

Anhydro Spray Bed Dryer

FOR PRODUCTION OF DUST FREE POWDERS



SPX Flow Danmark A/S is an international engineering company with a consistent goal to provide our customers with the optimal processing technology and the highest plant performance standards. We have specialized in supplying the optimal design and engineering with respect to production performance, flexibility, energy efficiency and environmental protection.

SPX FLOW offers a wide range of Anhydro spray bed dryer technologies for handling numerous applications that give high-quality end products in the most efficient and economical way.

SPX FLOW, Inc. (NYSE:FLOW) is a leading manufacturer of innovative flow technologies, many of which help define the industry standard in the market segments they serve. From its headquarters in Charlotte, North Carolina, it operates a sales and support network, centers of manufacturing excellence, and advanced engineering facilities, throughout the world. Its cutting-edge flow components and process equipment portfolio includes a wide range of pumps, valves, heat exchangers, mixers, homogenisers, separators, filters, UHT, and drying technology that meet many application needs. Its expert engineering capability also makes it a premium supplier of customized solutions and complete, turn-key packages to meet the most exacting of installation demands.

Incorporating many leading brands, SPX FLOW has a long history of serving the food and beverage, power and energy, and industrial market sectors. Its designs and engineered solutions help customers drive efficiency and productivity, increase quality and reliability, and meet the latest regulatory demands. In-depth understanding of applications and processes, state-of-the-art Innovation Centers, and advanced pilot/testing technology further assist in optimizing processes and reducing timescales to reliably meet production targets.

To learn more about SPX FLOW capabilities, its latest technology innovations and complete service offerings, please visit www.spxflow.com.

Customized Drying Systems for Making Dust Free Powders

The Anhydro spray bed dryer (SBD) is designed to combine spray drying and fluid bed agglomeration in one process in order to meet our customers demands of being able to produce uniform non-dusty powders with consistent powder quality.

The system combines a conventional conical spray drying plant with fluid bed technology.

Improvements of powder quality as well as reduction in operating costs compared to Anhydro standard spray drying plants are the most important benefits of the spray bed technology.

The Anhydro spray bed dryer is widely used in the food, dairy, pharmaceutical, and chemical industries.

Typical applications are:

- Food ingredients
- Yeast products
- Plant extracts
- Flavours and fragrances
- Agro chemicals
- Tanning agents
- Dyestuffs
- Fertilizers
- Detergent ingredients

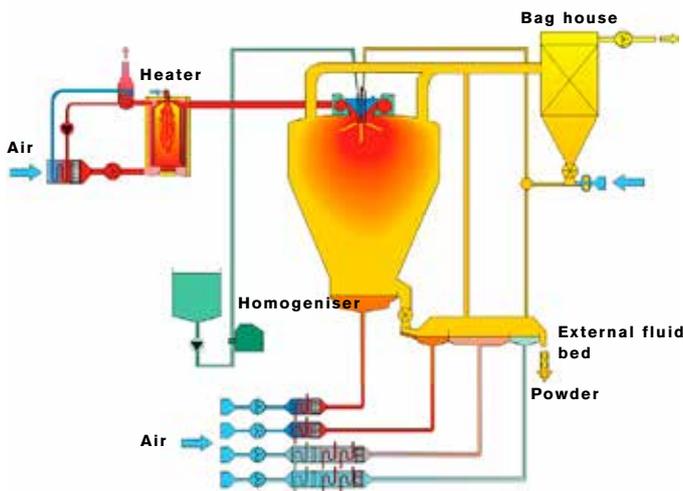


ANHYDRO SPRAY BED DRYER

Anhydro fluidisation chamber is provided with an integrated fluid bed. The feed is sprayed co-current into the drying air towards the fluid bed, where an adjustment of the fluidisation rate enables full control of the fines fraction to be removed from the product.

The fines are conveyed with the drying air to the wet zone in the drying chamber top, where the fines agglomerate with the wet droplets. Fines carried out together with the air are separated from the air in a cyclone system or a bag filter, and the fines are re-circulated to the atomizer zone for agglomeration.

The powder is further dried and cooled in an external fluid bed before discharge. The agglomerated powder produced is dust free with an average particle size of 100-350 microns, and the agglomerates have a high mechanical strength. The external fluid bed is often built together with the integrated fluid bed, saving building height and ductwork. This is an option for small and medium size plants.



ZIG-ZAG PARTICLE SIZE CLASSIFIER

The external fluid bed can be replaced by a zig-zag particle size classifier in cases where de-dusting and only moderate cooling of the agglomerated powder are required. The zig-zag particle size classifier provides particle size classification using very small air volumes compared to those of a fluid bed.

Typical Product Applications

With the Anhydro spray bed dryers, you can produce a wide range of powders for various industries.

Dairy Industry



Food & Beverage Industry



Pharmaceutical Industry



Chemical Industry



Customized Technologies

ATOMIZATION

Proper atomization is the key to the spray drying process. The spray is created by either a nozzle system or a centrifugal atomizer.

Particle formation and particle size distribution, and thereby the final powder specifications, can be controlled within certain limits through selection of the atomizer principle and by adjusting the atomization parameters, such as the feed pressure to the nozzles, or the atomizer wheel velocity in the centrifugal atomizer.

Normally, nozzle atomization is preferred in spray bed applications, as the average particle size which can be achieved is generally larger than that from a centrifugal atomizer.

Furthermore, the agglomerated particles are more uniform. The plant can, however, be designed for an optional choice between the two systems, if required.



An Anhydro spray bed dryer



Nozzle atomizer



Nozzle atomizer

INTEGRATED FLUID BED

By adjusting the air flow and the air temperature to the fluid bed, the size of the agglomerates and the residual moisture can be fine-tuned, as required.

As fluid beds generally provide much longer residence times than single-stage spray dryers, the drying outlet air temperature can be reduced in the combined system while achieving the same residual powder moisture. This reduces the energy consumption, and thereby the drying costs.

The fluid bed drying takes place at lower temperatures, providing a low heat impact on the product.

EXTERNAL FLUID BED

Final drying and cooling can take place in the external fluid bed. Instant properties of some agglomerated products can be achieved by adding lecithin in the rewet zone of the fluid bed.

Separate air inlet systems to the fluid bed provide flexibility with regard to air velocity and product temperature, ensuring removal of fines and discharge at the requested product temperature.



An Anhydro spray bed dryer

FINES RECIRCULATION

The fines from the product inside the drying chamber and the external fluid bed are separated from the process air in a cyclone battery or a bag filter.

The fines discharged from the separation system are re-circulated to the atomizer zone for agglomeration with the wet droplets. Agglomeration in the wet zone results in a very stable agglomerated powder, which can be bulk handled.

AIR BROOM

Some products are thermoplastic and have a tendency of sticking to the chamber wall. This can be prevented by applying the unique Anhydro rotating air broom system, sweeping and cooling the entire chamber surface by means of slightly heated air.

EXPLOSION PROTECTION

In case of a potential risk of a dust explosion, the plant is protected by means of a pressure relief system venting to the atmosphere, or by explosion suppression by means of injection of an inert media suppressing the explosion.

Closed circuit systems are applied where organic solvents are present in the feed applied. Nitrogen can be used as drying gas, which eliminates the risk of an explosion.

A second benefit is that the emission to the environment is minimised, which is imperative, when handling toxic materials.

CIP-CLEANABLE SYSTEMS

The complete plant including the bag filter can be Cleaned-In-Place (CIP). Fully automatic CIP systems designed according to the individual customer requirements are supplied on request.

Advantages of Anhydro Spray Bed Drying

All plants are tailor-made for each purpose with special focus on product quality, yield, and operating costs.

The Anhydro spray bed dryer offers the following advantages:

- Ability to produce uniform, stable agglomerated powders, which have a consistent powder structure and are easily dissolvable or dispersible
- Cost efficient drying, as the energy consumption is reduced by 10-15% due to multi stage drying compared to traditional single stage drying at low temperatures
- Gentle drying process, well suited for heat sensitive products, as the product temperatures generally are lower compared to standard dryers
- High plant availability due to optimised process conditions
- High flexibility



Inside view of an Anhydro external fluid bed



An Anhydro spray bed drying plant

Global Services for Individual Needs

SPX FLOW is committed to helping our customers all over the world to optimise product quality and plant availability, and to minimize operating costs on their Anhydro spray bed drying plants. Our solutions range from feasibility studies to full scale turnkey projects.

PROCESS DEVELOPMENT

SPX FLOW helps you to find the best solution for your long-term needs. We offer a close partnership based on personal commitment and documented Best Practice from the initial needs analysis and planning stage until the end of the service life of your Anhydro spray bed dryer many years later.

Together with you we analyse the available options based on your product and throughput requirements. If required, we can run pilot tests at our test facilities to ensure that the process will meet your expectations on a production scale.

3D computer design, global sourcing of equipment, and local manufacture, where appropriate, are part of our standard project execution.

INNOVATION CENTRE

SPX FLOW's state-of-the-art test facility close to Copenhagen in Denmark enables customers to test new products and to evaluate process conditions to secure precise synergy between optimization of the plant concept and reproducible product quality.

Alternatively, we can install small scale test plants at your site for a limited period for demonstration purposes or pilot-scale production.

ENGINEERING STANDARDS

Environment protection is incorporated in accordance with local rules and regulations and is a key point in the plant design. We are ISO 9001:2008 certified. All our plants meet the CE marking and ATEX requirements where applicable.

LIFELONG SERVICE AND SUPPORT

SPX FLOW worldwide service organization is ready, at all times, to provide any necessary spare parts at short notice. We can also dispatch service technicians to help you rectify any problems, thus reducing unscheduled downtime to a minimum.

SPX FLOW offers a number of service agreement options, depending on your individual needs, and our service engineers are always available to provide applications and development support.



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