

Valves for oxygen and clean gas applications



Compliance with the latest EIGA, CGA, AIGA, and JIMGA standards including:
CGA G-4.1 / EIGA Doc 33 • CGA G-4.4 / EIGA Doc 13 • CGA G-4.14 / EIGA Doc 200

VELAN

Quality that lasts.

Velan: A world leader in valve design, engineering solutions, and manufacturing

Velan at a glance

History

- Founded in 1950

People

- Over 1,600 employees

Product line

A world-leading range of valves across all major industrial applications:

- High pressure gate, globe, and check
- API standard gate, globe, and check
- Metal-seated and resilient-seated ball
- Triple offset and dual plate check
- API 6D & 6A

Including: actuators and steam traps

Quality

Velan holds major applicable approvals:

- ASME N/NPT (since 1970)
- ISO 9001 (since 1991)
- ISO 14001
- ISO 45001
- PED
- IEC 61508 SIL 3 Capable
- GOST/EAC
- API 6A and 6D
- TA-Luft
- Comprehensive quality programs that are compliant with the most stringent industry standards such as: ISO 9001, API Q1, NCA 4000, ASME NQA-1 and 10 CFR 50 Appendix B.
- Velan has been surveyed and audited by leading organizations around the world such as Bureau Veritas, API, ASME, NUPIC, DCMA, and shipbuilding companies.
- Total Process Improvement Program, including Lean manufacturing and Six Sigma

Headquartered in Montreal, Velan has several international subsidiaries.

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velan.com



Oxygen cleaned triple offset valves ready to be shipped.

Leading the way

Velan is one of the world's largest manufacturers of industrial steel valves, recognized as a leader in quality and innovation. Founded by A.K. Velan in 1950, our company leverages advanced engineering capabilities and innovation to continuously expand our offering of industrial valves.

Today, Velan gate, globe, check, ball, triple offset, engineered severe service valves and steam traps are installed throughout the world, handling diverse applications in cogeneration, fossil, nuclear power, oil and gas, refining and petrochemicals, chemicals and pharmaceutical, LNG and cryogenics, mining, marine, subsea, water and wastewater, and HVAC industries.

Engineered solutions

Velan's Engineering Group has vast experience, sophisticated software, and tools that enable us to find solutions to any customer challenge.

Whether it is for valves to handle liquid helium at -458°F (-272°C) in the world's largest particle accelerator at CERN, Geneva; four-way switch coker ball valves to handle one of the refining industry's toughest services; or valves for main steam isolation service in an operating nuclear power plant, Velan

has been selected by the world's leading engineering construction firms and end users. A long-standing commitment to quality has kept Velan at the forefront of our market sectors.

Velan holds all major industry certifications and approvals. Many prominent companies have established partnerships or global supply agreements with Velan.

Velan uses the latest automation technology, including CNC machines and many special-purpose transfer machines, enhanced by proprietary production techniques.

A global manufacturing leader

Velan is a global company with twelve manufacturing plants strategically located throughout North America, Europe, and Asia. Using the latest automation technology and a wide range of equipment, we can efficiently handle highly customized orders for specialty valves as well as large production runs of commodity valves.

Total quality commitment

Velan is totally committed to offering products and services that exceed customer expectations. All Velan valves are designed and manufactured with an emphasis on low emissions, safety, ease of maintenance and operation, reliability and long service life.

After sales service support

Velan products can be serviced by our experienced field service technicians, call +1 514 748-7743.

Velan valves for oxygen and clean gas service



Air separation plant for producing industrial gases.

What is industrial oxygen?

Oxygen is a highly reactive oxidizing gas or cryogenic liquid that can promote rapid combustion of materials if they are ignited in certain concentrations, temperatures, and pressures. The air we breathe contains 21% oxygen. Concentrations greater than 23.5% are considered oxygen-enriched and require special consideration. These applications are often divided into two categories: gaseous oxygen (GOX) and cold gas/liquid oxygen (LOX).

Gaseous oxygen: warm gas -30°C (-22°F) to 200°C (400°F) up to 3000 psi (21 MPa) with a dew point of -30°C (-22°F), EIGA Doc 13 as well as specialized applications above 200°C (400°F).

Cold/liquid oxygen: liquid, supercritical fluid, or cold gas less than -30°C (-22°F), EIGA Doc 200.

Due to the inherent dangers with oxygen enriched environments proper selection of materials, cleanliness, and training by a reputable equipment manufacturer is vital to avoid catastrophic accidents. Velan has the expertise, training, and experience to make sure that valves going into oxygen service are safe and reliable.

What are clean gases?

Clean gases are referred to those that have been processed or treated to remove impurities, contaminants, or pollutants.

Cleanliness is critical in applications that require high purity and require levels beyond normal industrial manufacturing and assembly. These may not have the same level of risk as oxygen service, but still require similar cleanliness levels.

Industries where oxygen is commonly used

- Aerospace
- Chemicals
- Energy
- Oil & gas
- Healthcare
- Welding
- Pharmaceutical
- Metals processing & fabrication



Velan valves for oxygen and clean gas service



Oxygen cleaned gate valve.

Valves for oxygen service and other industrial clean gases

Safety is of the utmost importance in the manufacture of valves, particularly for oxygen service. Great care must be taken to ensure safety of operators, plants, facilities, and surrounding communities. Conformance to international harmonized standards by valve suppliers is paramount to ensuring end user safety.

Velan has a history of proven in-service performance for liquid oxygen (LOX) and gaseous oxygen (GOX) handling applications as well as other industrial gases, including air, nitrogen, hydrogen, helium and more. Some examples include Velan metal-seated ball valves installed in high-pressure oxygen systems used in mining and in air separation units worldwide along with multi-turn valves in semiconductor manufacturing.

With the international harmonization of industry standards for the handling of oxygen and other industrial gases by Asia Industrial Gases Association (AIGA), Compressed Gas Association (CGA), European Industrial Gases Association

Examples of clean gases

- Nitrogen
- Argon
- Helium
- Fluorine
- Nitrous oxide
- Carbon dioxide
- Hydrogen
- Chlorine



(EIGA), and Japan Industrial and Medical Gases Association (JIMGA), Velan can offer a large selection of valves qualified to:

- **CGA G-4.1 / EIGA Doc 33 (2018),**
Cleaning of Equipment for Oxygen Service
- **CGA G-4.4 / EIGA Doc 13 (2020),**
Oxygen Pipeline and Piping Systems for gaseous oxygen with a temperature range between -30°C and 200°C (-22°F and 400°F)
- **CGA G-4.14 / EIGA Doc 200 (2017),**
Design, Manufacture, Installation, Operation, and Maintenance of Valves Used in Liquid Oxygen and Cold Gaseous Oxygen Systems for temperatures less than -30°C (-22°F)

Velan is able to offer a selection of cast steel, small forged, and B16.34 wall gate, globe, and check valves along with metal-seated ball (MSBV) and triple offset valves (TOV) able to meet EIGA and CGA standards from full cryogenic to 200°C (400°F). As well as specialized high temperature oxygen applications above 200°C (400°F).



Velan cryogenic valves in compliance with EIGA and CGA standards.

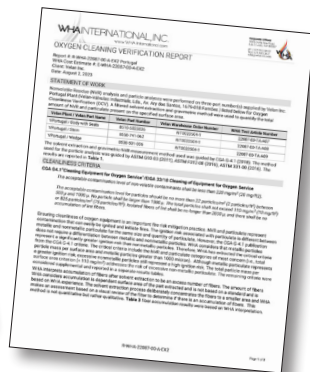
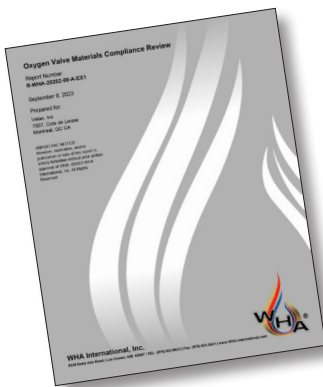
Velan valves for oxygen and clean gas service



Clean room within Velan's manufacturing plant.

Velan's qualification to EIGA and CGA

Compliance to the harmonized standards requires product design safety review, cleaning process protocol validation, and comprehensive training at all levels impacting risk. Velan worked collaboratively with WHA International Inc., an independent third-party company specializing in risk analysis in oxygen and hydrogen combustion, to ensure conformance was met in all three areas.



Oxygen Valve Materials Compliance Review and Oxygen Cleaning Verification Report prepared by WHA International Inc. for Velan.

Design safety

In both gaseous (GOX) and liquid (LOX) oxygen service, pipes, seals, lubricants, and other equipment can act as a fuel if an ignition event occurs and requires proper material selection and service evaluation. Velan oxygen service valves undergo a rigorous design safety review to assess oxygen service compatibility.

Manufacturing process protocols

The need for clean components in industrial valves used for oxygen service is paramount due to the inherent risks associated with oxygen-rich environments. Oxygen supports combustion, and any contaminants or impurities in the valves can pose a severe fire hazard. Even the smallest presence of oil, grease, metallic particles, or other organic and inorganic foreign substances can become an easily-ignited fuel for combustion, making it imperative to ensure that all components are meticulously cleaned. As part of a process to ensure effectiveness of cleanliness procedures, Velan valves conform to CGA G-4.1 and EIGA Doc 33 standards and have been third-party tested by WHA International Inc.

Velan valves for oxygen and clean gas service

Velan manufacturing sites in compliance

Presently, select Velan manufacturing facilities in North America, Europe, and Asia qualify to the international harmonized industry standards for the manufacturing, cleaning, and handling of oxygen and clean gas valves.

Comprehensive training program

Training personnel in the proper handling of oxygen service valves is indispensable and demands a deep understanding of cleaning procedures and material compatibility. Personnel must be well-versed in best practices to prevent accidents, uphold system reliability, and protect human lives. A comprehensive training program is an essential aspect of any operation involving oxygen service industrial valves.

Velan has partnered with WHA International Inc. to create a complete training program backed by current best practices and experience from a reputable source.

All personnel involved with processing an oxygen cleaned valve are trained in the hazards of oxygen service, current design standards, and proper cleaning techniques.

Safety review for oxygen service

Qualifying products must undergo a rigorous design safety review to assess compatibility for oxygen service:



Engineering designs are audited for conformity to safety standards.



Material flammability is assessed based on composition, thicknesses, and operating conditions such as pressures, temperatures, and velocity.



Packing and gaskets must be rated for oxygen service.



An overall oxygen hazards and risk assessment is made to ensure that finished products are safe for oxygen service.



Oxygen cleaned gate valve prepared for shipment.



Oxygen cleaned valves ready to be shipped.

Velan: A world leader in valve design, engineering solutions, and manufacturing

Automation capabilities

Velan offers a wide range of products to address each customer's application. Our valves can be equipped with electric, hydraulic, or pneumatic actuation. We also offer preinstalled switches, positioners, sensors (thrust and torque), and signal conditioners. Other available accessories include integral control actuation and two-wire control, overrides, limit stops, and most standard accessories.

Actuation feature to cycle on demand

- Valves can be supplied for direct mounting with no additional bracket or coupling.
- Drive train sizes are taken into consideration when selecting material and temperature.
- Oversized actuators ensure reliable valve cycling.

Latest fugitive emissions qualifications

Velan offers an extensive prequalified range of commodity products and customizes project-specific qualifications to meet current industry standards for fugitive emissions: ISO-15848, API 624 & API 641, API 622, and TA-LUFT.

Safety Integrity Level (SIL)

Velan can offer 3rd party (exida) certified SIL capable valve designs. As well as SIL capable actuation and sensors.

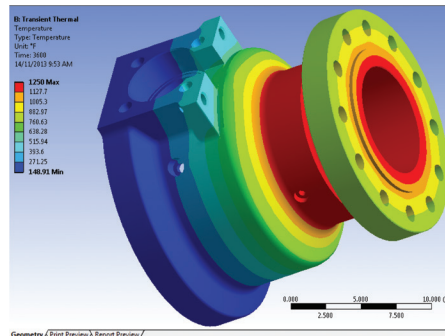


Research & Development

Velan's Research & Development (R&D) group is a key part of the Velan engineering team, and the services they provide include technical project management, design and analysis, standard and customized experimentation work, performance evaluation, and turn-key support from project initiation to program completion.

Velan's R&D provides customized testing programs, working closely with specialized third-party labs, to help develop and qualify our valves to clients' specifications and qualification needs.

Many of Velan valves are custom designed to perform in applications that can't be adequately handled using established materials and commercial valve designs. As a result, we invest in significant R&D to address the most difficult operational performance requirements.



Stress calculations are done using 3D Finite Element Analysis (FEA) software, like ANSYS and Pro/Mechanica, with 3D models developed in Pro-Engineer.

Velan FES & Aftermarket

- On-site service, maintenance, and product support on all Velan valve products.
- Engineering support and unsurpassed know-how.
- OEM spare parts are specific to Velan design and testing.



On-site service for Velan valves.

Field Engineering Services (FES) & Aftermarket support

Velan offers our end-users technical support and in-line service and maintenance on all our valve products. We are your one-stop-shop for repairs backed by Velan quality and warranty.

Our team of service engineers and technicians are available 24 hours a day. We are equipped with the most sophisticated tools available and over 50 years of valve service experience in nuclear and thermal power stations, fossil fuel plants, naval fleets, petrochemical, chemical and mining applications.

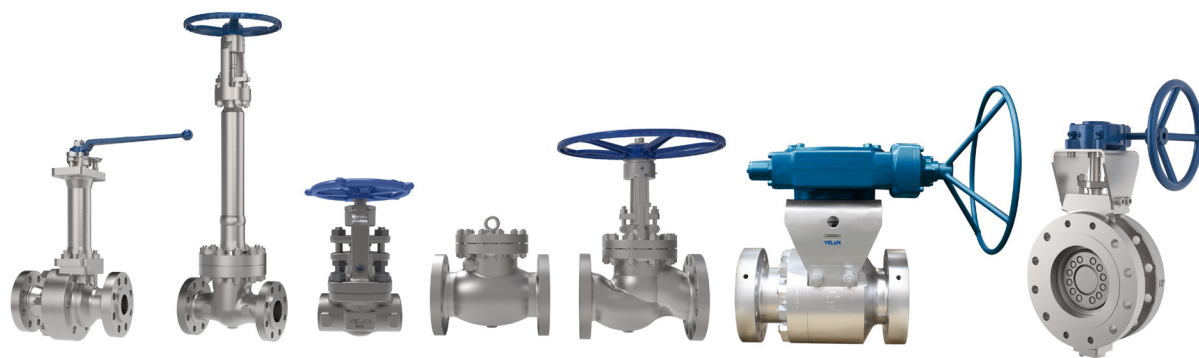
We offer complete support leading up to and throughout your maintenance outages and turnarounds. All our work carries the Velan quality our customers have learned to trust and is backed by our warranty.

Global network of service providers

Velan has a network of authorized service shops across the globe, ensuring we can meet your maintenance and service requirements wherever your location.

Service providers are qualified with Levels I, II, III, and IV shop classification, with Level I shops being the highest qualified. Velan authorized valve service and repair shops and are the best choice for servicing Velan valves.

Check Velan's website for our leading portfolio of valves for oxygen and clean gas service



Learn more about Velan's full product line at velan.com

Quarter-turn

- Memoryseal® ball valves
- Securaseal® metal-seated ball valves
- Torqseal® triple offset valves
- Velflex high performance cryogenic butterfly valves
- Coker ball valves
- Velan ABV API 6A & 6D trunnion-mounted ball valves

Go to our website for more resources

Go to the *Resources* tab on velan.com to access our most up-to-date library of literature and tools.

"Join My Velan" to gain access to even more! As a member of the MyVelan community, you can access additional resources including Maintenance manuals (IOMs), Data sheets, Application notes, and Product updates.

Gate, globe, and check

- API 600 gate, globe and check valves
- API 603 corrosion resistant gate, globe and check valves
- Pressure seal high pressure gate, globe and check valves
- API 602 small forged gate, globe and check valves
- Proquip dual plate check valves
- Y-pattern bonnetless globe and check valves
- Velan ABV expanding and slab gate valves

Special applications

- Nuclear
- Cryogenic
- HF Alkylation



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