

**Vacuum Pumps and Compressors for the  
Sugar Industry**



# NASH Vacuum Pumps and Compressors for the Sugar Industry



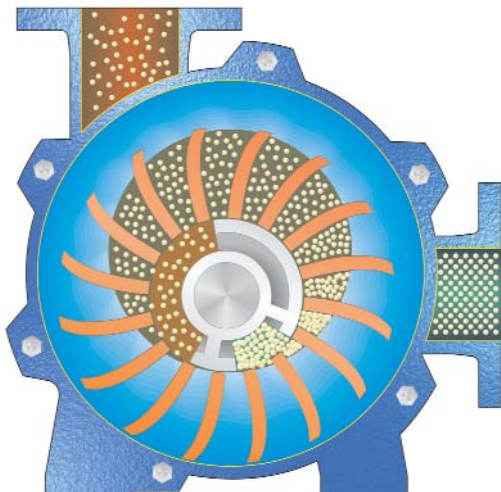
*Sugar beet photo courtesy of  
Michigan State University  
Saginaw Valley Dry Bean &  
Sugar Beet Research Farm*



## Get the original NASH

They say that imitation is the sincerest form of flattery. Nash imitators make many claims, but none of them have the equipment quality, engineering know-how, technical support and global service capabilities of the original NASH.

Our newest models were designed using state-of-the-art CFD and 3D solid modeling tools. They are significantly more efficient in energy and water usage, offering improved vacuum and capacity performance. Don't settle for an imitation.



### **A NASH liquid ring system**

- is more economical over its life cycle,
- will last longer,
- requires significantly less maintenance than other vacuum pumps and compressors,
- provides more uptime for your plant,
- does not require many of the complicated instrumentation safety and ancillary accessories that add complexity to hot-running pumps and compressors.

# NASH Vacuum Pumps and Compressors for the Sugar Industry

## From Plant to Juice

### Sugar Cane:

After harvesting and delivery to a sugar mill, the cane is washed, chopped, and shredded by revolving knives. The shredded cane is then repeatedly mixed with water and crushed between rollers. The juice is collected and the remaining fibrous solids (called bagasse) are burned for fuel and used for papermaking. Nash pumps are used in these processes as well.

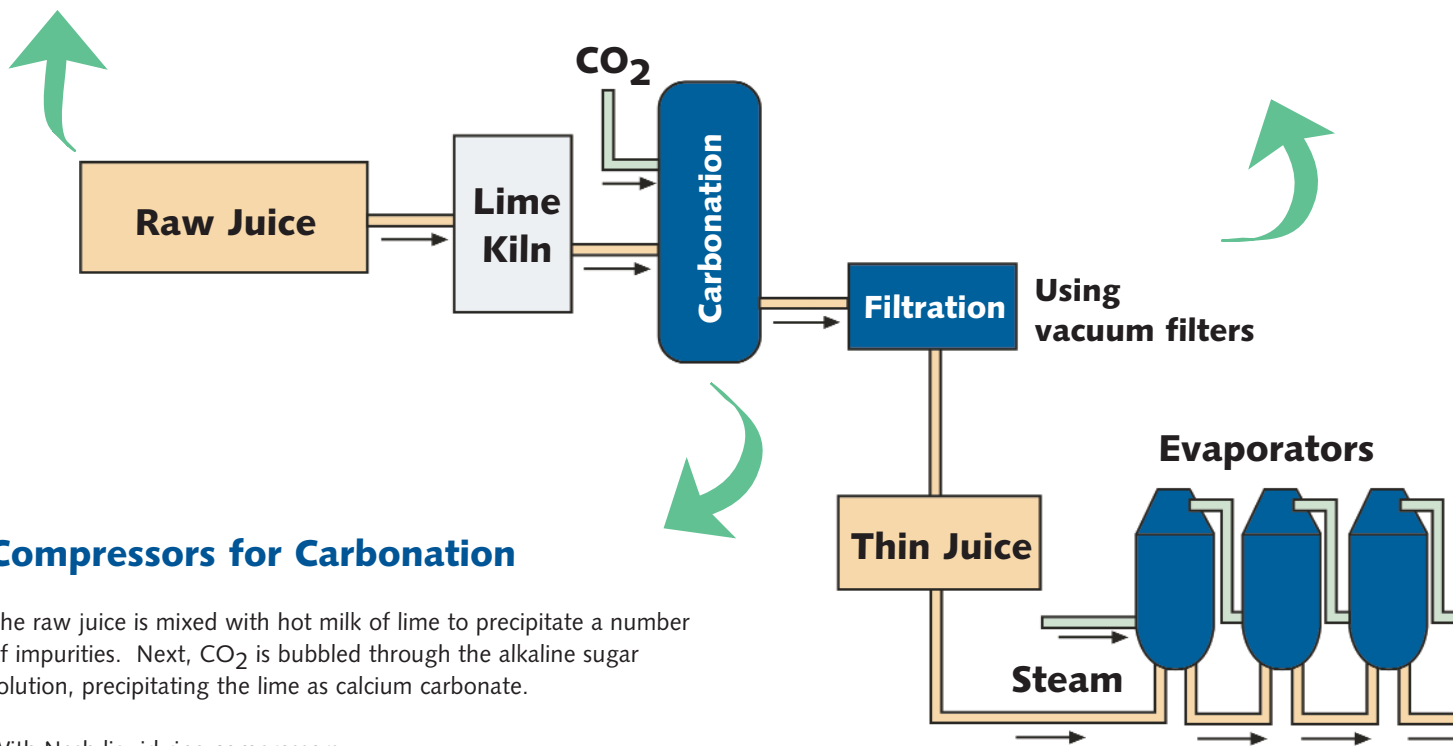
### Sugar Beets:

After harvesting and delivery to a processing plant, the beet roots are washed, mechanically sliced into thin strips called cosettes, and passed through a diffuser to extract their sugar content into a water solution. The used cosettes, or pulp, is pressed down to 75% moisture, recovering additional sucrose and reducing the energy needed to dry the pulp. The pulp is then dried and sold as animal feed.

## Rotary Vacuum Filters

Extracting available sucrose from the mud at the bottoms of clarifiers (filters) is usually a rotary drum filter operation. NASH vacuum pumps are the preferred auxiliaries for these filters in the sugar industry – as they also are in many other industries. Moisture in the vacuum line – even soft solids – will not damage a NASH vacuum pump.

Vacuum requirements are well within the range of single-stage pumps. Typically, a rotary vacuum filter requires a vacuum of about 405 mbar abs (18" HgV) at the wash section and about 675 mbar abs (10" HgV) at the pickup section. Allowing for pressure drops, this usually means about 303 mbar abs (21" HgV) at the pump inlet. With one vacuum pump serving both sections, the reduced vacuum at the pickup section can be maintained with a vacuum regulation valve.



## Compressors for Carbonation

The raw juice is mixed with hot milk of lime to precipitate a number of impurities. Next, CO<sub>2</sub> is bubbled through the alkaline sugar solution, precipitating the lime as calcium carbonate.

With Nash liquid ring compressors

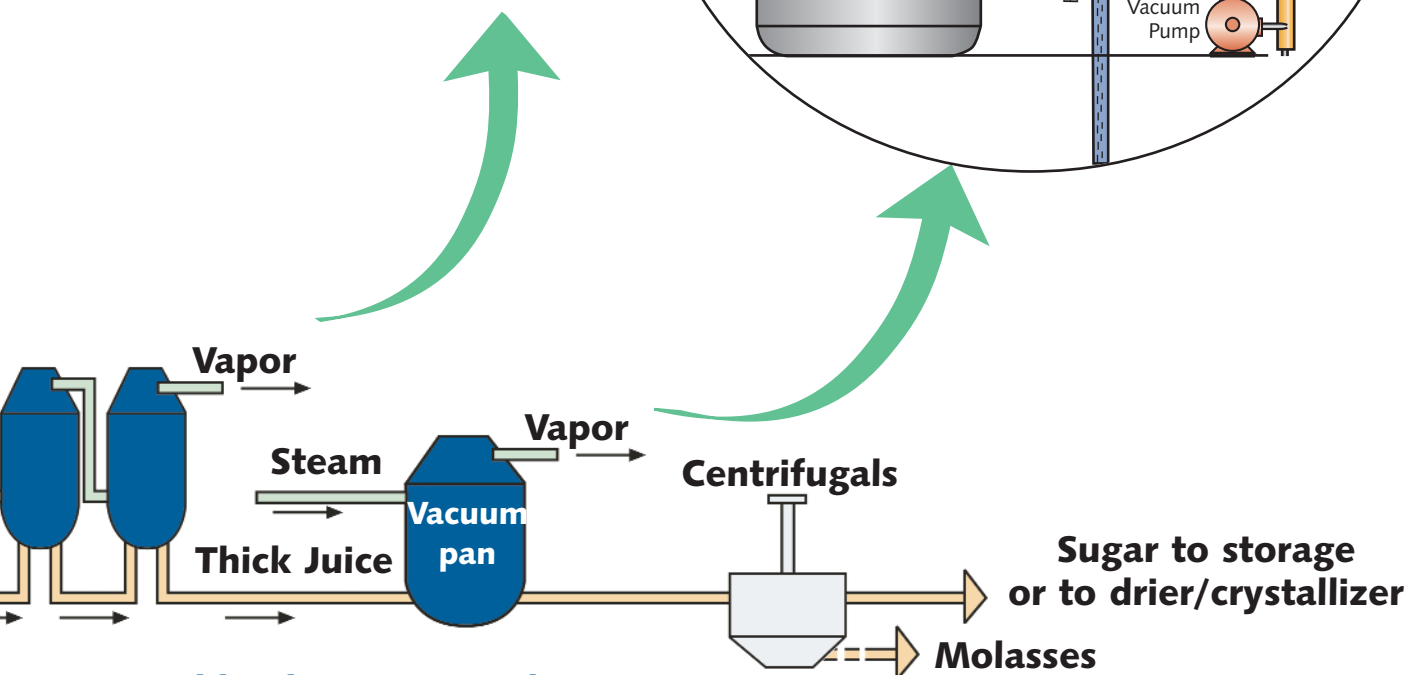
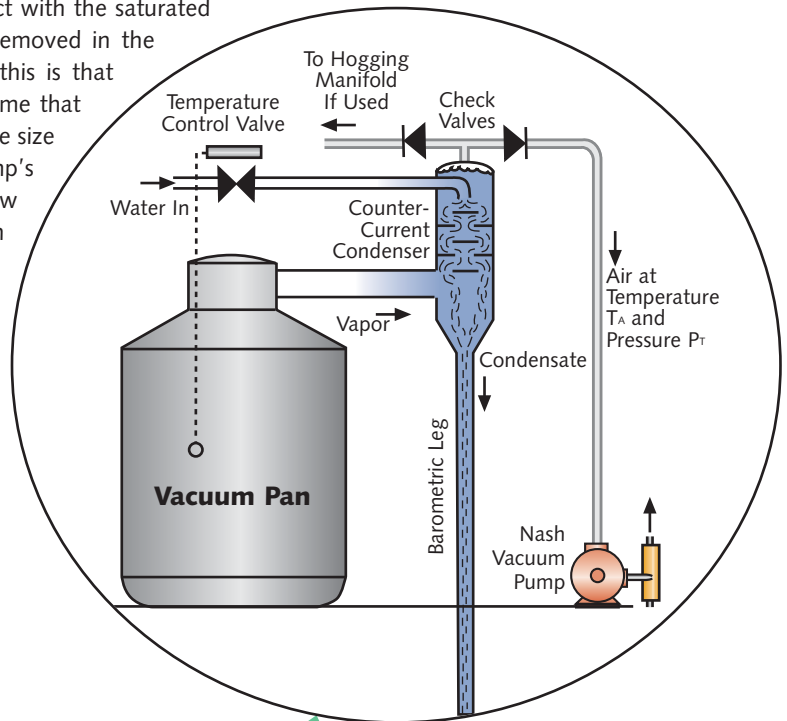
- CO<sub>2</sub> can be introduced at a constant pressure
- CO<sub>2</sub> quantity can be precisely regulated
- Small amounts of lime dust are easily handled with no pump damage
- No lubrication oil is carried over to the juice

# NASH Vacuum Pumps and Compressors for the Sugar Industry

## Drawing Non-Condensables Off Condensers

Vapor, air and other non-condensables can be drawn off evaporators and vacuum pans in several ways. The modern approach is to evacuate counter-current condensers with single-stage NASH vacuum pumps.

In a wet vacuum system like this, a NASH vacuum pump serves as a secondary condenser. Liquid compressant in intimate contact with the saturated air condenses most of the vapor that was not removed in the counter-current condenser. The significance of this is that transforming vapor into liquid decreases the volume that the pump must handle. Its effect is to decrease the size of the pump required by increasing the NASH pump's capacity significantly beyond its dry air rating. How much added capacity can be attained depends on how cool the liquid compressant is with respect to the temperature of the incoming air-vapor mixture.



## Worldwide Service and Support

All NASH manufactured equipment is 100% performance tested and all of our manufacturing facilities are ISO 9001 certified. Our service centers in the United States (in Missouri, Texas, Alabama, Ohio and Washington), Korea, China, Brazil, Australia, Netherlands and Germany are ISO 9001:2000 certified as well. In addition, Nuremberg, Germany has been ISO 14001:2004 certified in our ongoing effort to be an environmentally responsible company. Additional service centers can be found in England, Sweden, Singapore and South Africa and you can find Nash Distribution Centers in North America, Netherlands, Singapore and Brazil.

# NASH Vacuum Pumps and Compressors for the Sugar Industry

## Simple & Dependable

The high cost of shutting down a plant operation in the middle of a campaign leads sugar refiners to seek out the simplest, most dependable equipment available. They choose NASH vacuum pumps and compressors.

- Slugs of liquid carryover can be handled without damage
- Vapor is condensed into a liquid
- Gas is cooled and scrubbed by the compressors, delivering clean, oil-free gas



## Better Sugar Crystallization

The characteristics of Nash vacuum pumps and compressors enable you to achieve more uniform sugar crystallization.

- Product can be upgraded
- Color is better
- Production at lower cost

## Materials of Construction

This is an application that demands some care in material specification. Carbonic acid is produced when CO<sub>2</sub> is mixed with water. Corrosive sulfur compounds come through with flue gas from sulfur-bearing fuels. Either can make trouble, and both together are most likely to attack ordinary materials unless suitable precautions are taken.

If the gas stream contains hard particles, they will subject equipment to abrasive wear. A successful remedy for this is to install a wet scrubber ahead of the compressor.

If a cast iron compressor is used, it should be protected by pH control of the liquid compressant seal water. Adding soda ash to the water and pH monitoring are recommended. These precautions will extend a cast iron compressor's life from one or two campaigns to more than four. Many years of service are reported with lime kiln gas and where flue gas does not have a high sulfur content.

Stainless steel is the most durable material for CO<sub>2</sub> compressors. If you are seeking long compressor life and a virtually trouble-free system, specify stainless.

Your objectives for equipment life, your budget for initial equipment cost, the level of your system maintenance, and the composition of your gas mixture all should be considered. Ask your Nash technical representative to study the tradeoffs so that you can make the best choice in terms of your own operating conditions.

Features	Benefits
Ability to handle carryover	Minimal process problems resulting in more uptime; intended for severe applications
Long design life of 40+ years	Highest reliability
No internal lubrication required	Less maintenance required; less downtime
No metal-to-metal contact	Constant wear-free performance
Cool Running, minimal temperature rise between inlet and discharge	Pump acts as condenser, allowing smaller, less costly equipment selection
Only one moving part	Simple and reliable operation

## Other NASH Products

### 2BE3/P2620

Large liquid ring vacuum pumps with superior corrosion resistance  
Top discharge capability which eliminates need for trench  
Self-recirculating seal water, reducing need for external seal water source  
Capacity of 4,000 to 23,000 CFM with vacuum to 24" HgV  
Capacity of 6,800 to 39,000 m<sup>3</sup>/h with vacuum to 200 mbar abs



### Vectra

Liquid ring vacuum pumps and compressors  
Available in feature rich budget designs (XL or GL)  
Designed to handle high back pressure requirements  
Capacity of 115 to 2,860 CFM with vacuum to 29+'' HgV  
Capacity of 195 to 4,860 m<sup>3</sup>/h with vacuum to 31 mbar abs



### TC/TCM

Integral 2 stage liquid ring pumps with improved performance at vacuum levels down to 0.8'' HgA / 27 mbar abs  
Designed to handle large amounts of liquid carryover without difficulty  
Capacity of 100 to 2,240 CFM with vacuum to 0.8'' HgA  
Capacity of 170 to 3,740 m<sup>3</sup>/h with vacuum to 27 mbar abs



### 2BV

Compact liquid ring vacuum pumps built for serious cost savings  
Use up to 50 percent less water than other liquid ring pumps  
Monoblock and pedestal designs available  
Capacity of 4 to 350 CFM with vacuum to 29+'' HgV  
Capacity of 7 to 595 m<sup>3</sup>/h with vacuum to 33 mbar abs



### Compressors

Wide range of liquid ring compressors designed for many applications. Rugged and reliable, they can handle highly toxic, explosive and corrosive gases. Specifically developed for applications such as flare-gas, Chlorine and Vinyl Chlorine Monomer (VCM) recovery  
Capacity of 60 to 2,200 SCFM with pressure to 200 PSIG  
Capacity of 100 to 3,740 m<sup>3</sup>/h with pressure to 15 bar abs  
Single and two stage models available



Gardner Denver Nash has many ISO 9001 certifications.



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