

# Our Manufacturing Prog



**BUSS-HAMILTON LIMITED**

ANDREW HOUSE · 26 MELLOR ROAD  
CHEADLE HULME · CHESHIRE · SK8 5AU  
TEL. 061-486 0511 · TELEX 666822

## Complete Drying Units

for inorganic and organic products of the chemical, basic materials, plastics and food-stuffs industries. If your product to be dried is liquid or pasty or sandy, heat- or oxygen-sensitive or acidic or toxic - we have the right drying unit for you!

### Paddle Dryer

Batch-wise operation, very versatile, usable for small and large product rates.  
Filling volume: 150-12,000 l  
Water evaporation rate: 10-800 kg/h

### Contivac Dryer

Continuously operating, selfcleaning, likewise highly versatile in application, with simple residence time control.  
Residence time: Between 30 minutes and several hours.  
Water evaporation rate: 100-2000 kg/h

### Convex Dryer

Extremely compactly built pneumatic dryer, usable alone or as secondstage dryer.  
Residence time: 1-10 sec  
Water evaporation rate: up to 5,000 kg/h

### Conball Dryer

Continuously operating convection dryer, with a circulating ball bed, for drying pumpable products, with high thermal efficiency, permitting extremely gentle treatment of products at low drying temperatures.  
Residence time: between 2 and 60 minutes  
Water evaporation rate: up to 2000 kg/h

## Engineering

Process and P+I diagrams · Plot plans and Lay-outs · Models · Piping · Electrical and Instrument Engineering · Procurement of equipment, etc. · Erection services · Start-up · Time and cost control · Personnel assignments · Commercial services (contracts, insurances, etc.)

## Production Plants

Gas/liquid reaction units according to the loop principle · Plants for the hydrogenation of organic intermediates · Plants for continuous and batchwise hydrogenation of oils, fats and fatty acids · Decaffeination plants · Solvent recovery plants

Plants for the manufacture of

Hydrofluoric acid · Aluminium fluoride · Cryolite · Sodium fluoride · Fluorocarbons · Sodium hydrosulphite, Zinc oxide · Bisphenol A · Methyl chloride · Methylene chloride · Chloroform · Carbon tetrachloride · Perchloroethylene · Phosgene · Phtalic anhydride from naphtalene · Plasticizers

## Tanks and pressure vessels

Spherical tanks for liquid and town gas · Complete overground and underground tank farms · Gasholders · Silos · Containers, receivers and vessels for liquids and gases · Pressure vessels

## Steel structures for

Road and railway bridges · Industrial and administration buildings · Halls and halls standardized · Loading bridges · Crane bridges and runways · Radio transmission towers · Pylons for overhead lines · Equipment for hydro-electric power plants · High-bay warehouse · Steel chimneys · Conveyor belt bridges

## Penstocks

Manifolds · Tunnel and pressure shaft liners · Water supply conduits · Power supply conduits · Long distance pipelines

## Individual equipment

Stirrer kettles · Autoclaves · Chemical reactors · Extractors · Heat exchangers · Rotary kilns · Equipment for breweries, such as Fermentation vats, Wort boilers, Cooling pockets, Storage tanks

## Machinery

Buss-Kneaders Type PR for mixing, plasticising and homogenizing of thermoplastic and thermosetting materials, for the dispersion of dyes, or any other process best carried out in the high-viscosity phase (for instance reaction processes).

Buss-Kneaders Type K and KR for the continuous mixing and kneading of moist and crumbly up to plastic and doughy masses for the foodstuff, chemical and pharmaceutical industries.

Buss-Kneader plants Type KE for the fully automatic and continuous preparation of carbon electrode pastes containing the usual percentage of binder

Z-arm mixers and kneaders with volumes between 3 to 6000 l.

Mixing turbines for continuous dissolving processes.

Pellet cooling and drying units, heating and cooling units to Buss-Kneader plants.

**Buss Ltd., Basle CH-4133 Pratteln, Switzerland**

Phone (061) 81 54 41

Telex 62 472



# Field of Application

# Advantages

The CONTIVAC dryer is a continuous contact dryer, with a single horizontal agitator.

It is suitable for drying liquid, pasty, sticky and free flowing products.

The special features of the Contivac, namely

self cleaning of the heating surfaces, good mixing action, high heating surface to volume ratio, high specific drive capacity,

make it particularly suitable for products which show a tendency to form a hard crust or to pass through rheologically difficult phases during drying.

The evaporated moisture can be water or an organic solvent.

The standard range of CONTIVAC dryers have heating surface areas between 4 and 57 sq m and volumes between 100 and 2900 litres. They are suitable for operation under vacuum or at pressures of up to 3 atmospheres gauge.

Heating is by vacuum steam (from about 60 °C) or pressure steam (up to about 200 °C). For temperature above 200 °C – up to around 300 °C – heating oils is used.

The evaporative capacities of the standard plants are governed by the dryer size and heating temperature, and range from 100 to 2000 kg water per hour.

Apart from drying, the CONTIVAC dryer is also suitable for duties such as crystallisation from melts, heat exchange operations and reactions.

The agitator speed for rheologically difficult materials is from 8 to 20 r.p.m. depending on the dryer size, and for easier applications, it is between 25 and 60 r.p.m.

Final moisture contents below 1% can readily be reached and the mean residence time can be between thirty minutes and several hours, depending on the specific throughput. For final drying in the free-flowing phase, the agitator construction is specially designed to suit the particular requirements.

A pilot plant is available for the investigation of specific problems and hence for the design of scaled up CONTIVAC production plants. This pilot plant has the following specification:

Heating surface area	5 m <sup>2</sup>
Volume	150 litres
Heating temperature	60 to 230 °C
Agitator speed	6 to 120 r.p.m.
Residence time	10 to 120 min
Filter surface area	2.5 m <sup>2</sup>
Drive power	24 kw

Feeding:  
by monopump, paste hopper with forced feeding screw, double paste hopper, spiral screw or rotary valve.

Discharge:  
by rotary valve or double butterfly valve.

This unusually versatile installation makes it possible to determine the optimum drying conditions for a wide variety of wet products and the processing parameters which are essential for the design and operation of a CONTIVAC drying plant.

These include:

Feeding of the wet product  
Dust separation from the removed vapour  
Discharge of the dried product  
Vapour condensation  
Control and regulation

- Continuous operation – hence
- consistent product quality
- elimination of idle time
- easy integration into plants with continuous pre – and post – drying stages
- Satisfactory and uniform continuous drying of rheologically difficult products through a combination of
- high specific drive capacity
- self cleaning of the heating surfaces and
- good mixing and kneading action
- Ideally suited for the continuous vacuum drying of products which are temperature sensitive, wet with organic solvents, toxic, oxygen sensitive and which present a danger of dust explosion.



# Plant Description

The CONTIVAC dryer (figure 1) is in principle a single agitator disc contact dryer, consisting of a heated cylindrical housing (1) assembled from unit sections, and a heated hollow agitator rotor (2) which has a simultaneous rotating and oscillating movement by means of a rotating drive (3) and a reciprocating drive (4).

The drive (3+4) and stuffing box (8) are located at the dry product end, and the stuffing box is protected by a reverse acting flight (12). The wet product is introduced at the far end and is drawn in by the screw flight (13) and continuously conveyed through the dryer.

The vapour passes through the vapour filter (15) to the condenser. This Buss vapour filter system has a back scavenging action, and was specially developed for removing dust from vapour in vacuum drying plants.

The hollow agitator (2) is fitted, over its whole length, with heated flights, which are arranged equidistantly in pairs.

Between every two axially neighbouring agitator flights, there are, projecting inwards from the housing, fixed wiping pegs (10) or annular weir/kneading elements (11) which extend inward to the agitator core.

The self cleaning of the heating surfaces is achieved by the combined rotating-reciprocating movement of the agitator. The stationary elements (10 and 11) clean the faces of the agitator flights, at the end of each oscillating movement, during one rotation of the agitator. By the forward and backward movement, the edges of the agitator flights (9) clean the inner surface of the housing and the fixed elements projecting inwards to the core of the agitator clean the agitator (2). In all, about 95% of the heating surface is cleaned.

The rotating and reciprocating motions need not be synchronised, because the individual agitator flights (9) oscillate only between two adjacent fixed elements (10 and 11). This is so that the speed of rotation, the frequency of reciprocation and the forward and backward speed of reciprocation can be adjusted independently of one another over a wide range of settings.

The housing sections (1) are supported by frames (5) on rails and can be drawn forwards when cleaning is necessary.

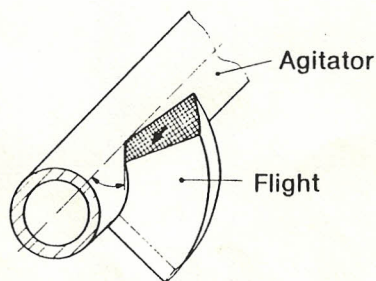
The transport of pasty products through the CONTIVAC dryer

selection of feeding equipment is determined by the nature of the wet product:

for wet products which are pumpable a paste hopper and mono pump (72.08); for pasty wet products, a paste hopper with forced feeder (72.07) and for free flowing wet products a double hopper system (72.06).

It is found of particular advantage, when the double hopper system is to be used, that the CONTIVAC dryer is functionally not sensitive to variations in feed rate, or short interruptions in feeding.

Discharge of the dried product under vacuum operation is achieved through an air lock (72.05) which consists of two valves with an intermediate chamber. When operating under atmospheric pressure, the dry product is discharged through a rotary valve or double discharge air lock.



is achieved by the differential forward and backward oscillatory speed, combined with the action of the bevelled edges of the agitator flights. For liquid and free-flowing products, the required settings are easily found. Figure 2 shows a CONTIVAC drying plant for vacuum operation. The