

How a Venturi Vacuum Works

Venturi Vacuums

The idea for a Venturi vacuum has existed in theory for nearly 300 years, going back to physicists who studied how fluids work under pressure. Daniel Bernouli and Giovanni Venturi are both responsible for discoveries leading up to the venturi vacuum pump. The Venturi vacuum utilizes Bernouli's principle, which is also the scientific reason for why airplanes fly.

Bernouli and Venturi

In the 1700s, Daniel Bernouli created a theorem now known as Bernouli's principle, which was based off of the work of Italian physicist Giovanni Venturi, who created a device that sped up the flow of a fluid by "constricting it in a cone-shaped tube."

The Bernouli principle describes a theorem where a transducer is placed inside a hollow tube, producing a vacuum by forcing "compressed air through a limiting orifice into a channel." When the compressed air passes through that orifice, it expands, increasing its velocity before it enters the channel section. Hence, an area of negative pressure is produced at the vacuum inlet port, which is the space between the channel section and the orifice.

Application of the Bernouli Principle

As a result of Bernouli and Venturi's work, a Venturi vacuum is created by a pump with compressed air running through it, however, the pump has no moving parts. Compressed air is run through the initial chamber and then through a smaller portal that opens into another larger chamber similar to the initial one.

Multi-Stage Pumps vs. Venturi Pumps

Multi-stage pumps have more moving parts, flap valves that open and close the air supply in order to help such the dirt or debris through. Intake filters, which often can become clogged, are required to protect the flap valves. When intake filters are clogged, it results in a loss of suction power, causing stoppage for maintenance on the filter or replacement. Flap valves also may need to be maintained or replaced throughout the life of the vacuum.

Venturi pumps have many of the opposite factors working in their favor. The factor of having a straight-through design helps to prevent clogging, which often comes through twists and turns. For this reason, Venturi pumps also require very little maintenance, if any at all. Venturi pumps have no valves, therefore requires no filter. Venturi pumps, depending on the design, have the capability to exceed multi-stage pumps by two to seven times.