

Description of the Plant

N 7395-13

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The Paddle Dryer (71.01) constitutes the main element of the drying unit. It consists of a horizontal, cylindrical housing which contains a paddle agitator in the form of a hollow shaft carrying agitator arms. The jacket, the hollow shaft and the agitator arms are steam-heated. The paddle agitator is driven by an electric motor and gear unit. A built-on torque bracket with microswitch protects the paddle agitator against overloading.

The product to be dried is filled in through the charging nozzle into the Paddle Dryer, where it is distributed uniformly by the rotating paddle agitator. The drying proceeds under vacuum while intensive intermixing by the agitator causes continual renewal of the product particles in contact with the heated surfaces. This guarantees efficient heat transfer and uniform product quality.

The vapours are purged of dust in passing through the Vapour Filter (71.04) and are then liquified in the Condenser (71.10). Non-condensable gases are drawn off by the Vacuum System (71.14).

The Vapour Filter is equipped with a removable filter insert. To prevent excessive vacuum drop across the fabric from thick (and possibly moist) dust build-up on the filter sacks, these are provided with a reverse jet arrangement, i.e. the individual filter sacks are cleaned in turn automatically during operation by short but powerful countercurrent blasts of steam being blown through the filter sack. This serves to blow and shake off the dust layer and keep the filter sack dry.

After the drying process is complete, the dried material can be cooled

down by applying cooling water to the dryer jacket and paddle agitator.

The dryer is emptied efficiently by the arms of the paddle agitator, which are designed to shovel the material in the vessel toward the outlet when rotated backwards. The discharge outlet is specially constructed to prevent the formation of a plug of material.

The main components of the Paddle Dryer plant are mounted on a Base, Frame (71.03). In similar fashion, all of the control elements for utilities are assembled to a compact Utility Station (71.20), thus limiting the final erection work at site to the fitting of a few pipes and the application of the insulation.

Normally, all plant components coming into contact with the product are built in stainless chrome-nickel steel.

For different applications, the following types of Paddle Dryers are available:

- Model C Paddle Dryers are designed to meet normal requirements in most cases. Permissible steam pressure is 2 to 5 kp/cm². The individual units of this model series are largely standardized.

- Model S Paddle Dryers are suited best to difficult operating conditions, such as occur in the drying of highly viscous, pasty substances. Heating media at pressures up to 30 kp/cm² can be used. The Paddle Dryer can be equipped with crushing bars, and a great many modifications are possible.

- Model M Paddle Dryers are used to best advantage in those cases involving the successive drying of small batches with thorough cleaning necessary each time. In this model, the agitator shaft is overhung, and one end of the casing can be opened like a door, making the inside of the dryer easily accessible.

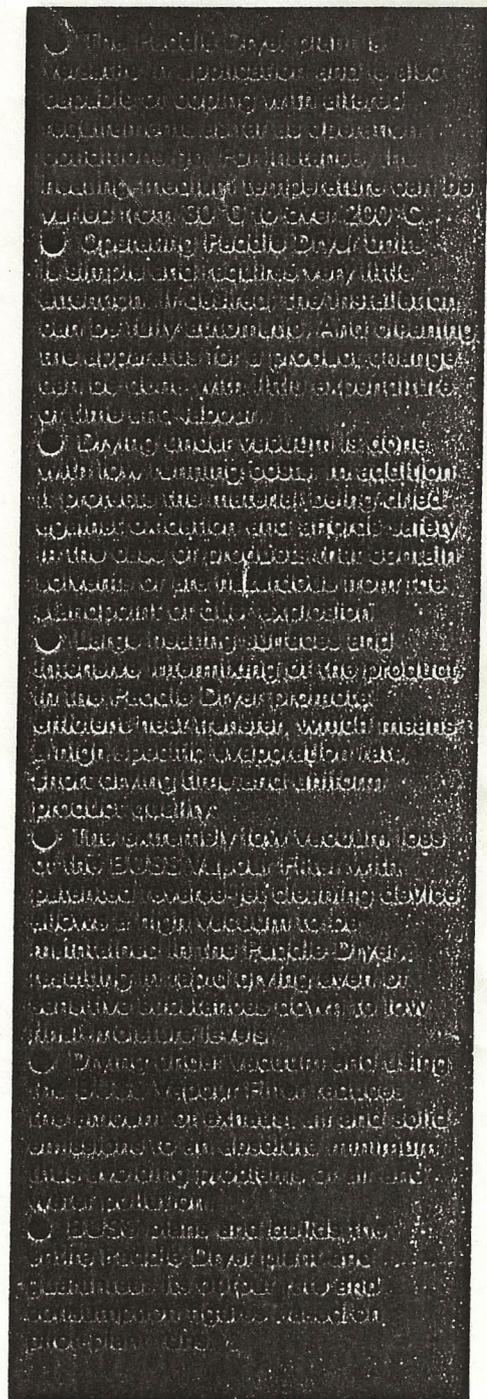
Paddle Dryer units are used for the batch drying of liquid, pasty and sandy materials. The liquid to be removed can be water or any solvent whatever. Typical areas of application are the drying of industrial and agricultural chemicals, of plastics powders and granulates, of dyestuffs, foodstuffs, pharmaceutical products and others. In all of these cases, BUSS Paddle Dryer installations stand out in comparison with other contact dryers in that the drying takes place very rapidly without any damage to the product, and running and maintenance costs are low.

BUSS Paddle Dryer units normally work at operating conditions from 25 to 100 mm Hg and at heating temperatures from 30 °C to over 200 °C. At a heating temperature of 100 °C, for example, as much as 15 kg of water per hour and square meter of heating surface evaporate. And in achieving this drying rate, the utilities consumption of the entire drying plant amounts only to about 1.5 kg of steam and 0.1 kWh of electric energy per kilogram of evaporated water.

BUSS can look back over decades of experience in the planning and building of Paddle Dryer installations. The standard range includes dryer sizes with stepped nominal volumes from 300 to 16,000 litres. Apart from these, special sizes are built as well to meet particular wishes of customers. And special designs are produced which permit Paddle Dryer units to be used for such duty as the conducting of chemical reactions, or crystallization processes and for solvent recovery. For planning and executing such installations, BUSS has a staff of process engineers, the necessary test facilities, and well-equipped workshops with qualified personnel.

1 Partial view of a Paddle Dryer plant

2 Model S Paddle Dryer with all operating elements and accessory components assembled as a package unit

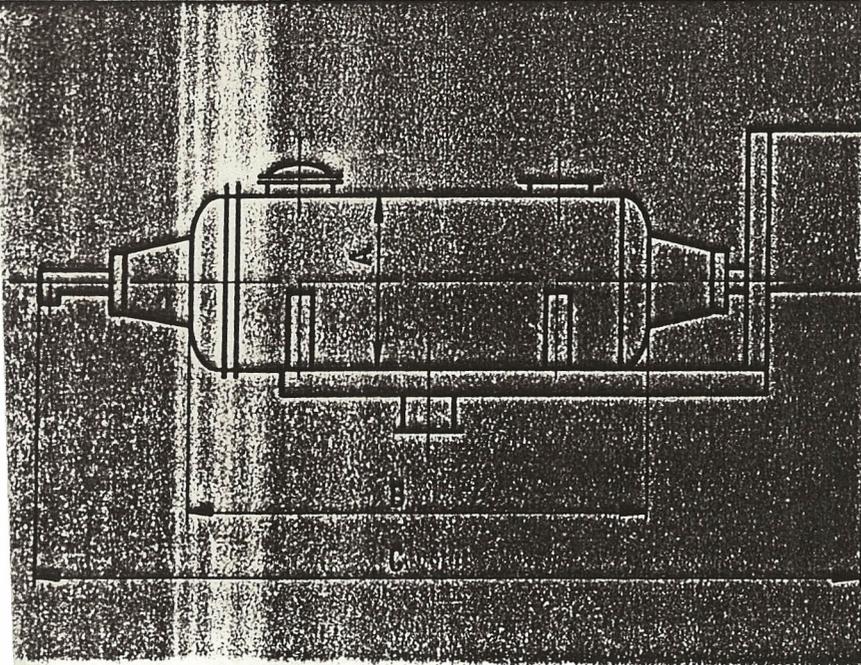


- The Paddle Dryer plant is available in operation and is also capable of coping with altered requirements as to dimensions, conditions of performance, the heating medium temperature can be varied from 30 °C to over 200 °C.
- Operating Paddle Dryer units are simple and require very little maintenance, the installation can be fully automatic. And changing the apparatus for a product, change can be done with the expenditure of little time and labour.
- Drying under vacuum is done with low running costs. In addition, it prevents the material being dried against oxidation and avoids safety hazards, or the risk of explosion.
- Large heating surfaces and automatic monitoring of the product in the Paddle Dryer prevents overheated material, which means a high specific capacity for fast, time-saving and excellent product quality.
- The extremely low vacuum loss of the BUSS Vapor Filter with patented reverse-air cleaning device allows a high vacuum to be maintained in the Paddle Dryer, resulting in a drying layer of sensitive substances down to low initial moisture levels.
- Drying under vacuum and using the BUSS Vapor Filter reduces the amount of extract and solid impurities to an absolute minimum, thus avoiding problems of air and water pollution.
- BUSS plants are built to the standards of a Paddle Dryer plant and equipped with a special control system for regular operation.

Model S
Paddle Dryer
in manufacture

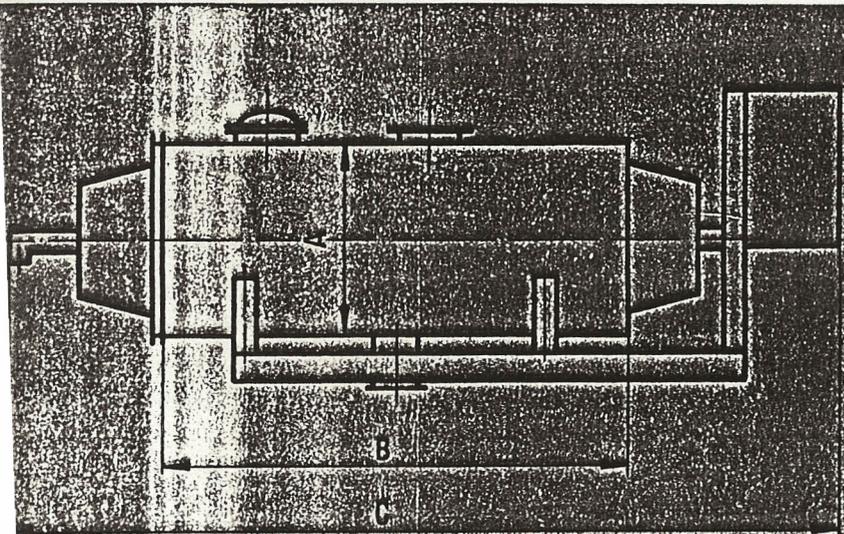


Dimension drawing for Model S Paddle Dryer



Model	Capacity lb.	Model	A in.	B in.	C in.
1000	1750	107	1000	2500	3700
1500	2300	109	1050	2700	3900
2000	2900	110	1100	2900	4100
2500	3500	112	1150	3100	4300
3000	4100	113	1200	3300	4500
3500	4700	114	1250	3500	4700
4000	5300	115	1300	3700	4900
4500	5900	116	1350	3900	5100

Dimension drawing for Model C Paddle Dryer



Model	Capacity lb.	Model	A in.	B in.	C in.
102	1700	108	1000	2500	3600
107	1800	110	1050	2700	3700
112	1900	112	1100	2900	3800
117	2000	114	1150	3100	3900
122	2100	116	1200	3300	4000
127	2200	118	1250	3500	4100
132	2300	120	1300	3700	4200
137	2400	122	1350	3900	4300
142	2500	124	1400	4100	4400
147	2600	126	1450	4300	4500
152	2700	128	1500	4500	4600
157	2800	130	1550	4700	4700
162	2900	132	1600	4900	4800
167	3000	134	1650	5100	4900
172	3100	136	1700	5300	5000
177	3200	138	1750	5500	5100
182	3300	140	1800	5700	5200
187	3400	142	1850	5900	5300
192	3500	144	1900	6100	5400
197	3600	146	1950	6300	5500
202	3700	148	2000	6500	5600
207	3800	150	2050	6700	5700