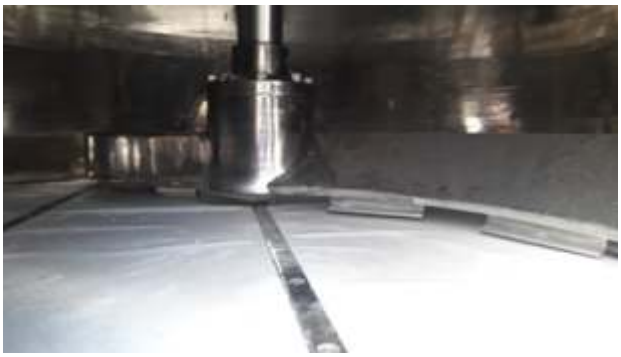
Hydraulic Power Pack

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

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

Discharge Valve

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.

Mechanical Seal

Double/Single Mechanical Seal either dry or wet type can be fitter on filter/filter dryer. The mechanical seal has bellow extended on the shaft.

Application Industry

Agitated Nutsche Filters are extensively used in Chemical, Herbal, Pharmaceuticals, Bulk Drug, Intermediate Compounds, Fine Chemicals, Chemicals, Agro Chemicals, Pesticides, Insecticides, Dyes and the Food industry for filtration and drying process.

Operation

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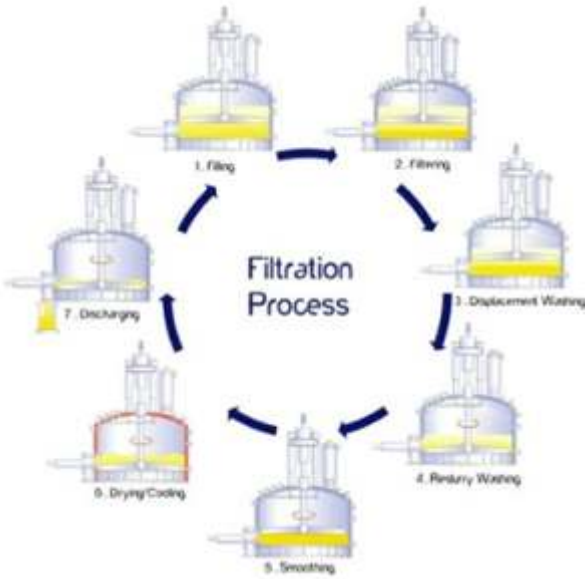
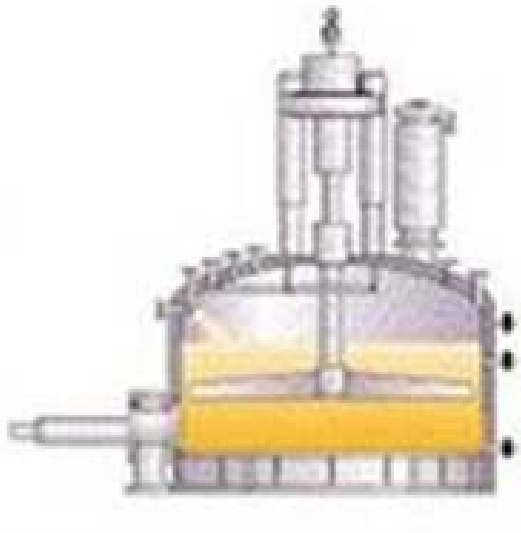


Filtration and drying are critical operations in a variety of industrial processes that require the separation of solid matter from a liquid. Solids can be discharged directly into a dryer, or in the case of a filter/dryer, the drying function is performed using the same equipment.

Filtration can be broken down into two types of processes - continuous and discontinuous (or batch) operations. Nutsche filtration, which we will be focusing on, is a batch filtration technique that uses vacuum and/or pressure in a closed vessel. Some benefits of using this technology include product isolation, minimal operator exposure, reduced product handling, and environmental protection against solvent vaporization. Additionally, the level of containment supplied can comply with GMP and other health and safety requirements that companies often face. For these reasons, nutsche filter/dryers are commonly used in pharmaceutical, fine chemical, dye and paint production, and waste water treatment applications.

So what exactly goes on in this closed vessel from start to finish? Here's a closer look at the seven basic steps that comprise the typical filtration and drying process in nutsche filter/dryers

1. Filling/Charging

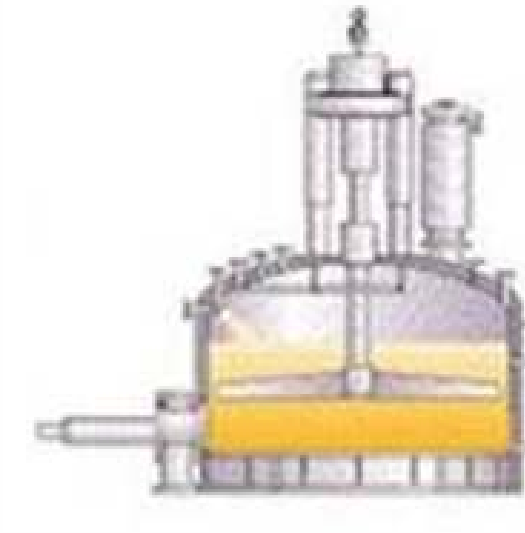


The first step involves the transferring of the product to be filtered, usually an aqueous or solvent based solid/liquid slurry, from the primary location (e.g. reactor) to the filter/dryer. The filter should be sized appropriately to handle the solids volume that is being charged. A general rule of thumb to follow is that the maximum solids height should be equal or less than the agitator stroke, typically 12 - 20 inches.

2. Filtering

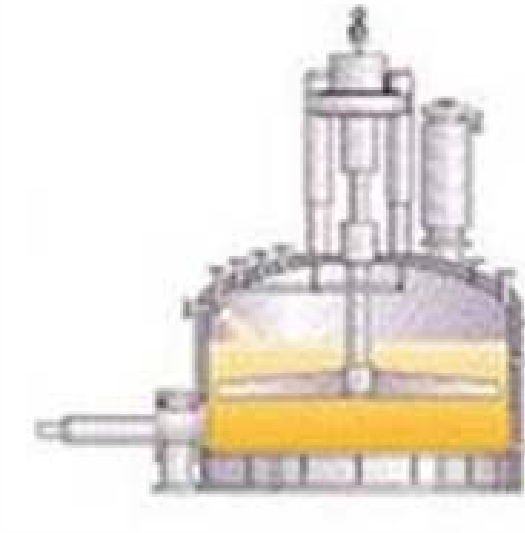
The second step involves the use of pressure and/or vacuum to force liquid through the solid bed and filter media. The process is stopped when solids are visible, or can be continued until all the liquid is pushed out. There are various types of filter media available in nutsche filters - cloth, single layer metal screen, or multi-layer sintered metal. The media should be determined based on the characteristics of the slurry including particle size and shape, cake porosity, and compressibility (which are all factors that, when taken into account with the filter media selected, will determine filtration rate).

3. Displacement Washing



Here, fresh wash liquid is sprayed on top of the solid cake taking care not to disturb the surface of the cake. The liquid is forced through with pressure or vacuum. Displacement washing serves several purposes - it removes the liquid and its impurities while keeping the cake intact and it replaces the previous liquid with fresh liquid. There is also the opportunity prior to this step to try and close cracks if the cake has any via smoothing.

4. Reslurry Washing



As an additional washing option, a re-slurry washing can be performed if additional extraction or dissolving of impurities is necessary. This is executed by the addition of fresh wash liquid that is mixed with the solids. The agitator is stopped and raised before filtering the wash liquid. The re-slurry process is also used when a long contact time is needed between the wash fluid and the solids or the displacement wash does not provide the required wash quality.

5. Smoothing

This next step may be used after any filtration or wash, especially after the final wash, when gas is blown through the cake. The agitator is used to close cracks and compress the cake to reduce residual moisture level. This function will help to achieve uniform flow of liquid or gas through the filter cake, while helping to eliminate liquid and gas channelling that reduces the efficiency of displacement washing and gas blow through.

6. Drying/Cooling

In most filter types, the solid must be evacuated into a second dryer to complete the drying and subsequent cooling process. In nutsche filter/dryers, the two functions are combined and drying can take place in the same vessel. To accomplish this, the vessel surfaces (including the wall, base, and agitator) are heated. There are two types of drying that can be conducted - vacuum drying and convection drying. The method used depends on the product behavior. Vacuum drying, the most common method, involves a vacuum source, agitation, and dust filter. This type of drying utilizes vacuum to reduce the temperature at which the solvent evaporates, reducing the average drying temperature.

During convection drying, hot, pressurized gas (usually nitrogen) is blown down through solids and out of filtrate lines (and even recirculated as necessary); this will eventually dry the solids. Convection drying is unique to filter/dryers due to their porous filter plate. Unlike vacuum drying, it does not require agitation. Whether vacuum or blow-through drying is selected, a filter/dryer can allow you to get completely dry material out from your process, with less than 0.1% final product moisture. At this point the vessel and product may need to be cooled to an ambient temperature prior to discharge.

7. Discharging

This final step is accomplished through the valve/port located on the vessel sidewall. The agitator is slowly lowered as it rotates, effectively moving product to the side discharge valve. There are certain applications where the desired product to be discharged is not a dry solid. Nutsche filter/dryers are designed to facilitate flexible discharge, which allows for wet solids, slurries, or even liquid to be discharged.

Understanding the steps that make up the nutsche filtration and drying process help to differentiate this equipment from other types of separation technology. What sets nutsche filter/dryers apart from other filtration units is their ability to carry out functions in a closed system under vacuum or pressure, which minimizes cake contamination and enables very high solvent recovery. From an environmental and personal health perspective, safety is maintained throughout the process. If you're interested in how your process can benefit from nutsche filtration fill out our Filtration Application Questionnaire and we can provide you with a detailed, customized assessment of what equipment would be right for your process.

Salient Features:

- Method of operation is totally enclosed, neat and hygienic. These conditions are excellent for solvent recovery, 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.
- The unit is designed with minimum maintenance features.
- Specially designed tank cleaning nozzle is provided for thorough cleaning of inside of filter body (CIP).
- The equipment is functionally safe and easy to operate
- Minimum hold up of filtrate in the equipment
- Agitator moves clockwise, anticlockwise, up and down. This ensures thorough washing and re-slurring of the cake.
- Blending of product possible before discharging
- Product can be washed thoroughly and economically with solvents.
- Complete automation with PLC is available
- Combining filtration, washing, re-slurry and drying in one fully enclosed, automated unit permits reduction of capital and operating costs
- Heat transfer surface can be provided on the vessel wall by providing Jacket or Limpet Coil.
- Large quantities can be processed faster than the conventional systems.
- The number of conventional machines is employed for filtration process is also reduced.

TECHNICAL SPECIFICATIONS

MODEL	ANF 50	ANFD 100	ANDF 200	ANDF 300	ANDF 500	ANDF 1000	ANDF 1500	ANDF 2000	ANDF 3000
Working Volume	50	100	200	300	500	1000	1500	2000	3000
Cake Volume	25	50	100	100	200	400	600	800	1500
Filter Area	0.2	0.4	0.5	0.6	0.75	1.1	1.5	2	3
Vessel Dia	425	600	700	800	1000	1200	1400	1600	2000
Vessel HT	400	400	550	600	600	900	1000	1000	1000
Bottom Opening Stroke	300	300	300	300	300	300	300	300	300
Discharge Valve ID	150	150	200	200	250	300	300	400	450
Agitater RPM	10	10	10	10	10	10	10	10	10
Agitater Drive	1	1	2	3	5	7.5	10	12.5	15
Agitater Vertical Stroke	200	200	200	200	250	250	300	400	450
Agitater Up/Down Speed	250	250	250	250	250	250	250	250	
Over All Dimension	1300x1300 x2400	1500x1500 x2500	1700x1700 x3000	1800x1800 x3000	2000x2000 x3300	2200x2500 x3675	2300x2300 x3800	2500x2500 x3800	800x2800 x4375
Design Pressure	Vessel-Full Vaccum, Jacket.Limpet-4bar								
Design Temp	150deg								

NSI EQUIPMENTS PVT. LTD.

LIST OF EQUIPMENTS MANUFACTURED BY US

- CENTRIFUGES
- REACTION VESSELS
- ROTARY VACUUM DRYERS
- ROTARY DRYERS
- ROTARY DRUM DRYER
- SPRAY DRYER
- SPIN FLASH DRYERS
- AGITATED NUTSCHE FILTER & DRYER
- RIBBON BLENDERS
- ROTARY FLAKER
- BALL MILLS
- AIR CLASSIFYING MILLS (ACM)
- JET MILLS
- ROTARY AUTOCLAVE
- EVAPORATOR
- CONDENSER
- BUCKET ELEVATOR
- SCREW CONVEYOR
- BELT CONVEYOR
- FLUE GAS DESULPHITER

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