

**anhydro**  
AN SPX BRAND

# Drying Systems for the Pharmaceutical Industry



**SPX**<sup>®</sup>

# Custimized Drying for Pharmaceutical Applications

*SPX offers a wide range of advanced spray, spin flash and fluid bed drying technologies for pharmaceutical applications requiring maximum product integrity and reliability.*

*Anhydro drying systems for the pharmaceutical industry can be combined and customized for specific product applications. Anhydro also performs verification and provides complete documented quality control according to the GAMP V model.*



## **Application performance**

SPX customizes, builds and delivers integrated, cGMP compliant drying solutions based on a unique combination of advanced component designs, documented-quality materials, precision engineering, and CFR Part 11-compliant process control and data acquisition options. These include spray drying, spin flash drying, fluid bed drying, spray bed agglomeration, and spray granulation options that comply with all current regulatory requirements.

Anhydro spray drying solutions are used in the pharmaceutical industry for the following applications:

- Single-stage spray drying of API and excipients for continuous production of free flowing powders
- Spray Bed Drying (SBD) combines spray drying with fluidized bed technology for production of agglomerated powder in one step
- Encapsulation of various formulations by spray drying. Encapsulation enables special properties such as controlled release of active material
- Spray congealing of excipients or API with a polymer
- Manufacturing of very fine powder for inhalation

## **Flexibility and partnership**

For SPX flexibility is more important than standard solutions. Based on partnership, dialogue, and in-depth understanding of customer requirements, we work with your experts to define the configuration that best meets your specific needs. SPX provides experience, expertise, service and support covering all aspects of technology implementation:

- Feasibility studies
- Extensive test facilities and analytical lab
- Engineering and procurement
- Project management
- Installation and commissioning
- Qualification services
- Training and pre-production
- 24x7 service and spare parts availability
- Rebuilding and troubleshooting

# Fluid Bed - Efficient and Uniform Mixing and Drying



Fluid bed drying is used in applications requiring efficient and controlled mixing conditions and low mechanical impact on the product. Fluid beds can be equipped with nozzles for agglomeration, granulation, coating, or mixing with liquid additives. The process offers intensive contact conditions between the fluidization gas and the product. Fines separation can be precision-controlled by widening or narrowing the upper section to achieve a specific air velocity.

Fluid bed plants can be configured in one or several sections as dryers, coolers, agglomerators, coaters or granulators. Anhydro supplies fluid-bed plants for both continuous and batch operation.

## **Plate and tubular evaporators**

In addition to drying solutions, SPX also offers falling film, rising film and forced circulation plate evaporation, and tubular evaporation plants.



# Pharmaceutical Process Technology Options

*All Anhydro drying solutions are available as single pass systems with either ambient air or inert drying gas, or as closed circuit systems with recycling of drying gas and recovery of solvent.*

## **Spray drying**

### **– efficient drying of heat sensitive product**

SPX offers spray dryer solutions with capacities ranging from 1 kg/h and up. A sanitary and easily accessible air distribution system facilitates optimum contact between drying gas and atomized products.

Atomizer design largely determines the structure and quality of the final powder. Spray dryers for pharmaceutical applications are often equipped with high-speed centrifugal atomizers. Other options are pressure nozzle atomization for coarser powders with narrow particle size distribution and high bulk density, and 2- or 4-fluid nozzle atomization for fine particles.





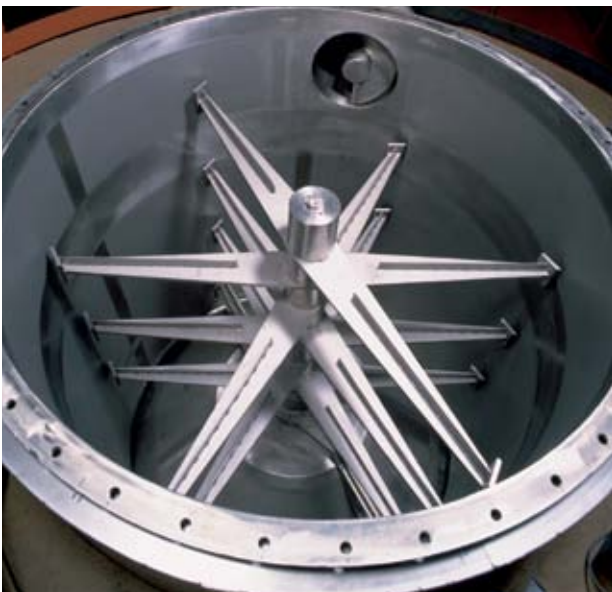
Spray bed drying combines a spray dryer with an integrated fluid bed for applications, featuring:

- Good agglomeration
- Large, strong particles
- Narrow particle size distribution
- Less dust due to effective agglomeration
- Good reconstititional properties

An air broom option is also available for effective cleaning of sticky products from the chamber wall. Alternatively, drying chambers can be equipped with wallsweep for removal of loose product adhering to the surface.

### **Anhydro Spin Flash®** – faster and more cost efficient drying

Developed and pioneered by SPX, Spin Flash® drying technology is a patented process used all over the world for fine powder drying applications removing the need of downstream powder milling. Spin Flash® drying enables direct drying of high viscous pastes and slurries, continuous processing with precision-controlled residence time and particle size, and safe drying of flammable products.

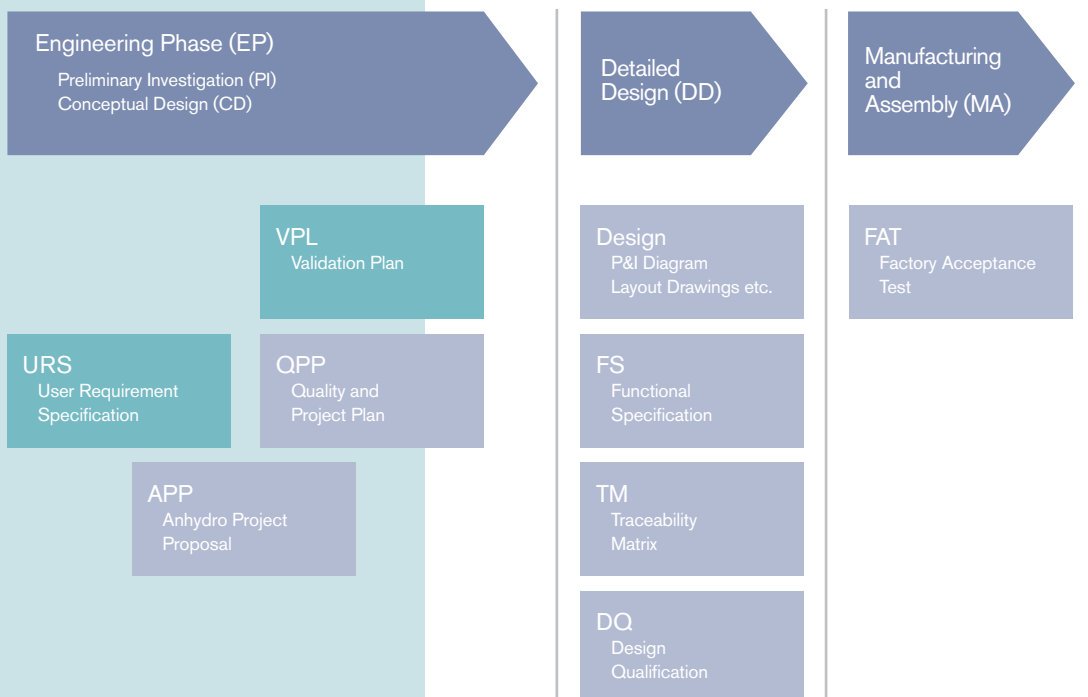


# Partnership and Cooperation

*Our aim is to help you 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 drying solution.*

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

SPX can assist with preparation of User Requirement Specification (URS) and Validation Plan (VPL) in the early project stages. In later project stages, we offer our Qualification Services following the ISPE Guidelines for Commissioning & Qualification.





### Flexibility down to the last detail

Flexibility demands precision and discipline. The SPX Pharmaceutical Project Model is a detailed plan outlining a timeline for a series of detailed activities from the preliminary investigation to qualification and production. Our experts stay with you all the way, making sure that the plant is designed, configured, built and delivered to meet every single one of your specifications.

### Test facilities

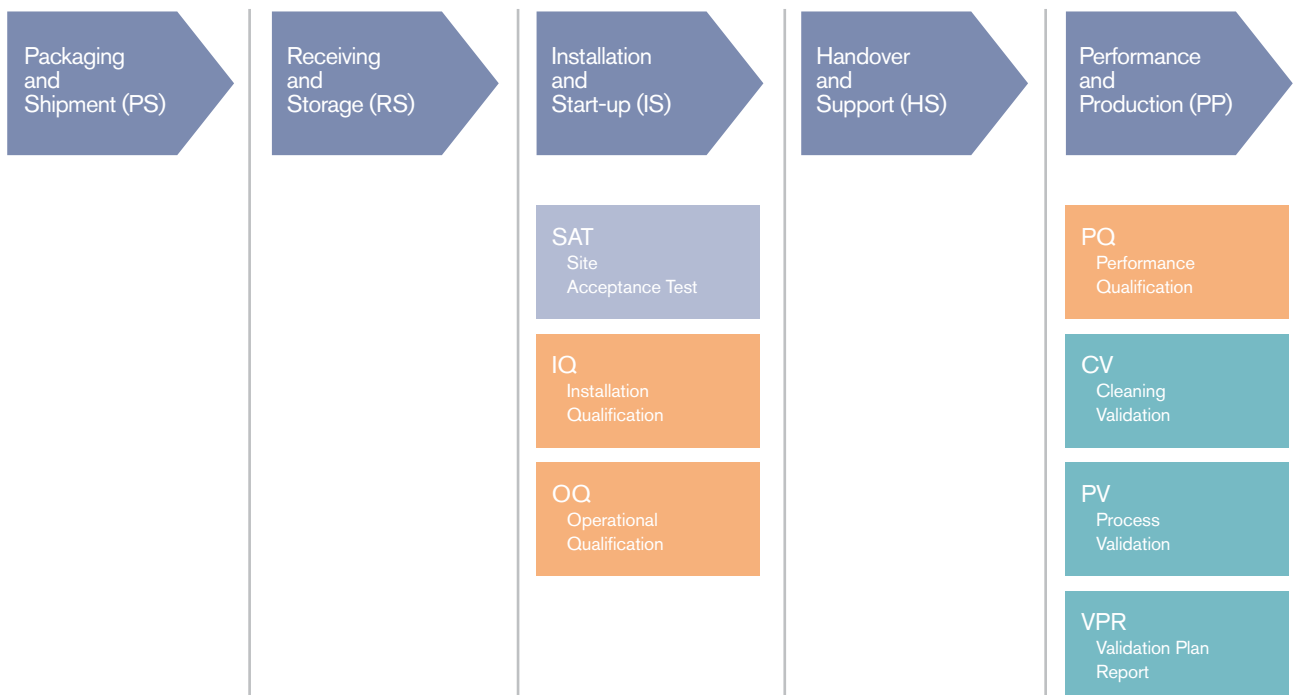
SPX offers a flexible test centre for testing new products and evaluation of process conditions to secure precise synergy between optimisation of plant concept and reproducible product quality.

We can also install test equipment or a pilot plant at your site for a limited period for demonstration purposes or pilot scale production.

### Lifelong service and support

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

We offer a number of service agreement options, depending on your individual needs, and our pilot plant engineers are always available to provide applications and development support.



SPX Flow Technology provides a full range of Anhydro Evaporation and Drying equipment for the global dairy, food and beverage, chemical, healthcare and pharmaceutical industries. Focusing on flexibility and attentiveness to individual customer needs, SPX enables excellence at every point along the value chain as part of our commitment to our customers' success.

SPX acts as a strategic development partner for leading manufacturers all over the world. Through close collaboration with our customers, we promote the development of innovative concepts and optimization of existing processes, enabling customers to introduce new products into the market as quickly and as cost effectively as possible.



**SPX**<sup>®</sup>  
WHERE IDEAS MEET INDUSTRY



SPX Flow Technology Danmark A/S  
7 Oestmarken  
DK-2860 Soeborg  
Denmark  
Phone +45 7027 8222 Fax: +45 7027 8223  
[www.spxft.com](http://www.spxft.com)

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