Absolute flow reliability.

Vonk Choke Valves
A unique rotating disc design means every Vonk choke delivers a reliable tight Class V shut-off - with zero leakages.
A Reputation
Born of Experience

Emerson has been working alongside some of the world’s largest energy companies for more than five decades providing innovative products for critical process applications. This includes the Vonk range of choke valves, which have built a reputation for high quality, technologically-advanced valve design in the oil and gas industry.

Vonk chokes are based on the innovative combi-choke control valve principle delivering high performance and reduced operating costs while also meeting our customers’ requirements for increasingly stringent safety, noise and emission requirements.

Emerson’s commitment to quality is evident through adherence to a strict set of international manufacturing quality standards. All valves and actuators are manufactured to ISO-9001:2000 and the company is also certified to SCC (Safety Health and the Environment (SHE) Checklist Contractors) Dutch, VCA.

Vonk chokes comply with the most stringent requirements of the European Directives and harmonized standards including Pressure Equipment Directive (97/23/EC PED) and ATEX 94/9/EC for potentially explosive atmospheres.
An innovation
In Upstream Controllability

The first stage in most gas processing installations is to separate free liquid from the gas stream to avoid overloading of the downstream facilities.

Generally, this is achieved by leading the gas through a high pressure separator. If the separator’s fluid level control and disposal mechanism work effectively, efficiencies of up to 90% can be achieved.

This separation target was often jeopardized, due to a high differential pressure across the drain valve and the erosive medium running through the valve for extended periods. This could lead to an undesirable high or low fluid level in the separator.

Emerson engineers developed and introduced the first ever combi-choke control valve: a choke control that combines the functions of controlling the flow and allowing a high-pressure drop across the valve for polluted and abrasive media. With the Vonk design, a shut-off to class V can be guaranteed, because the flowing medium is never in contact with the seat area.

It also provided the benefit of replacing two valves with one, dramatically reducing total installation and operating costs.

For a broad range of applications
The unique rotating disc design used in Vonk choke valves excels in applications with high differential pressures and abrasive fluids, including production, high pressure separators, well injection and fracturing applications.

They are used in:
• Oil and gas exploration both on and offshore
• Underground gas storage
• Petrochemical industry
• Mining industry

Where they are applied specifically in:
• Oil and Gas production
• Level control valve
• Blow down valve
• Water injection
• Steam injection
• Gas injection
• Fracturing
• Handling drilling fluids
• Handling slurry
• Gas lift valve

Service and support
Emerson provides full product support and a valve service and repair team are available 24 hours a day.

Technical specifications
Body materials
Cast and forged stainless steel, carbon steel and CRA

Connections
Flange, hub, threaded and butt weld

Pressure range
Models CHV/YCV:
ASME 150/4500; API 2000/20000
Model SCV:
ASME 150/2500, API 2000/5000
Model ICV:
ASME 150/2500; API 2000/10000

Body sizes
Models CHV/YCV: NPS 1 to NPS 8
Model SCV: NPS 1 to NPS 3
Model ICV: NPS 1 and NPS 2

End connections
Models CHV/YCV: NPS 1 to NPS 12
Model SCV: NPS 1 to NPS 6
Model ICV: NPS 1 to NPS 3

Cv values
Models CHV/YCV: 0.01 to 1030
Model SCV: Up to 103
Model ICV: Up to 45

Temperature range
-148 to +572°F [-100 to 300°C]

Other design temperatures on request.
Vonk choke valves feature several unique characteristics that minimize wear; maximize controllability and durability. They are designed to handle polluted media, for high-pressure differentials across the valve and for positive shut-off service.

**General features**
- Suitable for contaminated gases and liquids
- Resistance against high pressure drops
- Guaranteed seat-tightness (Class V ANSI FCI 70.2 and EN 1349)
- Easy maintenance design
- Low life cycle costs
- Guaranteed fixed Cv value
- Wide temperature range

The rotating disc principle consists of two tungsten carbide circular discs, each with one eccentric orifice. One disc is fixed in the valve body, the other being rotated either manually or by actuator to vary or close off the aperture.

**Trim design**
The robust trim design consists only 4 major parts: front disc, bean, turning fork and protecting bush. The front disc and bean are manufactured from Tungsten carbide, Stellite or ceramics. The rotating disc principle provides exceptional control and the simple, sturdy design guarantees a long service life with easy and low cost maintenance.

**Seating**
The rotating disc principle ensures the protection of the discs’ sealing surfaces against the medium’s erosive influence when the valve is in the open position. To provide the required overlap, the valve features a rotation angle of 180° (90° for 1” modulating choke) between the open and closed positions. This guarantees positive shut-off for an extended service life because the flowing medium is never in contact with the seat area.
Flow Characteristics

The flow characteristic of the disc with a circular orifice is almost linear. To allow a minimum controllable flow, front discs with shaped holes (DV trim) can be provided.

Pressure recovery
High pressure recovery throughout the valve minimizes cavitation, noise levels and erosion of the valve trim.

Bean construction
Downstream of the fixed disc is an abrasion-resistant tungsten carbide bean, which removes the majority of cavitation; erosion from the sealing surfaces and valve body and guarantees a fixed $C_v$ value. The medium will exit the bean at the required outlet pressure in a steady laminar flow.

Spring construction
A spring is fitted to pre-load the rotating disc, allowing the valve to be mounted in any position. The spring also absorbs thermal expansion due to temperature changes and vibrations.
Vonk’s unique rotating disc choke valves are available with angle, in-line and Y-type in-line body configurations to suit specific application requirements.

Angle body and inline Y-type body
The angle body and inline Y-type body configurations are both available in all valve sizes and offer:
• ISO top flange for easy automation
• Cast and forged body materials
• Stainless steel, carbon steel
• Flange, hub, thread and butt weld connections

Inline body
The inline-type body configuration is available in NPS 1 and NPS 2 body sizes, offering:
• ISO flange for easy automation
• Forged body materials
• Stainless steel
• Flange, hub, thread and butt weld connections
Valve Options

Low or high temperature valves
As standard, valves have a design temperature range of -20°C to +121°C (-4°F to 250°F). The complete range of valves is available with temperature ratings from either -100°C (-148°F), for the most severe cryogenic applications, or up to 400°C (572°F), suitable for steam and other high temperature applications, with pressures up to 15000 psi.

High capacity flow trim
A special trim is available for all valves to provide a higher flow rate.

Low noise trim
A unique low noise trim is available in all valve sizes.

Flushed trim
The flushed trim features an extra filter to keep out large particles, preventing clogging and is available across the whole valve range.

Multiple orifice trim
Vonk choke valves can be equipped with a front disc with 2 orifices for specific applications.

Design standards
High quality standards combined with 40 years experience have resulted in a product range which is compliant to the most stringent test procedures including:
- Fugitive emission testing to MESC SPE 77/312
- Low temperature testing to MESC SPE 77/200
- Fire safe testing to API 6FA
- All valves comply with Pressure Equipment Directive (PED 97/23/EC) - Valves certified to module H of PED, allowing application up to and including category III. Category IV is also possible with NoBo witness. All valves have CE marking.
- All valves are assessed and certified to ATEX 94/4/EC Potentially Explosive Atmospheres
  - Where applicable, valves include ‘Ex I M2 & Ex II 2/3 G/D’ marking.
  - All valves guaranteed with 100% tight shut-off to class V of the FCI-70.2.

Material selection
Material selection for Vonk standard chokes is based on the requirements of NACE specification MR.01.75 (latest edition). For choke designs to API-6A pressure ratings, relevant material selection criteria apply.
**Actuation and Instrumentation**

All types of chokes can be operated manually, by means of a hand knob, hand wheel or lever. A gearbox can be added where the operating torque is too high for direct operation. For remote operation, the rotating disc principle requires a 90° or 180° rotation, which can be by a pneumatic, hydraulic or electric actuator.

**Vonk valve assemblies**
Valve assemblies combine high quality valves with reliable actuators and accessories to provide a pre-assembled and tested product ready for on-site installation. The actuated valves can be equipped with a positioner, position transmitter, manual override, mechanical end stops, open-close limit switches, solenoids, filter regulators, boosters, quick exhaust valves, check valves, constant flow valves and filter regulator, as relevant.

They offer the options of:

**Single or double acting pneumatic actuator**
The single acting actuator can be fail closed or fail open. Valves fitted with a pneumatic actuator can be operated on/off, stepping or modulating.

**Single or double acting hydraulic actuator**
The single acting actuator can be fail closed or fail open. Valves fitted with a hydraulic actuator can be operated on/off, stepping or modulating.

**Electric actuator**
Power consumption for these actuators is based on customer specification.

**Available positioners:**
- Pneumatic
- Electro-Pneumatic
- Electro-hydraulic
- Electric

**Available fieldbus protocols:**
- Analog
- SMART
- HART
- Foundation Fieldbus
- Profibus
The position of the valve can be indicated by:

1. A local dial plate showing the opening of the valve. The following alternatives are standard:
   - full stroke of the actuator
   - % opening of the valve
   - equivalent bean size in x/64"  
2. Electrical limit switches indicating end of stroke of the actuator
3. Electronic valve position transmitter, presenting the position of the valve:
   - 4 - 20 mA signal
   - HART protocol
   - Fieldbus signal (e.g., Foundation Fieldbus, Profinet, Modbus)

Valve positioners

Valve positioners are usually fitted where chokes are used in a controlled mode, both conventional or microprocessor-based valve positioners are available for control signals of 0.2 - 1.0 bar or 4 - 20 mA. Positioners communicating through Foundation Fieldbus or Profinet can also be included.

Conventional valve positioners are equipped with a specially shaped cam to determine the valve opening. The shape of the cam is adapted to the required control characteristic, enabling linear or equal percentage characteristics to be achieved. With the smart valve positioner, the valve characteristic is programmed, so no special cam per orifice diameter is required.

Rangeability

The rangeability of the valve positioner depends on a number of factors. Boosters can be fitted between the valve positioner and actuator to shorten the stroking time.

Vonk turning principle

Because of the dead (passive) angle, the valve characteristic is programmed from 5.5 - 20 mA to achieve maximum accuracy and controllability.

Other accessories

Where required, Vonk chokes can be equipped with:

- Solenoid valves
- Quick blow-off valves to provide short stroking times of valves in on/off mode
- Snap-action relays
- Filter regulators
Partial Stroke Testing

When valves are used for emergency shutdown (ESD) or blow-down applications, they may not be operated for extended periods and yet their integrity must be guaranteed to ensure you maintain a low probability of failure on demand (PFD). In normal circumstances, the only way to ensure that the valves will not stick when called upon is to fully rotate them and this means a system shutdown. Waiting to test the valves during scheduled shutdowns can mean intervals of up to three years, which is too long to ensure a low PFD.

Partial stroke tests (PST) enable valves to be tested regularly between scheduled shutdowns.

With Vonk spring-to-open control valves, PST can be performed without opening the valve. By using the valve’s ‘passive’ angle, the front disc can be rotated for the majority of the 180° revolution. This feature makes it possible to perform PST during normal production, guaranteeing a low PFD while minimizing production downtime.

Vonk control valve features include
- Guaranteed tight shut-off due to single orifice rotating disc design
- Orifice for pressure/capacity reduction
- Tungsten carbide long bean that guarantees the maximum required Cv value will not be exceeded
- Single orifice rotating disc design enables PST during production, resulting in a low PFD

Automated partial stroke test
PLC-based safety systems can be programmed to perform PST, recording the results and alarm failures on a given schedule.

Example: extending the full stroke testing (FST) to 3 years at turnaround, and implementing partial stroke testing (PST) every 3 months, the PFD avg is still lower than the original PFD avg at FST of 1 year without PST.
Emerson uses design techniques including Six Sigma, QFD (quality function deployment), flow knowledge, the latest 2D and 3D software; FEM strength calculations, heat and CFX flow analyses that can be verified in extensive laboratory facilities.

A team of experienced, multi-lingual specialists are trained to degree level in disciplines including composite chemistry, mechanical design and production engineering.

**R&D facilities:**
- Flow loop for $K_v$, $C_v$, noise, torque and cavitation character measurements, up to DN 200
- Hydrostatic testing up to 2500 psi
- Emissions testing
- High pressure gas testing
- Low pressure seat leakage testing
- Lifetime testing in ambient, elevated and freezing conditions under pressures from -40°C up to 350°C
- Helium emission testing to standards including ISO and TA Luft
- Friction coefficient testing on rubber slabs in wet or dry conditions
- Pressure and torque testing