



KLINGER KHD-FSB

Fire safe ball valves
DN 8 - DN 200



STRONG & RELIABLE

Before and after, perfect operation



PRODUCT ADVANTAGES

- » Maintenance-free
- » Bidirectional flow
- » Solid ball with full bore design
- » Bidirectional sealing according to EN 12266 - leakage rate A
- » Serviceable without removal from the line (3-piece)
- » Anti-static design according to ISO 7121 / EN1983
- » ISO 5211 top flange with easy automation assembly



SPECIAL TYPES

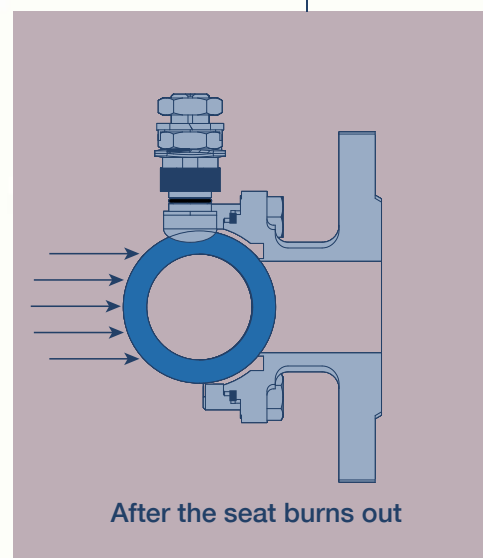
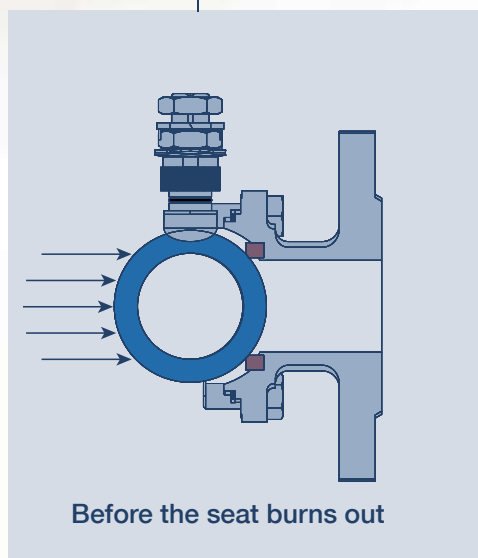
- » Fire safe version
- » Oil, grease and silicone-free
- » Operating stem extension
- » Oxygen version
- » Vacuum version



PRODUCT DETAILS

Pressure Rating	PN16/40, 420 BAR (6000 PSI), 210 BAR (3000 PSI) and 140 BAR (2000 PSI)
DN	8 - 200
Material	Carbon steel, stainless steel, further materials upon request
Temperature	-20°C to 240°C
Structure Design	One piece, two piece and three piece ball valves
End Type	Flanged, threaded and butt-welding





FIRE SAFE DESIGN

Reliable in most tough applications

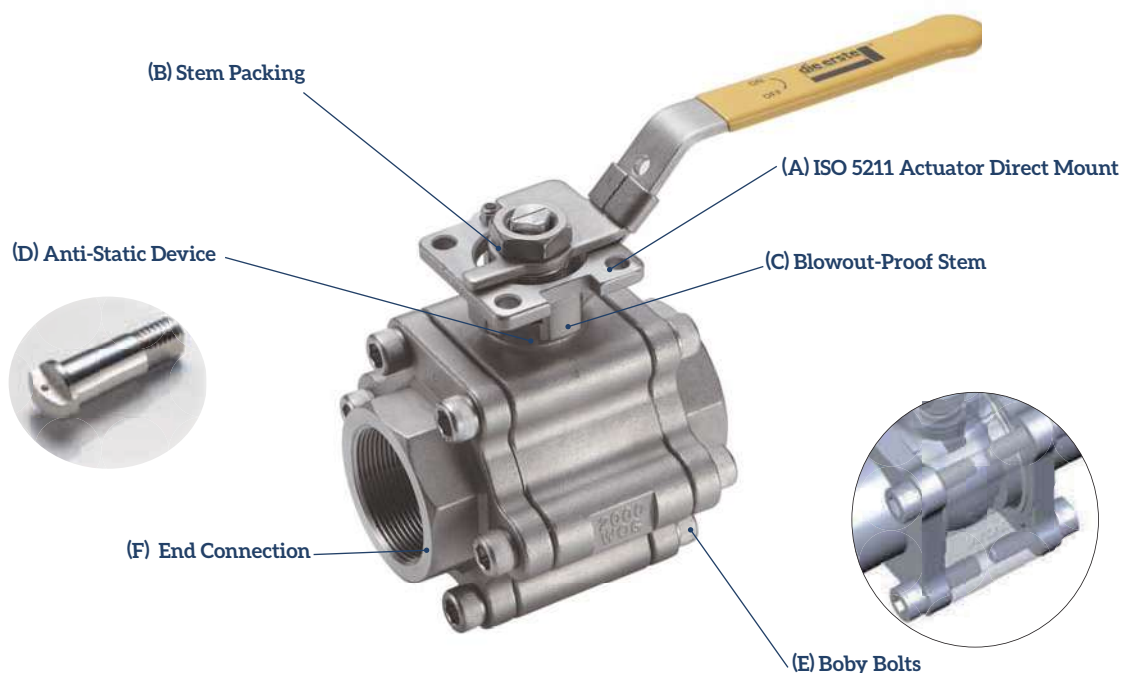
With the increasing demand of fire-safe ball valves, KLINGER Die Erste is proud to introduce the new KHD-FSB ball Valves. KHD-FSB ball valves are most suitable where operational perfection is needed, especially in the event of a fire. They assure bubble tight sealing and zero leakage in high pressure and fire conditions.

KHD-FSB ball valves have been approved to API 607, with the combination of graphite sealing, secondary fire-safe contact, anti-static stem, and strong body bolts. They offer secondary sealing for superior sealing effects. In high pressure condition, two sets of sealing rings are used to prevent leakage. In fire condition, the secondary sealing rings become the main sealing elements after the PTFE seats have been burnt away.

Anti-static devices are also installed on the stem. During the ball valve operation, static charge might build up between ball and seat, and can be potentially dangerous with inflammable fluids. To solve the problem, small metal ball and spring are used to discharge the static and maintain the electric continuity.

There are currently seven types of KHD-FSB series ball valves, including flanged, threaded and butt welded connections. Pressure ratings from a maximum of 420 bar to a minimum of 16BAR. Among them, the ones with the highest market acceptance and the most features are the KHD-FSB35 and 2D series.

In KHD-FSB35, instead of four long body bolts in the conventional three piece ball valves, KHD-FSB35 ball valves use eight strong body bolts to secure connections between center piece and two side caps. For larger sizes, twelve body bolts are used. The tensile body bolts are screwed into the center piece for maximum closure, and also prevent expansion of the bolts.



(A) ISO5211 Actuator Direct Mount

Square stem and twin ISO 5211 pattern mounting pad allow for easy actuator installation without bracket and adaptor.

(B) Stem Packing

Self-adjusting stem packing assembly with Belleville washers for temperature variation, vibration, and security. In KHD-FSB ball valves, graphite stem packing is used to prevent leakage through stem.

(C) Blowout-Proof Stem

The stem is inserted from inside the body bore. This particular design prevents the stem from shooting out when there is excess pressure in the bore caused by high temperature heat.

(D) Anti-Static Device

All KHD-FSB ball valves are equipped with Anti-static Device in the ball bore. This device provides a grounding path between the valve body and the ball for static electric charges.

(E) Body Bolts

The hinge on the central body provides the alignment of body to the end connection. In KHD-FSB ball valves, eight body bolts are screwed into the body to secure the valve structure in high pressure environment. Twelve bolts are used for larger sizes of KHD-FSB35 ball valves.

(F) End Connection

The KHD-FSB35 ball valve is available with threaded end, butt-welding, socket-welding. Other connection type is available upon request.

Fire-Safe Contact Surface

The end cap is specially designed and machined precisely to fit with the valve ball surface. During the event of fire, the soft ball seat may disintegrate in high temperature due to the nature of the material.

Thus, the valve ball comes into contact with the fire-safe contact surface and forms a secondary metal-to-metal seal. The downstream flow pushes the floating ball to the side, and effectively seals the bore.

Graphite Stem Seals and Packing

With the high temperature resistance property, graphite becomes the perfect material of choice for sealing parts. The graphite sealing rings are enclosed in a compartment and will not be in touch with the fluid. Therefore, regardless of the temperature and pressure, graphite seals stay immobile and continuously prevent leakage from or into the joined parts while under compression.

Dual Body Seal

KHD-FSB ball valves utilize two sets of body seals to prevent leakage. The inner body seal which are made with PTFE, for the purposes of avoiding graphite contamination in the fluid, though the chances are rare. The outer body seal is made with graphite material for fire-safe reason. Both seals are securely placed in the groove to avoid movements.

Direct Mounting Pad

For certain models of KHD-FSB ball valve, the dual ISO direct mounting pad allows precise and flexible mounting of actuator. Usually two sets of mounting holes are drilled for different actuator sizes. With the integrally cast top mounting platform, machined flat surface and square stem, the design ensures

correct alignment of the actuator to effectively minimize the side-loading during high cycle or continuous duty applications. The well-supplied (air or electric power) actuation equipments can be removed safely and easily while the valve is under the line pressure.



CERTIFIED QUALITY

Promised quality

Various tests and certifications by international standards has proven the many features of KHD-FSB ball valves. It means total safety in operation with guaranteed tightness.

- » **Valve meets low emission standards (on request)**
With a standard value of 10⁻⁴ mbar l/s, the KHD-FSB significantly outperforms the requirements of the German Technical Instruction on Air Quality Control, and ISO 15848-1 Fugitive Emission Tests.
- » **Fire safe**
The Fire safe tests in accordance with API 607 and EN ISO 10497 have been certified by international lab.
- » **Valve for gaseous fuels**
With special automation assembly, the KHD-FSB can be tested as a emergency shut-off installation for firing and burner systems according to European Norm.
- » **Emission testing according to VDI 2440**
Certified emission testing pursuant to VDI 2440 for the special packing system at room ambient temperature available.
- » **Standard antistatic**
The KHD-FSB standardized anti-static equipment according to ISO 7121 and EN 1983 standards. An anti-static stainless steel ball with spring ensures electrostatic discharge in all sizes of valve.
- » **Operational safety**
The KHD-FSB has a fitting for the installation of a locking device as a standard feature. This eliminates the possibility of unintended utilization and movement.
- » **3.1 Final inspection certificate**
In order to ensure quality, application safety, and guaranteed tightness for the operator, the KHD-FSB is standard issued with a final inspection certificate on the basis of EN 10204-3.1.
- » **Cryogenic option available**
KHD-FSB has a cryogenic version, which is able to operate under severe cryogenic temperature up to -196°C for specific applications.
- » **Sanitary applications**
For food and beverage and relevant sanitary applications, KHD-FSB can offer cavity filler seat

FIRESAFE KHD-FSB

Overview of types



KHD-FSB35
3-Pc Full Port, 140 BAR



KHD-FSB2D
2-Pc Flanged Full Port, PN16/40



KHD-FSB26
High Pressure 2-Pc Full Port, 420 BAR



KHD-FSB23
High Pressure 2-Pc Full Port, 210 BAR



KHD-FSB22
2-Pc Full Port, 140 BAR



KHD-FSB1D
Wafer Type 1-Pc, PN16/40



KHD-FSB11
1-Pc Reduced Port, 140 BAR



FIRE SAFE KHD-FSB35-G



3-Piece Full Port, 2000 PSI (140 BAR) Direct Mount Threaded connection

GENERAL FEATURES

- » Fire safe certificated
- » 3-piece ball valve, full bore
- » Floating ball, anti-static, locking device
- » Bidirectional sealing

CONNECTIONS

Female threaded to
ISO 228-1 / DIN 259
ISO 7-1 / DIN 2999
EN 10226-1

ACCEPTANCE TESTING

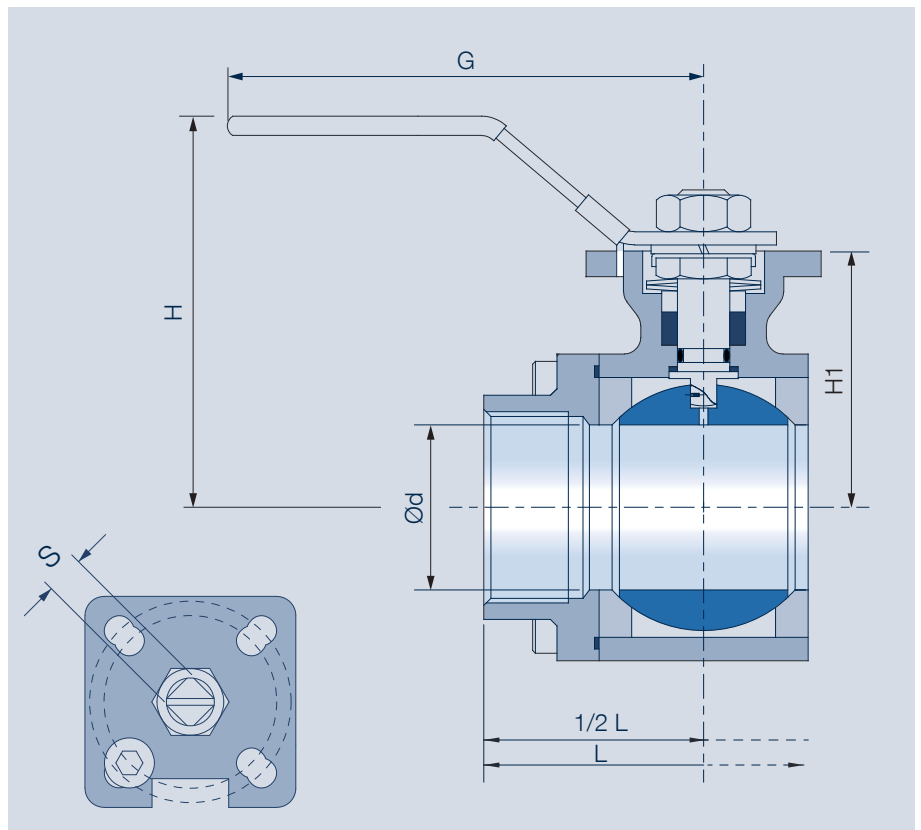
- » Shell strength: EN 12266-1 P10
- » Shell tightness: EN 12266-1 P11
- » Seat leak tightness: EN 12266-1 P12

AUTOMATION

Flange connection in accordance with ISO 5211, allows for direct mounting of an actuator or by means of brackets. Pneumatic and electrical actuators utilizable.

TEMPERATURE

- » -20 °C to +200 °C with Carbon-filled Seat
- » -20 °C to +180 °C with RPTFE / PTFE Seat



KHD-FSB35-G VARIANTS

STANDARD CENTER SECTION

Material: Steel casting 1.0619
(Material code VIII)
Stainless steel casting 1.4408
(Material code Xc)

* Bracket required. For direct mount, please select EXTENDED CENTER SECTION.

EXTENDED CENTER SECTION

Material: Steel casting 1.0619
(Material code VIII)
Stainless steel casting 1.4408
(Material code Xc)

DN	Dimensions						Mounting flange	Torque*	Weight
	Ød	L	H	G	H1	S	ISO	N.m	kg
8*	11	65	70	140	37.5	9	F04	13	1
10*	11	65	70	140	37.5	9	F04	13	1
15*	14	75	70	140	37.5	9	F04	13	1
20	20.5	80	90	180	50	11	F04/F05	19	1.2
25	25	90	100	180	60	11	F04/F05	25	2.1
32	31.5	110	112	215	72	14	F07	28	3.3
40	37	120	115	215	76	14	F07	36	4.5
50	50	140	133	215	93	14	F07	45	7.2
65	65	185	173	330	116.5	22	F07/F10	85	13.4
80	80	205	184	330	127	22	F07/F10	96	21
100	100	240	242	600	159	27	F10	185	34.4
8	11	65	84	140	51.5	9	F04	13	1
10	11	65	84	140	51.5	9	F04	13	1
15	14	75	84	140	51.5	9	F04	13	1
20	20.5	80	104	180	64	11	F04/F05	19	1.3

*Note: Torque measured at ambient temperature with no loading; safety factor is not included.

FIRE SAFE KHD-FSB35-S



3-Piece Full Port, 2000 PSI (140 BAR) Direct Mount Short welding ends

GENERAL FEATURES

- » Fire safe certificated
- » 3-piece ball valve, full bore
- » Floating ball, anti-static, locking device
- » Bidirectional sealing

CONNECTIONS

Welding ends in acc. with DIN EN 12627

DIMENSIONS

Face to Face Dimension in acc. with DIN EN 12982. series 67

ACCEPTANCE TESTING

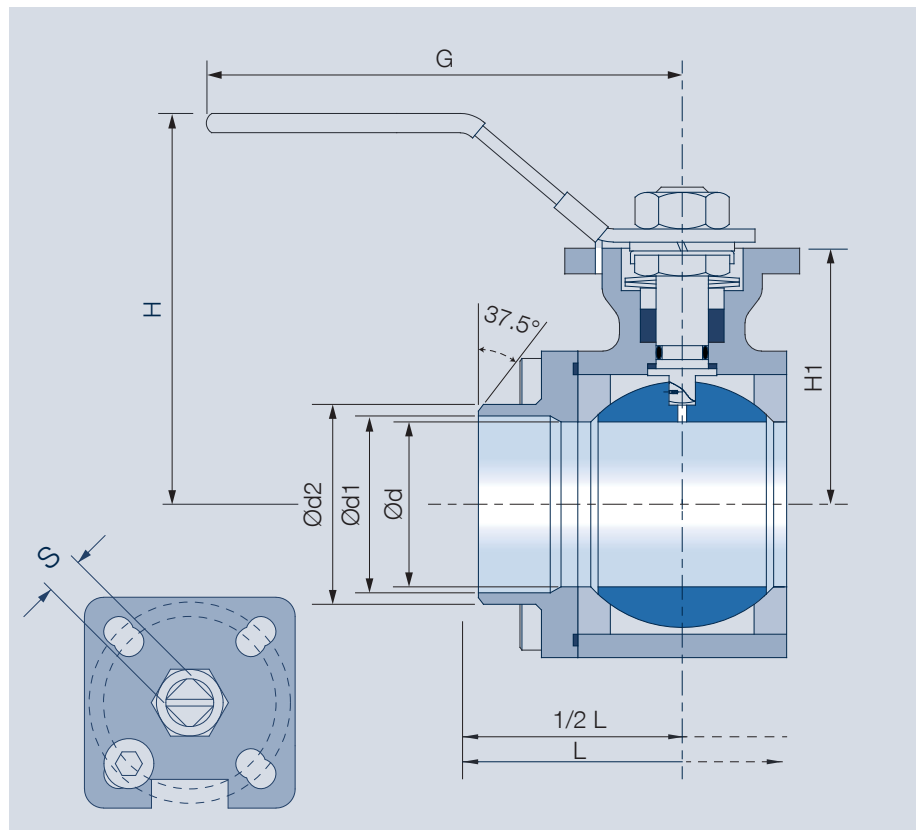
- » Shell strength: EN 12266-1 P10
- » Shell tightness: EN 12266-1 P11
- » Seat leak tightness: EN 12266-1 P12

AUTOMATION

Flange connection in accordance with ISO 5211, allows for direct mounting of an actuator or by means of brackets. Pneumatic and electrical actuators utilizable.

TEMPERATURE

- » -20 °C to +200 °C with Carbon-filled Seat
- » -20 °C to +180 °C with RPTFE / PTFE Seat



KHD-FSB35-S VARIANTS

STANDARD CENTER SECTION

Material: Steel casting 1.0619
(Material code VIII)
Stainless steel casting 1.4408
(Material code Xc)

* Bracket required. For direct mount, please select EXTENDED CENTER SECTION.

EXTENDED CENTER SECTION

Material: Steel casting 1.0619
(Material code VIII)
Stainless steel casting 1.4408
(Material code Xc)

DN	Dimensions								Mounting flange	Torque*	Weight
	Ød	L	H	G	H1	S	Ød1	Ød2	ISO	N.m	kg
8*	11	70	70	140	37.5	9	7.8	13.8	F04	13	1
10*	11	70	70	140	37.5	9	10.8	17.3	F04	13	1
15*	14	75	70	140	37.5	9	14.3	21.7	F04	13	1
20	20.5	90	90	180	50	11	19.7	27.2	F04/F05	19	1.2
25	25	100	100	180	60	11	25	34	F04/F05	25	2.1
32	31.5	110	112	215	72	14	32.9	42.7	F07	28	3.3
40	37	125	115	215	76	14	38.4	48.6	F07	36	4.5
50	50	150	133	215	93	14	49.5	60.5	F07	45	7.2
65	65	190	173	330	117	22	58.9	73	F07/F10	85	13.4
80	80	220	184	330	127	22	73.6	89	F07/F10	96	21
100	100	270	242	600	159	27	97.1	114	F10	185	34.4
8	11	70	84	140	51.5	9	7.8	13.8	F04	13	1
10	11	70	84	140	51.5	9	10.8	17.3	F04	13	1
15	14	75	84	140	51.5	9	14.3	21.7	F04	13	1
20	20.5	90	104	180	64	11	19.4	27.2	F04/F05	19	1.2

*Note: Torque measured at ambient temperature with no loading; safety factor is not included.

FIRE SAFE KHD-FSB2D-F



2-Piece Full Port, PN16/40 Direct Mount Flange design

GENERAL FEATURES

- » Fire safe certificated
- » 2-piece ball valve, full bore
- » Floating ball, anti-static, locking device
- » Bidirectional sealing

CONNECTIONS

Flange in acc. with DIN 2632/2633, DIN 2634/2635

DIMENSIONS

Face to Face Dimension DIN 3202-F4

ACCEPTANCE TESTING

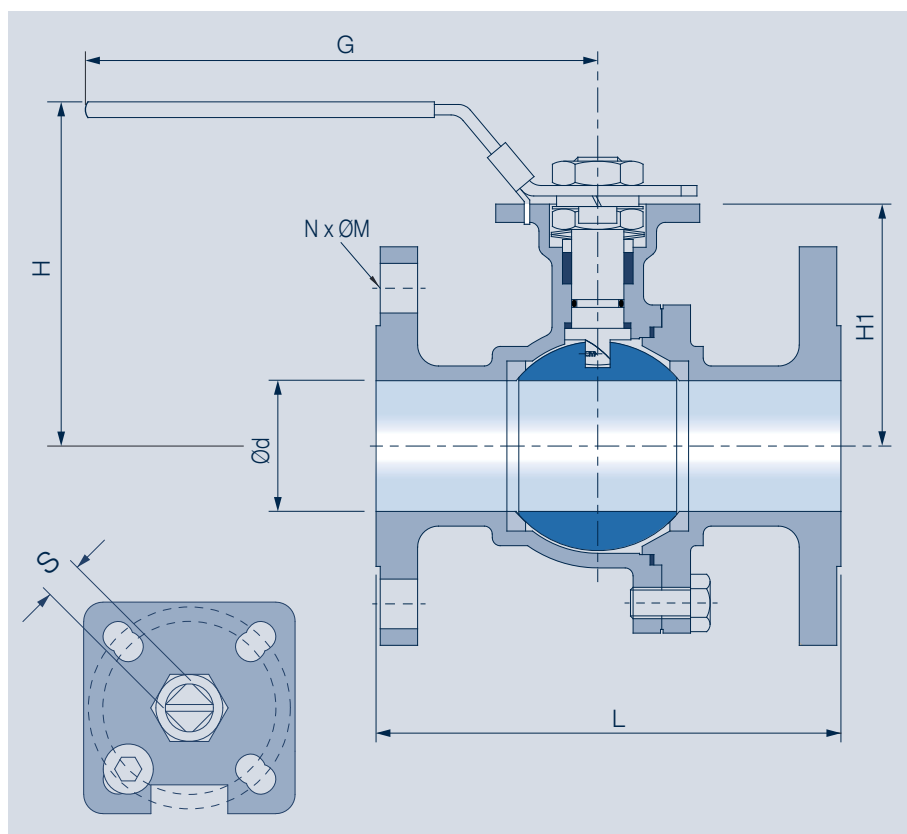
- » Shell strength: EN 12266-1 P10
- » Shell tightness: EN 12266-1 P11
- » Seat leak tightness: EN 12266-1 P12

AUTOMATION

Flange connection in accordance with ISO 5211, allows for direct mounting of an actuator or by means of brackets. Pneumatic and electrical actuators utilizable.

TEMPERATURE

- » -40 °C to +180 °C with TFM1600 seat
- » -20 °C to +180 °C with RPTFE / PTFE Seat



KHD-FSB2D-F VARIANTS

PN16

Material: Steel casting 1.0619
(Material code VIII)
Stainless steel casting 1.4408
(Material code Xc)

PN40

Material: Steel casting 1.0619
(Material code VIII)
Stainless steel casting 1.4408
(Material code Xc)

	Dimensions								Mounting flange	Torque*	Weight
DN	Ød	L	H	G	H1	S	N	M	ISO	N.m	kg

DN15-DN50 same as PN40											
65	64	170	152	300	105	17	4	18	F07/F10	55	13.8
80	76	180	164	300	116	17	8	18	F07/F10	95	18.4
100	100	190	194	335	138	22	8	18	F10/F12	180	25.3
150	150	350	278	580	218	27	8	23	F12/F14	300	-
200	200	400	355	950	267	27	8	23	F14	600	-

15	15	115	88	135	49	9	4	14	F03/F04	13	2.2
20	20	120	93	135	54	9	4	14	F03/F04	15	3
25	25	125	98	165	59	11	4	14	F04/F05	20	4.3
32	32	130	110	165	72	SS	4	18	F04/F05	25	5.6
40	38	140	116	195	77	14	4	18	F05/F07	30	7.2
50	50	150	124	195	85	14	4	18	F05/F07	44	9.6
65	64	170	152	300	105	17	8	18	F07/F10	55	13.8
80	76	180	164	300	116	17	8	18	F07/F10	95	18.4
100	100	190	194	335	138	22	8	22	F10/F12	180	25.3
150	150	350	278	580	218	27	8	26	F12/F14	300	-
200	200	400	355	950	267	27	8	30	F14	600	-

*Note: Torque measured at ambient temperature with no loading; safety factor is not included.

FIRE SAFE KHD-FSB26-G



High Pressure 2-Piece, 6000 PSI (420 BAR)
Threaded ends

GENERAL FEATURES

- » Fire safe certificated
- » 2-piece ball valve, full port: DN8-40; reduced port: DN50
- » Floating ball, anti-static, locking device
- » Bidirectional sealing

CONNECTIONS

Female threaded to
ISO 228-1 / DIN 259
ISO 7-1 / DIN 2999
EN 10226-1

ACCEPTANCE TESTING

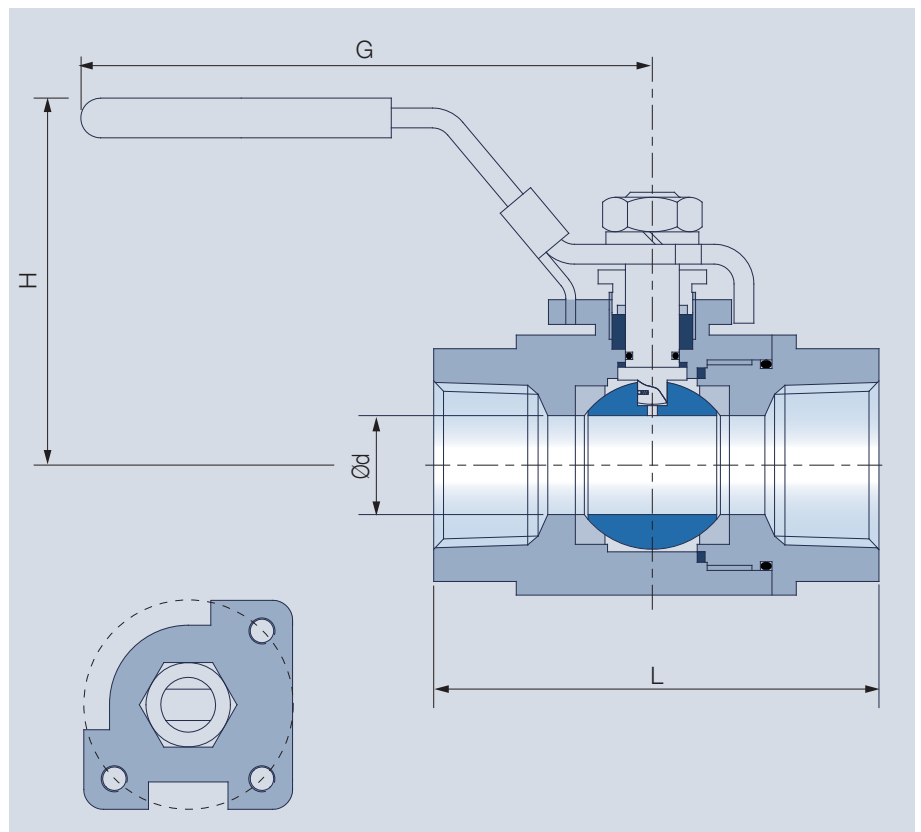
- » Shell strength: EN 12266-1 P10
- » Shell tightness: EN 12266-1 P11
- » Seat leak tightness: EN 12266-1 P12

AUTOMATION

Flange connection in accordance with ISO 5211, allows for mounting of brackets. Pneumatic and electrical actuators utilizable.

TEMPERATURE

- » -20 °C to +80 °C with DELRIN® seat
- » -20 °C to +240 °C with PEEK™ seat



KHD-FSB26-G VARIANTS

FULL BORE

Material: Steel casting 1.0619
(Material code VIII)
Stainless steel casting 1.4408
(Material code Xc)

REDUCED BORE

DN	Dimensions				Mounting Pad for Bracket	Weight
	Ød	L	H	G	ISO	kg
8	11.4	76	60	128	F03	0.6
10	12.7	76	60	128	F03	0.9
15	12.7	102	60	128	F03	0.9
20	19.1	108	68	150	F04	1.5
25	25.4	114	80	180	F05	2.5
32	32	124	114	255	F07	4.3
40	38.1	133	124	255	F07	6
50	38.1	159	124	255	F07	7.5

FIRE SAFE KHD-FSB23-G



High Pressure 2-Piece, 3000 PSI (210 BAR) Threaded ends

GENERAL FEATURES

- » Fire safe certificated
- » 2-piece ball valve, full port: DN8-DN40;
standard port: DN50
- » Floating ball, anti-static, locking device
- » Bidirectional sealing

CONNECTIONS

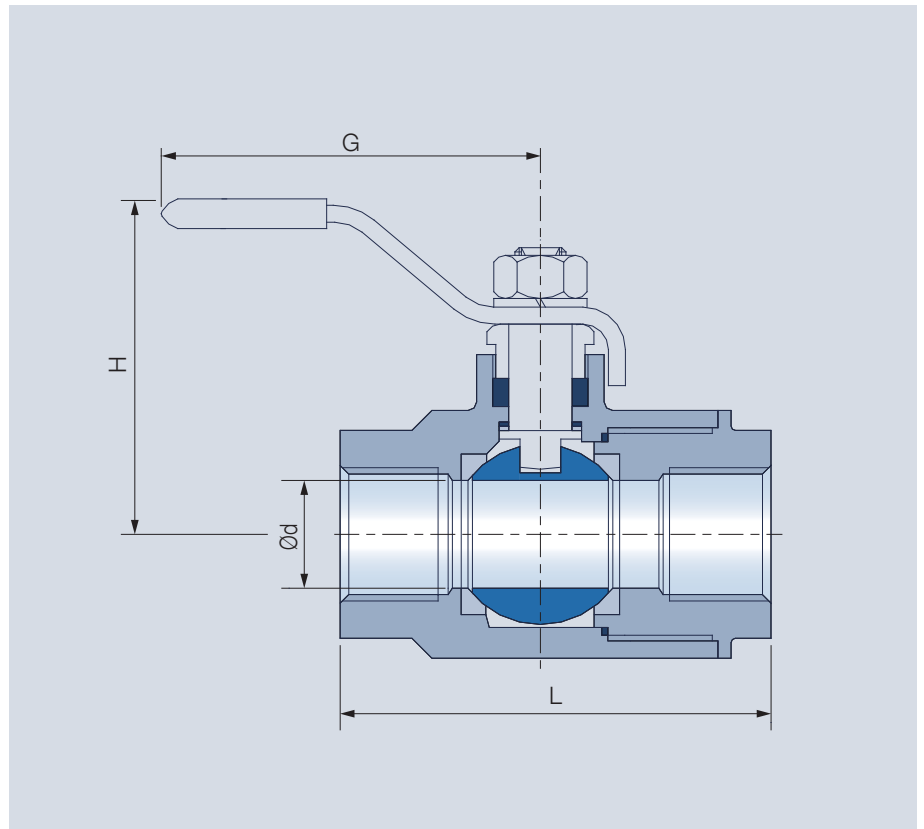
Female threaded to
ISO 228-1 / DIN 259
ISO 7-1 / DIN 2999
EN 10226-1

ACCEPTANCE TESTING

- » Shell strength: EN 12266-1 P10
- » Shell tightness: EN 12266-1 P11
- » Seat leak tightness: EN 12266-1 P12

TEMPERATURE

- » -20 °C to +80 °C with DELRIN® seat
- » -20 °C to +240 °C with PEEK™ seat



KHD-FSB23-G VARIANTS

FULL BORE

Material: Steel casting 1.0619
(Material code VIII)
Stainless steel casting 1.4408
(Material code Xc)

STANDARD BORE

DN	Dimensions				Weight
	Ød	L	H	G	kg
8	11.4	76	60	128	0.7
10	12.7	76	60	128	0.7
15	12.7	79	60	128	0.6
20	19.1	94	68	150	1.3
25	25.4	102	80	170	1.7
32	32	116	86	170	2.4
40	38	124	121	262	3.8
50	44.5	149	125	260	5.9

FIRE SAFE KHD-FSB22-G



2-Piece Full Port, 2000 PSI (140 BAR) Threaded ends

GENERAL FEATURES

- » Fire safe certificated
- » 3-piece ball valve, full bore
- » Floating ball, anti-static, locking device
- » Bidirectional sealing

CONNECTIONS

Female threaded to
ISO 228-1 / DIN 259
ISO 7-1 / DIN 2999
EN 10226-1

ACCEPTANCE TESTING

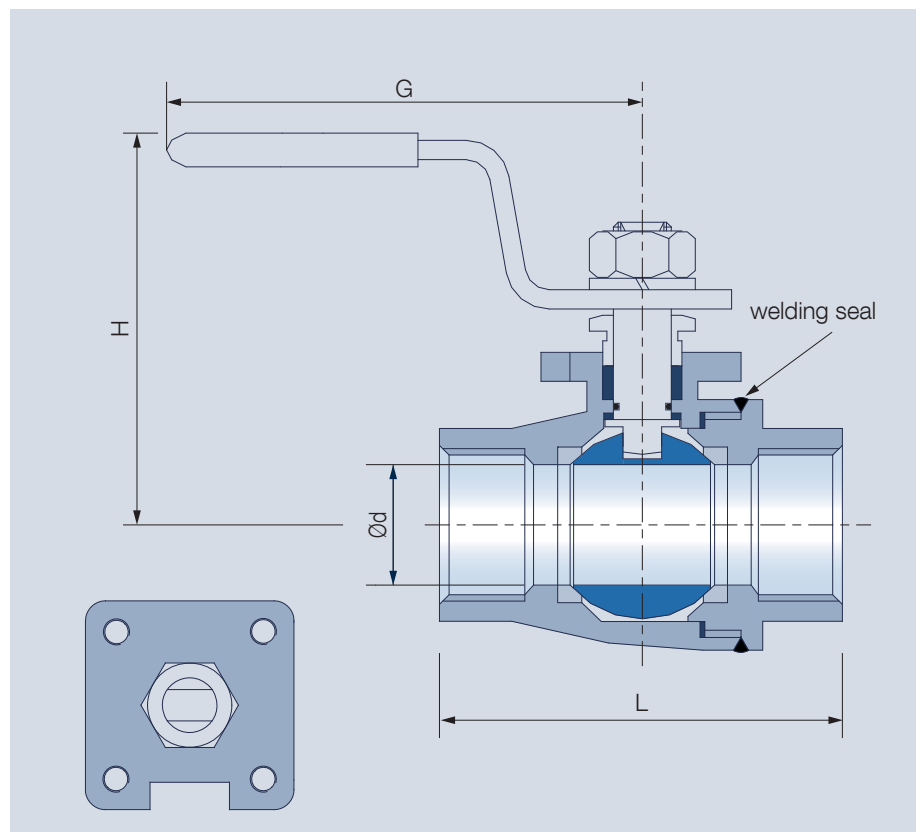
- » Shell strength: EN 12266-1 P10
- » Shell tightness: EN 12266-1 P11
- » Seat leak tightness: EN 12266-1 P12

AUTOMATION

Flange connection in accordance with ISO 5211, allows for mounting of brackets. Pneumatic and electrical actuators utilizable.

TEMPERATURE

-20 °C to +180 °C with RPTFE / PTFE Seat



KHD-FSB22-G VARIANTS

2000 PSI (140 BAR)

Material: Steel casting 1.0619
(Material code VIII)
Stainless steel casting 1.4408
(Material code Xc)

1500 PSI (100 BAR)

Material: Steel casting 1.0619 (code VIII)
Stainless steel 1.440 (code Xc)

DN	Dimensions				Mounting Pad for Bracket	Torque*	Weight
	Ød	L	H	G	ISO	N.m	kg
8	11	59	54	135	F03	5	0.4
10	12.5	59	54	135	F03	5	0.3
15	15	62	56	135	F03	5	0.4
20	20	73	64	135	F03	10	0.6
25	25.4	85	68	165	F04	15	1
32	32	97	74	165	F04	20	1.4
40	38	115	90	175	F05	25	2.2
50	50	134	100	175	F05	30	3.8
65	65	168	137	260	F07	45	6.5
80	80	191	147	260	F07	55	11.8
100	100	231	176	280	F10	80	20.5

*Note: Torque measured at ambient temperature with no loading; safety factor is not included.

FIRE SAFE KHD-FSB1D-W



Wafer Type 1-Piece, PN16/40 Direct Mount

GENERAL FEATURES

- » Fire safe certificated
- » 1-piece ball valve, full bore
- » Floating ball, anti-static, locking device
- » Bidirectional sealing

CONNECTIONS

Flange in acc. with DIN 2632/2633, DIN 2634/2635

ACCEPTANCE TESTING

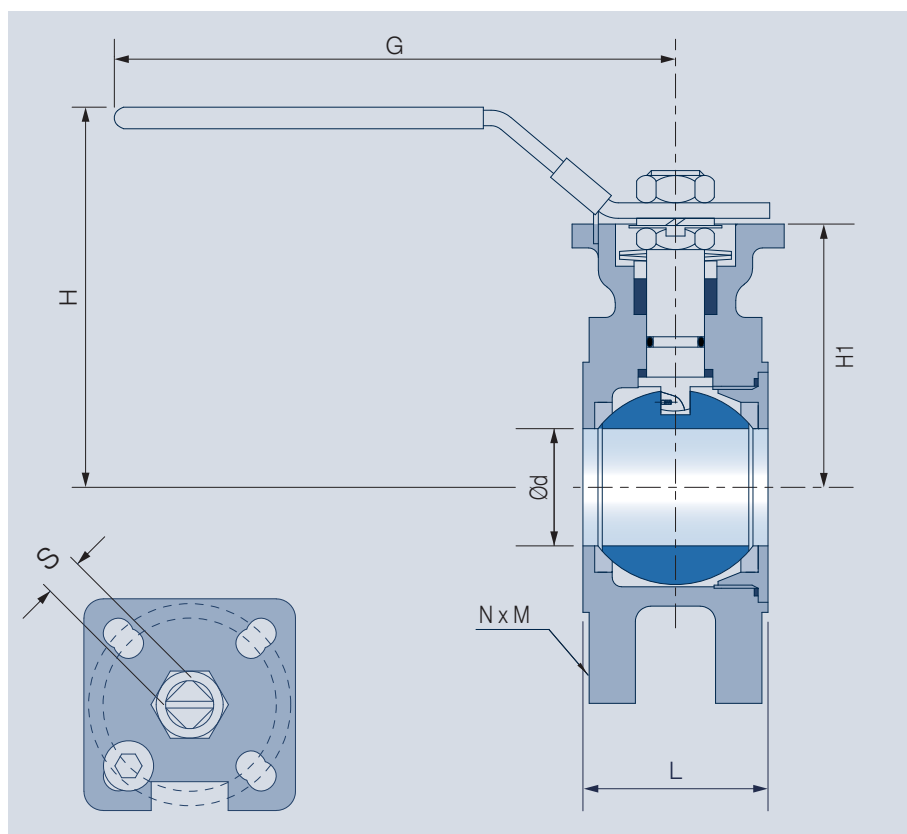
- » Shell strength: EN 12266-1 P10
- » Shell tightness: EN 12266-1 P11
- » Seat leak tightness: EN 12266-1 P12

AUTOMATION

Flange connection in accordance with ISO 5211, allows for direct mounting of an actuator or by means of brackets. Pneumatic and electrical actuators utilizable.

TEMPERATURE

- » -40 °C to +180 °C with TFM1600 seat
- » -20 °C to +180 °C with RPTFE / PTFE Seat



KHD-FSB1D-W VARIANTS

PN16

Material: Steel casting 1.0619
(Material code VIII)
Stainless steel casting 1.4408
(Material code Xc)

PN40

Material: Steel casting 1.0619
(Material code VIII)
Stainless steel casting 1.4408
(Material code Xc)

	Dimensions								Mounting flange	Torque	Weight
DN	Ød	L	H	G	H1	S	N	M	ISO	N.m	kg

DN15-DN50 same as PN40											
65	65	110	152	300	105	17	4	M16	F07	60	11.6
80	76	121	161	300	113	17	8	M16	F07	80	14.5
100	96	148	190	335	134	22	8	M16	F07/F10	100	21
150	125	192	250	600	174	27	8	M20	F10/F12	180	45

15	15	52	88	135	49	9	4	M12	F03/F04	6	1.6
20	20	52	93	135	54	9	4	M12	F03/F04	7	2.1
25	25	60	98	165	59	11	4	M12	F04/F05	10	2.8
32	32	58	101	165	63	11	4	M16	F04/F05	15	3
40	38	78	116	195	77	14	4	M16	F05/F07	25	5.3
50	50	80	124	195	85	14	4	M16	F05/F07	35	6.9

*Note: Torque measured at ambient temperature with no loading; safety factor is not included.

FIRE SAFE KHD-FSB11-G



1-Piece Reduced Port, 2000 PSI (140 BAR)

GENERAL FEATURES

- » Fire safe certificated
- » 1-piece ball valve, reduced bore
- » Floating ball, anti-static, locking device
- » Bidirectional sealing

CONNECTIONS

Female threaded to
ISO 228-1 / DIN 259
ISO 7-1 / DIN 2999
EN 10226-1

ACCEPTANCE TESTING

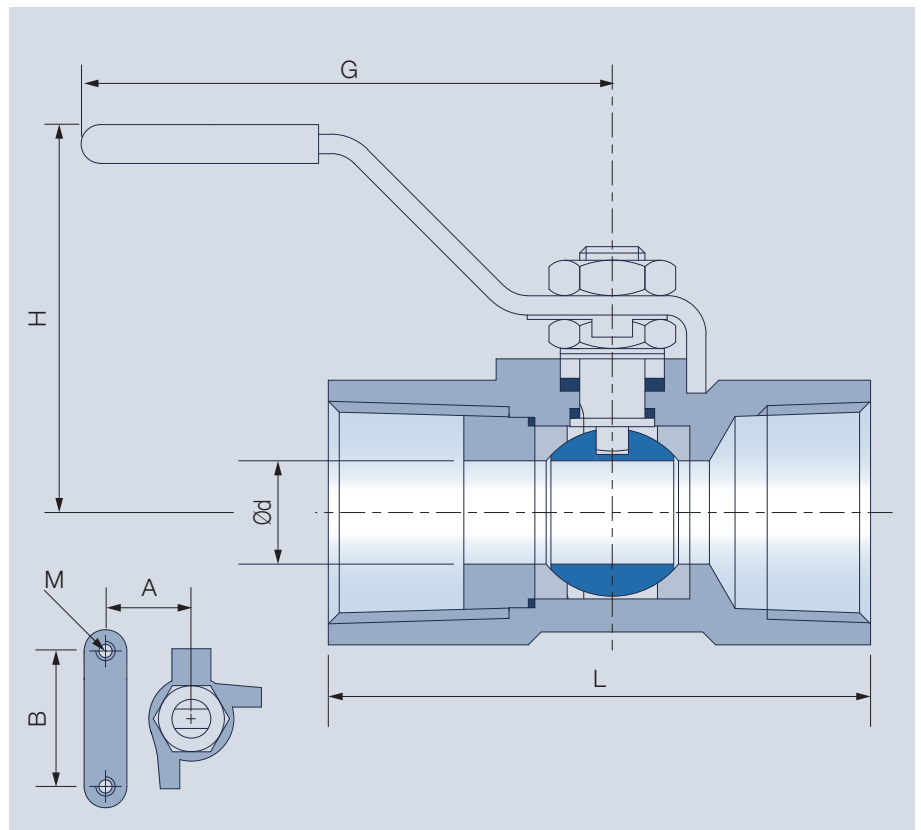
- » Shell strength: EN 12266-1 P10
- » Shell tightness: EN 12266-1 P11
- » Seat leak tightness: EN 12266-1 P12

AUTOMATION

The semi-mounting pad allows mounting of brackets. Only used for sensing devices such as limit switches or other components without over torque.

TEMPERATURE

- » -40 °C to +180 °C with TFM1600 seat
- » -20 °C to +180 °C with RPTFE / PTFE Seat



KHD-FSB11-G VARIANTS

REDUCED BORE

Material: Steel casting 1.0619
(Material code VIII)
Stainless steel casting 1.4408
(Material code Xc)

DN	Dimensions				Semi-Mounting Pad for Bracket			Weight kg
	Ød	L	H	G	A	B	M	
8	9.2	67	46	110	12.7	28.5	10-24UNC	0.3
10	9.2	67	46	110	12.7	28.5	10-24UNC	0.3
15	9.2	67	46	110	12.7	28.5	10-24UNC	0.3
20	12.5	71	50	110	12.7	28.5	10-24UNC	0.4
25	16	84	60	140	22.1	34.8	10-24UNC	0.7
32	20	94	65	140	22.1	34.8	10-24UNC	1.1
40	24.5	100	72	160	23.6	38.1	¼"-20UNC	1.3
50	32	118	78	160	23.6	38.1	¼"-20UNC	2.0

VALVE SEAT SELECTION

Pressure and temperature charts



Virgin PTFE

The most common material of seat ring. With excellent chemical resistance, PTFE can be used almost in all media.



DELTRIN

High pressure seat material. Delrin material is able to sustain pressure up to 6000 psig. However, it is not recommended to use in oxygen applications.



PEEK

Highest pressure resistance. Excellent in recovery from deformation, and high degree of dimensional stability. High mechanical strength.

Reinforced PTFE

Similar to PTFE, but offers higher pressure capacity while temperature is increasing. The material itself is harder than conventional PTFE. Please specify the application due to confusion with PTFE.



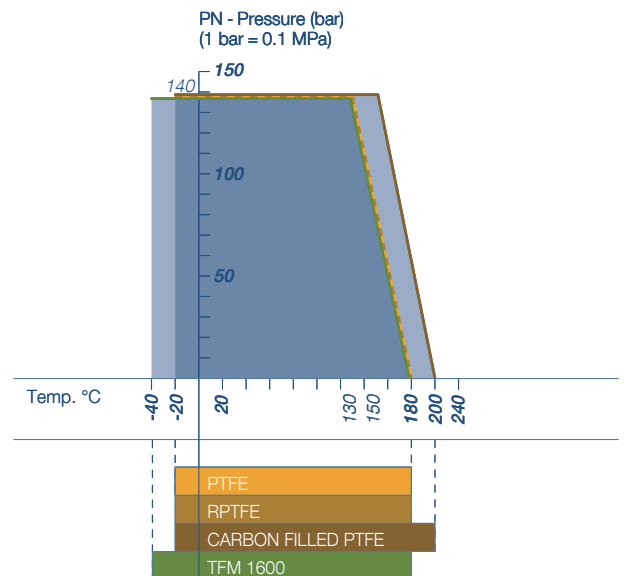
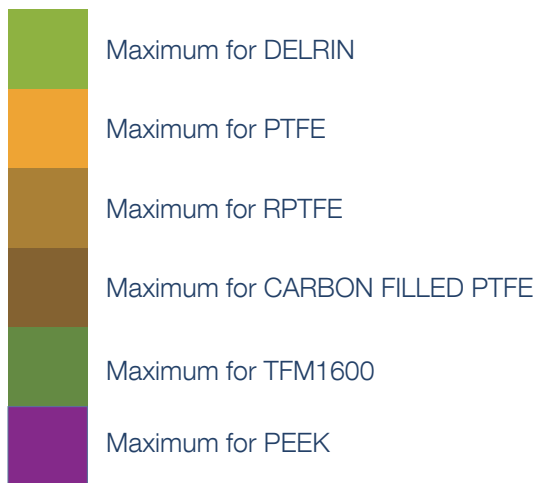
Carbon Filled PTFE

The most common material of seat ring. With excellent chemical resistance, PTFE can be used almost in all media.



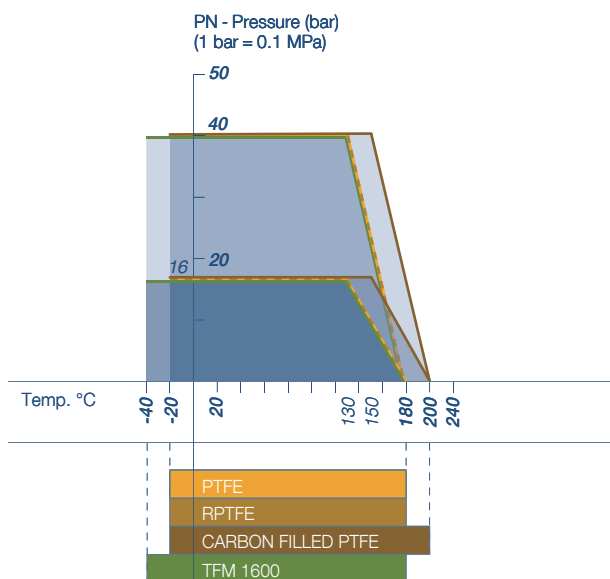
TFM1600

TFM is a modified PTFE which reduces permeation to provide advantages for corrosive applications or those applications where PTFE is used as a barrier to protect against or contain aggressive chemicals.



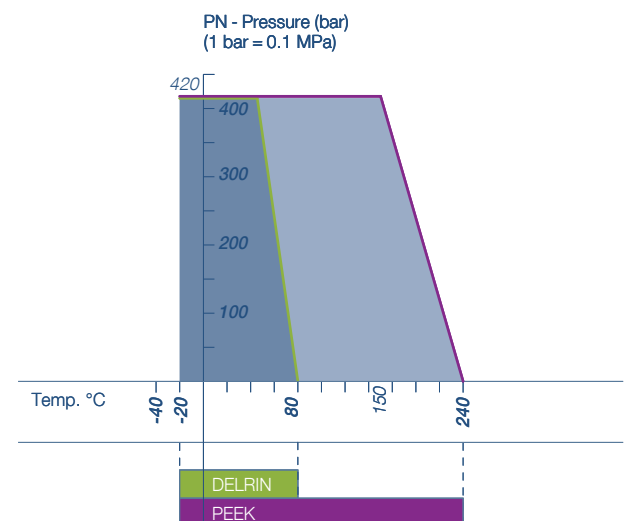
KHD-FSB35/FSB11

Material code Xc/VIII



KHD-FSB2D/FSB1D

Material code Xc/VIII

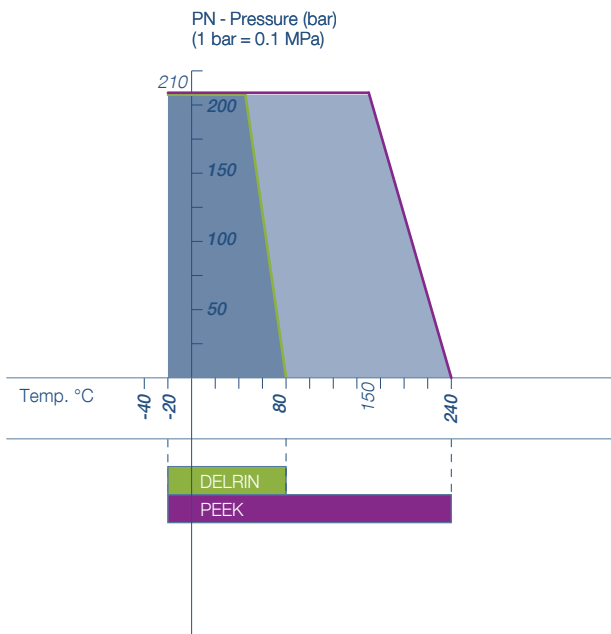


KHD-FSB26

Material code

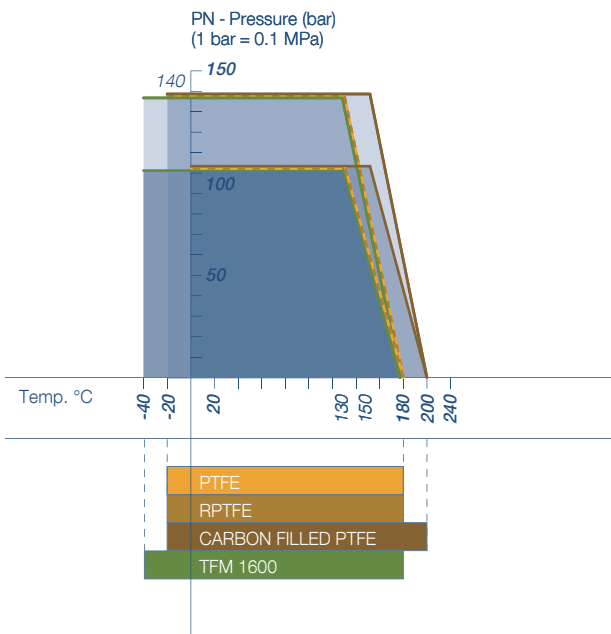
VALVE SEAT SELECTION

Pressure and temperature charts



KHD-FSB23

Material code Xc/VIII



KHD-FSB22

Material code Xc/VIII

TECHNICAL DETAILS

Flow characteristics for the determination of the nominal diameter

The left table represents the Flow Coefficients (Cv) and Flow Factor (Kv) for KHD-FSB full bore ball valves. This number represents the volume of water at 60°F that will flow in US gallon per minute through a valve with a 1 lb/in² pressure drop across in the full open position. For Kv, it is the flow of water with temperature from 5°C - 30°C in cubic meters per hour (m³/h) with a pressure drop of 1 bar.

$$Cv = F \sqrt{\frac{SG}{\Delta P}}$$

The Cv value is dependent on flow rate, pressure drop, specific gravity. The larger the Cv value, the easier the fluid will flow within the valve. However, Cv value is easily affected by various factors, such as fluid type, fluid viscosity, saturated steam pressure.

Flow Coefficients of full bore ball valves			
SIZE		Kv	Cv
DN	NPS		
15	1/2	19.7	23
20	3/4	38.6	45
25	1	66	77
40	1½	165	192
50	2	307	358
65	2½	524	611
80	3	736	858
100	4	1296	1512

Flow Coefficients (Kv) of V-port Ball Valve											
DN	Bore Angle	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
15	30°	0.00	0.02	0.27	0.44	0.76	1.25	1.90	2.69	3.41	4.92
	60°	0.00	0.03	0.28	0.62	1.13	1.73	2.72	3.90	5.92	8.66
	90°	0.00	0.03	0.29	0.72	1.35	2.20	3.50	5.38	8.40	13.06
20	30°	0.00	0.03	0.32	0.68	1.27	1.86	3.00	4.17	5.51	7.21
	60°	0.00	0.03	0.35	0.81	1.79	2.71	4.38	6.49	9.48	14.39
	90°	0.00	0.03	0.39	1.10	2.11	3.54	5.73	9.64	14.97	23.62
25	30°	0.00	0.21	0.81	1.39	2.06	3.32	4.58	6.41	8.43	10.55
	60°	0.00	0.22	0.83	1.85	2.95	4.66	7.00	10.66	14.85	23.00
	90°	0.00	0.24	0.93	2.18	3.84	6.39	10.03	15.35	22.89	34.72
32	30°	0.00	0.48	1.43	2.18	3.61	5.21	7.40	10.40	13.75	17.18
	60°	0.00	0.48	1.50	2.78	4.79	7.54	11.21	16.55	23.29	33.56
	90°	0.00	0.64	1.98	3.85	6.36	10.11	16.06	25.16	37.88	60.65
40	30°	0.00	0.39	1.17	2.10	4.68	7.09	9.73	13.02	19.10	24.44
	60°	0.00	0.29	1.36	2.62	6.25	10.15	14.98	22.68	34.32	47.63
	90°	0.00	0.53	2.03	4.67	8.32	13.41	21.32	33.25	53.74	82.90
50	30°	0.00	0.98	2.61	5.58	8.25	12.07	17.74	23.35	32.02	40.57
	60°	0.00	1.12	3.60	7.28	11.95	18.26	27.28	41.95	59.56	78.68
	90°	0.00	1.23	4.38	9.86	15.86	25.26	41.45	62.77	94.44	148.21
65	30°	0.00	1.85	4.26	8.53	13.59	21.57	29.33	42.07	54.65	67.70
	60°	0.00	1.73	5.50	12.71	19.42	29.82	45.24	68.93	91.91	128.71
	90°	0.00	1.53	9.97	18.04	27.94	43.38	72.07	102.38	154.44	216.29
80	30°	0.00	1.68	4.31	10.38	16.74	25.61	36.67	49.66	68.86	89.87
	60°	0.00	1.22	11.57	13.50	23.59	46.24	70.27	95.85	116.31	162.62
	90°	0.00	1.79	9.95	18.97	32.82	55.37	85.03	134.60	200.88	332.39
100	30°	0.00	3.33	9.17	16.66	30.00	45.91	62.32	86.14	112.54	137.00
	60°	0.00	5.54	13.11	21.19	44.27	69.36	101.59	149.23	208.53	283.91
	90°	0.00	6.15	20.79	37.17	62.73	95.23	145.84	224.68	343.50	557.41

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