

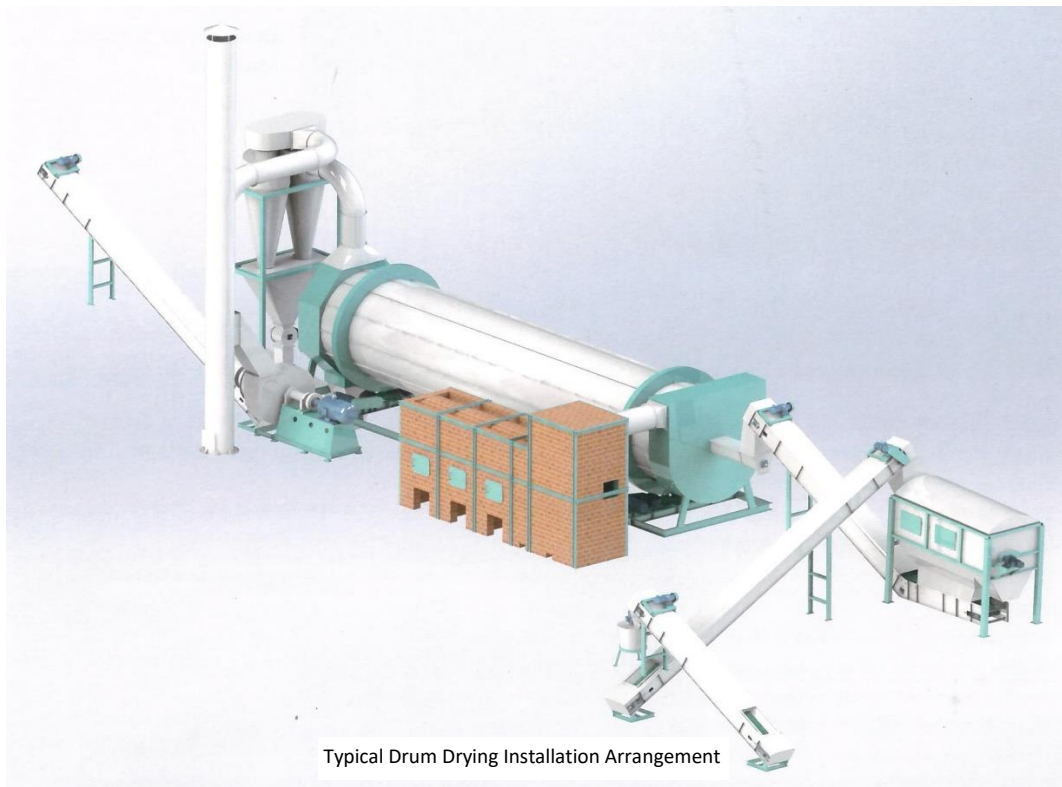


# GRAIN TECH LTD

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OFFERS TOTAL CAPABILITY IN  
EQUIPMENT SYSTEMS & PROCESSORS FOR  
Particle Size Reduction, Milling, Crushing, Sifting  
Classifying, Pelleting, Agglomeration, Extruding,  
Bulk Material Handling, Drying, Cooling,  
Conveying & Packaging

## ROTARY DRUM DRYER SYSTEMS



Typical Drum Drying Installation Arrangement

### 1. Introduction

The Grain Tech Rotary Drum Dryer/Dehydrating process systems provide a safe, dependable, widely used and successful method for drying/dehydrating materials within industrial, biomass and farming applications.

This series of drying machines have a range of capacities and are capable of economical operation and producing a high quality, uniformly dried product.

The drying/dehydrating principle employed within this series design is a heating and transfer process whereby the material dried retains its physical characteristics and properties with only the moisture content being changed.

The products of the dryer/dehydrator are uniform in quality and degree of dryness because the thermostatic control of air outlet temperature and fuel input, provided that there is a consistent and regulated material supply to the dryer/dehydrator.

## 2. General

The major components of this series of dryer/dehydrator are the furnace, combustion fire tube, triple pass drum, drum trunnion bases, fan unit, infeed tip station collection conveyor and transfer conveyor unit, and discharge ancillary cyclone collectors. A tip station and conveyor is utilized for the initial material supply to ensure that a consistent and regulated feed is maintained. Forage choppers, presses, hammer mills, automatic feeders and other auxiliary equipment, where required, are sold as separate units. The conveyor and controls may be set up on either side of the dryer/dehydrator drum, whichever is most convenient for each particular installation and should be arranged to enable the feed rate to be accurately regulated where required.

Both industrial and agricultural model dryers/dehydrators are available gas-fired, oil-fired or combination fired with natural gas and diesel fuel oil. The particular type of burner and local fuel specifications must be advised at the time of order so that the fire tube arrangement and specifications may be provided to suit. Optionally, these dryers may be heated from biomass fuel type burners.

## 3. Operation of the Dehydrator/Dryer

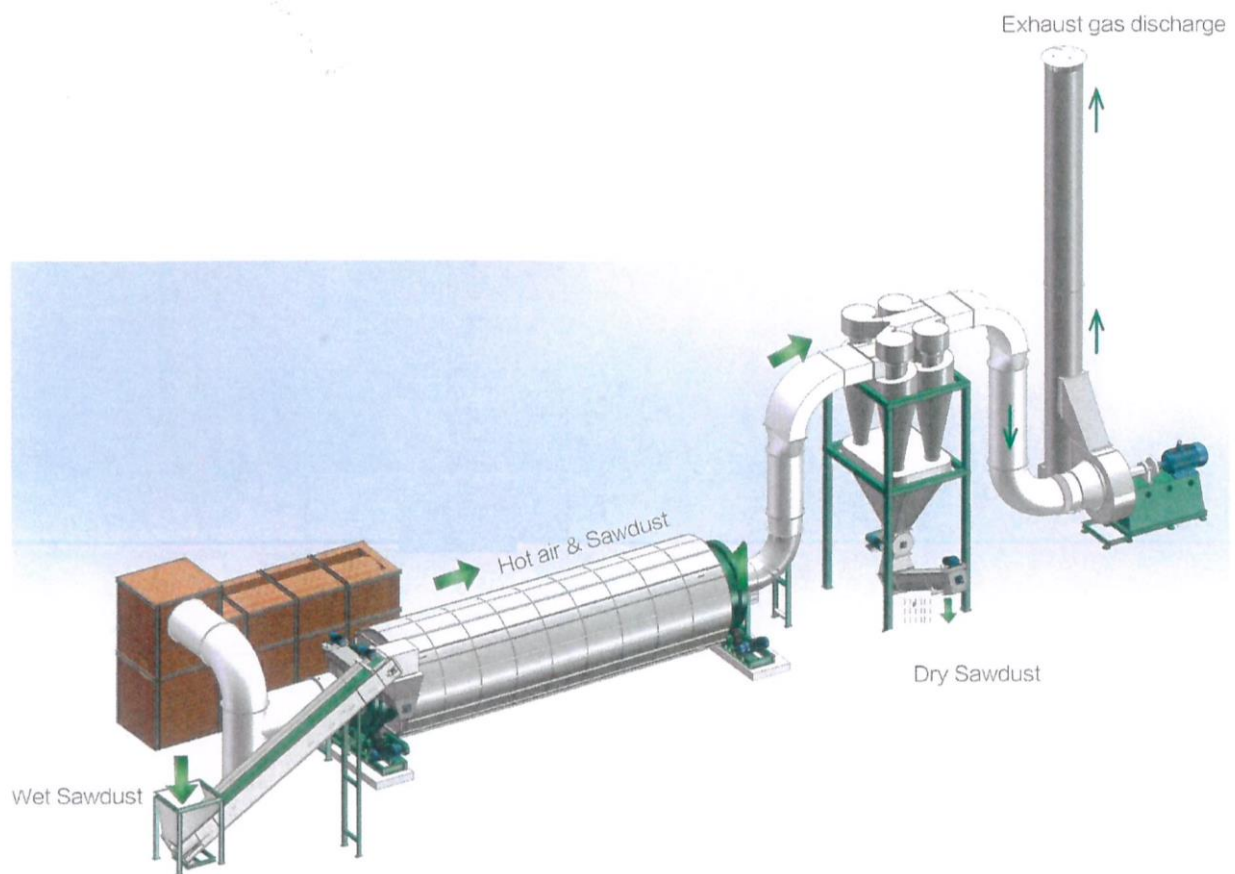
An automatically controlled concentric end-fired furnace with a specially designed combustion chamber fired from a biomass fuel burner or by gas or oil, supplies the necessary heat for the drying process. Hot gasses pass directly from the combustion chamber through the intake tube and enter the inner drum cylinder at a temperature ranging from 175 to 900 degrees Celsius depending upon the application and moisture content of the material to be dehydrated. After the material to be dried is properly prepared, it is fed into the tip station and transfer conveyor which conveys it into the receiving chute delivering to the intake section of the drum assembly. The regularity of the feed material supply and in-feed product moisture content is paramount to maintaining consistent and reliable finished dried product moisture content specifications.

The drum unit consists of a concentric drying cylinder into which the gases enter by way of the heat section intake tube. The material which is fed into the head section of the drum is then advanced and cascaded from the internal lifters through the drying drum by means of a drying suction fan. The triple pass cylinder design is arranged and mechanically interlocked and rotates at a variable speed. The material is repeatedly carried to the top of the cylinder by the cylinder flights and dropped through the hot gasses so as to give maximum exposure of the material. Moisture is given off as the material passes progressively forward through the cylinder to discharge via the transfer conveyor. The dried material is pneumatically conveyed to the drying suction fan at the discharge end of the machine to transfer to the recovery cyclone receiver. With this type of concentric triple pass cylinder construction, the material is exposed to the drying medium for approximately 22 meters in the Model 85-25.

## 4. Dryer Models & Specifications

Single Pass Drum Dryer/Dehydrator



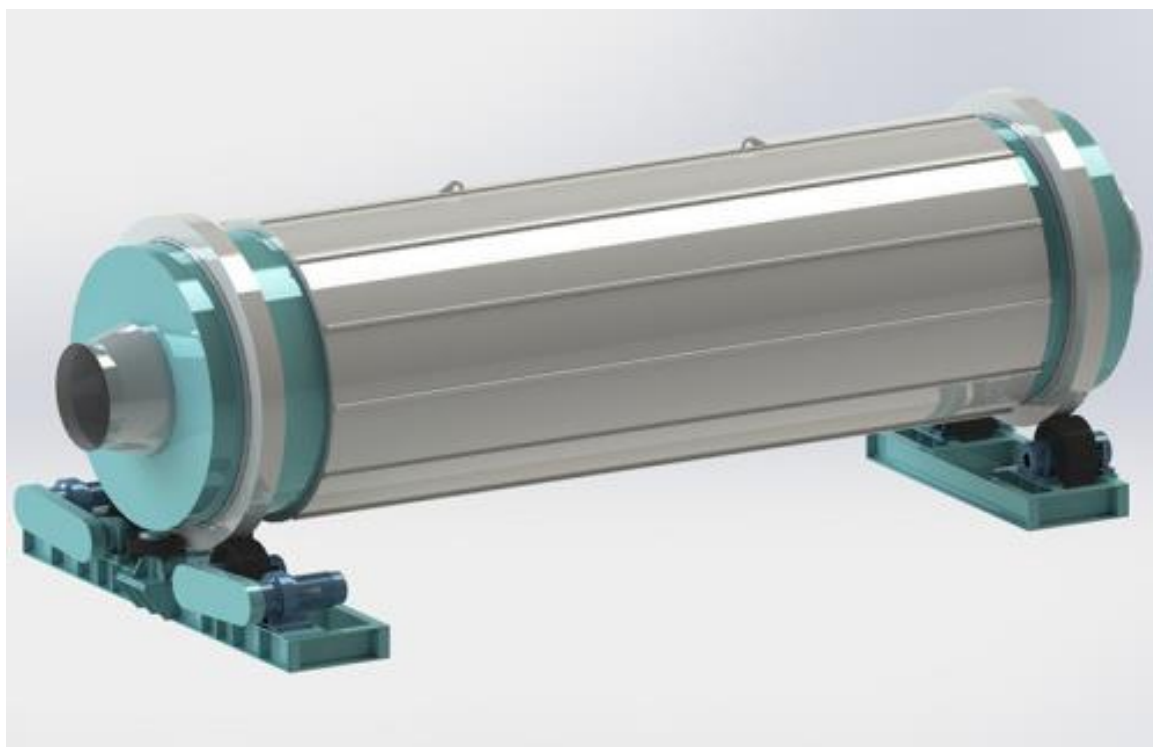


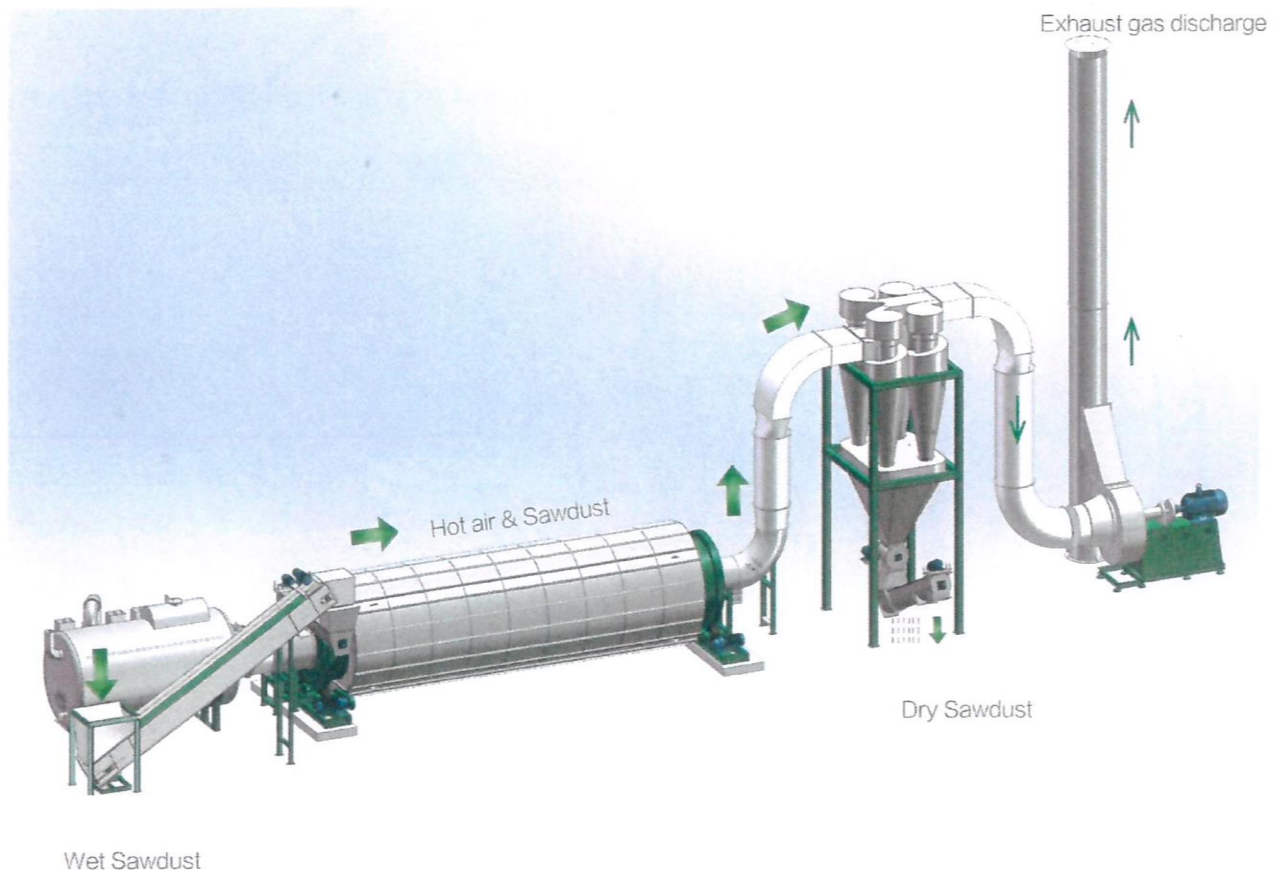
### Features:

- Capable of operating on a wide range of biomass raw materials, i.e. fibrous blocks and agglomerated types such as sawdust, woodchips, shavings, hulls, etc.
- Drum driving gear ring and gear wheel arrangement is characterized by heavy duty cast and machined components ensuring optimum strength, stable operation, high resistance to wear and long service life
- Material infeed may be either via screw feeder or drop into the top zone according to the material characteristics.
- The drumhead and tail assemblies interface seal with the rotating drum incorporates an elastic wear resistant steel sheet providing long service life while being easy to assemble and maintain.
- The barrel internal lifters are designed for optimum distribution of the material to cascade through the hot air for even and consistent contact and even drying effect.
- The dried material discharge arrangement provides for efficient separation of the hot air and material.
- The dryer drum is insulated with heat resistant material cladding to provide a barrier to heat loss during operation.

Table of Technical Parameters						
Model	LYHG0.8x8	LYHG1.2x12	LYHG1.6x11.5	LYHG1.6x15	LYHG2x16	LYHG2x20
Body: Diameter (mm)	800	1200	1600	1600	2000	2000
Body: Length (mm)	8000	12000	11500	15000	16000	20000
Body: Rotary Speed (r/min)	Can be adjusted by process					
Capacity (t/h)	0.5	1	2	3	4	4.5-5
Inlet Temperature (degrees Celsius)	<500	<500	<500	<500	<500	<500
Raw Material	Sawdust					
Moisture (%)	45					
Outlet Temperature (degrees Celsius)	80	80	80	80	80	80
Power (kW)	2.2x2	3x2	4x2	4x2	4x4	5.5x4

- Triple Pass Drum Dryer/Dehydrator





## Features:

- Heavy duty low speed drum operation running on high-capacity trunnion assemblies for safe and reliable, low maintenance performance. Design incorporates explosion proof structural component assemblies.
- Material infeed rate is easily adjusted according to process requirements.
- Triple pass arrangement ensures high capacity, continuous operation suited to long run processing for even final dried product.
- Incorporates a high level of automation including:
  - I. Auto feed rate control consistent with finished product called for moisture content.
  - II. Adopts exhaust temperature intelligent control for modulation of feed rate and temperature input regulation to optimize heat energy requirements.
- Compared to single pass drum dryer operation, the thermal efficiency is increased by 40-50% while the volumetric heat transfer coefficient is double that of a single pass dryer.
- The drum outer surface is fitted with an insulation heat barrier cover to optimize thermal efficiency and increase energy savings.
- Finished dried material physical characteristics are maintained without degradation through over heating or burning. Final moisture contents of <15% are practical.



Table of Technical Parameters					
<b>Model</b>	LYHG1.7x8	LYHG2.45x8	LYHG2.65x9.1	LYHG2.85x9	LYHG3.77x10
<b>Body: Diameter (mm)</b>	1700	2450	2650	2850	3700
<b>Body: Length (mm)</b>	8000	8000	9100	9000	10000
<b>Rotary Speed (r/min)</b>	Can be adjusted by process				
<b>Capacity (t/h)</b>	1	2	3	4	5
<b>Inlet Temperature (degrees Celsius)</b>	<500	<500	<500	<500	<500
<b>Raw Material</b>	Sawdust				
<b>Moisture (%)</b>	45				
<b>Outlet Temperature (degrees Celsius)</b>	80	80	80	80	80
<b>Power (kW)</b>	2.2x2	3x2	4x2	4x4	5.5x4

## CAUTION

The equipment herein described is a direct fired apparatus and when used properly for the purpose for which it is intended, much of the oxygen from the drying air medium is utilized for fuel combustion purposes. The possibility of oxidation of the product being processed is thereby limited. An accurate and reliable system of electric control further contributes to the safety of the dryer. However, any interference with the normal flow of material through the system could result in a fire. Interference could be caused by:

1. A power shortage in which case the material would lie dormant in the drying drum and could under, adverse conditions, ignite from the residual furnace heat.
2. Improper preparation of the material, such as would cause it to lodge in the drum or plug up the discharge transfer to the receiving cyclones. The material, if allowed to fill to the top of this, could ignite due to over-exposure.
3. Materials of widely varying moisture content must not be dried simultaneously since the relatively dry material does not contain enough moisture to protect itself against the higher temperature required to dry the wet material. In these fire potential instances, the operator is advised to extinguish any hot spot or material using a fire hose and remove this from the system by opening the cyclone access cover so that the material discharges on to the floor. Material should then be removed from the premises.
4. Where the finished material is to be transferred for further pelletizing processing then the latent heat within the material is advantageous within the pelletizing process. Where the finished material is to be stored it is advisable to provide aeration within the finished product storage

facility utilizing a cooling fan and aeration to maintain a properly cooled condition while in final storage.

5. In order to properly maintain the operation of this equipment it is essential that the operatives have a sound appreciation of the process and the parameters required for optimum performance, control and Safe work practices.

All dehydrators/dryers are equipped with electric temperature control and an electric actuator with reversing motion for activating fuel and air valves, solenoid safety valve in the main fuel line and indicating pyrometer with the thermocouple and wire and air switch. The variation in temperature at the discharge end of the dehydrator/dryer is detected by the thermocouple of the electronic temperature control causing an instantaneous response of BTU input through the actuator and fuel valves at the inlet of the drying system.

The solenoid valve which is wired in series with the main fan motor and air switch prohibits furnace ignition until the main fan and furnace blower are running which automatically provide for a purge of the system of any gas accumulation prior to light off.

Protection at the drum drive chain and the revolving drum is provided by the customer, usually with a railing or other safely barriers. The main fan drive as well as the four drum rollers is protected by well built metal guards that are easily removed and replaced.

## Drums

### Single-Pass

**The Single Pass Drum** is built with full length flighting fixed to the interior of the drum. As the drum rotates at a constant speed, the positioned flighting continually lifts the product up and drops it through the heated air stream. The drying process occurs while the product is in suspension. Once product moisture is removed, the material is conveyed to the collection system by a suction fan.

#### Characteristics

- Processes products of varying sizes and densities.
- Lower initial capital investment.
- Reduced maintenance.
- Less horsepower required.

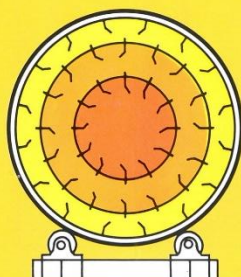


### Triple-Pass

**The Triple Pass Drum** consists of two concentric cylinders within one large outer cylinder. These fixed cylinders are aligned to rotate at the same speed. The inner cylinder maintains the highest temperature with progressively lower temperatures and air velocities in the intermediate and outer cylinders. The suction fan draws the material through the inner cylinder, back through the intermediate cylinder, and then forward through the outer cylinder into the discharge end of the drum. The product is carried to the top of each cylinder by built-in flights.

#### Characteristics

- Requires less operator attention.
- Can meet more precise moisture content requirements.
- Controls retention time.
- Product travels three times farther than in single-pass.



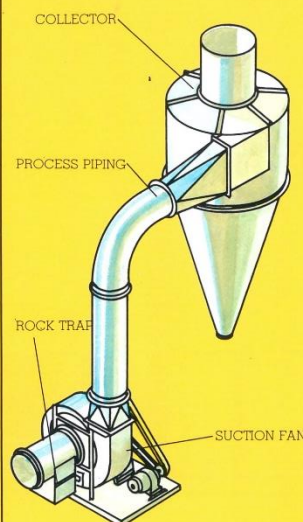
## Air Systems

### Positive

**The Positive Air System** suction fan pulls the dry product from the drum discharge and then conveys product through the fan and on to the collector. Inside the collector, product and air are cyclonically separated and the product is then discharged from the bottom of the collector.

#### Characteristics

- Less capital expense.
- Designed for non-abrasive products.
- Requires less process piping.
- Requires less horsepower.

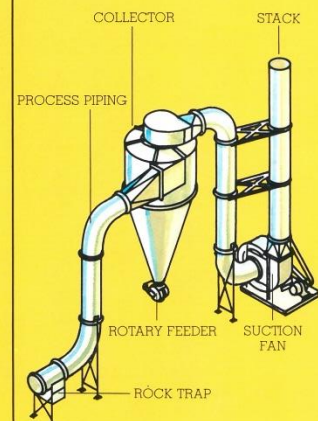


### Negative

**The Negative Air System** draws the dehydrated product from the drum discharge by a suction fan and conveys it through the piping into a high efficiency collector. Inside the collector, the air and product are cyclonically separated, with the product being discharged from the collector by a rotary airlock feeder. The separated air is discharged by the suction fan.

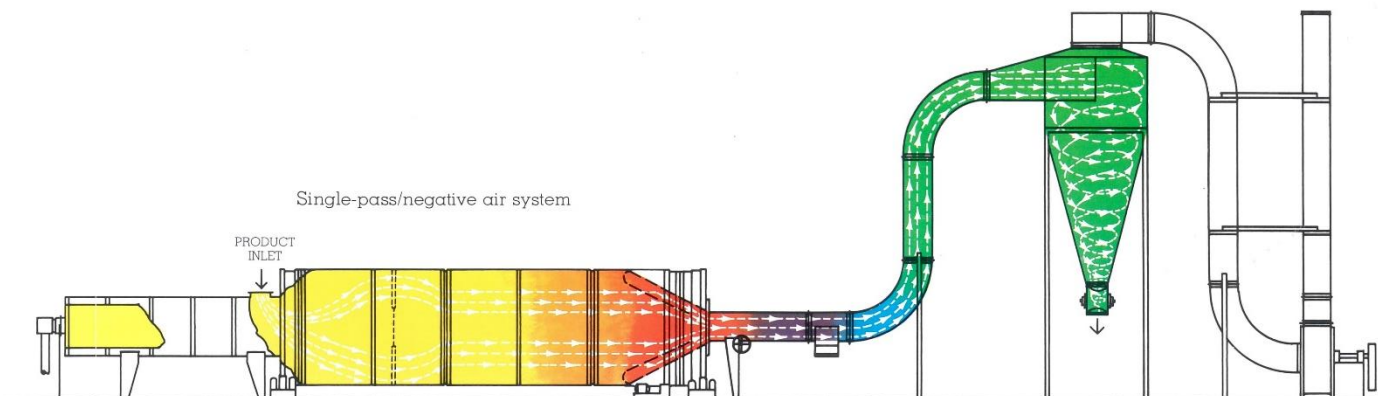
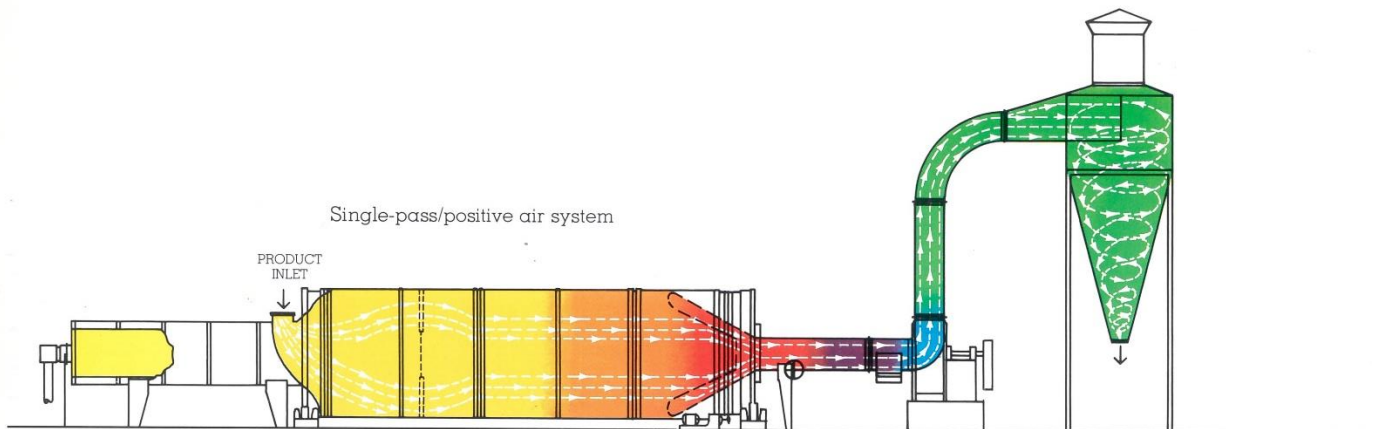
#### Characteristics

- More efficient product collection and separation from air.
- Minimizes product loss.
- Reduces fan maintenance (Product does not contact fan rotor).
- Product size characteristics maintained.

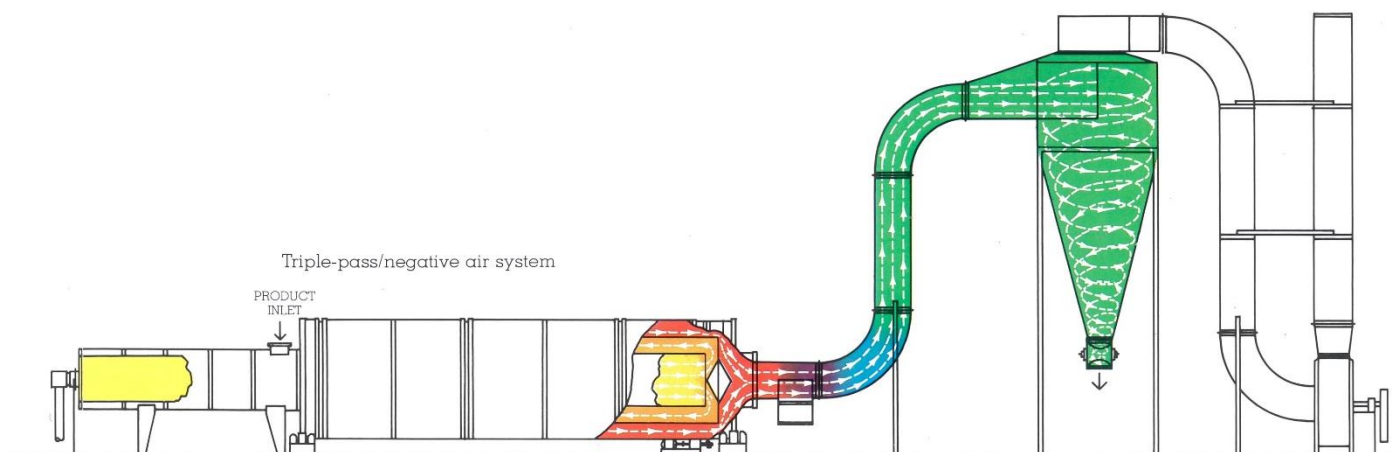
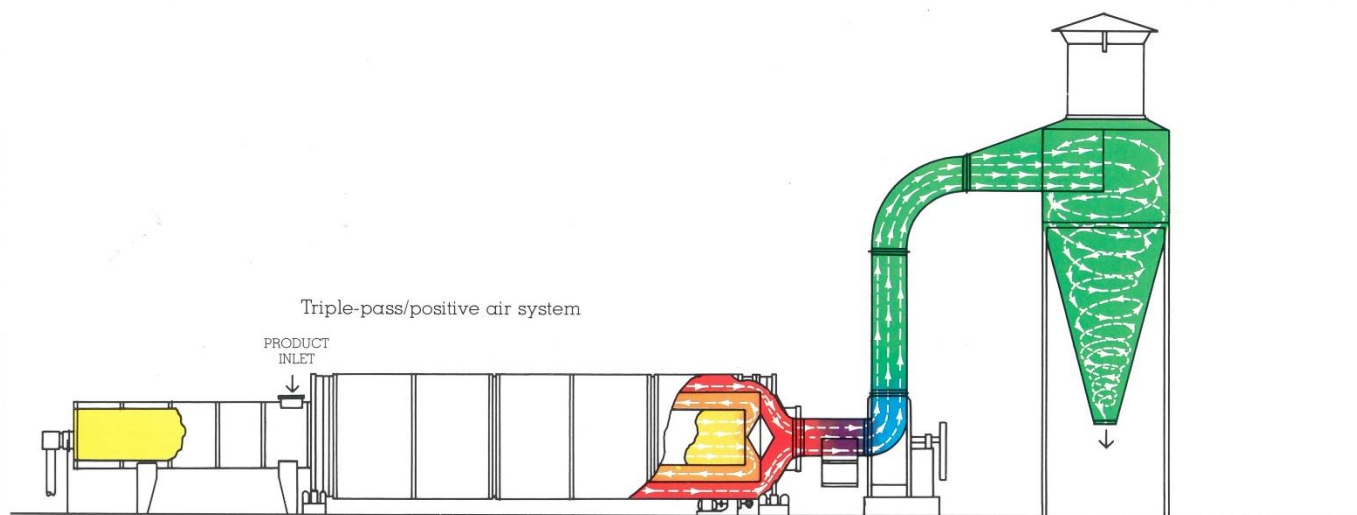


## Rotary Drum Dehydration Systems – for every application

- Size Selection: Drum diameters from 1.2m to 3.6m  
Drum lengths from 4.8m to 18m
- Production Ranges: Evaporative capacities from 450 kgs to 14500 kgs  
Production capabilities are available to meet virtually any requirements
- Design Flexibility: Single and Triple Pass Design  
Positive and Negative Air Systems







## Biomass Gasification Burner

### 1. Application

Heat energy source for Rotary Drum Dryers enabling the use of optional biomass fuels, i.e. sawdust, shavings, chip, off-cut material, shredded waste timber, etc.

### 2. Operation

The biomass fuel burner furnace incorporates a forced air principle suited to running on a range of biomass fuels and may be adopted to providing heat energy for drying and boiler operation applications.

### **2-1) Biomass Supply Feed System**

Fuel supply may be stored and transferred from either bunker or silo and needs to be checked to ensure that it is screened for consistency and has extraneous material removed and is to the specified moisture content.

### **2-2) Burner Furnace Feed Supply**

Biomass supply is transferred from the intake hopper via either a belt or multi screw conveyor to an auto feed conveyor belt delivering to the overhead valve feeder unit. The feeder unit consists of a dual slide gate valve assembly which operates to meter a consistent supply within an air lock. The feed dosage rate is regulated automatically according to the required furnace temperature called for within the process.

### **2-3) Industrial Biomass Gasifier Burner Features**

The Industrial Biomass Gasifier Burner uses energy saving heat transfer technology and optimum efficiency combustion design. These systems support renewable fuel sources such as wood waste materials, land fill waste and tyre derived fuel (TDF). Biomass heat energy systems can reduce emissions, help in maintaining a carbon neutral footprint and provide significant improved overall energy efficiencies within heating and drying applications.

A wood gasifier with automatic wood waste off cuts feeder can replace any existing combustion boiler or heat furnace.



**Table of Technical Parameters  
Of the Industrial Biomass Gasifier Burner Series  
(including automatic ash cleaning)**

<b>Model</b>	GV-360-AG	GV-480-AG	GV-600-AG	GV-720-AG
<b>Output Power (Kcal)</b>	360x10 <sup>4</sup>	480x10 <sup>4</sup>	600x10 <sup>4</sup>	720x10 <sup>4</sup>
<b>Applicable Fuel</b>	Wood chips, pellets	Wood chips, pellets	Wood chips, pellets	Wood chips, pellets
<b>Voltage</b>	V	V	V	V
<b>Feeding System</b>	Pneumatic	Pneumatic	Pneumatic	Pneumatic
<b>Cleaning Way</b>	Manual/Auto	Manual/Auto	Manual/Auto	Manual/Auto
<b>Power Consumption</b>	24.7kW	29.2kW	43.8kW	43.8kW
<b>Fuel Consumption (h)</b>	900 kg/h	1200 kg/h	1500 kg/h	1800 kg/h
<b>Size</b>	3103*2888*3584mm	3303*2888*3584mm	3703*2888*3864mm	3903*2888*3884mm
<b>Gross Weight</b>	11600 kg	12200 kg	15000 kg	16500 kg
<b>Nozzle From Ground Floor</b>	1646 mm	1666 mm	1676 mm	1691 mm
<b>Nozzles Diameter</b>	596 mm	636 mm	676 mm	706 mm
<b>Chamber Temperature</b>	≤ 900 °C	≤ 900 °C	≤ 900 °C	≤ 900 °C
<b>Flame Temperature</b>	≤ 1100 °C	≤ 1100 °C	≤ 1100 °C	≤ 1100 °C
<b>Nozzle Material</b>	310s/316 Stainless Steel	310s/316 Stainless Steel	310s/316 Stainless Steel	310s/316 Stainless Steel
<b>Control System</b>	VFD, auto constant temperature, touch screen box	Frequency conversion, automatic constant temperature, touch screen box	Frequency conversion, automatic constant temperature, touch screen box	Frequency conversion, automatic constant temperature, touch screen box
<b>Gasification Furnace</b>	High temp-resistant corundum cement in one pouring moulding	High temp-resistant corundum cement in one pouring moulding	High temp-resistant corundum cement in one pouring moulding	High temp-resistant corundum cement in one pouring moulding
<b>Feeding System</b>	Belt conveyor	Belt conveyor	Belt conveyor	Belt conveyor



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