



**Repair and Maintenance Service**

- Repair and maintenance
- Field sketch
- Parts replacement
- Whole machine replacement
- Spare parts and standbys

**On-site Service**

- Material confirmation
- Cleaning service
- Performance test
- Installation and commissioning
- Unit operating guarantee

**Technical Service**

- Selection consultation
- On-line diagnose
- Operation evaluation
- Data sharing
- System integration
- Technical training



**MFB Series  
KHV Rising Stem Ball Valve**

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KHV-PE-08/2014

**KHV FLOWCONTROL CO., LTD**

## KHV Valve Group Products Related Patent Certificate



For more product patent, please consult our technology research and development department.

## MFB series rising stem ball valve

- ◆ KHV self-developed MFB rising stem ball valve has a developing history of about 20 years and obtained many patent certificates. This products have fugitive emission ISO15848 and fire test certificate. And the application of this valves mainly used in the device of catalyzing and cracking, continuous reforming, hydro-cracking, isomerization and etc., LNG or LPG gas processing plant, inlet and outlet of the pump or compressor, and process unit in the coal chemical. The main functions of MFB rising stem ball valve are: open and closing, shut-off, control and regulate, measuring, isolation, bypass, vent and drain etc.
- ◆ As one of KHV most core mature products, MFB rising stem ball valve has been continuously improved by our technology team combined with different industry applications based on the over 20 years developing experience. By June 2014, we have provided more than 10,000 sets of rising stem ball valve for global customers.

In **September 2013**, under witness of many experts, KHV successfully completed **100** times full pressure differential on-off performance test of high pressure hydrogenation rising stem ball valve developed for one of domestic hydrocracking unit (**NPS8, CLASS 1500**).



- ◆ Use for oil-gas storage unit in **April 2014**, which together developed with CNPC, (**NPS16 & NPS14, CLASS 900**).



- ◆ In **July 2014**, KHV Vprovided 102pcs rising stem ball for one of Sinopec large-scale isomerization unit (**UOP process**) successfully commissioned (**NPS 1 – NPS8, CLASS 300**).



## Core parts solutions

Sealing surface and cavity hardening treatment(coating)



## Realization leakage class VI sealing support

Super-hard sealing surface machining technology (imported 5-axis ball surface grinding)



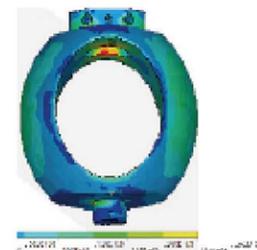
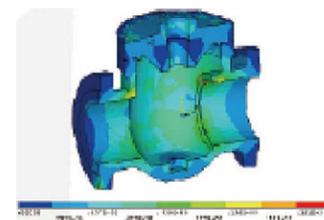
## ■ Mass production support



Ball and seat matching grinding (imported lapping compound)



Wear resistant high temperature type approval test and finite element numerical simulation



## ■ MFB series rising stem ball valve



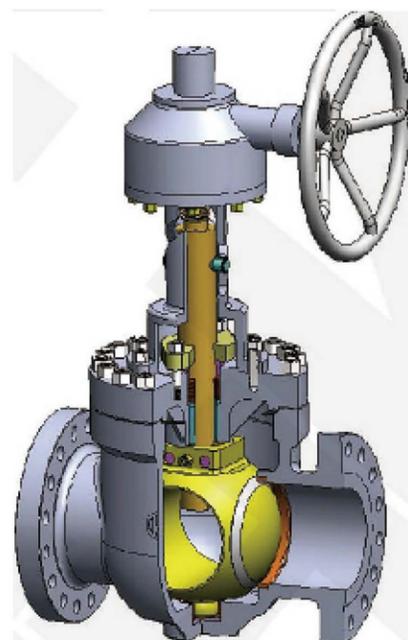
## MFB series rising stem ball valve



## Application standard

Item	Standard	Standard Description
Valve Design	API 608	Metal ball valves – flanged, threaded and welding ends
	API 6D	Pipeline Valves
	ASME B16.34	Steel valves – flanged, welding and threaded ends
	ASME Volume VIII	Pressure vessel construction rules
Face-to-face Dimension	Enterprise Standard	Specification for MFB series ball valve design
	ASME B16.10	Face-to-face and end-to-end dimension of valves
Connection Standard	MFR	Factory standard
	ASME B16.5	Pipe flanges and flanged fittings
	MSS SP-44	Steel pipeline flanges
	ASME B16.25	Butt welding end
	ASME B16.11	Forged fittings, socket welding and threaded
	ASME B1.20.1	Pipe threads, general purpose (INCH)
Material Specification	ASTM Material specification	
	API 598	Valve inspection and testing
Performance Test	ANSI /FCI 70-2	Control valve seat leakage
	ISO 15848	Industrial valves – Measurement, test and qualification procedures for fugitive emissions
	ATEX	Explosion proof certification
Fire Test	API 607	Requirements for valve fire test
Valve Degreasing	HG 20202	Specification for construction and acceptance of degreasing work
NDT	ASME Volume V	Non-destructive test
Valve Identification	MSS SP-25	Standard marking systems for valves, fittings, flanges and unions

## Rising Stem Ball Valve Main Structural Characteristics:



### Forced seal

The bevel of the rising stem on the bottom provides a mechanical chocking force to ensure continuously tight sealing.

### Low torque operation

There is no seal rubbing, so the operation torque is very low.

### Self-cleaning function

Moving the ball away from the seat before rotation causes immediate flow around 360 degrees of the ball place. Product flow flushes any foreign material away from the seat.

### Single seat design

Avoid the problems of trapped pressure between seals.

### Patent stem guiding cam structure design

Spiral grooves does not be machined directly on stem, but on the bracket. So the strength of the stem is high, and the stress concentration and bending are not easy to be occurred.

### No Rubbing between sealing surfaces

The tilt-and-turn action eliminates seal abrasion, which is the major cause of seat wear in conventional ball, gate and plug valves.

### Optimum flow

The full and reduced bore openings give high Cv values. System pumping efficiency is enhanced and erosion problems are reduced.

### Long life

Rising stem ball valve replaced the traditional ball valve, gate valve, globe valve and plug valve. Its design has performance advantages that reduce plant outage and reduce the cost of owner.

### Top entry design

In line inspection and repair, after system depressurizing, simplifies maintenance.

### Wear-resistant hard facing on sealing surface

The sealing surface is a hard, polished material that will endure severe service, without loss of sealing integrity.

## How to order rising stem ball valve

Sizes for choosing (● means there is supplying performance, ✘ and the specification and sizes beyond the range in the table please consult our company technology department).

	Class150	Class300	Class600	Class900	Class1500	Class2500
NPS2	✘	●	●	●	●	●
NPS3	●	●	●	●	●	●
NPS4	●	●	●	●	●	●
NPS5	●	●	●	●	●	●
NPS6	●	●	●	●	●	●
NPS8	●	●	●	●	●	●
NPS10	●	●	●	●	●	●
NPS12	●	●	●	●	●	✘
NPS14	●	●	●	●	●	✘
NPS16	●	●	●	●	✘	✘
NPS18	●	●	●	●	✘	✘
NPS20	●	●	●	●	✘	✘
NPS24	●	●	●	✘	✘	✘

### Type Arrangement

Ball Valve 8 MFB 1 RF -BP CF8M / 20H20H30A -GT  
 A B C D E F G H K

A: valve name: ball valve

B: valve specification: NPS 8, written as 8; for reduced bore valve, NPS 8\*6, written as 8\*6

C: valve type code: MFB is the type code of forced seal ball valve.

D: pressure class: 1 – class 150, 3 – class 300, 6 – class 600, 9 – class900, 15 – class1500, 25 – class 2500

E: connection: RF – raised face, RJ – ring joint face, BW – butt welding, SW – socket welding. NPT – threaded end

F: special requirement code for the type: according to customer's requirements or consult our technology department

G: Body material: marked as the material brand

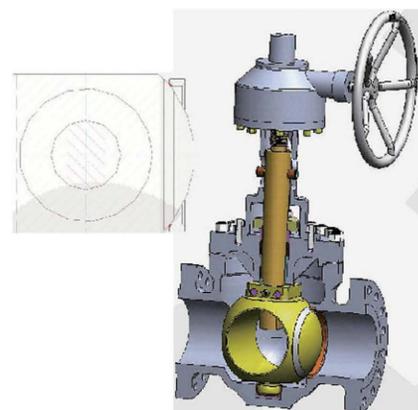
H: Trim code: including ball, ball sealing surface, seat, seat sealing surface, stem and seat sealing ring, specific shall be according to customer's requirements or consult our technology department

K: special requirement code for the material: according to customer's requirements or consult our technology department

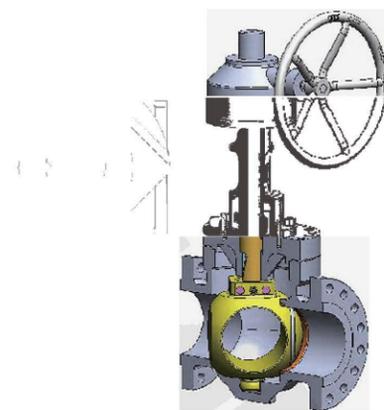
## Rising stem ball valve operating principle

### Opening Process

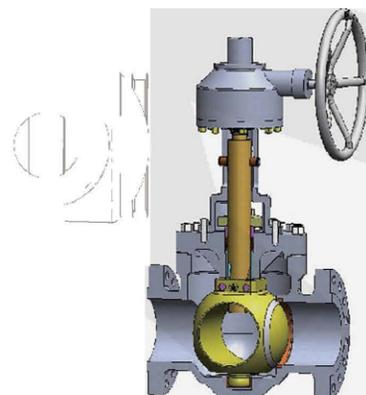
1. The ball firmly against the seat under the forced action of stem on close position.



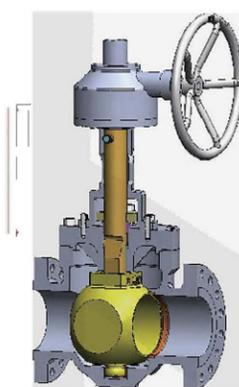
2. Counter-clockwise rotate the hand wheel, the stem rises, the two surfaces makes the ball deviate from the seat.



3. The stem continuously rises. The guiding pin on the stem acts with the spiral groove on the bracket, making the ball rotates without friction.

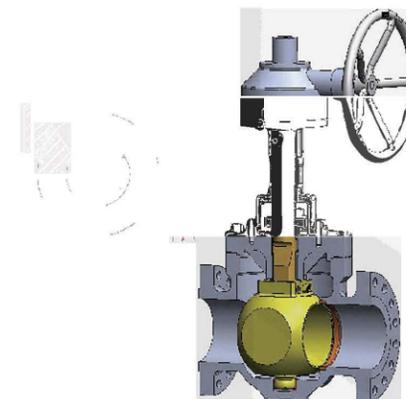


4. To the fully open position, the stem rises to the limit position, and the ball rotates to the fully open position.

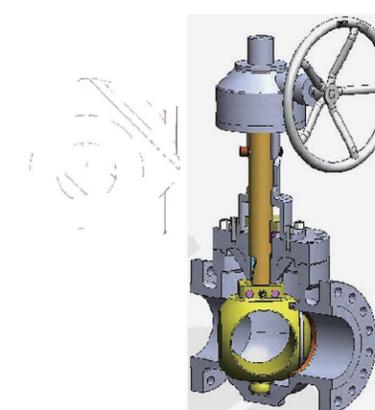


### Closing process

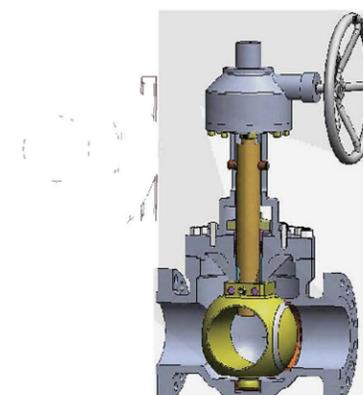
5. Clockwise rotate the hand wheel when closing. The stem begins to lower and the ball starts to rotate.



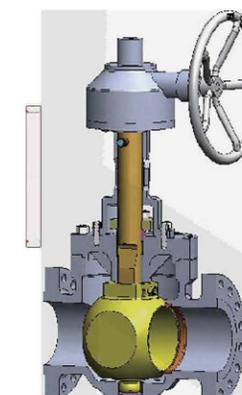
6. Precision spiral grooves in the stem act against fixed guiding pin, causing the stem and ball to rotate.



7. Continued turning of the handwheel rotates the ball and stem a full 90 degrees without the core touching the seat



8. In the last several turns of handwheel mechanically wedge the stem down, pressing the ball firmly against seat.



## Rising stem ball valve main parts commonly used material selection

### Technical data:

Valve specification: NPS1 – NPS24

Pressure class: Class150 – Class2500

Applicable temperature: -101°C - +590°C

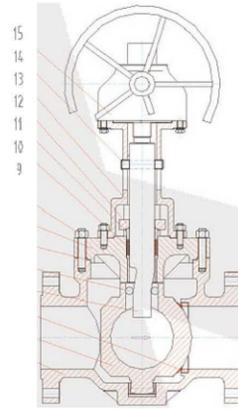
Body material: Carbon steel, stainless steel, DSS, alloy steel

Connection: Flange end, welding end, threaded end

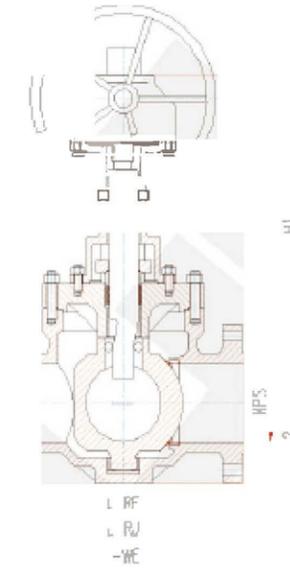
Leakage: ANSI B16.104 Class VI

Actuating mode: Manual, electric, pneumatic, hydraulic etc.

Standard piping installation position: vertical installation  
(horizontal installation shall be noted when purchasing).



## Rising stem ball valve connection size and weight



Class 150

Item	Part Name	Standard type TS	Low temperature TL	Alternating temperature TC	Hydrogenation TH
		-29°C - +300°C	-46°C - 300°C	-101°C - 300°C	-29°C - 425°C
1	Body	ASTM A216 WCB	ASTM A352 LCB	ASTM A351 CF8	ASTM A351 CF8C
2	Ball	ASTM A351 CF8 Special hardening treated	ASTM A351 CF8 Special hardening treated	ASTM A351 CF8 Special hardening treated	ASTM A351 CF8C Special hardening treated
3	Seat	ASTM A182 304 Special hardening treated	ASTM A182 304 Special hardening treated	ASTM A182 304 Special hardening treated	ASTM A182 321 Special hardening treated
4	Stem	ASTM A564 630	ASTM A564 630	ASTM A564 630	ASTM A638 660
5	Rolling pin	ASTM A564 630	ASTM A564 630	ASTM A564 630	ASTM A638 660
6	Gasket	304+flexible graphite	304+flexible graphite	304+flexible graphite	321+flexible graphite
7	Bonnet	ASTM A216 WCB	ASTM A352 LCB	ASTM A351 CF8	ASTM A351 CF8C
8	Stud	ASTM A194 B7	ASTM A320 L7	ASTM A320 B8	ASTM A320 B8
9	Nut	ASTM A194 2H	ASTM A194 7	ASTM A194 8	ASTM A194 8
10	Packing	Flexible graphite	Flexible graphite	Flexible graphite	Flexible graphite
11	Gland	ASTM A182 F6a	ASTM A182 F6a	ASTM A182 304	ASTM A182 321
12	Gland flange	ASTM A216 WCB	ASTM A352 LCB	ASTM A351 CF8	ASTM A351 CF8
13	Bracket	ASTM A216 WCB	ASTM A352 LCB	ASTM A351 CF8	ASTM A351CF8
14	Guiding pin	ASTM A564 630	ASTM A564 630	ASTM A564 630	ASTM A564 630
15	Actuator	Assembly	Assembly	Assembly	Assembly

Other materials please consult our company technology research and development center.

NPS	DN	L-RF (Flange)	L-WE (Welding)	H1	H2	Weight	
						Flange	Welding
1	25	216	216	458	56	18	15
1-1/2	40	241	241	500	74	27	22
2	50	216	216	559	75	29	25
3	80	282	282	588	155	46	41
4	100	305	368	689	165	98	100
6	150	403	508	683	199	172	136
8	200	457	594	725	240	236	213
10	250	673	673	779	235	517	453
12	300	762	762	918	305	880	780
14	350	826	826	1003	321	1170	1080
16	400	902	991	904	366	1610	1510
18	450	1092	1092	1156	394	1900	1800
20	500	1194	1194	1207	434	2150	2040
24	600	1397	1397	1267	494	3250	3050

For other design standard, please consult our technology research and development center.

Class300

NPS	DN	L-RF (Flange)	L-WE (Welding)	H1	H2	Weight	
						Flange	Welding
1	25	216	216	458	56	19	16
1-1/2	40	241	241	500	74	28	23
2	50	216	216	559	82.5	32	26
3	80	282	282	577	152	52	46
4	100	305	368	674	164	105	102
6	150	403	508	685	201	177	146
8	200	502	594	802	238	263	223
10	250	673	673	855	283	549	453
12	300	762	762	1098	315	925	780
14	350	826	826	1071	324	1175	1075
16	400	902	991	1100	355	1674	1510
18	450	1092	1092	1179	399	1950	1850
20	500	1194	1194	1219	439	2250	2150
24	600	1397	1397	1267	494	3350	3150

For other design standard, please consult our technology research and development center.

Class600

NPS	DN	L-RF (Flange)	L-WE (Welding)	L-RTJ (RJ)	H1	H2	Weight	
							Flange	Welding
1	25	216	216	216	478	62	20	17
1-1/2	40	241	241	241	513	74	30	25
2	50	292	292	295	560	95	37	27
3	80	356	356	359	652	152	64	50
4	100	432	432	435	673	164	138	110
6	150	559	559	562	738	220	254	200
8	200	660	660	664	828	250	426	358
10	250	787	787	791	1028	283	794	680
12	300	838	838	841	1160	321	1225	1098
14	350	889	889	892	1161	346	1814	1601
16	400	991	991	994	1316	389	1960	1860
18	450	1092	1092	1095	1223	442	2360	2230
20	500	1194	1194	1200	1280	489	3320	3190
24	600	1397	1397	1407	1361	500	4200	4010

For other design standard, please consult our technology research and development center.

Class900

NPS	DN	L-RF (Flange)	L-WE (Welding)	L-RTJ (RJ)	H1	H2	Weight	
							Flange	Welding
1	25	254	254	254	478	62	27	22
1-1/2	40	305	305	305	513	74	45	40
2	50	368	368	371	528	100	59	41
3	80	381	381	384	669	160	77	64
4	100	457	457	460	691	178	167	130
6	150	610	610	613	784	221	358	272
8	200	737	737	740	943	263	630	476
10	250	838	838	841	983	291	943	717
12	300	965	965	968	1277	350	1533	1239
14	350	1029	1029	1038	1260	355	2170	2050
16	400	1130	1130	1140	1302	380	2570	2420
18	450	1219	1219	1232	1390	460	3370	3220
20	500	1321	1321	1334	1470	520	3980	3780
24	600	1549	1549	1568	1520	560	4500	4300

For other design standard, please consult our technology research and development center.

Class 1500

NPS	DN	L-RF (Flange)	L-WE (Welding)	L-RTJ (RJ)	H1	H2	Weight	
							Flange	Welding
1	25	254	254	254	501	66	27	24
1-1/2	40	305	305	305	554	85	50	45
2	50	368	368	371	674	100	69	51
3	80	470	470	473	692	127	113	64
4	100	546	546	549	783	188	177	143
6	150	705	705	711	989	236	726	585
8	200	832	832	841	981	277	1200	1100
10	250	991	991	1000	1130	291	1600	1500
12	300	1130	1130	1146	1370	350	2000	1900
14	350	1257	1257	1276	1460	370	2500	2400
16	400	1384	1384	1406	1590	380	2750	2600
18	450	1537	1537	1559	1690	460	3970	3810

For other design standard, please consult our technology research and development center.

Class 2500

NPS	DN	L-RF (Flange)	L-WE (Welding)	L-RTJ (RJ)	H1	H2	Weight	
							Flange	Welding
1	25	308	308	308	570	65	32	27
1-1/2	40	384	384	387	613	85	53	48
2	50	451	451	454	692	117	95	85
3	80	578	578	584	783	152	177	165
4	100	673	673	683	1091	178	351	320
6	150	914	914	927	1215	242	885	825
8	200	1022	1022	1038	1370	277	1400	1200
10	250	1270	1270	1292	1460	291	2600	1900
12	300	1422	1422	1444	1590	350	2750	2550

## MFB Series Rising stem ball valve

