Instrumentation Solutions for Hydrogen Applications

Components and systems for use with gaseous and liquid hydrogen

Parker

ENGINEERING YOUR SUCCESS.

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Your Reliable Partner for Driving the Energy Evolution Forward

Parker is supporting the global decarbonisation efforts through a broad range of solutions for a variety of applications. Our hydrogen-compatible components and systems enable safe and efficient operation from vacuum to 1,380 bar (20,000 psi) and temperatures from -253°C to +538°C (-423°F to +1000°F).

ON-BOARD VEHICLES

EC-79 CERTIFIED

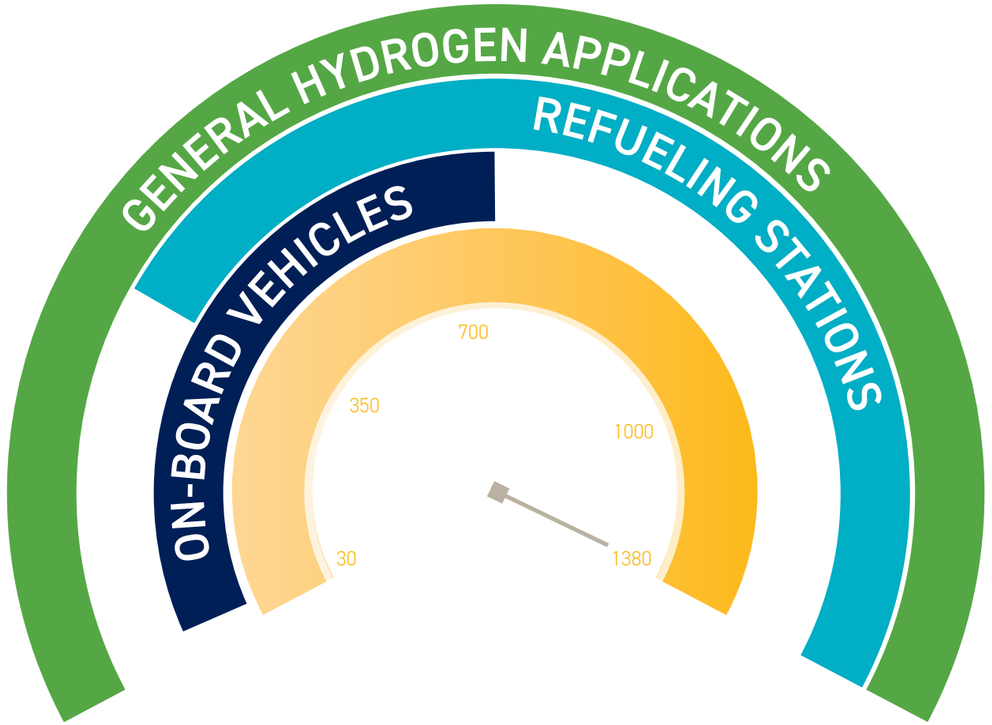
Two Ferrule Tube Fittings - A-LOK® Series EC-79 Certified
Parker Autoclave Engineers®:
Medium Pressure Fittings EC-79 Certified
Needle Valves - SM Series EC-79 Certified
Medium Pressure Tubing EC-79 Certified

GENERAL HYDROGEN APPLICATIONS

Two Ferrule Tube Fittings - A-LOK® Series
Permanent Ferrule-less Connectors - Phastite® Series
Ball Valves - B Series
Ball Valves - Hi-Pro Series
Ball Valves - HB Series
Inline Filters - F Series
Check Valves - CO Series
Stream Switching Systems - R-Max II
Modular Sample Conditioning Systems - IntraFlow™ Series
Pressure Regulators - IR4000 and IR6000 Series
Excess Flow Shutoff Valves - FS190 Series

CRYOGENIC/LH_2 APPLICATIONS

Bestobell Cryogenic Valves:
Globe Valves
Pneumatically Actuated Globe Valves
Lift Check Valves
Swing Check Valves
Manual Gate Valves
Actuated Gate Valves



VACUUM

Parker's range of tube fittings, needle valves and tubing for pressures up to 700 bar meet the general requirements of hydrogen components and systems used on hydrogen-powered motor vehicles as per regulation (EC) No 79/2009 of The European Parliament and of The Council of 14 Jan 2009.

ISO-CERTIFIED PRODUCTS FOR REFUELING STATIONS

ISO 19880-3 TESTED

Parker Autoclave Engineers®:
Needle Valves - 20SM Series Tests Passed - Pending Certification
Check Valves - CXO Series Tests Passed - Pending Certification

GENERAL HYDROGEN APPLICATIONS

Parker Autoclave Engineers®:
Medium Pressure Fittings - Cone and Thread
Needle Valves - 15SM and 20SM Series
Check Valves - CXO Series
Double Block & Bleed Needle Type Manifold - 20DBNV Series
Relief Valves - RVS Series
Medium Pressure Accessories and Adapters
Medium Pressure Actuators

Medium Pressure MPI™ Series:
Fittings
Tubing
Needle Valves - MAN Series
Check Valves - MAC Series

Hydrogen can be very damaging to most metallic materials, causing embrittlement cracking. Follow this link to learn about the factors which can cause hydrogen embrittlement:
https://discover.parker.com/Challenge-of-Hydrogen-Embrittlement-White-Paper

READ WHITE PAPER

Stainless Steel material is Parker's standard offering for hydrogen systems and all the pressure and temperature ratings featured in this catalogue refer to this grade. Other materials are available on request.

1,380 BAR
20,000 PSI

Parker's needle valves 20SM series and check valves CXO series have successfully passed all the required tests for high pressure gas valves used in gaseous hydrogen stations of up to the H70 designation specified in ISO 19880-3 certification.

On-Board Vehicles

Components for on-board hydrogen-powered vehicles for pressures from 30 to 700 bar (435 to 10,152 psi).

EC-79 Certified

Parker's range of products approved for use on-board hydrogen-powered vehicles from 30 to 700 bar includes tube fittings, needle valves and tubing. These products meet the general requirements of hydrogen components and systems used on hydrogen-powered motor vehicles as per regulation (EC) No 79/2009 of The European Parliament and of The Council of 14 Jan 2009.

Applications from 30 to 350 bar (435 - 5,076 psi)

Two Ferrule Tube Fittings - A-LOK® Series

EC-79 Certified

Parker A-LOK® two ferrule tube fittings are designed to achieve quality leak-free connections on-board hydrogen-powered vehicles up to 350 bar pressures and temperatures down to -40°C. These fittings provide reliable operation in cryogenic, pressure & thermal cycling and vibration applications. Manufactured at an IATF 16949 certified plant and EC-79 approved for hydrogen service, they come in a range of sizes and configurations in 316 Stainless Steel material. For optimised installation instructions see p.18 of this catalogue.
To order EC-79 certified components, simply add the suffix EC79 at the end of your part number.
For more details please see catalogue ref. 4190-FMTG.

Available Sizes	MWP	Temperature	Hydrogen Form	Catalogue Ref. Number
1/4" to 1" (6mm to 25mm)*	350 bar (5,076 psi)	-40°C to +120°C (-40°F to +248°F)	Gas, Liquid	4190-FMTG

*A-LOK® tees and crosses approved in sizes up to 1/2" (12mm). Please contact Parker for further information.

Applications up to 700 bar (10,152 psi)

Medium Pressure Fittings - Cone and Thread - Autoclave Engineers®

EC-79 Certified

Parker Autoclave Engineers medium pressure cone and thread connections are designed for applications that require higher flow rate capability. Manufactured from high tensile strength cold worked 316/316L Stainless Steel material as standard for 700 bar (10,152 psi) MAWP, this Medium Pressure range has all the benefits of the High Pressure version with all metal sealing for operations at temperatures from -40°C to +120°C (-40°F to +248°F).
These fittings are designed for use with Parker Autoclave Engineers' 20SM Series valves and medium pressure tubing according to ASME B31.3 Chapter IX standards.
To order EC-79 certified components, simply add the suffix EC79 at the end of your part number.
For more details please see catalogue ref. 02-0124SE.

Available Sizes	MWP	Temperature	Hydrogen Form	Catalogue Ref. Number
1/4" to 1"	700 bar (10,152 psi)	-40°C to +120°C (-40°F to +248°F)	Gas, Liquid	02-0124SE

Medium Pressure Needle Valves SM Series - Autoclave Engineers®

EC-79 Certified

Parker Autoclave Engineers SM Series valves are designed specifically for use with matching orifice medium pressure cone & thread fittings and tubing for the most efficient flow path possible using cone & thread style connections. They are manufactured using high tensile strength UNS S31600/S31603 cold worked 316/316L Stainless Steel material as standard for 700 bar (10,152 psi) MAWP.
To order EC-79 certified components, simply add the suffix HYGEC79 at the end of your part number.
For more details please see catalogue ref. 02-0112SE.

Available Sizes	MWP	Temperature	Hydrogen Form	Catalogue Ref. Number
1/4" to 1"	700 bar (10,152 psi)	-40°C to +120°C (-40°F to +248°F)	Gas	02-0112SE

Medium Pressure Tubing - Autoclave Engineers®

EC-79 Certified

Parker Autoclave Engineers offers a complete selection of austenitic, cold drawn stainless steel tubing designed to match the performance standards of Parker Autoclave valves and fittings. Parker Autoclave Engineers medium pressure tubing is manufactured specifically for high pressure applications requiring both strength and corrosion resistance.
For more details please see catalogue ref. 02-0124SE.

Available Sizes	MWP	Temperature	Hydrogen Form	Catalogue Ref. Number
1/4" to 1"	700 bar (10,152 psi)	-40°C to +120°C (-40°F to +248°F)	Gas, Liquid	02-0124SE

ISO Products For H_2 Refueling Stations

Components for hydrogen refueling stations for pressures up to 700 bar (10,152 psi).

Tests Passed, Pending ISO 19880-3 Certification

Parker's needle and check valves have successfully passed the required tests for high pressure valves used in gaseous hydrogen stations as specified in ISO 19880-3 certification. These are now awaiting the completion of the final steps towards achieving the certification.

Medium Pressure Needle Valves 20SM Series - Autoclave Engineers®

Tested, Pending ISO 19880-3 Certification

These Parker Autoclave Engineers 20SM Series Needle Valves (HYG option) have unique STEM/SEAT and PACKING design that can withstand temperatures ranging between -73°C and 316°C and pressures of up to 700 bar (10,152 psi).
The valves are available with two different styles of connection options including cone & thread and MPI™.
To order ISO 19880-3 certified components, simply add the suffix HYG at the end of your part number.
For more details please see catalogue ref. 02-0112SE.

Available Sizes	MWP	Temperature	Hydrogen Form	Catalogue Ref. Number
1/4" to 1"	700 bar (10,152 psi)	-73°C to +316°C (-99°F to +601°F)	Gas	02-0112SE

Medium Pressure O-Ring Check Valves CXO Series - Autoclave Engineers®

Tested, Pending ISO 19880-3 Certification

These Parker Autoclave Engineers O-Ring Check Valves CXO Series (HYG option) can withstand temperatures ranging between -73°C and 316°C and pressures of up to 1,380 bar (20,000 psi).
The valves are available with two different styles of connection options including cone & thread and MPI™.
To order ISO 19880-3 certified components, simply add the suffix HYG at the end of your part number.
For more details please see catalogue ref. 02-0124SE.

Available Sizes	MWP	Temperature	Hydrogen Form	Catalogue Ref. Number
1/4" to 1"	700 bar (10,152 psi)	-73°C to +316°C (-99°F to +601°F)	Gas	02-0124SE

Other associated products for hydrogen refueling stations are featured on the following pages.

General Hydrogen Applications

Components for general hydrogen applications at pressures from vacuum to 1,380 bar (20,000 psi).

Parker offers an extensive range of high-quality components and system solutions suitable for general hydrogen use in a wide variety of industries including power generation, petrochemical, agricultural and research & development.

Applications up to 414 bar (6,000 psi)

Two Ferrule Tube Fittings - A-LOK® Series

Available Sizes	MWP	Temperature	Hydrogen Form	Catalogue Ref. Number
1/16" to 2" (2mm to 50mm)	414 bar (6,000 psi)*	-253°C to +538°C (-423°F to +1000°F)**	Gas, Liquid	4190-FMTG

* Please refer to Parker tube tables for higher pressure tube/fitting combinations up to 689 bar (10,000 psi).
** Material de-rating and media compatibility factors need to be taken into consideration for higher temperature applications.
For optimised installation instructions see p.18 of this catalogue.

Ball Valves - B Series - Isolation and Directional Control Valves

Available Sizes	MWP	Temperature	Hydrogen Form	Catalogue Ref. Number
1/8" to 3/4" (3mm to 18mm)	414 bar (6,000 psi)	-54°C to +232°C (-65°F to +450°F)	Gas	4121-BV

Needle Valves - V Series - Isolation and Flow Control Valves

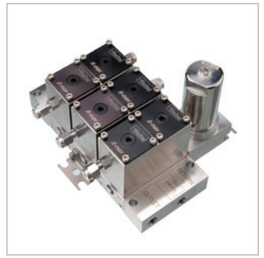
Available Sizes	MWP	Temperature	Hydrogen Form	Catalogue Ref. Number
1/8" to 3/4" (3mm to 18mm)	345 bar (5,000 psi)	-54°C to +232°C (-65°F to +450°F)	Gas	4110-NV

Inline Filters - F Series

Available Sizes	MWP	Temperature	Hydrogen Form	Catalogue Ref. Number
1/8" to 1" (3mm to 25mm)	414 bar (6,000 psi)	-51°C to +204°C (-60°F to +399°F)	Gas	4135-CV

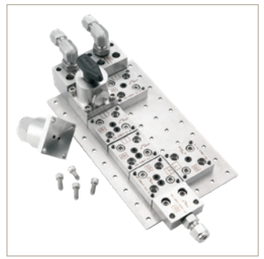
Check Valves - CO Series - Directional Control Valves

Available Sizes	MWP	Temperature	Hydrogen Form	Catalogue Ref. Number
1/4" to 1/2" (6mm to 12mm)	414 bar (6,000 psi)	-57°C to +204°C (-71°F to +399°F)	Gas	4135-CV



Stream Switching Systems - R-Max™ Gen II Series

Available Size	MWP	Temperature	Hydrogen Form	Catalogue Ref. Number
1/8"	34 bar (500 psi)	-57°C to +204°C (-71°F to +399°F)	Gas	4141-R



Modular Sample Conditioning Systems - IntraFlow™ Series

Available Size	MWP	Temperature	Hydrogen Form	Catalogue Ref. Number
1/8"	34 bar (500 psi)	-57°C to +204°C (-71°F to +399°F)	Gas	4250

Pressure Regulators - IR4000 and IR6000 Series

Available Size	MWP	Temperature	Hydrogen Form	Catalogue Ref. Number
1/4"	276 bar (4,000 psi)	-40°C to +260°C (-40°F to +500°F)	Gas	4255-PA

Excess Flow Shutoff Valves - FS190 Series

Available Size	MWP	Temperature	Hydrogen Form	Catalogue Ref. Number
1/4"	241 bar (3,500 psi)	-23°C to +66°C (-9°F to +151°F)	Gas	4255-PA

Applications up to 1,380 bar (20,000 psi)

Medium Pressure Two Ferrule Inverted Tube Fittings - MPI™ Series

Available Sizes	MWP	Temperature	Hydrogen Form	Catalogue Ref. Number
1/4” to 1”	1,034 bar (15,000 psi)	-253°C to +538°C (-423°F to +1000°F)*	Gas, Liquid	4234-MA

* Material de-rating and media compatibility factors need to be taken into consideration for higher temperature applications.

Medium Pressure Fittings - Cone and Thread - Parker Autoclave Engineers®

Available Sizes	MWP	Temperature	Hydrogen Form	Catalogue Ref. Number
1/4” to 1 1/2”	1,380 bar (20,000 psi)*	-253°C to +538°C (-423°F to +1000°F)*	Gas, Liquid	02-0124SE

* Material de-rating and media compatibility factors need to be taken into consideration for higher temperature and higher pressure applications. Refer to technical catalogue 02-0142SE.

Permanent Ferrule-less Connectors - Phastite® Series

Available Sizes	MWP	Temperature	Hydrogen Form	Catalogue Ref. Number
1/4” to 1” (6mm to 25mm)	1,380 bar (20,000 psi)	-45°C to +93°C (-49°F to +199°F)	Gas	4235-PH

Ball Valves - Hi-Pro Series - Isolation Valves

Available Sizes	MWP	Temperature	Hydrogen Form	Catalogue Ref. Number
1/4” to 1” (6mm to 25mm)	689 bar (10,000 psi)	-54°C to +232°C (-65°F to +450°F)	Gas	4190-HBV

Ball Valves - HB Series - Isolation Valves

Available Sizes	MWP	Temperature	Hydrogen Form	Catalogue Ref. Number
1/8” to 1/2” (6mm to 12mm)	489 bar (10,000 psi)	-54°C to +204°C (-65°F to +399°F)	Gas	4121-BV

Needle Valves MAN - MPI™ Series

Available Sizes	MWP	Temperature	Hydrogen Form	Catalogue Ref. Number
1/4” to 1”	1,034 bar (15,000 psi)	-73°C to +316°C (-99°F to +601°F)	Gas	4234-MA

This valve has been modified for use with Hydrogen. To order, add the suffix HYG at the end of your part number.

Medium Pressure Needle Valves 15SM and 20SM Series - Autoclave Engineers®

Available Sizes	MWP	Temperature	Hydrogen Form	Catalogue Ref. Number
1/4” to 1 1/2”	1,380 bar (20,000 psi)*	-73°C to +316°C (-99°F to +601°F)*	Gas	02-0112SE

This valve has been modified for use with Hydrogen. To order, add the suffix HYG at the end of your part number.

Medium Pressure O-Ring Check Valves CXO Series - Autoclave Engineers®

Available Sizes	MWP	Temperature	Hydrogen Form	Catalogue Ref. Number
1/4” to 1”	1,380 bar (20,000 psi)*	-73°C to +316°C (-99°F to +601°F)*	Gas	02-0124SE

This valve has been modified for use with Hydrogen. To order, add the suffix HYG at the end of your part number.

Medium Pressure O-Ring Check Valves MAC - MPI™ Series

Available Sizes	MWP	Temperature	Hydrogen Form	Catalogue Ref. Number
1/4” to 1”	1,034 bar (15,000 psi)	-73°C to +316°C (-99°F to +601°F)	Gas	4234-MA

This valve has been modified for use with Hydrogen. To order, add the suffix HYG at the end of your part number.

Double Block & Bleed Needle Type Manifold - 20DBNV Series - Autoclave Engineers®

Available Sizes	MWP	Temperature	Hydrogen Form	Catalogue Ref. Number
1/4” to 9/16”	1,380 bar (20,000 psi)*	-73°C to +316°C (-99°F to +601°F)*	Gas	02-9328SE

This valve has been modified for use with Hydrogen. To order, add the suffix HYG at the end of your part number.

* Material de-rating and media compatibility factors need to be taken into consideration for higher temperature and higher pressure applications. Refer to technical catalogue 02-0142SE.

Relief Valves - Soft Seat RVS Series - Autoclave Engineers®

Available Sizes	MWP	Temperature	Hydrogen Form	Catalogue Ref. Number
9/16”	1,380 bar (20,000 psi)	0°C to +204°C (32°F to +399°F)	Gas	02-0129SE

This valve has been modified for use with Hydrogen. To order, add the suffix HYG at the end of your part number.

Medium Pressure Tubing - MPI™ Series

Available Sizes	MWP	Temperature	Hydrogen Form	Catalogue Ref. Number
1/4” to 1”	1,034 bar (15,000 psi)	-253°C to +538°C (-423°F to +1000°F)	Gas, Liquid	4234-MA

Medium Pressure Actuators - Autoclave Engineers®

Available Sizes	MWP	Temperature	Hydrogen Form	Catalogue Ref. Number
1/4” to 1 1/2”	1,380 bar (20,000 psi)	-73°C to +316°C (-99°F to +601°F)	Gas, Liquid	02-0121SE

Medium Pressure Adapters - Autoclave Engineers®

Available Sizes	MWP	Temperature	Hydrogen Form	Catalogue Ref. Number
1/4” to 1 1/2”	1,379 bar (20,000 psi)	-253°C to +538°C (-423°F to +1000°F)*	Gas, Liquid	02-0127SE

Medium Pressure Accessories - Autoclave Engineers®

Available Sizes	MWP	Temperature	Hydrogen Form	Catalogue Ref. Number
1/4” to 1 1/2”	1,380 bar (20,000 psi)	-253°C to +538°C (-423°F to +1000°F)*	Gas, Liquid	02-0134SE

* Material de-rating and media compatibility factors need to be taken into consideration for higher temperature applications.

ADDITIONAL RESOURCES AVAILABLE ON WWW.PARKER.COM/IPD

› WHITE PAPER - ADDRESSING THE CHALLENGE OF HYDROGEN EMBRITTLEMENT IN METALLURGY
› BROCHURE - INSTRUMENTATION SOLUTIONS FOR HYDROGEN-POWERED VEHICLES

Cryogenic/LH_2 Applications

Components for cryogenic/LH_2 applications at temperatures down to -253°C (-423°F) and pressures up to 50 bar (725 psi).

Designed and engineered for use with Group 1 gases, Parker Bestobell's valves are suitable for liquid hydrogen applications requiring temperatures as low as -253°C. All valves are pressure-tested prior to dispatch.
To order, add the suffix -H at the end of your part number.

Globe Valves - Stainless Steel with Bronze Internals - Bestobell Industrial

Available Connections	Seat Type	Available Sizes	MWP	Temperature	Hydrogen Form	Catalogue Ref. Number
• Butt Weld • Socket Weld • Flange Class 150 and 300	Soft	DN15 to DN100 (1/2" to 4")	Up to 50 bar (725 psi)	-253°C to +65°C (-423°F to +149°F)	Gas, Liquid	5190-BBV

Globe Valves - Stainless Steel - Bestobell Marine

Available Connections	Seat Type	Available Sizes	MWP	Temperature	Hydrogen Form	Catalogue Ref. Number
• Butt Weld • Socket Weld • Flange Class 150 and 300	Metal to Metal	DN15 to DN100 (1/2" to 4")	Up to 50 bar (725 psi)	-253°C to +80°C (-441°F to +176°F)	Gas, Liquid	5190-BBM

Pneumatically Actuated Globe Valves - Stainless Steel with Bronze Internals - Bestobell Industrial

Available Connections	Seat Type	Available Sizes	MWP	Temperature	Hydrogen Form	Catalogue Ref. Number
• Butt Weld • Socket Weld • Flange Class 150 and 300	Soft	DN15 to DN100 (1/2" to 4")	Dependent on end connections/ actuator	-253°C to +80°C (-423°F to +176°F)	Gas, Liquid	5190-BBV

Pneumatically Actuated Globe Valves - Stainless Steel - Bestobell Marine

Available Connections	Seat Type	Available Sizes	MWP	Temperature	Hydrogen Form	Catalogue Ref. Number
• Butt Weld • Socket Weld • Flange Class 150 and 300	Metal to Metal	DN15 to DN100 (1/2" to 4")	Dependent on end connections/ actuator	-253°C to +80°C (-423°F to +176°F)	Gas, Liquid	5190-BBM

Lift Check Valves - Stainless Steel with Bronze Internals - Bestobell Industrial

Available Connections	Seat Type	Available Sizes	MWP	Temperature	Hydrogen Form	Catalogue Ref. Number
• Butt Weld • Socket Weld • Flange Class 150 and 300	Soft	DN15 to DN100 (1/2" to 4")	Up to 50 bar (725 psi)	-253°C to +65°C (-423°F to +149°F	Gas, Liquid	5190-BBV

Lift Check Valves - Stainless Steel - Bestobell Marine

Available Connections	Seat Type	Available Sizes	MWP	Temperature	Hydrogen Form	Catalogue Ref. Number
• Butt Weld • Socket Weld • Flange Class 150 and 300	Soft	DN15 to DN100 (1/2" to 4")	Up to 50 bar (725 psi)	-253°C to +80°C (-423°F to +176°F)	Gas, Liquid	5190-BBM

Swing Check Valves - Stainless Steel - Bestobell Marine

Available Connections	Seat Type	Available Sizes	MWP	Temperature	Hydrogen Form	Catalogue Ref. Number
Various Contact Parker	Soft	DN25 to DN80 (1" to 3")	Up to 50 bar (725 psi)	-253°C to +80°C (-423°F to +176°F)	Gas, Liquid	5190-BBM

Manual Gate Valves - Stainless Steel - Bestobell Industrial

Available Connections	Seat Type	Available Sizes	MWP	Temperature	Hydrogen Form	Catalogue Ref. Number
• Butt Weld • Socket Weld	Soft	DN40 to DN100 (1 1/2" to 4")	Up to 40 bar (580 psi)	-253°C to +65°C (-423°F to +149°F	Gas, Liquid	5190-BBV

Actuated Gate Valves - Stainless Steel - Pneumatic Tyre Design - Bestobell Industrial

Available Connections	Seat Type	Available Sizes	MWP	Temperature	Hydrogen Form	Catalogue Ref. Number
• Butt Weld • Socket Weld	Soft	DN40 to DN100 (1 1/2" to 4")	Up to 40 bar (580 psi)	-253°C to +65°C (-423°F to +149°F	Gas, Liquid	5190-BBV

Appendix

A-LOK® tube fittings installation for hydrogen service

Parker has an improved and optimised installation procedure for its A-LOK® parts used in hydrogen service. Please follow the steps below for correct installation.

1. The tube should be fully inserted into the shoulder of the fitting until full tube abutment is achieved.
2. The nut should be advanced to the finger tight position and then be marked at the 6 o'clock position.
3. The nut should then be advanced 1 ½ turns with the appropriate wrench making sure a back-up wrench is used to hold the fitting body during the tightening process.
4. The mark will now be at the 12 o'clock position.

Once this has been achieved, the assembly will be ready to use in your Hydrogen system. For tube specifications, ordering information, preparation and pressure ratings, please refer to the Parker Fittings, Materials and Tubing Guide catalogue ref. 4190-FMTG.

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