

**RTC TAIWAN ATYCO
FLUID CONTROL**

RTC
Lead the smart flow

Ceramic Lined Ball Valve

Erosion-Corrosion-Cavitation Resistant
Manual and Automated
Series 713FCA



TAIWAN ATYCO FLUID CONTROL
EQUIPMENT INTERNATIONAL COMPANY LIMITED
Liaoning Yuanlu Machinery Equipment Manufacturing Co., Ltd.
Address:55 Gongnong Road, Zhanqian District,
Yingkou City, Liaoning Province,China

TEL:+008613332319780
FAX:+00860417-3535904
Website:www.atyco.cn
Email:atycoln@163.com

Ceramic Lined Ball Valve

RTC's advanced ball valve is fully lined with Zirconia Ceramic, exploiting its high chemical stability and hardness (HRA86-90) only inferior to diamond. The valve is designed for high standard of performance that provides the ideal solution for the most critical and difficult services of high corrosion, high erosion, high wear and high temperature. Especially the fluid contains high hardness particle or strong corrosion and wear medium. It is mainly used to cut off or regulate the fluid medium in these harsh conditions.

■ Ceramic Advantage

Zirconia is produced by calcining zirconium, taking advantage of its high thermal stability. It also has better tenacity than ordinary ceramic materials.

Zirconia is commonly blended with some other stabilizing oxide to balance toughness and strength. Effective stabilizer include Magnesium Oxide (MgO), Yttrium Oxide (Y2O3), Calcium Oxide (CaO) and Cerium Oxide (Ce2O3).

With years of experiences in manufacturing, we provide Zirconia by adding Yttria which is ideal for the most corrosive and abrasive services under an operating temperature of 400°C.

■ Yttria Tetragonal Zirconia Polycrystal (Y-TZP) Ceramic Material

Yttria stabilized zirconia is partially stabilized with 5.4% Yttria (Y2O3). It is also known as TZP, Tetragonal Zirconia Polycrystal, and it has the finest grain size of all the zirconia materials. Y-TZP is well suited to replacing metals due to its extremely high strength and toughness, it also provides far higher resistance to chemicals and superior erosion resistance.

■ Prime Features

- Very high mechanical strength
- High hardness
- High impact resistance
- Very high wear resistance
- Very high erosion resistance
- High chemical resistance (acids/alkalis)
- High corrosion resistance
- Very low thermal conductivity
- Non-magnetic
- Modulus of elasticity similar to steel
- Coefficient of thermal expansion similar to iron



Composition Chart Y-TZP ZrO2 Ceramic

Crystal	>85% cubic and tetragonal
Lg. loss	0.8%~1.0%
Average	0.4µm~0.7µm
Apparent Density	>0.4 g/cc
Tapped Density	>0.8 g/cc
ZrO2 Purity	>99.95%
Y2O3 Yttrium Oxide	5.4% ±0.1
Color	Light Gray

Material Specifications

Item	Description	Material	Qty.
1	Body	WCB,CF8,CF8M	1
2	Body Bushing	Y-TZP Zirconia Ceramic	1
3	Ball	Zirconia Ceramic	1
4	Seat	Zirconia Ceramic	2
5	O-ring	FKM	2
6	Disc Spring	Stainless Steel	2
7	O-ring	FKM	2
8	O-ring	FKM	2
9	End Flange	WCB,CF8,CF8M	2
10	Cap Bushing	Y-TZP Zirconia Ceramic	2
11	Stud	Stainless Steel	4
12	Washer	Stainless Steel	8
13	Hex. Nut	Stainless Steel	8
14	Stem	AISI 316 (Hastelloy, Zirconia Ceramic)	1
15	O-ring	FKM	1
16	Washer	Stainless Steel	1
17	Stem Packing	PTFE Chevron, Graphite	1
18	Packing Gland	SS304, SS316	1
19	Spring Washer	Stainless Steel	1
20	Gland	SS304, SS316	1
21	Hex. Bolt	Stainless Steel	2
22	Washer	Stainless Steel	2

Lead the smart flow

Standard Specifications

Valve Design: ASME B16.34
Face to Face: ASME B16.10
Flange Adaptability: ANSI Class 150 JIS 10K, PN10/16
Inspection & Testing: API 598, EN12266-1

Product Range

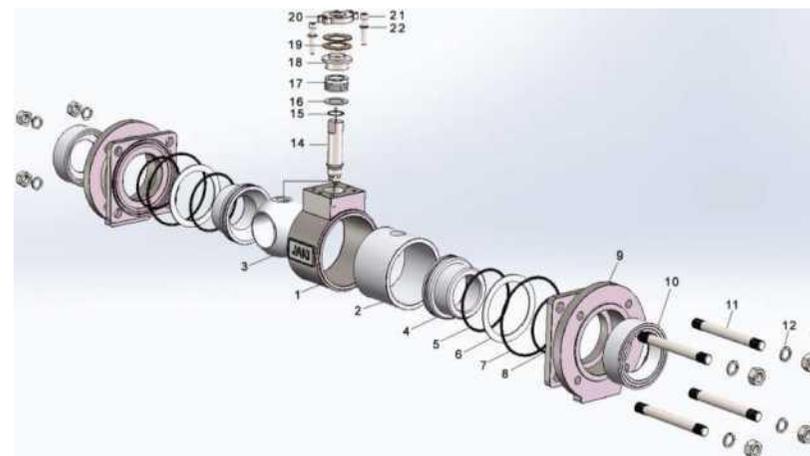
Body Configurations: 3pc split body
Valve Size: 1/2" ~ 8" (DN15 ~ 200)
Rating: Class 150
Max. Temperature:
Standard type 220°C (428T)
High Temp. type 388°C (732°F) Leakage
Class: Class V/VI shut-off

Operator Available

Lever Handle, Gear Operator, Pneumatic and Electric Actuators

Other Options of Ceramic available:

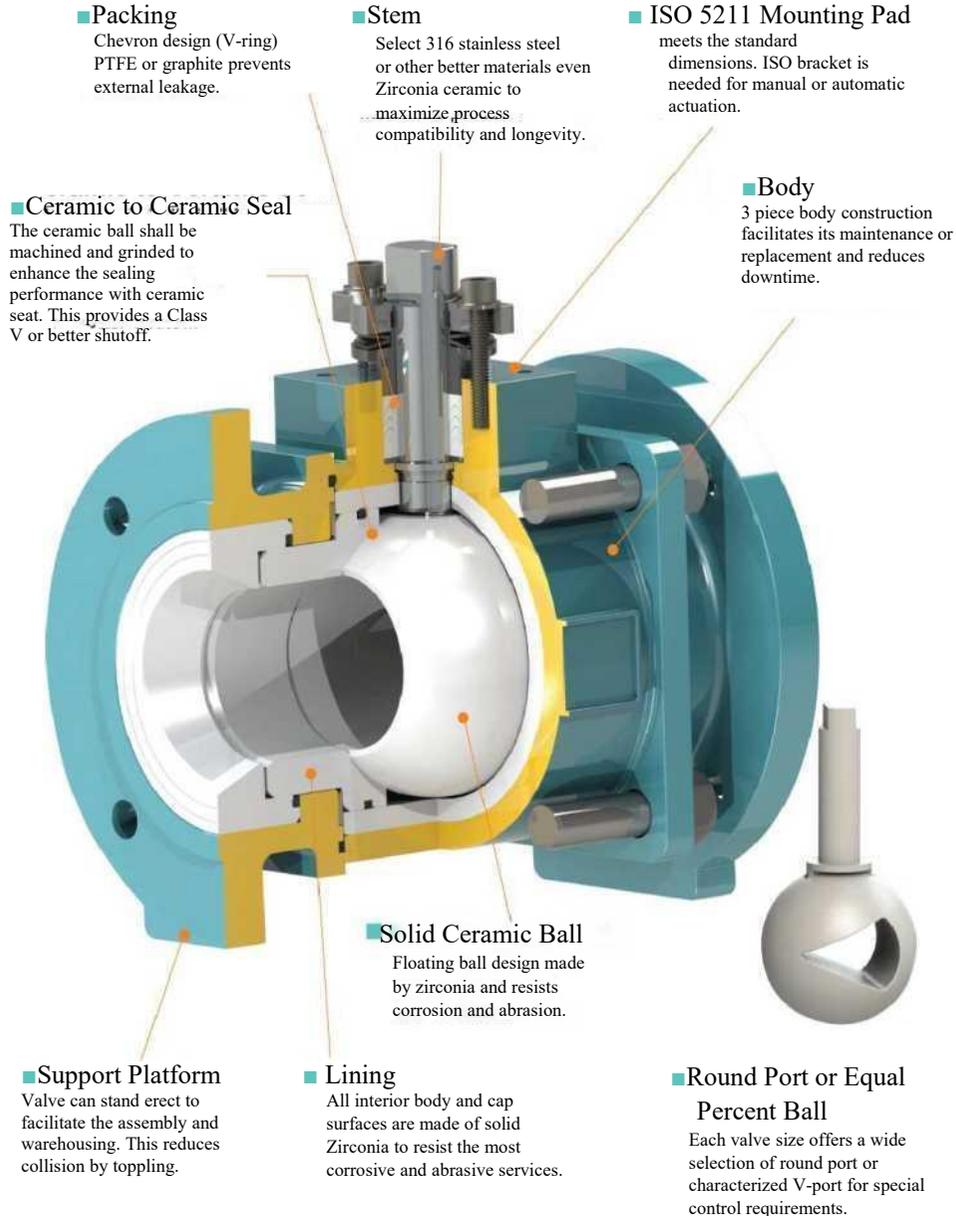
PSZ (Partially Stabilized Zirconia)
Alumina Al2O3
Silicon Nitride Si3N4
Silicon carbide SiC



Ceramic Lined Ball Valve

Lead the smart flow

Valve Design Features



■ Packing

Chevron design (V-ring) PTFE or graphite prevents external leakage.

■ Stem

Select 316 stainless steel or other better materials even Zirconia ceramic to maximize process compatibility and longevity.

■ ISO 5211 Mounting Pad

meets the standard dimensions. ISO bracket is needed for manual or automatic actuation.

■ Ceramic to Ceramic Seal

The ceramic ball shall be machined and grinded to enhance the sealing performance with ceramic seat. This provides a Class V or better shutoff.

■ Body

3 piece body construction facilitates its maintenance or replacement and reduces downtime.

■ Solid Ceramic Ball

Floating ball design made by zirconia and resists corrosion and abrasion.

■ Support Platform

Valve can stand erect to facilitate the assembly and warehousing. This reduces collision by toppling.

■ Lining

All interior body and cap surfaces are made of solid Zirconia to resist the most corrosive and abrasive services.

■ Round Port or Equal Percent Ball

Each valve size offers a wide selection of round port or characterized V-port for special control requirements.

Ceramic Material Performance

Technical Data & Property Values		Zirconia		Alumina	Silicon Nitride	Silicon Carbide	
		Y-ZrO ₂	Mg-ZrO ₂	99% Al ₂ O ₃	Si ₃ N ₄	SiC	
Physical Properties							
Water Absorption	%	0	0	0	0	0.5	
Density	g/cm ³	6.0-6.05	5.72-5.74	3.9-3.95	3.2-3.33	3.15-3.25	
Mechanical Properties							
Flexural Strength	MPa	1150	900	450	1200	470	
Compressive Strength	MPa	2000	1800	2200	2800	—	
Hardness	HRA	87	85	92	92	94	
Fracture Toughness K _{1c}	MPam	10-12	13-15	4.5	7	4	
Modulus of Elasticity	GPa	200	200	350	300	400	
Thermal Properties							
Use Temperature (max.)	°C	500	1000	1500	1500	1500	
Thermal Expansion Coefficient	/°C	9.6X10 ⁻⁶	10x10 ⁻⁶	8.3x10 ⁻⁶	3.4x10 ⁻⁶	4x10 ⁻⁶	
Thermal Shock Resistance	°C	87	110	50	200	75	
Thermal Conductivity	W/mK	2	2	28	25	100	
Electrical Properties							
Resistivity	20° C	◎.cm	>10 ¹⁰	>10 ¹⁰	>10 ¹²	>10 ¹¹	10 ⁶ -10 ⁸
	100° C	◎.cm	—	—	10 ¹² -10 ¹³	>10 ¹¹	—
	300° C	◎.cm	—	—	>10 ¹²	>10 ¹¹	—

Corrosion Resistance

Media	Temperature	Lining Materials					
		ZrO ₂	99% Al ₂ O ₃	Si ₃ N ₄	SiC	PTFE/PFA	Fluororubber
20%HCl	60 °C	A	A	B	A	A	A
20%HCl	95 °C	A	A	C	A	A	A
90%H ₂ SO ₄	60 °C	A	A	A	A	A	A
90%H ₂ SO ₄	95 °C	A	A	B	A	A	A
60%H ₃ PO ₄	60 °C	A	A	C	A	A	A
60%H ₃ PO ₄	95 °C	A	A	C	A	A	A
10%HF	60 °C	C	B	A	A	A	A
46%HF	95 °C	C	C	C	A	A	A
60%HNO ₃	60 °C	A	A	C	A	A	A
60%HNO ₃	95 °C	A	B	C	A	A	A
30%NaOH	60 °C	A	B	B	A	A	A
30%NaOH	95 °C	A	B	C	A	A	A

A=<0.1 mmg/cm²/day Recommended

B=0.1 -0.3mmg/cm²/day Conditional, consult factory

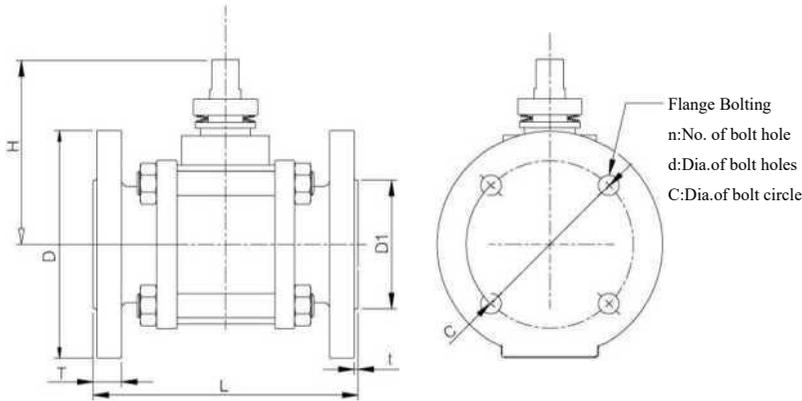
C=>0.3mmg/cm²/day Not Recommended

The data in the above chart was obtained under controlled test conditions, and actual valve characteristics and performance may increase or decrease depending upon actual installation conditions.

Ceramic Lined Ball Valve

Lead the smart flow

Fig. 713FCA Ceramic Lined Ball Valve



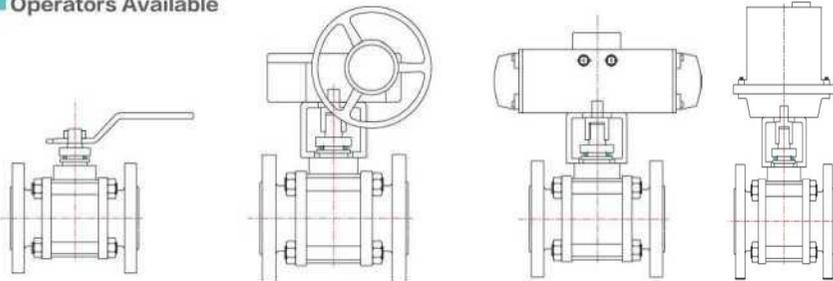
■ Dimensions

Flanged End / Class 150/2 way

SIZE	L	D	D1	C	T	t	n	d	H
1/2 "	108	89	35	60.5	11	1.6	4	16	238
3/4 "	117	98	43	70.0	11	1.6	4	16	248
1 "	127	108	51	79.5	13	1.6	4	16	253
1-1/4 "	140	117	64	89.0	14	1.6	4	16	268
1-1/2 "	165	127	73	98.5	14	1.6	4	16	276
2 "	178	152	92	120.5	16	1.6	4	19	294
2-1/2 "	190	178	105	139.5	18	1.6	4	19	313
3 "	203	190	127	152.5	19	1.6	4	19	371
4 "	229	229	157	190.5	24	1.6	8	19	396
5 "	254	254	186	216.0	24	1.6	8	22	451
6 "	267	279	216	241.5	25	1.6	8	22	476
8 "	292	343	270	298.5	29	1.6	8	22	494

Dimensions are in mm. Weight in kg

■ Operators Available



Valve Flow Data

The table below provides flow coefficients for series 713FCA ceramic lined ball valve. The Cv values represent the flow of water through a round port or equal percent port. Cv: the volume flow in US gallons per minute [gpm] at a temperature of 60°F with a pressure drop of 1 psi.

Kv: the volume flow in cubic meters per hour [m³/h] at a temperature of 16°C with a pressure drop of 1 bar (kg/cm²).

$$Cv = 1,156 \cdot Kv$$

$$Kv = 0.865 \cdot Cv$$

VALVE SIZE		Cv value			
INCH	DN	O PORT	V60°	V45°	V30°
1/2	15	10.2	7	4	3
3/4	20	10.2	7	4	3
1	25	18.2	12	8	5
1-1/4	32	28.6	18	12	8
1-1/2	40	47	30	20	13
2	50	73	46	31	21
2-1/2	65	114	72	48	32
3	80	181	115	76	51
4	100	292	185	123	82
5	125	456	289	192	128
6	150	712	452	300	201
8	200	1025	650	432	289

Valve Torque Data

(All torques in N-m.)

VALVE SIZE	INCH DN	VALVE SIZE											
		1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4	5	6	8
WORKING PRESSURE	6 bar	12	12	24	30	40	50	60	80	150	260	260	490
	10 bar	18	18	30	42	50	60	85	125	165	260	260	520
	16 bar	20	20	30	60	80	90	100	140	180	280	280	650

Industries & Applications

- Power and Cogeneration
- Waste Treatment Process
- Iron and Steel Plants
- Mining
- Pulp and Paper
- Chemical Processing
- Refining
- Slurries
- Mud and Sand dispersal
- Cement
- Caustic
- Lime
- Acid fluid
- Desulfurization

More information about application for a given service, please consult manufacturer.