

Sugar Manufacture

During the season – which is normally approx. four months – the sugar mills are working round the clock. This corresponds to one year of normal operation. After this all pumps and other equipment are usually checked and maintained. Should pumps fail during the season it will create huge problems!

Sugar beets are transported to the sugar mill where they are unloaded into big silos. Then they are washed and soil and pebbles are removed. The clean beets are now processed in a cutting machine and a conveyor belt leads the small pieces of beet (cossettes) into a diffusion plant. In this plant the sugar juice is extracted by means of water, and the non-sugar substances are removed (e.g. plant acid and salts) by adding burnt and slacked lime. The lime is precipitated by adding carbon dioxide in saturation boilers and the juice is then filtered in a filter press where the lime slurry is removed.



The so-called thin juice now has to be concentrated which is done in an evaporator resulting in thick juice which after boiling down ends up as magma (massecuite) – a product with very large crystals. By centrifuging (hydroextraction) the magma becomes green runoff syrup (solid sugar and liquid syrup). The liquid syrup is boiled down again and the result is after-product sugar and molasses whereas the solid sugar is refined by dissolving in water, and then it is bleached and cleaned. The solution is now crystallized by means of a new evaporation and centrifuging.

The ROTAN® pumps are used for pumping syrup that contains very limited amounts of crystals (in principle the syrup should not contain crystals, but there will always be some small amounts left). In case the syrup contains crystals of larger quantities the ROTAN® pumps are not applicable. The dry matter of molasses and syrup is measured in BRIX.

Sugar syrup of 68 BRIX @ 20°C – viscosity approx. 250 cSt

Sugar syrup of 76 BRIX @ 30°C – viscosity approx. 1350 cSt

Normally the laboratories of the sugar mills will be able to inform the viscosity of the actual syrup.

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As crystals may occur the pumps should always be equipped with tungsten carbide bearings and the number of rotations should be reduced to 40-60% of maximum rpm. The number of rotations should be kept low as at high rpm heat is generated in the bearings which may lead to crystallization and caramelizing of the sugar with subsequent destruction of the bearings.

The ROTAN® pump is also used for pumping of final molasses, which is a residual product from the sugar production, is among other things used as animal feed. The molasses supplied direct from the sugar mill is chemically neutral whereas imported molasses may contain small amounts of formic or sulphuric acid in order to prevent fermentation during transportation. Molasses containing acid may cause corrosion in cast iron pumps so in some cases stainless steel pumps should be used. Molasses has to be considered an abrasive liquid which

is why as a minimum the idler pin and bearing have to be of wear resistant material.

Viscosity of molasses lies between 500 and 20,000 cSt dependent on temperature and dry matter (BRIX). Therefore, pay special attention to the viscosity in relation to temperature when offering pumps. Likewise syrup molasses may cause bearing problems and therefore the pumps should be dimensioned to approx. 30% of maximum speed.

