

KPC CORPORATION 201-7, GAKSAN-DONG DONG-GU, DEAGU, 201-0

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> Certification Body for Functional Safety SGS-TÜV Saar GmbH

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> Certification Body for Functional Safety SGS-TUV Sear GmbH

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> Certification Body for Functional Safety 808-TÜV Sear GmbH

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BRIEF HISTORY

1977.10 Established Korea Precision Casting Co. **1981.08** Changed to KPC Corporation, a corporate company **1982. 03** Started Ball Valve Division **1987.05** Started Special Alloy Steel Division **1988.06** Started Vacuum Arc Re-melting Division *1990. 05* Started Forging Division **1992. 05** Developed and produced Ball Valves for NACE and High Temperature Service **1994. 08** Authorized to use the API Monograms for API 6D **1997.02** ISO 9001 : 1994 certified by QCB **1997.12** Started Titanium Casting & Forging 2000. 08 Started Valve Automation Center 2002. 12 QA System for Material Manufacturing-certified by TÜV to European Directive 97/23/EC **2003. 03** Established Material Division Factory **2003.06** QA System for Valve Manufacturing-certified by TÜV to European Directive 97/23/EC 2003. 11 Newly certified ISO 9001 : 2000 for Valves and Alloy Steel Castings by TÜV 2007. 06 Established a Factory for Large Size Valve Assembly **2008.01** Established a Factory for Machining Facilities **2011. 01** Separated a KPCM(KPC Metal) from KPC Corporation 2012. 06 SIL certified by TÜV 2014. 03 ISO 14001. OHSAS 18001 certified by TÜV **2015. 10** Awarded the Gold Tower Order of Industrial Service Merit





KPC TITANIUM VALVES

WORLD LEADER IN TITANIUM VALVES

KPC is one of the world's leading manufacturers of industrial titanium valves, offering a full range of forged and cast titanium valves in a wide range of critical applications for chemical, petrochemical, aluminum and mining industries. The core competence of KPC is its capability to deliver titanium valves that would add value to the customer's process industry.

OPTIMAL DESIGN

Finite Element Analysis and 3D Parametric Design Program of CATIA are rigorously utilized for analysis and verification of design in an effort to provide the optimum valve design that would best meet design requirements of customers.

VERTICALLY INTERGRATED PRODUCTION

KPC's production system is vertically integrated to cover the whole production process from material production to final assembly and in-house testing. This advantage provides unparalleled competitiveness in terms of price, quality and delivery.

PRODUCTION AND WAREHOUSE AUTOMATION

Contract handling at every stage is geared to meet the fast response time, with proven records in supplying special design valves in short lead times to meet the customer's requirements. Through rigorous ERP program and automated warehouse we are fully utilizing the resources of the company to offer timely and cost saving service in design, procurement, production and test to satisfy even the most stringent requirements of cryogenic environment.

QUALITY MANAGEMENT

In addition to its own highly strict company quality standards, KPC is ISO 9001 certified and has a manufacturing ability to comply with ASME, DIN, API, and other internationally recognized standards. KPC ensures that each valve fulfills all engineering specifications, including the most demanding applications. Our goal is to provide the best product at the most competitive price with in-time delivery with the backing of a full service program.

MATERIAL TESTING

- Nondestructive testing, such as radiography, ultrasonic, and liquid penetrant tests.
- Chemical analysis by computer-controlled direct reading emission spectrometer.
- Mechanical testing for tensile properties at ambient, bend and hardness, Charpy testing at ambient and elevated temperatures.

VALVE TESTING

All pressure containing items are hydrostatically tested, seat leakage tested and functionally tested. We can also perform high pressure gas, packing emission, cryogenic, and advanced functional tests.

AFTERMARKET SOLUTIONS

The aftermarket solutions are based on our engineering know-hows and expertise from maintenance strategies, life extensions and project upgrades.



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KPC TITANIUM MANUFACTURING PROCESS



KPC | Flow Control Division

KPC'S EXPERTISE ON TITANIUM VALVES

KPC is specialized in the production of following grades:

COMMERCIAL PURE GRADES

Ti-gr.1: The very low content of oxygen implies a reduced tensile strength and high ductility as well as excellent corrosion resistance in bland reducing to strongly oxidizing environments.

* Availability upon minimum production lot quantity

- **Ti-gr.2**: This grade is considered the most commonly used in industrial service, offering a good combination of high corrosion and erosion resistance, good cold formability and excellent weldability. Compared to Ti-gr.1, it shows a higher oxygen content and tensile strength.
- Ti-gr.4 : Among the commercial pure grades, this one shows the highest tensile strength, while ductility and cold formability are slightly reduced. It is used for draft gears and components operating in marine environments.
 * Availability upon minimum production lot quantity

α-β ALLOYS

- **Ti-gr.5**: Recommended for high mechanical resistance applications up to 350 400°C, it combines an ideal set of properties: high tensile strength, low density, toughness and ductility, weldability and machinability comparable to austenitic stainless steel. Suitable for solution and precipitation heat treatments.
- **Ti-gr.5eli :** Ti6Al4V with extra low interstitial elements content, with enhanced ductility, typically used in non aged condition for maximum toughness. Widely used for cryogenic devices as well as medical applications.





REFERENCE LIST FOR TITANIUM VALVES

CLIENT	THRU	PROJECT / LOCATION	Q'TY	SIZE	CLASS	SHIP DATES	REMARK
WESTERN MINING	J/V BKK & KILBORN	BULONG PROJECT NICKEL MINE / AUSTRALIA		2"	600#~900#	1997	ANGLE VALVE
KP CHEMICAL	KP CHEMICAL	PTA REVAMPING PROJECT/ KOREA	15	1/2"~ 3"	300#	2002	BALL VALVE
SAMSUNG PETRO CHEMICAL	SAMSUNG PETRO CHEMICAL	PTA REVAMPING PROJECT / KOREA	26	1/2"~6"	150#~300#	2003	BALL VALVE
KP CHEMICAL	KP CHEMICAL	PTA-2 / KOREA	28	1"~ 4"	300#	2003	BALL VALVE
STPC(SHAHID TONDGOOYAN PETROCHEMICAL COMPANY)/IRAN	DAELIM INDUSTRIAL CO., LTD	PTA-1 PJT / IRAN	98	1/2"~ 10"	150#~300#	2003	BALL VALVE
KP CHEMICAL	KP CHEMICAL	PTA PROJECT	32	1"~ 3"	300#	2004	GLOBE, BALL VALVE
KOFRAN	KOFRAN	CORROSION LINE REPLACEMENT / KOREA	15	2"~ 8"	150LB	2004	BUTTERFLY, BALL VALVE
FLO SOLUTION	FLO SOLUTION	AUSTRAILIA	18	2"	150#~600#	2004	ANGLE VALVE
MITSUBISHI	MITSUBISHI	C-PTA PJT / CHINA	211	1/2"~ 10"	150#~300#	2005	BALL VALVE
SAMSUNG PETRO CHEMICAL	SAMSUNG PETRO CHEMICAL	X-PROJECT / KOREA	13	1/2"~ 8"	150#~300#	2005	BALL VALVE
SAMSUNG TOTAL CHEMICAL	SAMSUNG ENGINEERING	PTA REVAMPING PROJECT / KOREA	42	1/2"~ 8"	150#~600#	2005	ANGLE, BALL VALVE
KP CHEMICAL	KP CHEMICAL	DOMESTIC / KOREA	53	1"~6"	300#	2006	BALL VALVE
STPC(SHAHID TONDGOOYAN PETROCHEMICAL COMPANY)/IRAN	MITSUBISHI	PTA-2 PJT / IRAN	56	1/2"~ 10"	150#~600#	2006	BALL VALVE
BHP BILLITON	"RAVENSTHORPE JV (HATCH & MINPROC)"	RAVENSTHORPE/NICKEL PROJECT / AUSTRALIA	17	2"	300#~600#	2006	ANGLE VALVE
MINERA EL TESORO	FASTPACK	COPPER MINE / CHILE	4	28"	150#	2006	BUTTERFLY VALVE
FORMOSA	SHINE WAY	AE PROJECT / TAIWAN	252	1/2"~ 16"	150#~300#	2006	GLOBE, BALL VALVE
TAEKWANG INDUSTRY CO., LTD.	TAEKWANG INDUSTRY CO., LTD.	PTA 500,000 TON REVAMPING PROJECT / KOREA	28	1/2"~ 12"	150#~600#	2007	BALL VALVE
BATEMAN AFRICA PTY LTD	PLEIX QUIP	BONANZA MINE URANIUM MINE / SOUTH AFRICA	18	2"~ 8"	600#	2007	BALL VALVE
UNKNOWN	FASTPACK	COPPER MINE / CHILE	4	8"	300#	2007	GLOBE VALVE
BATEMAN AFRICA PTY LTD.	PLEIX QUIP	BONANZA MINE URANIUM MINE / SOUTH AFRICA	190	2"~ 8"	150#~600#	2007	BALL VALVE
MCC PTA	MITSUBISHI	HP PJT / INDIA	28	2"~ 6"	300#	2008	BALL VALVE
PKN ORLEN	MITSUBISHI	PKN PJT / POLAND	154	1/2"~14"	150#~300#	2009	BALL VALVE
LOTTE CHEMICAL	LOTTE CHEMICAL	DUMP LINE REPLACEMENT / KOREA	9	1.5"~ 8"	150#~300#	2014	BALL VALVE
MITSUBUSHI CHEMICAL ENGINEERING CORPORATION	MITSUBUSHI CHEMICAL ENGINEERING CORPORATION	FIRST IMPROVEMENT PROJEC / POLAND	6	2"~ 6"	300#	2014	BALL VALVE
LUKOIL	SECL	WEST QURNA-2 / IRAQ	1	3"	300#	2015	BALL VALVE
SAMSUNG GENERAL CHEMICAL.	SAMSUNG GENERAL CHEMICAL.	PTA MAINTENACE/KOREA	4	1"~ 3"	300#	2015	BALL ANGLE
HANWHA GENERAL CHEMICAL	HANWHA GENERAL CHEMICAL	PTA NO3 MAINTENACE / KOREA	8	0.75"'~ 6"	150#~300#	2015	BALL VALVE
ABU DHABI COMPANY FOR ONSHORE OIL OPERATIONS	GS E&C	RUMAITHA SHANAYEL PHASE-III / UAE	4	1"~ 2"	150#	2015	BALL VALVE
HANWHA GENERAL CHEMICAL	HANWHA GENERAL CHEMICAL	DOMESTIC / KOREA	29	0.75"~ 6"	300#	2017	BALL VALVE
BAHRAIN LNG	GS E&C	BAHRAIN LNG IMPORT PROJECT / NDIA	4	3"	150#	2017	BALL VALVE
KUWAIT OIL COMPANY	GS E&C	NEW WATER CENTER PROJECT / UAE	9	0.75"~3"	150#	2017	BALL VALVE
KIPIC	HDE	KLNGI PROJECT	127	1"~10"	150#~300#	2017	BALL VALVE
BHP BILLITON	FASTPACK	COPPER MINE /CHILE	402	3"~36"	150#	2018	GATE, CHECK, GLOBE, BUTTERFLY BALL
LOTTE CHEMICAL	LOTTE CHEMICAL	PIA REVAMPING / KOREA	21	0.75"~16"	150#~1500#	2018	BALL VALVE
SOLVAY	SOLVAY	CORRSION LINE REPLACEMENT / KOREA	25	2"~ 8"	150#	2018	BALL VALVE
KIPIC	HDE	KLNGI PROJECT / KUWAIT	144	1"~ 10"	150#~300#	2018	BALL VALVE
BP ZHUHAI	FIDEM	BP ZHUHAI PTA PLANT / CHINA	2	6"~10"	300#	2018	BALL VALVE
CGIS	CGIS	CANADA	23	1/2"~ 2"	150#~800#	2018	BALL VALVE

BALL VALVES

The KPC Ball Valves are manufactured in various types and features : One piece End-entry, Two piece and Three piece bolted construction. These valves can be supplied full or reduced port in forged casting construction. Bolted body connections facilitate service and maintenance on site.

Especially, Top entry construction give more convenience to maintain on site. Valves can be supplied either Raised Face, Ring Type Joint, Butt Welded and Socket Welded end connections. Pressure rating is from ANSI CL. 150 through ANSI CL. 1500.

TECHNICAL & GENERAL INFORMATION

APPLICABLE STANDARD

- American Society of Mechanical Engineers » ASME
- » MSS Manufactures Standardization Society
- American Petroleum Institute » API
- International Standard Organization » ISO
- American Society for Testing Materials » ASTM
- British Standard Institute » BSI





APPLICABLE SEAT

- RTFE / PEEK / DEVLON » SOFT SEAT NYLON / PCTFE
- Ti + TiO2 Coating » METAL SEAT Ti + Nitride + TIN Coating

PRESSURE RATING

» ANSI CLASS 150 / 300 / 600 900/1500



BALL VALVE COMPONENTS















BUTTERFLY VALVES

TRIPLE ECCENTRIC CONCEPTION

KPC designs and manufactures metal and soft seated high performance Butterfly Valves with double and triple eccentric. Their main application is isolation of process lines in petrochemical and mining indurstry for high temperature corrosion and erosion services.

TECHNICAL & GENERAL INFORMATION

DESIGN CONSTRUCTION

- » Design flexibility due to fabricated construction.
- » Design according to ASME B16.34 as a standard.
- » Pressure test : API598, ISO5208
- » KPC also designs to international standards ; ANSI, DIN, API etc.
- » For product development, KPC uses tools like finite element calculations, in-house design and testing facilities and recognized material and mechanical research laboratories.

PRODUCTION METHOD

- » Integrated casting or forged design.
- » Fabricated or bar stock design.
- » Combinations of fabricated and bar stock design.



- Solid titanium body & disc seat with TIN surface hardened. - Replaceable seat without disassembling whole valve.











DUAL PLATE CHECK VALVES

KPC's patented design does not have any holes drilled into the body wall, unlike other manufacturer's designs. This unique design completely prevents leakage to the atmosphere and functions perfectly in all valve sizes and ratings. KPC utilizes set screws to retain two pin guides that house both the hinge and pins. This allows quick disassembly without the need for special tools or presses. This unique feature meets today's and future fugitive emission controls.

Dual-plate check valves are designed such that the discs are hinged at their sides like a door, eliminating the effect of gravity. Consequently, very little energy is needed to open the valve and maintain this position, resulting in lower energy costs.

DESIGN CONSTRUCTION

» DESIGN STANDARD	API 594
» PRESSURE – TEMPERATURE Ratings	ASME 16.34
» VALVE TESTING	API598
» FACE-TO-FACE DIMENSIONS	API594 Also complies with API 6D, ISO 14313, ASME B 16.10
» FLANGE DIMENSIONS	ASME B16.5 for NPS 2-20(DN 50-500) Alternative flange compliance available upon request



WAFER LUG TYPE



WAFER TYPE

DUAL PLATE CHECK VALVES

VALV	E'S COMPONENTS	
DP01	BODY	X 1
DP02	DISC	X 2
DP03	INSERT	X 2
DP04	STOP PIN	X 1
DP05	HINGE PIN	X 1
DP06	SPRING	X 1 to 4
DP07	WASHER	X 2 over
DP08	SET SCREW	X 2 or 4
DP09	EYE - BOLT	10" over





DP03

DP04

TITANIUM VALVES 11





DP05

DP02

ANGLE VALVES

KPC's Angle Valves are designed for the convenient and fast discharging of materials or samples from the bottom of the reactor, drain or feed vessel. This valve can be welded and installed on the vessels through the flange at the bottom of the valve. Tank bottom angle valves are most commonly installed to feed vessels or space free draining and pipelines.

KPC's Angle Valves are widely used in the petrochemical, aluminum, steel, polymer, mining, the pharmceutical and fine chemical industries.

DESIGN FEATURES

- » This range of angle valve is manufactured in integrated structure.
- » Structures with disc opening into the tank and disc opening into the valve.
- » Available with 45°, 60°, 90° degree outlet angle in the body.
- » A rotation-resistant device is set up to ensure that the valve stem only has straight line motions and no rotations...
- » The protection plate makes for the outstanding erosion resistance and corrosion resistance of the valve body.
- » The sealing surface of the valve seat and the valve disc is made of over laying Tio2 or TIN coating.
- » The auxiliary line sealing guarantees the reliability of the sealing performance.

DESIGN CONSTRUCTION

» FLANGE CONNECTION	ASME B16.5
» DESIGN STANDARD	ASME B16.34
» PRESSURE RANGE	Class 150 ~ Class 1500
» SIZE RANGE	DN50 ~ DN500. NPS 2 ~ NPS 20
» CONNECTION	Flange
» OPERATING TYPE	Pneumatic, Manual, Electric



ANGLE VALVES

Piston Angle Valve





GATE & GLOBE VALVES

GATE VALVE

STANDARD COMPLIANCE

- » The face to face dimension is in accordance with ANSI B16.10 JIS F 7310, 7360.
- » The Body is designed to API STD. 600, ANSI B16.34 JIS F 7310, 7360.



DESIGN FEATURES

It is the valve that shut off a right angle with flow direction of fluid by vertical movement of wedge.

- » Gate valve is suitable for simple opening / closing.
- » It is recommended to avoid control of flow due to resist fluid in the back of wedge and cavitations which mat cause corrosion on wedge.
- » It has double locking effectiveness because the seat has both sides.
- » When wedge is fully opened, it minimizes fluid flow disturbance by deviating from inside diameter.



GATE & GLOBE VALVES

OPERATIONS

The following operation of the valve is available and the choice is depending upon the valve location, the type of work and service for each valve is used.

- » Manual hand wheel.
- » Manual bevel gear.
- » Hydraulic actuator.
- » Electric actuator.

GAT	E VALVE	
No	PART NAME	MATERIAL
1	BODY	B367 Gr 2
2	BODY SEAT RING	B381 Gr 5
3	BONNET	B367 Gr 2
4	BUSH RING	B381 Gr 5+TIN
5	DISC	B381 Gr 5 +TIN
6	YOKE	SUS 316
7	STEM	B381 Gr 5
8	GLAND RING	B381 Gr 5
9	PACKING GLAND	B381 Gr 5
10	PACKING	RTFE / VOC
11	GASKET	TI WITH GRAPHITE
12	HAND WHEEL	CAST IRON
13	GEAR BOX	ASS'Y

GLO	BE VALVE	
No	PART NAME	MATERIAL
1	BODY	B367 Gr 2
2	BODY SEAT RING	B381 Gr 5
3	BONNET	B367 Gr 2
4	BUSH RING	B381 Gr 5+TIN
5	DISC	B381 Gr 5 +TIN
6	YOKE	SUS 316
7	STEM	B381 Gr 5
8	GLAND RING	B381 Gr 5
9	PACKING GLAND	B381 Gr 5
10	PACKING	RTFE / VOC
11	GASKET	TI WITH GRAPHITE
12	HAND WHEEL	CAST IRON
13	GEAR BOX	ASS'Y

GLOBE VALVE

DESIGN FEATURES

The valve shut off flow direction of fluid by vertical movement of plug type disc.

- » Globe valve is suitable for the use of flow control and opening / closing fluid in unidirection.
- » Short stroke of valve brings shorter operating.
- » As linear movement valve, long face to face dimension is featured for adopting long flow passage which is required to ensure smooth flow by valve without sudden revolution.











OTHER TITANIUM PRODUCTS

HOW TO SPECIFY KPC TITANIUM VALVES

(1-2-3-4-5-6-7-8-9-10) BA-0B-1-FB-T2-E-3-1-2-7

1 VALVE TYPE		
CODE	DESCRIPTION	
BA	BALL VALVE	
BU	BUTTERFLY VALVE	
СН	DUAL PLATE CHECK VALVE	
GT	GATE VALVE	
GL	GLOBE VALVE	
AN	ANGLE VALVE	

(5) BODY CODE T1

T2

Т3

T4

T5

② SIZE			
CODE	SIZE	CODE	SIZE
0A	1/2"	8	8"
OB	3/4"	10	10"
01	1"	12	12"
1A	1/2"	14	14"
2	2"	16	16"
3	3"	18	18"
4	4"	20	20"
6	6"	24	24"
		30	30"

' MATERIAL	6 T	RIM MATERIAL
DESCRIPTION	CODE	DESCRIPTION
TITANIUM Gr 1	А	TITANIUM Gr 1
TITANIUM Gr 2	В	TITANIUM Gr 2
TITANIUM Gr 3	С	TITANIUM Gr 3
TITANIUM Gr 4	D	TITANIUM Gr 4
TITANIUM Gr 5	E	TITANIUM Gr 5

8 END CONNECTION		
CODE	DESCRIPTION	
RF	RASIED FACE FLANGE	
FF	FLAT FACE FLANGE	
RTJ	RING TYPE JOINT	
BW	BUTT WELD	
SW	SOCKET WELD	

9 OPERATING CODE DESC BAI 1 2 LEV 3 GE 4 PNEU 5 MO 6 HYDF 7 OVAL Х SI

VESSEL PART

» TUBE SHEET	Max. 0.D. 4,000mm
» FORGED RING	Max. 0.D. 4,000mm
» FLANGE	1/2 Inch ~ 60 Inch / 150#~1500# (ASME, DIN, API)
» NOZZLE	Max. 0.D. 4,000mm
» BOSS	Max. 0.D. 4,000mm







PIPING PART

» FLANGE	½ Inch ~ 60 Inch / 150#~1500# (ASME, DIN, API)
» NOZZLE	Max. 0.D. 4,000mm
» FORGED FITTING	Max. 0.D. 4,000mm
» FORGED NECK	Max. 0.D. 4,000mm
» BOSS	Max. 0.D. 4,000mm









FORGED BAR

- (0.D 35~800mm)
- » SHAFT
- **» FORGED PIPE**
- **» BOLT&NUT**
- » SWAGE
- » NOZZLE



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(3) AN	ISI CLASS
CODE	CLASS
1	150LB
2	300LB
3	600LB
4	900LB
5	1500LB

④ BO	RE
CODE	DESCRIPTION
FB	FULL BORE
RB	REDUCED BORE

⑦ SEAT MATERIAL	
CODE	DESCRIPTION
1	RTFE
2	PEEK
3	PCTFE
4	DEVLON
5	METAL

CRIPTION	
RE STEM	
EVER OP	
EAR OP	
JMATIC OP	
DTOR OP	
RAULIC OP	
L HANDLE	
PECIAL	

(10) OPTION		
CODE	DESCRIPTION	
1	DOUBLE ECCENTRIC	
2	TRIPLE ECCENTRIC	
3	PISTON TYPE	
4	DISC TYPE	
5	WAFER TYPE	
6	LUG TYPE	
7	FLOATING TYPE	
8	TRUNNION MOUNTED TYPE	