

Production of Bioethanol

Liquid pumps, vacuum pumps, and complete vacuum systems

Process Pumps for Bioethanol Production



Bioethanol is made by fermentation of renewable feedstocks, followed by distillation and dehydration processes. Typical feedstock materials are:

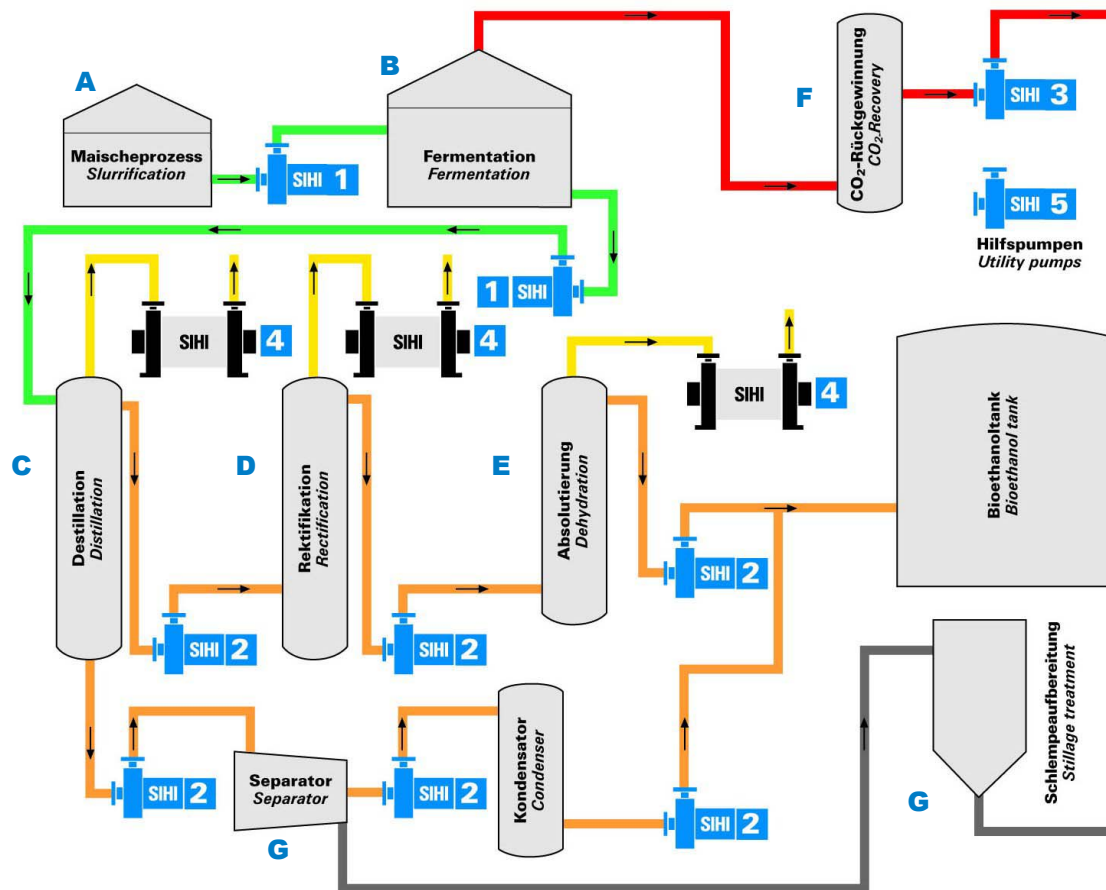
starches and cereals -- wheat, corn, rye, cassava, potatoes, rice

sugars -- cane molasses, beet molasses, sugar syrup, fructose, whey

Raw material for bioethanol is sugar derived in an enzymatic reaction from starch. The fermentation generates ethyl alcohol with the help of yeast. This ethyl alcohol (bioethanol) is then separated by distillation. For petrol-grade bioethanol, the alcohol must be dehydrated, raising the concentration of bioethanol to more than 99%.

The by-product of the ethanol process is stillage. It can be used to fuel biogas plants for energy generation, or it can be converted into DDGS, a protein-rich food for animals.

Bioethanol Production Process



Process steps

- A Slurrification**
After milling, the mash is liquified with water and steam, and starch is enzymatically transformed into sugars.
- B Fermentation**
The mash is mixed with yeast. The yeast ferments the sugar into alcohol and CO₂.
- C Distillation**
The mash is cooked and the alcohol evaporated in the column.
- D Rectification**
The rectifier concentrates the alcohol.
- E Dehydration**
The concentrated bioethanol is dehydrated to an ethanol content of more than 99.9 %.
- F CO₂-recovery**
The CO₂ from fermentation is collected, washed, liquified, and pumped to a storage tank.
- G Stillage treatment**
The remaining stillage is evaporated and then dried.

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Process Pumps for Bioethanol

Process Pumps for	Pump type	Pump execution
1 Mash	Centrifugal pump Type CBT	 Capacity: max. 2200 m³/h Shaft sealing: single mechanical seal Material: grey cast iron, stainless steel Ex-proof: yes
	Centrifugal pump Type DBS	 Capacity: max. 800 m³/h Shaft sealing: single mechanical seal Material: grey cast iron, stainless steel Ex-proof: yes
	Centrifugal pump Type CBS	 Capacity: max. 650 m³/h Shaft sealing: single mechanical seal Material: grey cast iron, stainless steel Ex-proof: yes
	Centrifugal pump Type SPL	 Capacity: max. 3500 m³/h Shaft sealing: single mechanical seal Material: grey cast iron, stainless steel Ex-proof: yes
2 Ethanol	Centrifugal pump Type CBS	 Capacity: max. 650 m³/h Shaft sealing: double mechanical seal Material: stainless steel Ex-proof: yes
	Centrifugal pump Type CBE/CBM	 Capacity: max. 650 m³/h Shaft sealing: mag drive Material: stainless steel Ex-proof: yes
3 CO ₂	Side channel pump Type CEH	 Capacity: max. 35 m³/h Shaft sealing: single mechanical seal Material: grey cast iron Ex-proof: no
	Side channel pump Type ASH	 Capacity: max. 12 m³/h Shaft sealing: single mechanical seal Material: grey cast iron Ex-proof: no
4 Distillation Rectification Dehydration	Liquid ring vacuum pump Type LPHX/LPH	 Capacity: max. 3000 m³/h Shaft sealing: single mechanical seal Material: stainless steel Ex-proof: yes
	Liquid ring vacuum pump Type LEH	 Capacity: max. 3000 m³/h Shaft sealing: single mechanical seal Material: stainless steel Ex-proof: yes
	Complete vacuum systems Type PL	 Capacity: max. 3000 m³/h Shaft sealing: single mechanical seal Material: stainless steel Ex-proof: yes



**...Liquid pumps, vacuum pumps and
complete vacuum systems ...from one source**

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Utility Pumps for Bioethanol

Utility Pumps for		Pump type	Pump execution
5	Cooling water	Centrifugal pump Type ZLN	 Capacity: max. 1800 m³/h Shaft sealing: single mechanical seal Material: grey cast iron Ex-proof: no
		Centrifugal pump Type CBT	 Capacity: max. 2200 m³/h Shaft sealing: single mechanical seal Material: grey cast iron Ex-proof: no
		Centrifugal pump Type SPL	 Capacity: max. 3500 m³/h Shaft sealing: single mechanical seal Material: grey cast iron Ex-proof: no
5	Cleaning liquid	Centrifugal pump Type CBS	 Capacity: max. 650 m³/h Shaft sealing: single mechanical seal Material: stainless steel Ex-proof: no
		Centrifugal pump Type ZLN	 Capacity: max. 1800 m³/h Shaft sealing: single mechanical seal Material: stainless steel Ex-proof: no
		Side channel Pump Type AKH	 Capacity: max. 35 m³/h Shaft sealing: single mechanical seal Material: stainless steel Ex-proof: no
5	Condensate from Steam generation	Side channel Pump Type CEH	 Capacity: max. 35 m³/h Shaft sealing: single mechanical seal Material: grey cast iron Ex-proof: no
		Multi-Stage Pump Type MSL	 Capacity: max. 650 m³/h Shaft sealing: single mechanical seal Material: grey cast iron Ex-proof: no
5	Storage tank	Centrifugal pump Type CBS	 Capacity: max. 650 m³/h Shaft sealing: double mechanical seal Material: stainless steel Ex-proof: yes
		Centrifugal pump Type CBE/CBM	 Capacity: max. 650 m³/h Shaft sealing: mag drive Material: stainless steel Ex-proof: yes
		Side channel Pump Type CEH	 Capacity: max. 35 m³/h Shaft sealing: mag drive Material: stainless steel Ex-proof: yes



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