

SUGAR DRYING EQUIPMENT

Sugar is the generalized name for a class of chemically-related sweet-flavored substances, most of which are used as food. They are carbohydrates, composed of carbon, hydrogen and oxygen.

There are various types of sugar derived from different sources. Simple sugars are called monosaccharides and include glucose (also known as dextrose), fructose and galactose.

Table or granulated sugar most customarily used as food is sucrose, a disaccharide (in the human body, sucrose hydrolyses into fructose and glucose). Other disaccharides include maltose and lactose.

Sugars are found in the tissues of most plants, but are only present in sufficient concentrations for efficient extraction in sugar-cane and sugar beet.

Sucrose is formed by plants and cyanobacteria but not by other organisms. Sucrose is found naturally in many food plants along with the monosaccharide fructose. In many fruits, such as pineapple and apricot, sucrose is the main sugar.

Ventilex sugar processing equipment:

- Meets the highest production standards
- Advanced PLC control system
- Designed and supplied within the safety directives.
- High-efficiency, low operation cost
- Low energy usage

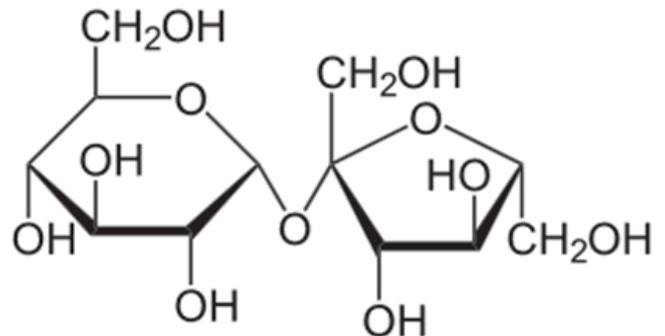


FIGURE 1 Structure of sucrose (saccharose)

In others, such as grapes and pears, fructose is the main sugar. De molecular formula of sucrose is $C_{12}H_{22}O_{11}$, see figure 1.

The two most important sugar crops are sugar-cane (around 80% of total worldwide production) and



sugar beets, in which sugar can account for 12% to 20% of the plant's dry weight.

Minor commercial sugar crops include the date palm, sorghum, and the sugar maple. Sucrose is obtained by extraction of these crops with hot water. Concentration of the extract gives syrups, from which solid sucrose can be crystallized.

In 2013, worldwide production of table sugar amounted to 175 million tonnes.



Production of sugar (refinery) from cane and beet

A sugar refinery is a refinery which processes raw sugar into white refined sugar.

Many cane sugar mills produce raw sugar, which is sugar that still contains molasses, giving it more colour (and any associated nutrients) than the white sugar which is normally consumed in households and used as an ingredient in soft drinks and foods. While cane sugar does not strictly need refining, beet sugar is almost always refined to remove the strong, almost always unwanted, taste of beets from it thus also removing nutrients that are found in beets. The refined sugar produced is more than 99 percent pure sucrose.

Whereas many sugar mills only operate during a limited time of the year during the cane harvesting period, many sugar refineries work the whole year round.

The raw sugar is stored in large warehouses and then transported into the sugar refinery by means of transport belts. In the traditional refining process, the raw sugar is first mixed with heavy syrup and centrifuged to wash away the outer coating of the raw sugar crystals, which is less pure than the crystal interior. Many sugar refineries today buy high pol sugar and can do without the affination process.

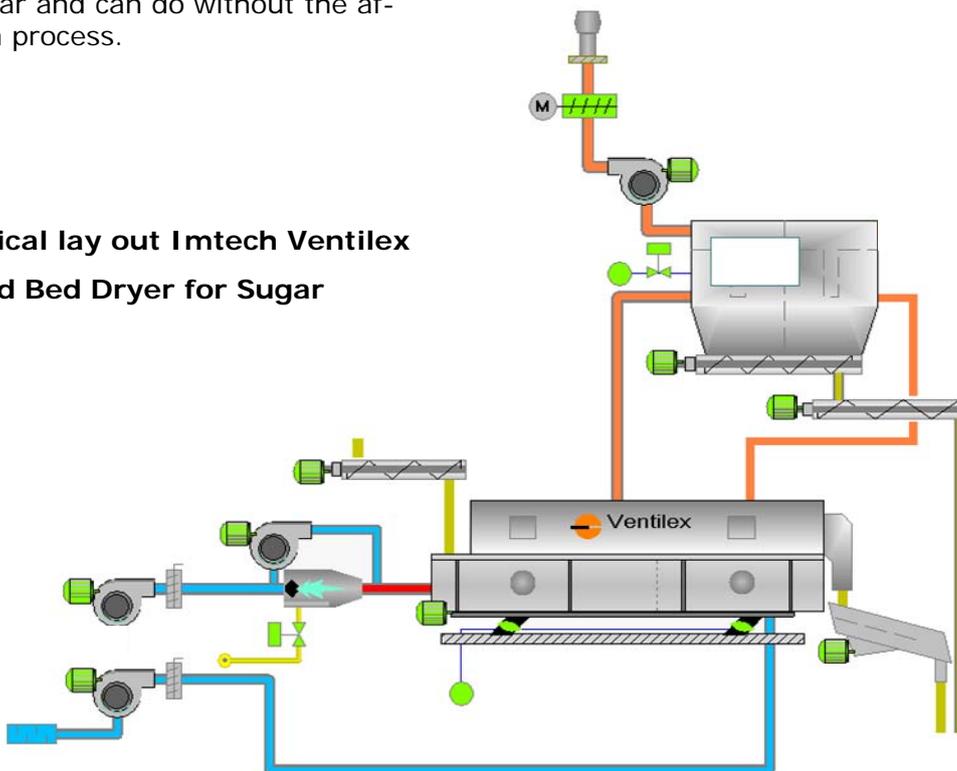
The remaining sugar is then dissolved to make a syrup (about 70 percent by weight solids), which is clarified by the addition of phosphoric acid and calcium hydroxide that combine to precipitate calcium phosphate. The calcium phosphate particles entrap some impurities and absorb others, and then float to the top of the tank, where they are skimmed off.

After any remaining solids are filtered out, the clarified syrup is decolorized by filtration through a bed of activated carbon or, in more modern plants, ion-exchange resin.

The sugar syrup is concentrated by boiling and then cooled and seeded with sugar crystals causing the sugar to crystallize out. The liquor is spun in a centrifuge to separate the sugar crystals from the mother liquor. To produce granulated sugar, in which the individual sugar grains do not clump together, sugar must be dried.

Drying is accomplished first by drying the sugar in a dryer, and then by blowing cool air through it for several days in so-called conditioning silos. The finished product is stored in large concrete or steel silos. It is shipped in bulk, big bags or 25 – 50 kg bags to industrial customers or packed in consumer-size packages to retailers. The dried sugar must be handled with caution, as sugar dust explosions are possible.

Typical lay out Imtech Ventilex Fluid Bed Dryer for Sugar



Imtech Ventilex Sugar drying equipment

Experience has shown that significant benefits, the most important being much improved fuel economy, arise from the use of fluid-bed dryer/cooler technology rather than the traditional rotary drum.

The basic principles of the Ventilex line are drying and cooling through ambient air of the gypsum and plaster.

The dryer is a so called fluid bed dryer in which a product or solid is made fluid by an upward moving flow of gas. This means that product with a certain moisture content is fed over a perforated plate under which heated air is supplied and by moving up and down the whole at the same time, the product is moving (fluidizing).

Depending on the shaking frequency of the dryer bed and the moisture content of the product the product is conveyed in the longitudinal direction of the dryer.

To reduce the product temperature after drying, a cooler section is integrated into the unit. Fresh air will be taken in via one supply fan. This fan supplies the cooler with sufficient process air. The drying air is heated up by an indirect gas burner system, consisting of gas burner unit and heat exchanger.

The exhaust air of the dryer will be dedusted by a cyclone or filter

The process air will be blown off through the exhaust fan.

The Ventilex Fluid Bed Dryer can be equipped with integrated CIP nozzles for a complete and efficient CIP wet cleaning with very short turnaround time.

A whole range of products can be processed in the Fluid Bed and sub-Fluid Bed and long residence times, up to two hours per machine, are possible. Our unique drive provides an ideal plug-flow.

Safety aspects

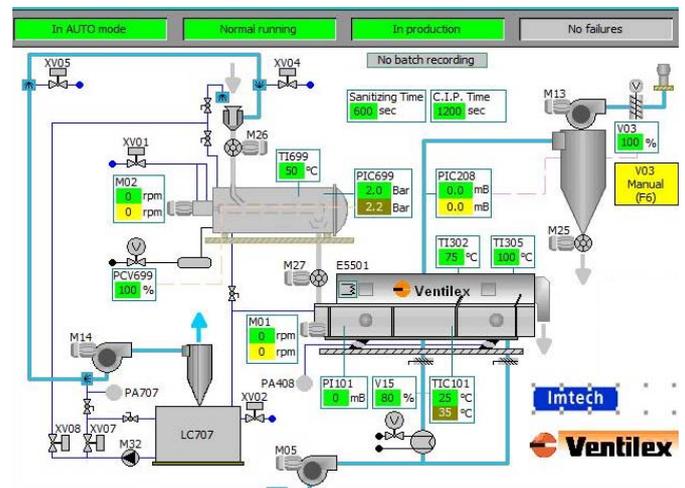
All plants designed and supplied by Imtech Ventilex will enable the end user to obtain approvals put forward by the EU directives. If required we can also meet global regulations or standards.



Fluid bed dryer for flavoured sugar



Fluid bed dryer for flavoured sugar



Data Logging and PLC instrumentation

Specific characteristics/advantages of the Ventilex Fluid Bed Dryers:

- Naturally hygiene has top priority in the food industry. The sanitary design (FDA/ USDA-GMP) ensures that our installations meet the high requirements of this industry.
- Our installations are completely made of stainless steel and all the product contact parts are polished and welded.
- The quick-acting closures and the C.I.P. system (Cleaning In Place) make the installation easy to disassemble and to clean. Then production can quickly be resumed.
- The Ventilex Fluid Bed system is preferable to the traditional belt dryer. It takes up less space, has low energy consumption and no product loss.
- What is more, the installation and maintenance costs are considerably lower.



Fluid Bed Dryer for pepper

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Fluidbed dryer with rotary weir