

LIQUID RING CONE PORTED VACUUM PUMPS



Member of the AERZEN GROUP

MARKETS AND APPLICATIONS

Vooner FloGard® manufactures and provides high-quality, conical ported, liquid ring vacuum pumps and low pressure compressors to a variety of industries. Customers rely on our products to return their operations to running efficiently while minimizing expensive downtime and lowering total cost of ownership. Vooner also provides pumps that “bolt-in replace” CL, 904 and AT models.



POWER

Vooner FloGard provides a variety of pumps for the power generation industry. Long-lasting 316 stainless steel is used for fly ash vacuum conveying systems and condenser gas extraction systems for geothermal power plants. Cast iron single stage vacuum pumps are used on gypsum dewatering filters with FGD scrubbers while cast iron two-stage vacuum pumps are used for condenser air removal on steam turbines.



FOOD PROCESSING

Vooner FloGard 304 stainless steel internal vacuum pumps are rugged and very economical for chicken and fish evisceration, sugar processing, and cornstarch drying.



MINING

Vacuum filtration of mineral slurries requires Vooner's rugged design, which includes cone ports and a housing with solid corners. Vooner offers different materials of construction using various amounts of stainless steel for erosion and corrosion protection.



PAPER

Vooner supplies its vacuum pumps for dewatering showers, vacuum boxes and separators to the pulp and paper industry as a paper process system.



CAPABILITIES

“Command a prominent position as an innovator and supplier of process-critical solutions to our customers that provide reliability, safety, and a minimum of total cost of ownership (TCO).”

Vision Statement



WEB SITE

The Voener web site is loaded with comprehensive technical data and powerful engineering features.

The entire Voener vacuum pump and compressor product line including accessories and spare parts information is provided. Some of the information available on our web site includes:

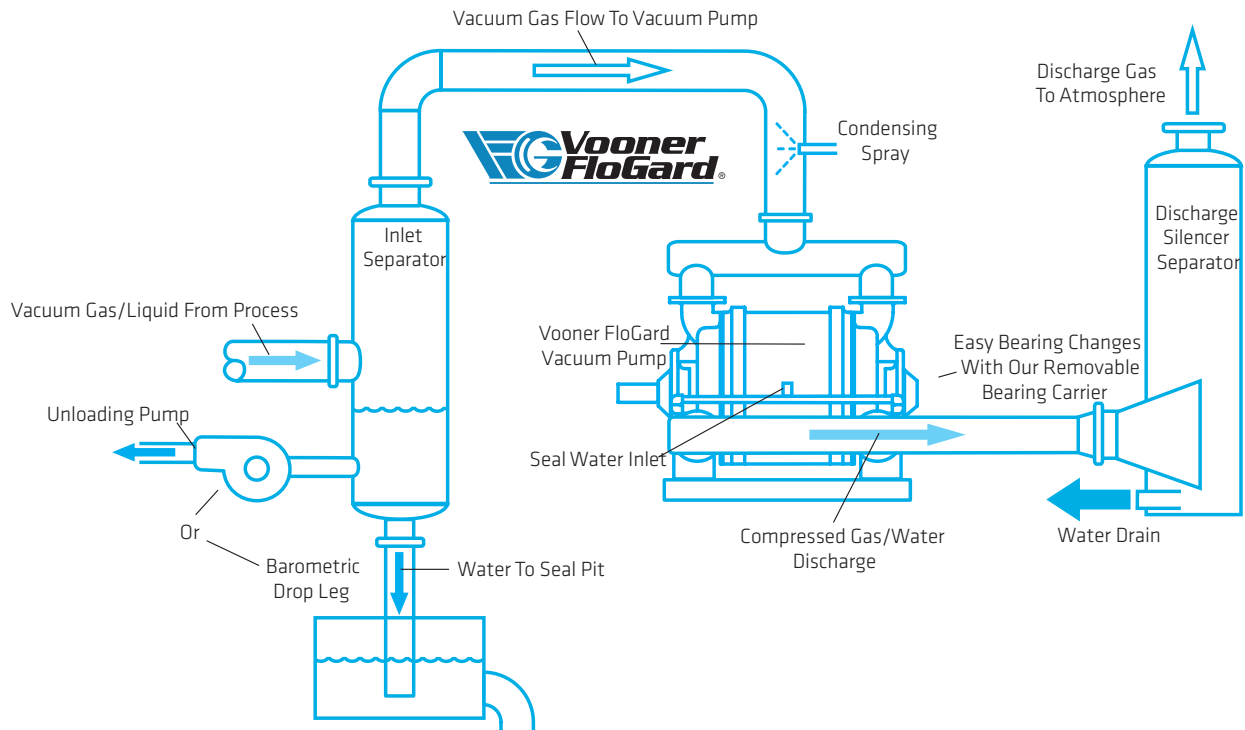
- PDFs of all Voener brochures & fliers
- Cross-reference chart between Voener FloGard & Nash pumps
- Pump rebuilds and field testing services
- PDF outline drawings & technical data sheets
- Materials of construction chart



Visit us at:

www.voener.com

CAPABILITIES



VACUUM PUMP ACCESSORIES

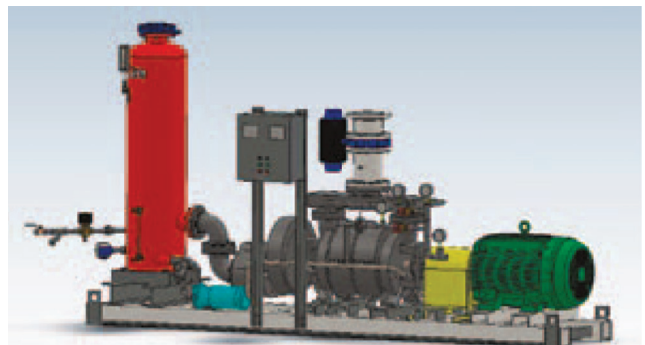
Voener manufactures and offers a wide range of ancillary equipment to support various industrial applications. Below is a partial list of these components:

- Inlet and discharge manifolds
- Seal water systems (including closed loop recirculating systems)
- Spray condensing and cooling systems
- Inlet separators (with unloading pump or barometric drop leg)
- Discharge silencer separators
- Skid bases & protective guards
- Motors (with sliding bases)
- V-belt, direct coupled or adjustable frequency drive systems

VACUUM PUMP CUSTOM PACKAGE DESIGN AND FABRICATION

Voener's engineering department is capable of supporting highly complex vacuum pump applications. Using state-of-the-art 3D modeling and engineering programs (Solid Works & AUTOCAD), Voener provides customers with highly detailed information which helps assure a smooth installation of our equipment.

To assist our customers' engineering departments, Solid Works and CAD drawings can be provided, upon request, for sizing and installation. From our web site, www.voener.com, PDF drawings can be downloaded directly and reviewed proper installation fit.



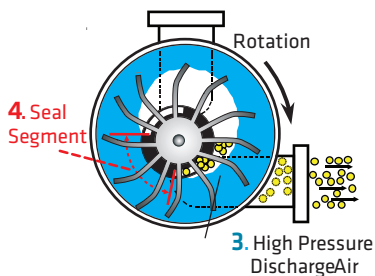
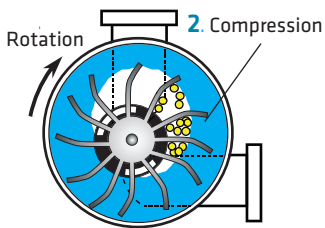
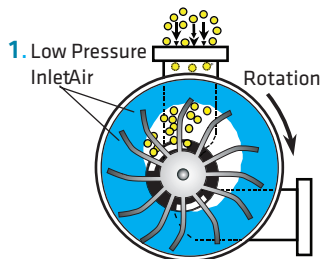
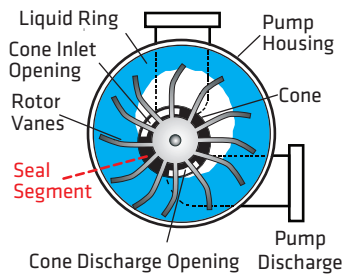
VTS10 Two-Stage Condenser Exhauster Package

PROJECT MANAGEMENT

Vooner provides complete planning, organizing, procurement and managing of resources necessary to bring about the successful completion of highly complex projects. Vooner has experience managing complex multi-million dollar projects.

Call or e-mail us today for an installation list for your industry.

HOW THE PUMP WORKS Liquid Ring Vacuum Pump



4. Seal Segment

QUALITY CONTROL

Our quality policy statement expresses our commitment to our customers.

“Vooner will supply products and services that meet or exceed customer expectations every time. We are committed to identifying opportunities for continuous improvement to our quality management system using principles of lean manufacturing.

We strive to identify current and future customer needs to meet customer requirements, and exceed customer expectations. Top management ensures that customer requirements are understood and met, by requiring compliance with documented customer communication procedures. Customer requirements are determined, converted into internal requirements, and communicated to the appropriate people in our organization.”

FACTORY TESTING

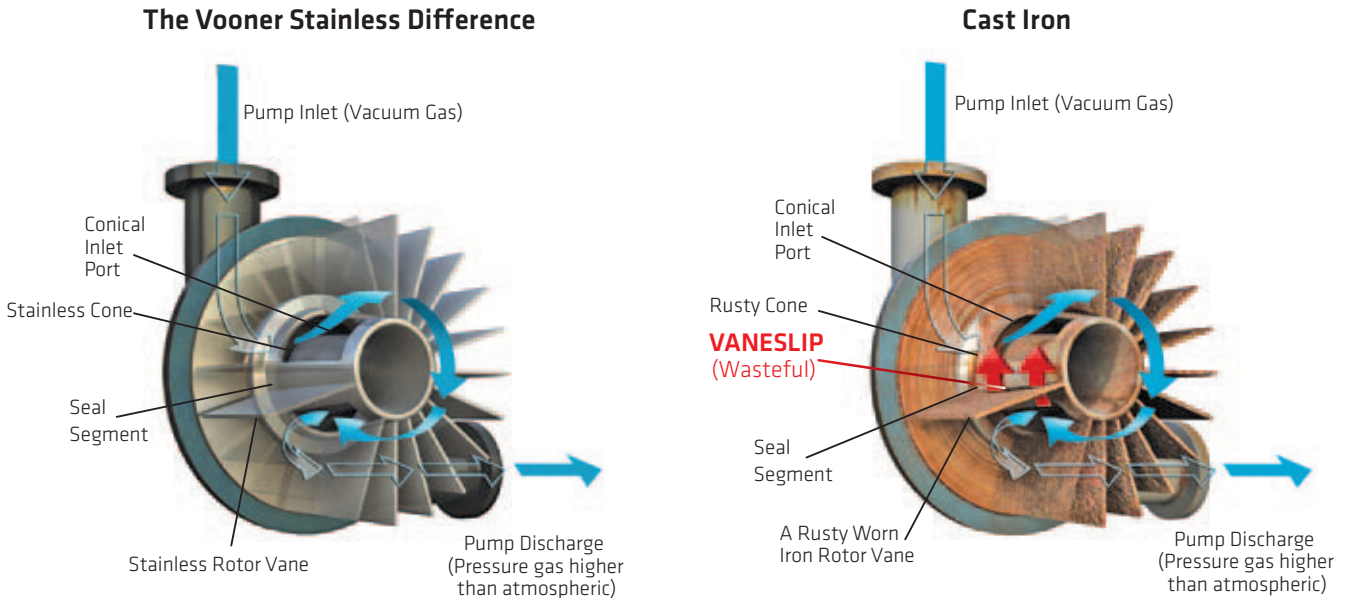
All Vooner pumps are performance tested according to Heat Exchange Institute (HEI) specifications prior to shipping to the customer.

Our rigorous quality control inspections and performance tests guarantee that each Vooner FloGard pump matches the capacity at vacuum and power consumption shown on our performance curves.

- Test and procedures mutually developed and part of purchase agreement
- Performance test based on Heat Exchange Institute (HEI) specification for testing vacuum pumps

CAPABILITIES

HOW “VANESLIP” AFFECTS PUMP PERFORMANCE

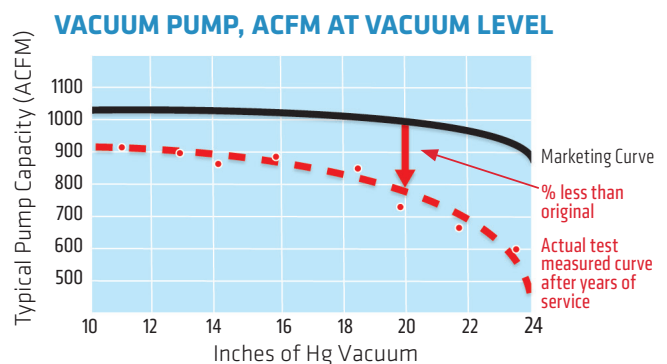
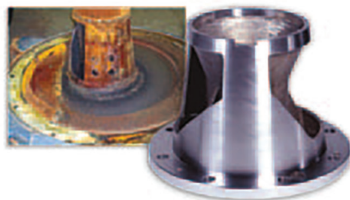


The portion of the discharge gas that is not discharged out of the pump, but leaks past the seal clearance between the vane of the rotor and seal segment of the cone is called “Vaneslip”. Vaneslip allows high-pressure gas to enter the inlet section and therefore robs space for new inlet air to enter the pump, thereby reducing the flow of vacuum gas being removed from the process.

ON-SITE PERFORMANCE TESTING

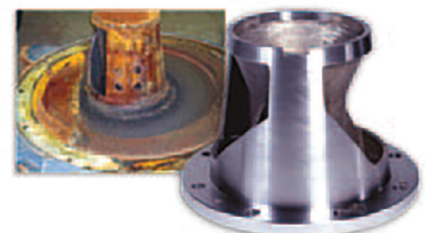
With cast iron pumps in operation, the iron oxide (rust) that forms on the rotor and cone surfaces is physically worn away with use, increasing the clearance between the rotor vanes and the seal segment of the cone. This decreases the seal which then allows the high pressure gas of the discharge segment to enter the vacuum inlet section of the pump.

Vooner will bring our test equipment (orifice plates or test manifold) to your plant and perform an orifice test on each vacuum pump (Vooner FloGard, Nash, etc). The data collected is utilized to compare the current dry air performance of your existing vacuum pump to the original manufacturer’s marketing performance curve. A written survey report will be provided. **Call or e-mail us for an estimate.**



VACUUM PUMP REBUILD SERVICES

Vooner has been involved in liquid ring vacuum pump applications since 1983. During that time we have developed the expertise to accurately diagnose and rebuild Vooner FloGard and Nash vacuum pumps. We can offer Standard or a Full Clad Rebuild services. **Call or e-mail us for an estimate.**



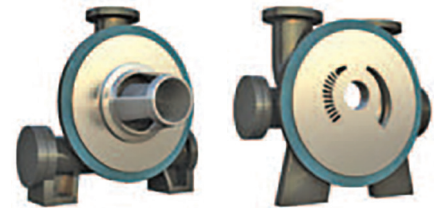
VALUE-ADDING FEATURES

VOONER FLOGARD CONE PORTS

Cone port pumps are the standard in the world market for vacuum service involving carry over of liquids or solids and having the ability to re-establish original clearances and, therefore, recovering performance. Cone port openings are large enough to allow the carry over of process liquids (including condensing spray from inlet) and erosive solids from the process.

Cone Port Pumps Offer Several Advantages Over Flat Plate Designs:

- Passes slugs of process water and entrained solids easily through Vooner FloGard's large cone ports
- Can re-establish the clearances to regain original performance
- Allows spray condensing in the inlet pipe to pass condensate through the pump



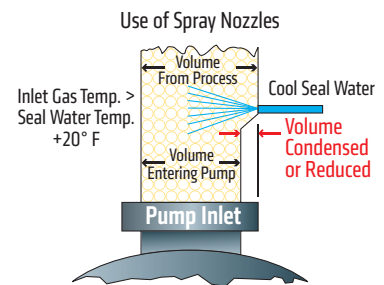
Vooner FloGard
Cone Ports

Typical Flat
Plate Ports



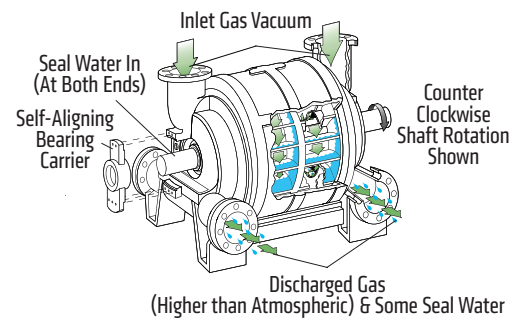
CAPACITY BONUS FROM SPRAY CONDENSING OR COOLING

The large inlet cone ports of the Vooner FloGard cones enable you to take full advantage of the condensing abilities of the pump when injecting a portion of the seal water ahead of the inlet. Flat sided pumps' smaller suction port cannot handle this excess water without a reduction in capacity.



VOONER FLOGARD'S TWO-INLET PUMP DESIGN

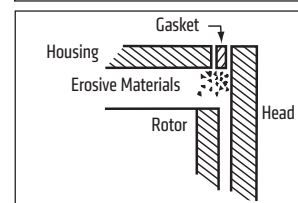
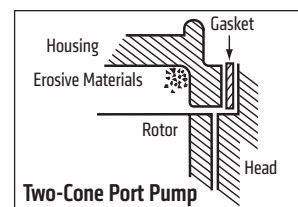
All Vooner FloGard pumps are the world standard two-inlet pumps. With this design, there is a zero average axial thrust load on the bearings. A single inlet, single cone design pump always has a thrust load in one direction on the bearings. Vooner FloGard's two-inlet design allows slower air velocity, therefore less impact force inside the pump, and slower operating speed than single inlet designs.



PROTECTION FROM EROSION OF HOUSING CORNERS IN A VOONER FLOGARD LIQUID RING VACUUM PUMP

Erosive materials in many applications get into the pump and cannot exit. They collect in the corners of the housing, continually roll around and cause erosion. Vooner FloGard's stainless steel housings provide lobe purges to remove solids (see page 9).

- For the Vooner FloGard two-cone port pumps, the housing corner is solid and resists erosion. If leaks occur and repair is needed, weld or epoxy fill is easy.
- For flat plate port pumps or single cone pumps, the housing corner is an assembly joint of the housing and head including a gasket. Erosive wear occurs on the metal ends of the housing and gasket. If leaks occur and repair is needed, weld or epoxy fill is very difficult.



THE BENEFITS OF VOONER'S PUMP DESIGN

EASY BEARING CHANGES ... FOR LOWER MAINTENANCE COSTS

Vooner VG pumps have patented removable bearing carriers that facilitate bearing changes (not available on the CL). A bearing change on a Vooner VG pump can be done by one man with a wrench in less than 2 hours. The process to change a bearing on a VG pump is to remove the bearing carrier with a wrench, change the bearing in the carrier, and reinstall the bearing with a wrench. Clearance settings are not disturbed, remain unchanged and the pump is ready to restart.

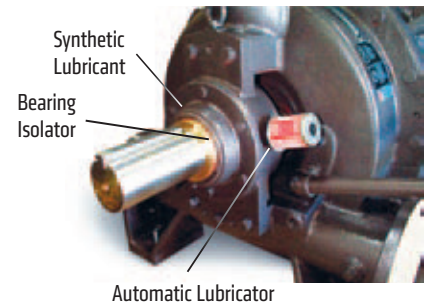


Changing a bearing on a competitor's CL pump requires two men, a crane and a shop. The process to change a bearing on a CL requires removing the pump from its location, disassembling the pump, changing the bearings in the heads, reassembling the pump, resetting clearances, reinstalling the pump in its location, checking alignment and turning it on.



3 YR. MAINTENANCE FREE BEARING PROTECTION PACKAGE ... FOR LOWER MAINTENANCE COSTS

As a feature, Vooner FloGard pumps can provide a re-lubrication schedule that extends to 36 months, significantly longer than standard industry intervals. The unique design features noncontact metallic bearing isolators having a labyrinth design to keep a special synthetic lubricant in the bearing housing while shielding the bearings and lubricant from external contaminants and water. A unique automatic lubricator is provided which supplies a continual, precisely controlled flow of fresh lubricant to the bearing interior. The special design of this lubricator helps to not over or under lubricate the bearings for the three year design period, as compared to the use of 60-day rubber grease seals. The result: dramatic savings in bearing-related expenses.

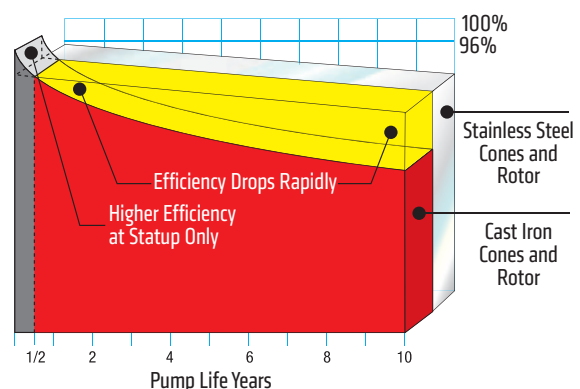


VOONER FLOGARD'S STAINLESS STEEL STRUCTURAL DIFFERENCE ... FOR LONGER LIFE

Stainless steel dynamically hardens its surface with the formation of chromic oxide. This resists erosive attack from solids and corrosive attack from chemicals. Vooner can provide stainless steel rotor and cones which help to maintain the very close tolerance clearance between the rotor blades and the cone surface of the seal segment for long-term retention of hydraulic performance.

Stainless steel housings and heads can also be supplied for structural erosion and corrosion protection in very severe service such as: paper mills, mineral processing, power plant fly ash conveying systems, CO₂ gas compressors and geothermal condenser gas extraction systems. Solid stainless steel is also specified for "non-sparking" applications with natural applications with natural gas and anaerobic digester gas recirculation compressors.

Relative Retained Airflow at Vacuum

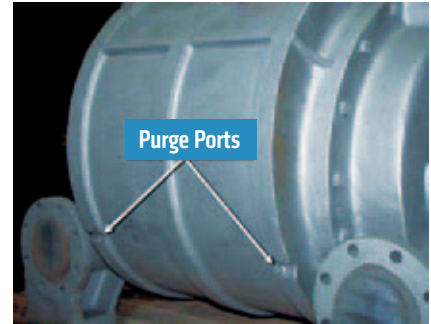


VOONER FLOGARD LOBE PURGES ... FOR LONGER LIFE

In many vacuum pump applications, small granular particles are brought into the vacuum pump from the process or the seal water supply and cannot exit. It is common for these particles to collect in the outer corners of the pump housing. When particles become trapped in the corners, they will continually erode the corners of the housing. Even stainless steel housings can erode completely through, if the particles are not removed.

Voener FloGard pumps with stainless steel housings (“XVS”, “SS4”, and “SS6” material codes) include plugged lobe purge connections as standard. Lobe purge connections may be used to drain solids built up in the liquid ring by piping each connection to a valve and periodically opening the valve to remove collected solids.

Voener recommends using full ported ball valves for manual purging or full ported solenoid valves controlled by a timer for automatic purging of the pump corners. Frequency of purging depends on severity of solid build-up for each application.



PUMP PERFORMANCE

Single Stage Vacuum Pump Airflow Performance		
Cone Port Cast Pumps	Airflow Performance Range ¹	
Standard Model	ACFM	M ³ /Min
V4F150	10,000 - 15,000	283 - 425
V4T130	6,900 - 12,900	195 - 365
V4S110	6,000 - 11,400	170 - 323
V4R95	5,200 - 9,400	147 - 266
V4P75	4,300 - 8,000	122 - 227
V4M55	3,300 - 6,100	93 - 173
V4L50	2,500 - 5,100	71 - 144
VG460	4,900 - 7,000	139 - 198
VG490	7,200 - 9,800	204 - 278
VG40	3,000 - 4,600	85 - 130
VG30	2,200 - 3,100	62 - 88
VG20	1,250 - 2,200	35 - 62
VG10	745 - 1,110	21 - 31
VG7	480 - 740	14 - 21
VG4	290 - 475	8 - 13
VG3	200 - 325	6 - 9

Two-Stage Vacuum Pump Airflow Performance	
Airflow Performance Range ¹	
ACFM	M ³ /Min
1,200 - 2,100	34 - 59
500 - 1,100	14 - 31

¹ Dry Air Capacity at 60°F with 60°F seal water.
Actual airflow performance is dependent on vacuum level.
Please consult Pump Performance Curves at www.vooner.com for specific sizing information.



VG20 Single Stage Vacuum Pump



V4M55 Single Stage Vacuum Pump



V4M55 Single Stage Vacuum Pump

Individual performance curves can be downloaded www.vooner.com



Three Year Warranty on material and workmanship

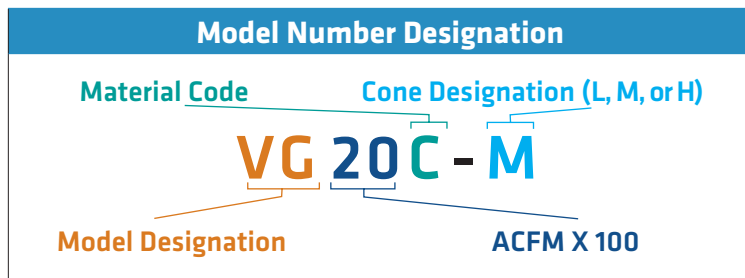
VOONER FLOGARD MATERIALS OF CONSTRUCTION ... FOR LONGER LIFE

Voener FloGard vacuum pumps can be provided in a wide range of materials designed to outlast the competition in the toughest industrial applications. The Materials of Construction chart illustrates the various component combinations available. All Voener FloGard pumps are equipped with long-lasting standard Teflon-Graphite packing and 316SS Packing Glands, Studs & Nuts.

VG & V4 Models						
Pump Material Code Chart						
Material Code	Rotor	Cones	Housing	Heads	Shaft	Packing Glands
A	DI	CI	CI	CI	CS	316 SS
C	304 SS	304 SS	CI	CI	410 SS	316 SS
XVE4	304 SS	304 SS	CI + 304L SS lining	CI + 316 SS wearplates	410 SS	316 SS
XVS	304 SS	304 SS	304 SS	CI _ 316 SS wearplate	410 SS	316 SS
SS4	304 SS	304 SS	304 SS	304 SS	316 SS	316 SS
SS6	316 SS	316 SS	316 SS	316 SS	316 SS	316 SS

DI - Ductile Iron
CI - Cast Iron

SS - Stainless Steel
CS - Carbon Steel



INTERCHANGEABLE MODEL CHARTS

Single Stage Cone Port Pumps	
Voener - Cast	Nash ²
VG3	CL-300
VG4	CL-400
VG7	CL-700
VG10	CL-1000
VG20	CL-2000
VG30	CL-3000
VG40	CL-4000
V460	CL-6000
V490	CL-9000
V4L50	904-L
V4M55	904-M
V4P75	904-P
V4R95	904-R
V4S110	904-S
V4T130	904-T

Two-Stage Cone Port Pumps	
Voener - Cast	Nash ²
VTS10	AT1004, 5, 6
VTS20	AT2004, 5, 6

¹ Contact Voener Sales Department for Availability
² NASH is a trademark of Gardner Denver, Inc.



Vooner FloGard® LLC

475 T. Elmer Cox Drive
Greeneville, TN 37743
Phone: 423-638-2211

Vooner FloGard Pumps are running today in...



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