



■ INDUSTRIAL DRYING TECHNOLOGY



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Chem Process, designs and manufactures vacuum, evaporation, crystallization, drying, desalination and heat transfer equipment for the process industries and energy sectors. Having decades of experience in the design of steam jet vacuum systems, steam jet heaters, exhausters, compressors, scrubber systems, desuperheaters, thermocompressors, eductors, syphons and ejectors, Chem Process retains experienced design personnel to solve the most challenging process requirements.

Spray Dryers

Spray Drying is a single step operation to convert liquid solutions/slurries/emulsions to free flowing powders or agglomerates.

The product properties as required by the client can be achieved by deciding the correct atomization system as well as the process parameters. Product properties like dispersibility, bulk density, product moisture can be achieved during Spray drying.

Rotary Disk Atomization

In Rotary Disk Atomization, Centrifugal Energy is utilized. In Rotary Atomization, the feed is introduced at the centre of the wheel rotating at high speed. The feed flows towards the periphery of the wheel where it accelerates and disintegrates into tiny droplets. These Droplets come in contact with the Hot Air and dry to form free flowing powders. Normally Atomizers can produce fine to medium coarse powders from 30 micron to 120 micron.

Chem offers various Wheel Designs like Straight hole, Square hole Curved Vane, S Wheels, Umbrella Wheels in Diameters of 60mm, 100mm, 175mm, 250mm, 350 and 400 mm.

Atomizers are operation from 10kgs/hr Feed upto 10000 kgs/hr Feed Rate.

Nozzle Atomization

Feed Solutions/Slurries are fed to the Nozzle Atomizers under high pressure. Pressure Energy is converted to Kinetic Energy and the feed is disintegrated to fine Droplets and instantaneously dried.



Products from the Nozzle type Dryers are Free flowing coarse or fine powders with Particle size ranging from 80-250 micron based on the feed characteristics and air flow patterns.

Air Flow Patterns and Dryer configuration should be decided upon the desired product characteristics required.

Nozzle Dryers operate from 25kgs/hr feed upto 4000 kgs/hr feed rate.

Agglomeration Multistage Spray Dryers

Ideal for producing Highly Dispersible Products with high particle sizes.

- Ideal for producing highly dispersible products with high particle sizes.
- Possible to dry at a lower exhaust temperature, so as to make the dryer energy efficient.
- Sizes available from 50kgs to 3000 kgs/hr Evaporation capacity
- Can be designed for highly flammable and explosive products

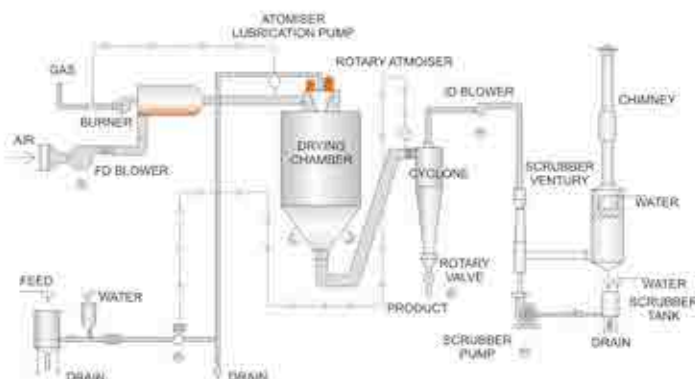
Flash Dryers

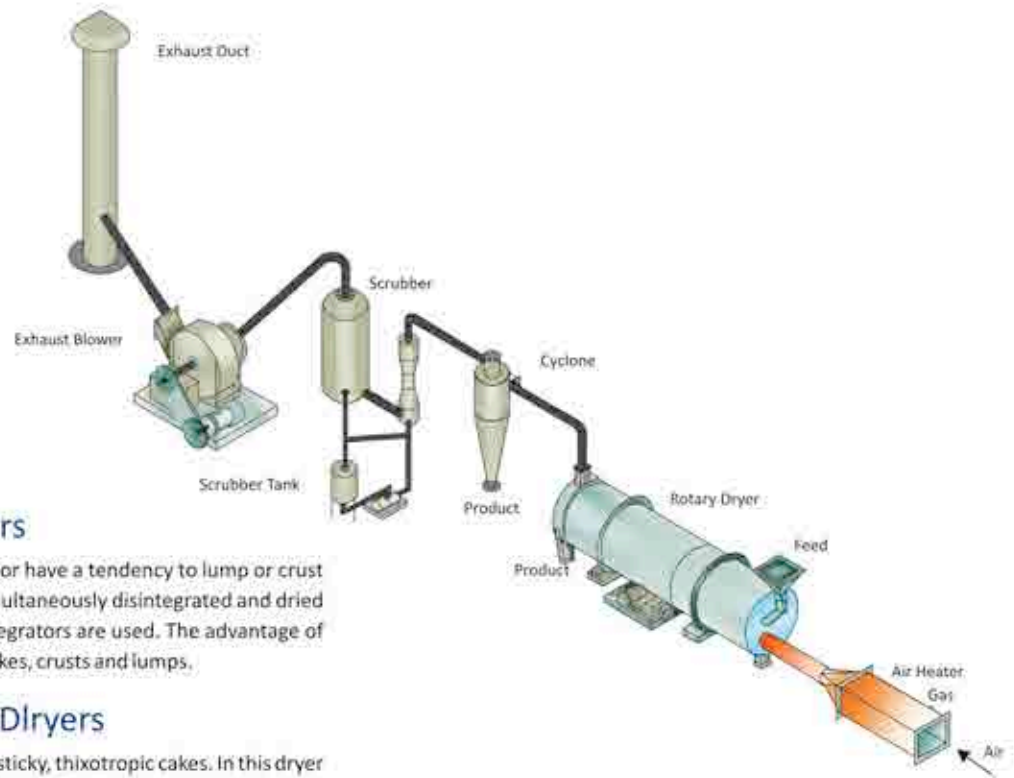
The Basic working Principle of Flash Drying is to evaporate Moisture instantaneously with very low residence time. Wet cakes, powders, granules, lumps products are best dried in our Flash dryers. In these dryers the feed is dispersed in a stream of hot Air at significant velocities and are dried. This dryer can be designed to suit varying residence times based on the end product requirement.

Special feed conditioning equipment are integral to this dryer to take care of uneven feed cake moistures.

Feed cake moisture contents from 5% upto 87% can be handled in these dryers.

Flash dryers with feed capacities ranging from 50kgs/hr up to 7000 Kgs/hr.





Cage Mill Flash Dryers

When the feed cake is very hard or have a tendency to lump or crust while drying and needs to be simultaneously disintegrated and dried then dryers with cage mill disintegrators are used. The advantage of this dryer is to handle the hard cakes, crusts and lumps.

Swirl Agitated Flash Dryers

These Dryers are ideal for drying sticky, thixotropic cakes. In this dryer the wet feed is introduced in a swirling fluid bed of material. The bed is kept in continuous agitation by means of an agitator mounted at the bottom. Adequate residence time of drying is provided in the dryer. Particle size of the final product can be controlled in this dryer.

If cake is solvent laden, then closed loop designs of the swirl agitated dryer operating with nitrogen as the heating media are available.

Fluid Bed Dryers

Fluid bed dryers are ideal for drying free flowing crystals, powders, granules and extrudates. Fluid bed dryers can be both bed dryers, vibration transmitted by vibratory motors are used to supplement the fluidizing air.

Rotary Dryers

Rotary Dryers are ideally suited for large capacity applications and where feed have an uneven particle size distribution. The dryers are very robust and have low maintenance.

The rotary dryer is essentially an inclined shell which is rotating. Feed is showered throughout the shell by spirally mounted lifters into a stream of hot air. The Rotary Dryer is rotated by means of a Girth gear and tyres. Special seals are provided to avoid leakage thru the dryer.

Our Products

- Rotary Atomiser Based Spray Dryers
- Pressure Nozzle Based Tall Type Spray Dryers
- Multistage Agglomeration Spray Dryers
- Two Stage Spray Dryers with External Fluid Bed
- Co-Current Spray Dryers
- Counter - Current Spray Dryers
- Mixed Flow Spray Dryers
- Spray Coolers
- Flash Dryers
- Swirl Agitated Flash Dryers
- Cage Mill Flash Dryers
- Fluid Bed Dryers
- Rotary Dryers



- Single step drying because of unique designed combination of vertical and horizontal dryers
- Effective evaporation of concentrated slurries, heat sensitive products, viscous and fouling fluids up to 99% in a single pass
- Simple installation as the equipment is supplied skid mounted with all inter connecting piping, condensers and vacuum system
- Single source responsibility for all project stages because of combined expertise in vacuum technology, heat transfer, evaporation, crystallization and drying - a design mix which gives optimal results

Application Range

Thin film equipment are mainly used for difficult vaporization and heat-exchange process, especially where products to be handled are highly viscous and conventional plants can no longer meet user demands because heat transfer is insufficient. Due to the liquid film mechanically generated on the heating surfaces, thin film equipment achieve much better heat transfer rates, even with highly viscous products, containing solids.

- To concentrate highly viscous products, polluted liquids, salt solutions, oils, resins, etc.
- For use as a sump evaporator for vacuum rectification columns
- For sludge drainage
- To continuously dry powdery residues
- For distillation of high-boiling substances under high vacuum
- For degassing and/or removal of volatile components of highly viscous products
- For heating or cooling of viscous solutions
- To improve product quality by removing colour bodies, minimizing impurities and eliminating thermal degradation
- To increase product recovery by reclaiming additional bottoms product from overhead and distillate products from bottoms
- For separation of close-boiling compounds
- Enhanced product recovery



- Recovers additional bottoms product from overhead
- Eliminates loss due to thermal degradation
- Recovers additional distillate product from bottoms
- Separation of close-boiling compounds

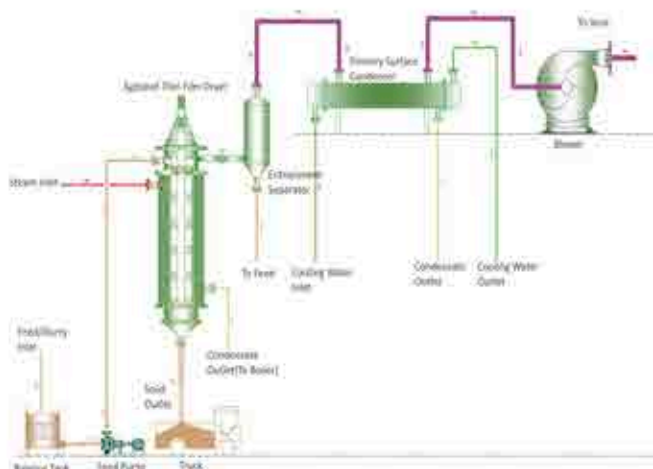
Chem Process Research, Development & Test Centre

Chem process selects an optional design based on its extensive experience and process performance databases. It also houses a full-fledged pilot test centre and conducts in-house trials for newer liquids to be evaporated/dried.

Pilot Plant Capabilities:

Process throughput from 5 to 500 kg/h depending on the specific process

- Hot water, steam and hot oil available as heat transfer medium, up to 300°
- Chilling capabilities down to 7°c
- Vacuum capabilities to 0.1 mm Hg absolute
- Agitated feed tanks/reactors, for mixing solutions of differing rheologies
- Range of fluid types
- Real-time data log of multiple process variables in a single setup
- Relationships with local laboratories for off-site analytical testing
- The tests carried out at our pilot plant facilities ensure that the plant
- Scale equipment meets our customers' specific requirement.



AGITATED THIN FILM DRYERS & EVAPORATORS

CHEM Process is a leading designer and manufacturer of a wide range of process solutions and customized process equipment and turnkey plants for evaporation, crystallization, thermal separation, drying, desalination, heat-transfer and vacuum for all industries. We combine an innovative approach, with an unparalleled depth of knowledge, to develop cost effective, practical solutions for the most challenging separation process. Designed and built to exacting standards, our powerful technologies have enabled us to succeed, where our competitors have failed.

Chem Process agitated thin film evaporators and dryers are used to concentrate, refine or recover a valuable product through distillation or similar thermal separation processes. Due to its inherent design features, it is ideal for thermal treatment of solutions and heat sensitive products, where reduced operating temperatures and vacuum operating pressures are desirable.

The typical agitated thin film evaporator consists of a tubular heat transfer area with an external heating jacket and a fast-revolving, inner rotor with flexible or rigid wiper elements. The driving speed is adapted to the product being handled, its particular specifications and task.

The feed product is distributed by the rotor and its wipers evenly over the heating surface, forming a thin liquid film of uniform thickness. Highly turbulent swirls are produced at the tip of the rotor blades and wipers with intensive mixing and agitation of the product as it comes into contact with the heating surface. These assure excellent heat transfer and combined with constant renewal of the product film, and provides an even heating and short residence time of the product through the heated zone.

Advantages

- Good heat conductivity (k-value), even when working with highly viscous and contaminated products
- Minimal thermal stress, thanks to low operating capacity, therefore a short dwell time (10-20 seconds of mean dwell time)
- No dead zone, therefore overheating prevented and a constantly high product quality guaranteed
- Continuous mechanical cleaning of the heating surface prevents incrustations
- Concentrated slurry, heat sensitive product, viscous and fouling fluid evaporation upto 99% in a single pass
- High evaporation rates, due to highly turbulent film and large difference in temperature
- Gentle evaporation, due to short residence times, rapid conveyance in the heated zone, and the constant product film renewal often
- combined with suppressed boiling points due to operation under vacuum
- Reduced need for maintenance because of sophisticated bearings and shaft sealing parts
- Shorter downtime and assembly time for maintenance and inspection
- No corrosion as outside surface is usually made of stainless steel
- Evaporation in one pass, no circulation
- Small film thickness, no hydrostatic height
- High turndown ratio, high flexibility for variation in requirements
- Low operating pressure down to 1 micron to reduced boiling temperature.



PRODUCT RANGE

EJECTORS AND VACUUM SYSTEMS

- Steam Jet Ejectors
- Liquid Jet Ejectors
- Thermocompressors
- Liquid Ring Vacuum Pumps
- Ring Jets
- Eductors
- Jet Heaters
- Jet Mixers
- Silencers
- Hybrid Systems

EVAPORATORS WITH TVR/MVR

- Single and Multi Stage Flash
- Forced Circulation
- Natural Circulation
- Falling Film
- Rising Film
- Combination Type
- Multi-Effect Distillation

- Scraped Surface Type
- Horizontal Wetted

CRYSTALLIZERS AND DRYERS

- Adiabatic Vacuum
- Evaporative Forced
- Draft Tube Baffle Type
- Spray Evaporator
- Oslo Type
- Agitated Thin Film Dryers : ATFD
- Flash Dryers
- Fluid Bed Dryers

PROCESS PLANTS/ TURNKEY PROJECTS

- Zero Liquid Effluent Discharge Plants
- Ethylene Glycol Vacuum Systems
- Caustic Concentration Systems
- Salt Recovery Plants
- Desalination Plants
- Venturi Scrubbers

- Milk Condensing & Khoa Cooling Equipment
- Distillery Spent Wash Treatment
- Food & Beverage
- Distillation
- Gas Scrubbing System

POWER PLANT EQUIPMENT

- Steam Surface Condensers
- Air Extraction Systems
- Gland Steam Condensers
- Condensing Packages
- Feed Water Heaters - LP & HP

SPECIALIZED EQUIPMENT FABRICATION

- Heat Exchangers
- Oil Coolers
- Reactors & Columns
- Pressure Vessels
- Media Filters
- Re-Boilers
- Skids & Packaged Plants

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