

PROCESS EQUIPMENT SPECIFICATIONREACTORItem No. 204

<u>Plant</u>	DSPP Extension
<u>Title</u>	Contivac Reactor
<u>No. off</u>	1
<u>Duty</u>	To convert mono sodium orthophosphate to di sodium pyrophosphate at a rate of 416 Kg/h product.
<u>Type</u>	Scraped, thermal screw
<u>Size</u>	Screw 450 mm diameter, 4.8 m (15.7 ft) long
<u>Volume</u>	0.5 m ³ (17 ft ³)
<u>Heat Transfer Area</u>	14.5 m ² (155 ft ²)
<u>Drive Motor</u>	75 kw (estimated)
<u>Recommended Suppliers</u>	Buss Ltd., Basle, Switzerland.

OPERATING CONDITIONS

<u>Heat of Reaction</u>	251 kJ/kg (60 CHU/lb) product
<u>Total Theoretical Heat Required</u>	57 kw (107,000 CHU/h)
<u>Total Estimated Heat Required</u>	70 kw (132,000 CHU/h)

	<u>Process</u>	<u>Service</u>
Fluids entering:	450 kg/h MSP 34 kg/h air	140 kg/h
Fluids Condensed:	-	140 kg/h.
Fluids vaporized:	34 kg/h water	-
Specific heat of solids:	1.26 kJ/kg (0.3 CHU/lb)	-
Latent heat of Vapours:	2260 kJ/kg (540 CHU/lb)	1775 kJ/kg (424 CHU/lb)
Temperature in:	60°C	232°C
out:	230°C	232°C
Pressure:	0.94 bar (715 mmHg)	30 bar (420 p.s.i.g.)

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 ²
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 ²
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.