Lower your costs with high performance valves that last longer.

Keystone K-LOK Series H
High Performance Butterfly Valves.

EMERSON™

World Class Butterfly Valves

Keystone high performance butterfly valves set the industry standard, designed to last longer, extend cycle life and lower the cost of ownership. Keystone is part of the Emerson portfolio of Final Control products, which includes control valves, pressure relief valves, automated valves, isolation valves, actuators and regulators.

We understand the importance of keeping your process running continuously, regardless of the conditions. Which is why we are dedicated to providing the highly reliable technologies that will help you control, regulate and isolate your process with absolute certainty.

At Emerson we offer our customers not only the most comprehensive range of products, technologies and services in the industry, but the confidence that comes from working with a single-trusted-partner.

So forget about juggling with multiple manufacturers or suppliers. With Emerson as your single main valve partner you will always have the complete solution. When you need a premier global valve business that will help you operate safely, improve reliability and optimize plant performance, just think Emerson.

Keystone K-LOK Series H High Performance Butterfly Valves

Now you can lock-in the highest levels of performance, safety and efficiency with K-LOK Series H.

These high performance butterfly valves feature a double eccentric design and are available with ASME Class 150 and 300 pressure ratings.

You can also choose from five unique seat designs - General Service (GS) polymer seats, Heavy Duty (HD) polymer seats, elastomer seats, fire-safe seats and metal seats - all of which offer distinct advantages, based on application requirements and service conditions. Furthermore, this ability to offer a variety of seat options allows for longer service life, lower cost of ownership and a host of key benefits.

Lock-in enhanced efficiency

- High cycle life and a lower cost of ownership are achieved with a unique seat design which provides bi-directional, drop-tight shutoff in vacuum and full rated differential pressure.
- Maintenance and down time are reduced due to an inverted packing gland bridge, which allows for easy and full access to adjustment bolting without actuator removal. A 360° radius machined on the packing gland in turn eliminates uneven packing adjustment - it fits into an angle on the packing gland bridge to ensure a 360° even compression on the packing gland and packing.
- Reduced downtime and increased valve life are achieved by positioning the bearings close to the disc, providing maximum shaft support.

Lock-in superior safety

- Operator safety is increased via a standard blow-out proof shaft which meets API 609.
- Positive shutoff and maximum seat life are achieved by a cast in disc stop that aligns the disc into the seat perfectly.

Lock-in advanced technology

- Flexibility is provided by a unique packing design, suitable for both pressure and vacuum without modification or special assembly.
- A positive and strong disc to shaft connection is achieved by tangentially positioned wedge pins placed in a compression rather than shear, eliminating the potential for failure.
- Actuator mounting integrity is increased through direct mounting to the valve top plate without the use of brackets and couplings.

Technical Data

Size range:

DN 50 to DN 900 (NPS 2 to NPS 36)

Pressure rating:

Series H1: ASME 150 / 25 bar
Series H2: ASME 300 / 50 bar

Temperature rating:

-40°C to 538°C (-20°F to 1000°F)

Vacuum rating:

1.016 x 10^{-3} mm Hg (4 x 10^{-5} in Hg)

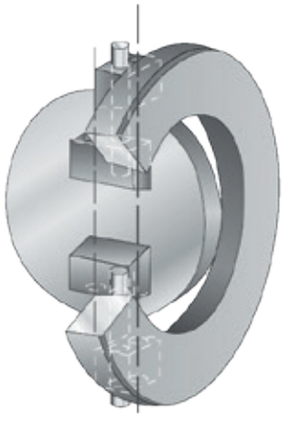
Body style:

Lug and Wafer

Lug bodies are fully rated for bi-directional dead end service

Double Offset

First Offset



Second Offset

K-LOK Series H Principles of Operation

Double offset disc design

K-LOK's unique two-piece shaft and double-eccentric disc design allows for high cycling and creates a lower disc profile with increased capacity and a range of control of 33:1.

In addition to increasing the flow area across the disc, this design minimizes wear points between seat and disc.

The first offset is achieved by locating the shafts downstream of the center-line of the seat. This allows for a totally unobstructed 360° sealing surface.

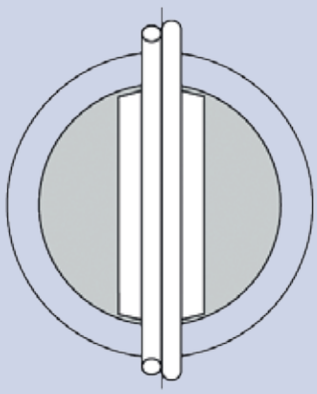
The second offset locates the shafts off-center of the vertical axis of the seat.

The combination of these two offsets creates a camming effect as the disc swings into and out of the seat. The disc lifts quickly out of the seat in the first few degrees of travel and does not contact the seat again until it is nearly closed. There are no wear points between the seat and disc, thus lowering operating torques and increasing seat life.

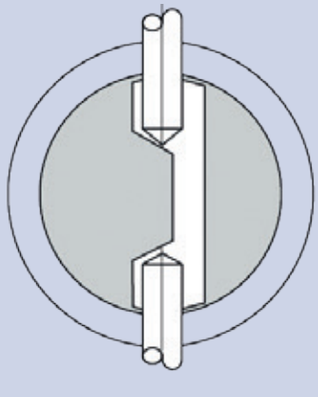
Two-Piece Shaft Vs One-Piece Shaft

K-LOK's disc geometry maximizes flow capacity by increasing the available flow area through the valve. This increase in disc efficiency results in a higher valve Cv /Kv.

Aspect ratio = Open area ÷ Disc area



Competitor one-piece shaft



K-LOK two piece shaft

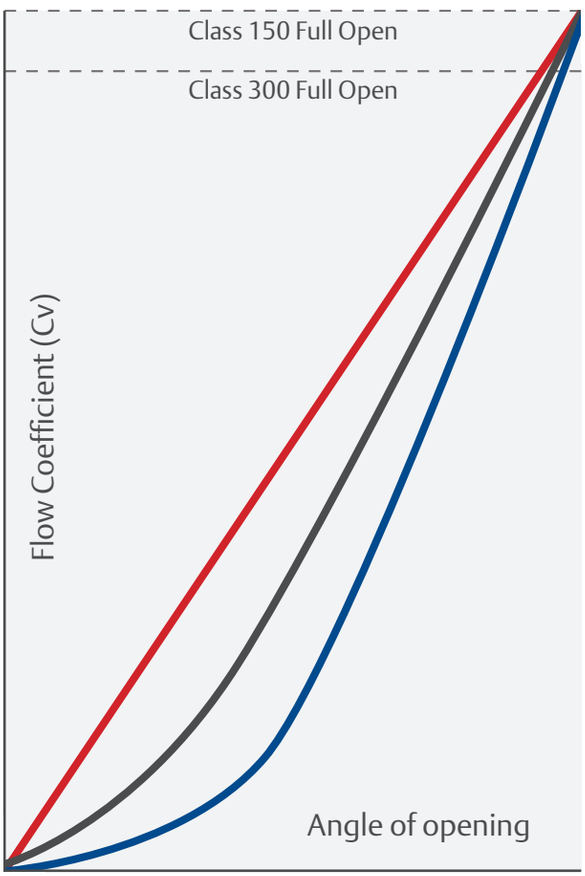
K-LOK Series H for on-off and control applications

The Keystone Series H is utilized extensively in both on-off and control applications. The two-piece shaft design allows for a thinner disc profile and higher flow capability. This gives us an equa-linear flow characteristics which is between linear and equal percentage. The direct mount capability of the Series H eliminates the need for costly brackets and couplings and reduces hysteresis caused by poor quality bracket construction.

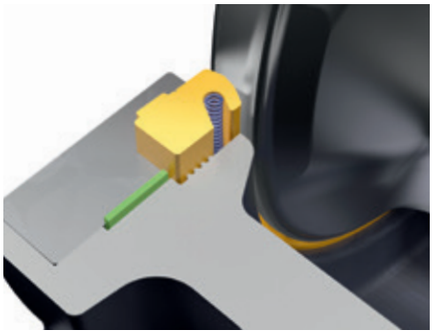
The Series H is a high recovery valve so it exhibits small pressure loss at given flow rates, high internal velocities and low internal pressures. The pressure is said to “recover” from the low internal pressures to the relatively higher pressures of the downstream piping.

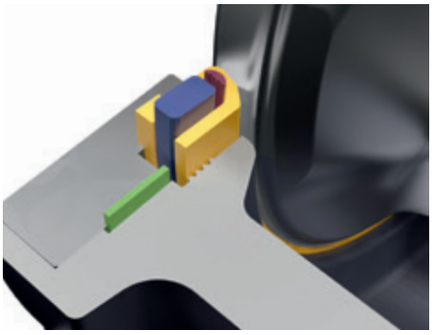
The rangeability, which is the ratio of maximum to minimum values of valve capacity within the valve’s inherent characteristic range, is approximately 33:1.

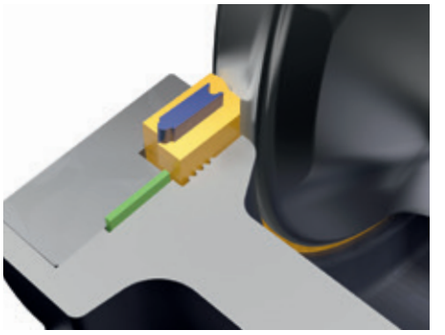
Velocity rating of the Series H is approximately 50 ft/sec for liquids and 350 ft/sec for gas service.



- Linear characteristic
- Equalinear characteristic™
- Equal percentage characteristic







Unique Seat Designs

GS Polymer Seat Design

The GS polymer seats (PTFE and RTFE) provide bi-directional drop tight (zero leakage) sealing at low pressures, high pressures and vacuum. This unique seat utilizes a custom engineered energizer behind the polymer seat which provides radial flexibility and assures a tight shutoff even at low differential pressures. The GS seat is also axially pliant and as pressure is applied it is allowed to move into the disc thus creating a very tight seal and reducing seat wear. Due to the slightly pressure energized seat design, seating and unseating torques are lower which allows the use of smaller actuation packages.

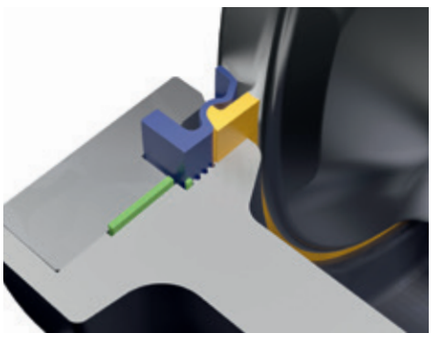
HD Polymer Seat Design

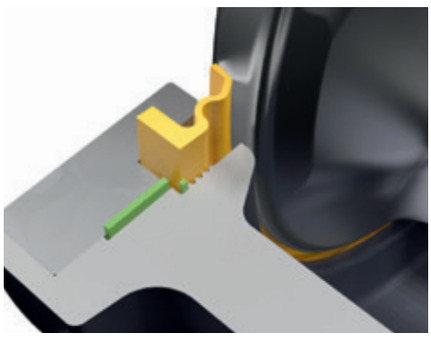
The HD polymer seats (PTFE, RTFE and UHMWPE) incorporate a stainless steel wire wrap enclosed in a U-shape polymer envelope, to provide seating energy and memory. This wire wrap allows axial flexibility in both directions of flow. The wrap also allows radial flexibility when the disc is not fully closed, reducing seat/disc interference, seat wear and shaft torque. When the disc closes, it provides circumferential stiffness and assures the disc/seat seals tight. The HD seat utilizes a true interference design and does not rely on line pressure to assist in sealing. This and the fact that there is almost no voids for media to get trapped, allows the Series H with the HD seat to be used in difficult services such as those containing particulate. All HD polymer seats seal drop tight (zero leakage) bi-directionally at low pressure as well as high pressure and vacuum.

Elastomer Seat Design

The elastomer seats are molded around a stack of V-shaped stainless steel rings that provide the same stability, support and flexure as the wire wrap in the polymer HD seats. These seats provide bi-directional drop tight sealing and are great in slightly abrasive applications and/or oil based slurry applications.

Keystone Series H polymer, elastomer and fire-safe seats (pre fire exposure) are zero leakage and tested per MSS-SP-61. K-LOK fire-safe seats (post fire exposure) meet or exceed the requirements of API 607. K-LOK metal seats meet or exceed the Class IV shut off per ASME/FCI 70-2.





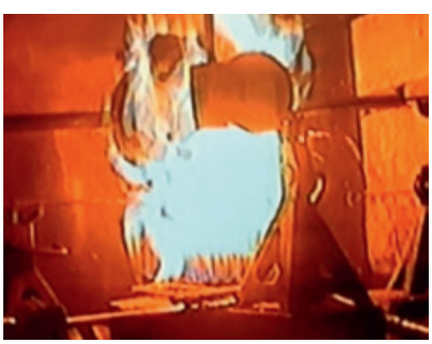
Fire-Safe Seat Design

The fire-safe seat design offers exceptional performance in a fire-safe application. The unique seat utilizes a combination of RTFE and metal to provide zero leakage before a fire and leakage after the burn that is well within the requirements of the standards.

This makes the Series H an exceptional valve for difficult service requiring fire-safe capability within the chemical, petrochemical, oil and gas, and marine applications. The Keystone Series H has been qualified to API 607, 6th edition and to ISO 10497.

Metal Seat Design

The Series H metal seat design utilizes an Inconel® seat whose shape facilitates expansion and contraction due to thermal cycling. The metal seat is good for applications with high temperature or abrasion. The metal seats flexibility has been optimized for high cycle life and high integrity sealing. The Keystone Series H metal seat meets or exceeds a Class IV shutoff per ASME/FCI 70-2 standard.



The Broadest Range of Applications

The K-LOK Series H's five unique seat designs offer distinct advantages based on application requirements and service conditions. Generally, K-LOK Series H valves can be used for:

- Airport refuelling
- Hydrocarbon processing
- Chlorine
- Chemical processing
- Purified gas
- Steam and vacuum services
- Potable water
- Food processing
- Sour gas
- Oxygen
- Reverse osmosis
- HVAC
- Ammonia

SEAT MATERIALS

GENERAL SERVICE SEAT (GS)	**MATERIAL**	**TYPICAL APPLICATIONS**
1. RTFE	Reinforced polytetrafluoroethylene	HVAC, water, air
2. PTFE	Polytetrafluoroethylene	Potable water, NSF-ANSI STD 61, white media
For Seats 1 thru 2		
Energizer	Stainless steel	

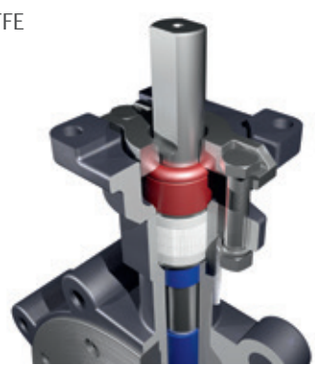
HEAVY DUTY SEAT (HD)	**MATERIAL**	**TYPICAL APPLICATIONS**
3. RTFE	Reinforced polytetrafluoroethylene	Chlorine, ammonia, nitrogen, gasoline
4. PTFE	Polytetrafluoroethylene	White media, pharmaceuticals, water
5. UHMPWE	Ultra high molecular weight polyethylene	Abrasives, suspended solids, scaling media
For Seats 3 thru 5		
Wire wrap	Stainless steel	
Seat backing ring	Stainless steel	

ELASTOMER SEAT	**MATERIAL**	**TYPICAL APPLICATIONS**
6. EPDM		Water based fluid, slurry applications, abrasives
7. NBR		Oil based fluid, slurry applications, abrasives
8. Fluoroelastomer (FKM)		Elevated temp, slurry applications, abrasives
For Seats 6 thru 8		
Metal insert	Stainless steel	

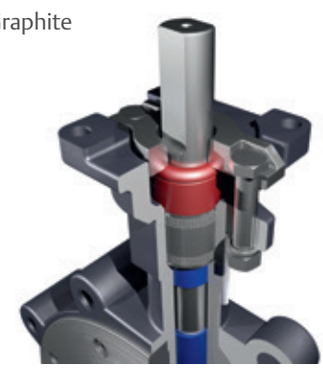
METAL SEAT	**MATERIAL**	**TYPICAL APPLICATIONS**
9. Metal	Inconel®	High temperature, low temperature, abrasives, fly ash, slurries

FIRE-SAFE SEAT	**MATERIAL**	**TYPICAL APPLICATIONS**
10. Fire-safe	Reinforced polytetrafluoroethylene combined with Inconel	Fire-safe installations, abrasives, slurries, steam

PTFE



Graphite



K-LOK Series H shaft packing design

The K-LOK Series H offers a unique shaft packing design which does not rely on pressure to create the seal but rather on an interference fit with the body which is equally effective in pressure or vacuum conditions. Many other manufacturers' designs require special packing or packing adjustments for use in vacuum services.

The standard PTFE version of the packing consists of 3 rings of braided PTFE rope between one solid PTFE V-ring at the top and bottom.

The fire-safe and metal seated version of the packing consists of three rings of preformed graphite between one ring of braided graphite rope at the top and bottom.

An additional benefit of the packing design is that it is easily field adjustable without the need to remove actuation. The unique design of the inverted packing adjustment bolts allows easier access for adjustment than most other valves.

The gland bridge has also been designed to allow 360-degree contact with the packing gland compensating for any uneven adjustment of the packing gland bolts. This maintains an even compression on the packing, reducing the possibility of packing leaks.

Series H Special configurations

The Keystone Series H can be customized to meet a variety of demanding applications. Some of the common options are listed below.

Live Loaded Packing

K-LOK Series H valves can be provided with disc spring washers which are applied to the packing gland adjustment bolts to create a live loaded shaft packing. Live loading the packing has been shown to extend periods of packing adjustments and is now a common requirement in the chemical process industry. This feature can be purchased with a new valve or can be provided as a kit for existing valves.

Steam Service

K-LOK Series H can be used up to 150psi (10bar) saturated steam for on-off service. The trim of the valve would include a nickel plated disc to allow for erosion resistance. For higher pressures or for modulating applications, contact the factory.

NACE Service

K-LOK Series H valves can be ordered in accordance with NACE MR0175 specifications. This specification establishes metallic material requirements for resistance to Sulfide Stress Cracking (SSC) in sour H2S environments.

Vacuum Service

The unique design of the Series H packing is such that it does not rely on line pressure but rather is an interference sealing. This allows for the K-LOK to handle pressures up to 740psi and vacuum up to an absolute pressure of 4×10^{-5} in Hg without modification.

Oxygen Service

K-LOK Series H are available for oxygen service. These valves are carefully cleaned and handled in order to keep grease, oil and other contaminants that may react to oxygen service away from the valve.

Chlorine Service

K-LOK Series H valves can be built and cleaned for chlorine service. Their ability to perform a tight shutoff and the availability of alloy materials make them well suited for oxygen applications.

Alloy Trim Valves

The K-LOK Series H is available in a variety of materials for corrosive services. These include duplex, super dulpex, 316L stainless steel, 304 stainless steel, Hastelloy, SMO 254 and others upon request.

Certifications

The Keystone Series H is available with the following certifications:

Standard certifications
PED/CE - Pressure Equipment Directive
ABS - American Bureau of Shipbuilding
DNV - Det Norske Veritias
SIL 3 - Safety Integrity Level

Available upon request or special trim
API 607 6th edition/ISO 10497 fire test
NSF/ANSI Standard 61
NACE - National Association of Corrosion Engineers
ISO 15848: Part 1 Class B fugitive emissions test
API 641 - Type Testing of Quarter-turn Valves for Fugitive Emissions

Standards and Specifications

STANDARDS AND SPECIFICATIONS		
API	609	Butterfly valves: Double flanged, lug and wafer type
	607	Fire test for quarter turn valves and valves equipped with non-mentallic seats
ASME	B16.34-2013	Valves - Flanged, threaded and welding end
	B16.5-2013	Pipe flanges and flanged fittings - DN 65 – 600 (NPS 21/2 – 24)
	B16.47-2011	Large diameter steel flanges - DN 650 – 1500 (NPS 26 – 60) - Series A
	B16.10-2009	Face-to-face and end-to-end dimensions of valves
	B31.1-2014	Power piping - ASME code for pressure piping, B31
	B31.3-2014	Process piping - ASME code for pressure piping, B31
	FCI 70-2-2006	Control valve seat leakage
EN	593-2009	Industrial valves - Metallic butterfly valves
	558-2008	Industrial valves - Face-to-face and center-to-face dimensions of metal valves for use in flanged pipe systems - PN and Class designated valves
	19-2002	Industrial valves - Marking of metallic valves
	12266-1-2012	Industrial valves - Testing of metallic valves - Part 1: Pressure tests, test procedures and acceptance criteria - Mandatory requirements
	12266-2-2012	Industrial valves - testing of metallic valves - Part 2: Tests, test procedures and acceptance criteria - Supplementary requirements
	1092-2007	Flanges and their joints - Circular flanges for pipes, valves, fittings and accessories, PN designated - Part 1: Steel flanges
ISO	7005-1-2011	Pipe flanges - Part 1: Steel flanges for industrial and general service piping systems
	5208-2008	Industrial valves - Pressure testing of metallic valves
	5752-1982	Metal valves for use in flanged pipe systems - Face-to-face and center-to-face dimensions
	5211-2001	Industrial valves - Part turn actuator and attachments
MSS	SP25-2013	Standard marking system for valves, fittings, flanges and unions
	SP6-2012	Standard finishes for contact faces of pipe flange and connecting-end flanges of valves and fittings
	SP55-1996	Quality standard for steel castings for valves, flanges, fittings and other piping components - Visual method for evaluation of surface irregularities
	SP61-2013	Pressure testing of valves - Standard
	SP68-2011	High pressure butterfly valves with offset design
AS	2129-2000	Flanges for pipes, valves and fittings

Selection Guide

Notes

1. All lug valves have bolted seat retainers for full rated bi-directional dead end service.
2. Must be used with UHMWPE, fire-safe and metal seats.
3. May require de-rated pressure holding capabilities.
4. Standard body gasket is graphitic. Other materials are available for special applications.
5. Other material is available on request.
6. Available in NPS 2 to 12 (DN 50 to 300), ASME 150 / 25 bar only.

SELECTION GUIDE

Example:	H2	L	-	0100	C0	S0	S0	R1	T	S	G	A1	I	-	00	000	00

Series

H1	ASME 150 / 25 bar
H2	ASME 300 / 50 bar

Style

L	Lug [1]	**W**	Wafer

Size

0050	DN 50/NPS 2	**0200**	DN 200/NPS 8	**0500**	DN 500/NPS 20
0065	DN 65/NPS 2½	**0250**	DN 250/NPS 10	**0600**	DN 600/NPS 24
0080	DN 80/NPS 3	**0300**	DN 300/NPS 12	**0700**	DN 700 /NPS 28
0100	DN 100/NPS 4	**0350**	DN 350/NPS 14	**0750**	DN 750/NPS 30
0125	DN 125/NPS 5	**0400**	DN 400/NPS 16	**0800**	DN 800/NPS 32
1050	DN 150/ NPS 6	**0450**	DN 450/NPS 18	**0900**	DN 900/NPS 36

Body

C0	Carbon Steel	**S2**	316L Stainless Steel
C1	LCC Carbon Steel	**U0**	Duplex Stainless Steel
S0	316 Stainless Steel	**V0**	Super Duplex Stainless Steel
S1	304 Stainless Steel		

Disc

S0	316 Stainless Steel	**U0**	Duplex Stainless Steel
S1	316 Stainless Steel/EPN [2]	**V0**	Super Duplex Stainless Steel
S4	316L Stainless Steel		

Shaft [3]

S0	17.4 PH Stainless Steel	**S3**	17.4 PH DHT
S1	316B Stainless Steel [3]	**J0**	Alloy 718
S2	XM19	**M0**	Nickel Alloy 500

Seat

GS seat [6]		**HD seat**		**Fire-safe seat**		**Elastomer seat**	
P0	PTFE/SS	**P1**	PTFE/SS	**F0**	RTFE/Inconel	**E0**	EPDM
R0	RTFE/SS	**R1**	RTFE/SS	**Metal seat**		**N0**	NBR
		U1	UHMWPE/SS	**M0**	Inconel	**V0**	FKM

Packing

T	PTFE	**G**	Graphite

Bearings

S	316SS/BRZ/TFE
F	Alloy 625/Hi Temp Low Friction

Seat retainer ring gasket [4]

G	Graphite	**F**	Fiber

Flange Drilling

Refer to Technical Data Sheet VCTDS- 03192 page 23 for all drilling codes

Actuator Mounting

I	ISO 5211 Mounting

Actuation

00	None
H0	10 pos. handle
G0	Gear actuation

Special Requirements

000	None

Special Coating

00	Standard

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