



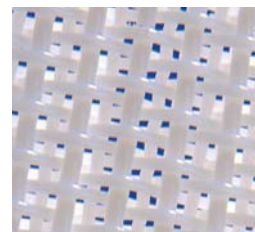
Process Engineering
Division

Niro

FILTERMAT[®]

Spray Dryer

Successful Drying
of Delicate
Food Products



NIRO POWDER TECHNOLOGY



Final drying sections with venturi design for air-flow

These products require special technology in order to economically produce quality powder in an agglomerated, easy-to-handle form.

The solution is the FILTERMAT® spray drying system, which provides:

- **the gentlest drying**
- **the most economic drying**
- **the greatest flexibility**

The FILTERMAT® spray dryer successfully dries most sticky, hygroscopic, thermoplastic and slowly crystallising products into free-flowing, agglomerated powders. This is possible due to a lower level of powder temperature than those possible in conventional spray dryer layouts. Furthermore, the powder can be held much longer within the dryer until the process is completed.

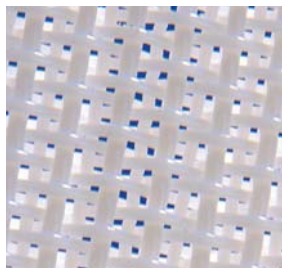
The FILTERMAT® spray dryer combines a co-current nozzle tower dryer with a built-in conveyor belt. The residence time while the powder is moved along with the belt is several minutes, offering sufficient time to complete powder drying and cooling while maintaining the required powder temperatures.

Spray Drying

while Preserving Product Quality



The open agglomerate structure is evident as the powder falls from the belt.



Polyester belt specially designed for ease of cleaning during the drying operation.



Feed is atomized into the special air-flow created by the air disperser.

The food and dairy industry uses products and ingredients in powder form to an ever-increasing degree. However, many of these products and ingredients are difficult to spray dry due to high carbohydrate, fat, or protein contents.

Continuous production of such powders in conventional one- or two-stage spray dryers is often associated with product quality degradation, deposit losses, and frequent cleaning procedures.

FILTERMAT®

at a Glance

The feed liquid or concentrate is pumped to a high pressure nozzle assembly and sprayed downwards into drying air through a roof air disperser. The combined atomizer and air disperser operation creates an air flow pattern in the main drying chamber (1) that directs the particles downwards onto the moving belt. The first stage of the drying is completed during this phase.

Semi-dried particles accumulate on the belt as an agglomerated, porous powder layer. The drying air is exhausted through the powder layer and continues during the entire conveying of the powder on the belt (second drying stage).

Outlet air temperature control is important to obtain the moisture content necessary to achieve the exact degree of product agglomeration and porosity of the powder layer.

Drying is completed in two chambers (2 and 3) adjacent to the main chamber (1). Powder cooling and conditioning are carried out in the last chamber (4) using dehumidified, cooled air, if necessary.

The ability to control the air temperatures in chambers 2, 3 and 4 gives the FILTERMAT® a high flexibility regarding the type of products that can be processed and the structure of the final agglomerates.

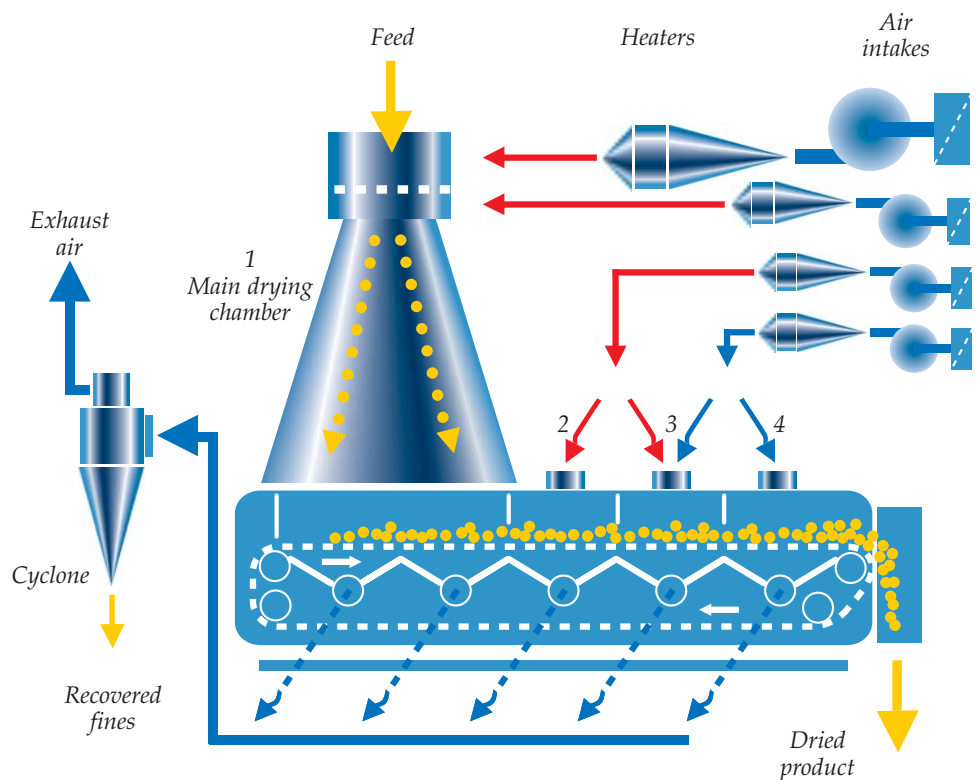
After completion of drying and cooling, the powder falls off the belt and is milled/sieved prior to being conveyed into silo storage or to a bagging station.

An important feature of the FILTERMAT® is that, as the exhaust air

flows down through the powder layer and belt, the finest particles are retained in the powder layer. Negligible amounts of powder pass to the cyclones with the exhaust air. Particulate emission levels are low, even without bag filters.

The FILTERMAT® is equipped with full CIP and meets the strictest sanitary design standards.

Special attachments, such as dry powder dosing are available on demand.



Top of drying chamber showing air disperser



Multi-nozzle assembly



FILTERMAT[®]

- Simply Superior Performance

1. Complete control of product temperature profile and powder residence time on the belt gives
 - a. complete control over drying and final moisture content
 - b. complete control over final product structure
2. Agglomerated powders can be produced without the need of fines recycle as in other spray dryer designs.
3. Environmental emission standards can often be met without installation of extensive air cleaning equipment.
4. Cleaning and inspection is easy: Downtime between production runs is very often minimal.
5. With Niro CIP systems, the plant layout meets pharmaceutical processing standards.
6. Excellent heat economy can be achieved, as the exhaust air leaves the dryer at much lower temperatures than in other spray dryer designs.



FILTERMAT®

Spray Dryer, Type FMD-12.5

Ideal for process confirmation, market samples, and small production runs.
 Can also simulate the various stages of commercial FILTERMAT® spray drying.
 Delivered ready to use.

Featuring air heater, feed pump, nozzle, drying section with integrated removable screen, cyclone, exhaust filter, and controls.

Removable screen



Drying/
 conditioning
 chamber with
 CIP installed

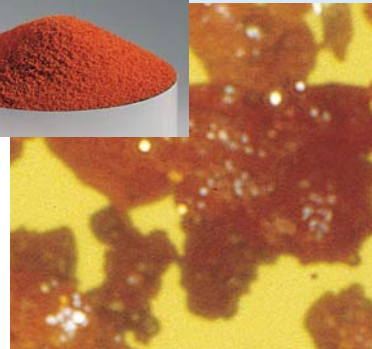
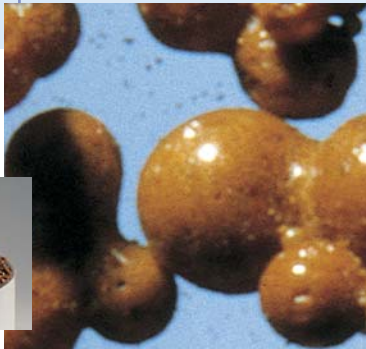
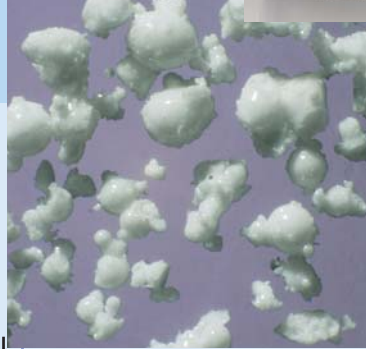
AVAILABLE PLANT SIZES

SPACE REQUIREMENT

Type	Capacity* Kg/h	Floor Area L (m) x W (m)	Ceiling Height** (m)
FMD – 12.5	15-35	7.2 x 6.9	10.0
FMD – 63	200	16.0 x 12.0	14.0
FMD – 125	500	17.0 x 12.0	20.0
FMD – 200	1000	19.0 x 13.0	20.0
FMD – 250	1250	19.0 x 13.0	20.0
FMD – 315	1575	19.0 x 13.0	20.0
FMD – 400	2000	19.0 x 13.0	20.0
FMD – 500	2500	22.0 x 15.0	22.0
FMD – 630	3150	22.0 x 15.0	22.0
FMD – 800	4000	22.0 x 15.0	22.0
FMD – 1000	5000	25.0 x 18.0	25.0
FMD - 1250	6250	25.0 x 18.0	25.0

*Water evaporative capacity for a 125°C air temperature difference over dryer.
 **Minimum.

Products



Beverages/Food

Flavours

- Chocolate
- Coffee*
- Meat flavours
- Mustard
- Spices
- Soy
- Tea

Dairy Foods

- Baby food
- Buttermilk
- Casein
- Caseinate
- Cheese
- Cream
- Fat-filled whey
- Lactose hydrolysed whey*
- Permeate
- Skim milk
- Sweetened condensed milk
- Whey
- Whole milk
- Yoghurt

Flour Mixes

- Bakery mix
- Cereal baby food
- Sauce base
- Tomato soup base*

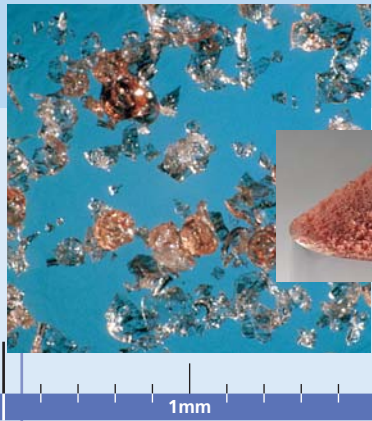
The FILTERMAT®

*spray drying system provides the gentlest drying
- the most economic drying -*

* Finished product shown in each associated picture

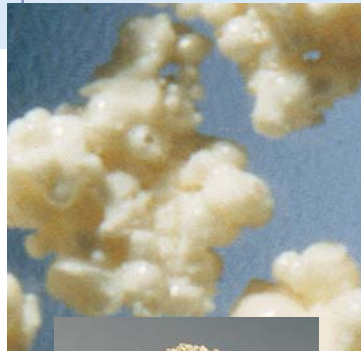
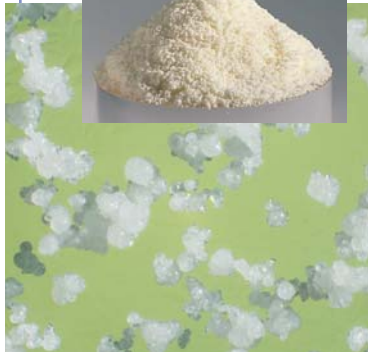
Carbohydrates

- Caramel
- Glucose syrups
- Corn syrups
- Honey with carriers
- Malt extract*
- Molasses
- Sorbitol
- Total sugar



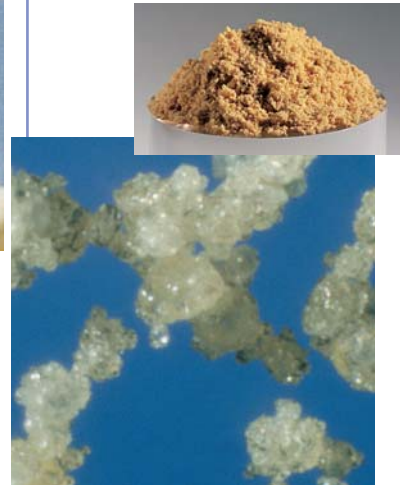
**Fruits/Vegetables
in Pulp Form
or with Carriers**

- Apple
- Apricot
- Asparagus
- Avocado
- Banana
- Carrot
- Coconut
- Cranberry
- Garlic
- Mango
- Onion
- Orange*
- Paprika
- Pineapple
- Strawberry
- Tomato



**High Fat Powder
containing**

- Butter*
- Fish oil
- Lard
- Lecithin
- Mayonnaise
- Tallow
- Vegetable oil



Protein Foods

- Bouillon*
- Egg
- Fish extract
- Hydrolysed vegetable protein
- Hydrolysed whey protein
- Hydrolysed yeast extract
- Whey protein concentrate

- the greatest product flexibility.

FILTERMAT[®]

Spray Dryer

Niro is a world leader in industrial drying, with spray drying, freeze drying, and fluid bed processing as core technologies. The Niro companies are part of the Process Engineering Division of the GEA Group.



GEA Niro A/S

Process Engineering
Division

A company of GEA Group

Niro A/S · Gladsaxevej 305 · PO Box 45 · DK-2860 Soeborg · Denmark
Tel: +45 39 54 54 54 · Fax: +45 39 54 58 00 · food.dairy@niro.dk · www.niro.com