CARTEN HiLife

ZIRCONIA

ASME B16.34

HiLife Series

Ceramic and General Industry Products

PED

ISO9001

For Abrasive, Erosive and Corrosive Applications

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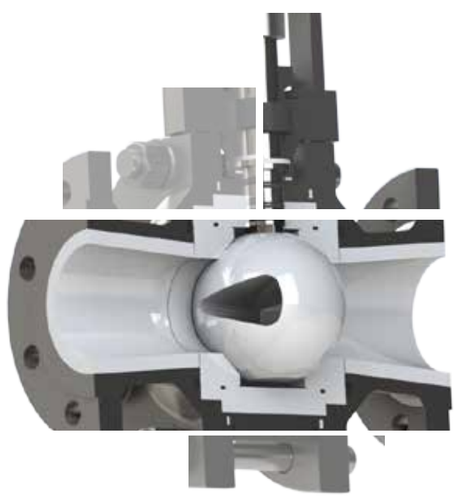

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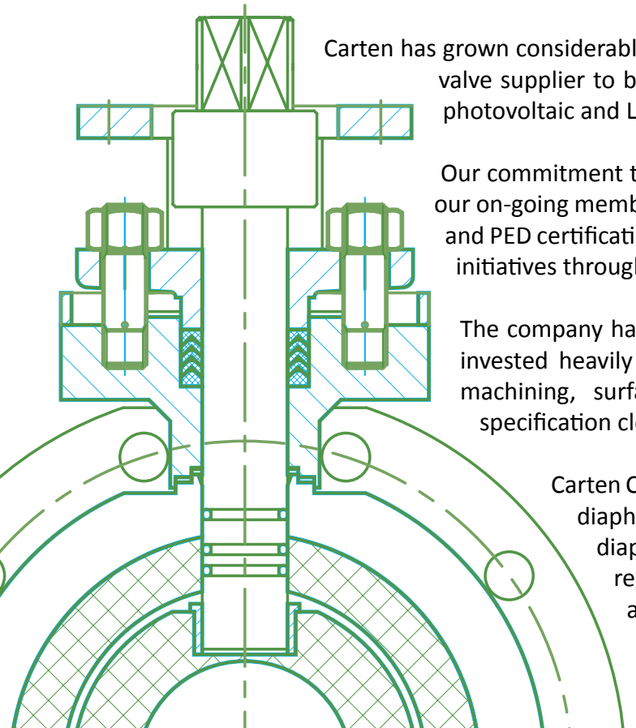
About Carten Controls Ltd

Carten Controls has been a member of the Fujikin Group (FCG) since 1991. Carten, through the Fujikin Group, are the pioneers of the ceramic ball valve. The ceramic (Cosmix) series was developed by Fujikin in 1975, with tens of thousands units of ceramic valves sold. The reputation of customers confirms our record as the highest quality in the market.

Carten has developed the Hi*Life* Ceramic series to adapt to ever increasing challenges from industries that require solutions to abrasive high pressure applications, extreme component wear, erosive and corrosive media, in particular fine powder application (PCI, TiO^2, and Polysilicon) where higher life and wear is a requirement from valve performance. Taking into consideration the frequent maintenance and replacement costs required of alternative severe-service valves, the Hi*Life* substantially improves on overall service life, accuracy and control and reduces the total cost of ownership in abrasive, erosive and corrosive systems.

Carten valves are utilised globally in a wide variety of applications and systems in the most demanding industries. These include bulk gas delivery, lateral distribution systems, filter-skids, purifiers, valve manifold boxes (VMBs), valve manifold panels (VMPs), gas panel, solvent, hook-up and gas cabinet applications. Together with Fujikin, Carten design and manufacture customised media flow solutions by utilising products from Carten-Fujikin's global network that deliver efficiency, reliability, safety and performance to specification and global standards. Carten-Fujikin have developed design and manufacturing knowledge in ceramic valves for severe service systems that deliver reliability, safety, performance and lower total cost of ownership in abrasive, erosive and corrosive industries.



Carten has grown considerably and is firmly established as a leading and innovative valve supplier to blue-chip global customers in the semiconductor, LED, photovoltaic and LCD markets.

Our commitment to our customers and quality is demonstrated through our on-going membership and certification to the IS EN ISO9001 standard and PED certification by the implementation of continuous improvement initiatives throughout the company.

The company have expanded in line with industry demands and have invested heavily in new production capabilities. These include CNC machining, surface finishing, welding, electropolishing and high-specification cleanrooms to ISO4, ISO5 and ISO6 standards.

Carten Controls' core product line includes high-purity bellows, diaphragm, check and ball valves and pharmaceutical diaphragm valves. We manufacture gas-pressure regulators, dual-containment valves, vacuum generators, and ceramic and control valves in our state-of-the-art facilities in Ireland and the USA.

Material Overview - Ceramic and Steel

Ceramic Overview

Technical ceramics are compounds of atoms bonded together in much stronger covalent and ionic bonding than in metals, therefore ceramics generally have properties of high hardness, high compressive strength, and chemical inertness.

The selection of these compounds offer unique characteristics that can be tailored to suit the unique requirement of the user's system.

- Extreme hardness – directly translates into unmatchable wear resistance
- Low density is significantly lighter than stainless steel (8 g/cc) and titanium (4.5 g/cc)
- Technical ceramics possess a chemically stable structure
- Technical ceramics exhibit low chemical solubility - creating high resistance to corrosion
- Stabilising agents induce transformation toughening increasing fracture toughness

Traditional Vs Technical Ceramics

- Traditionally ceramics are known as brittle structures with low tensile strength and fracture toughness.
- Technical ceramics improve on this through the addition of unique elements that stabilse the ceramic compound structure, improving tensile strength and fracture toughness thorugh a process known as transformation toughening.

The Hi*Life* series utilises a specific composition of Ce-TZP for the dynamic part of the internal ball valve seal – the ball itself. This stabilisation required for the Zirconia ball allows an increased Fracture Toughness and Flexural Strength required for the most critical component of this valve.

Steel Overview

Stainless steel is an iron-based alloy that must contain a minimum of 10.5% chromium. The chromium will form a protective oxide film which gives stainless its corrosion resistance. Additional alloying elements are often added to enhance the properties of steel.

- For ultimate strength, forging is used to form the housings of ceramic-lined ball valves
- Non-porous forgings support high rotational torque forces
- Cast carbon steel is utilised to provide an economic solution
- Coating added to provide additional corrosion protection.

For product contact components, where ceramic lining is not required as corrosion and/or abrasion forces are not as extreme, Carten provide stainless steel body options with dynamic components coated or formed with hard wearing alloys such as hastelloy, stellite, Inconel, or alternative options as required.

Carten Hi*Life* Ceramic Ball Valves

Carten HiLife Ceramic Ball Valves are:

Corrosion-Resistant: Ceramics do not react with most chemicals, including strong acids and alkalis.
Abrasion Resistant: Ceramics are almost equivalent to diamonds in terms of hardness and they are highly resistant to wear.
Cavitation Resistant: Unlike stainless steel, they can handle continuous cavitation without cracking or wearing down.
Ceramics are **not affected by changes in the pressure** across the valve.
Zirconia along with a number of other materials offers **high thermal shock resistance.**
Serialised Valves as standard to ensure traceability to all production records, raw material, chemical and mechanical composition data.

Figure 1: Hardness Comparison

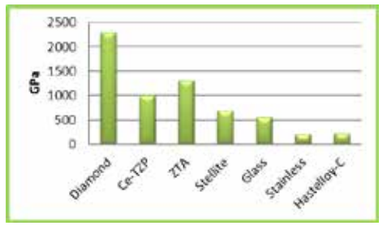


Figure 2: Fracture Toughness Comparison

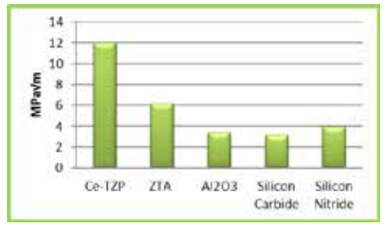


Figure 3: Flexural Strength Comparison

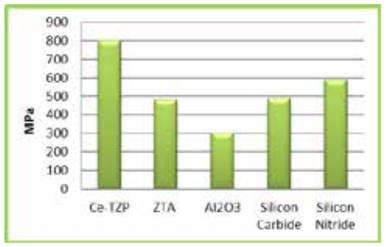
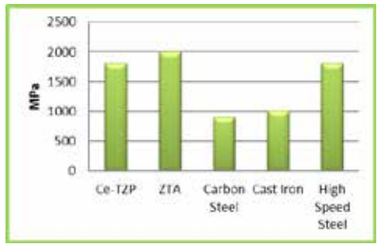


Figure 4: Compressive Strength Comparison



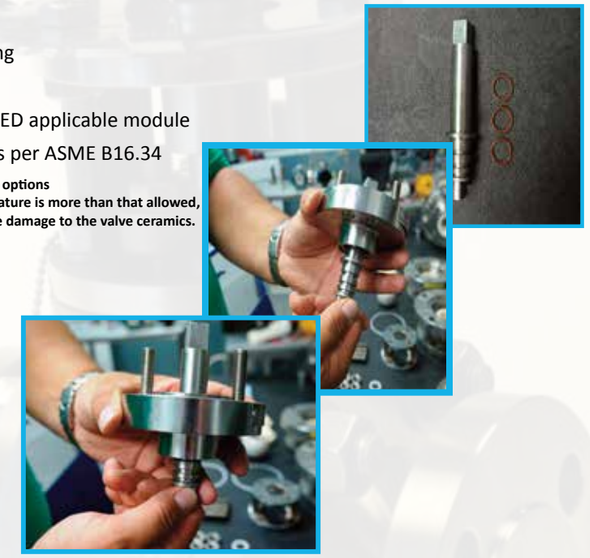
Properties of Ceramics	Units	Materials	
		Cerium Stabilised Zirconia	Zirconia Toughened Alumina
Colour	-	Ivory	Ivory
Bulk Density	g/cm^3	5.6	4.2
Water Absorbency	%	0	0
Hardness	Kgf/mm^2	850	1300
Flexural Strength	MPa	1150	480
Compressive Strength	MPa	1850	2000
Thermal Conductivity @ 20°C	W/mk	2.7	22
Fracture Toughness	MPa√m	10	5.5
Maximum Use Temperature (in valve)	°C	200	200
Thermal Shock Resistance	°C	<200	<250
Young's Modulus of Elasticity	GPa	207	320
***Coefficient of thermal expansion**	200 °C (*10-6/ °C)	9-11	7-8

Hi*Life* Ball Valve Technical Specifications

Hi*Life* Key Specifications

Maximum Pressure Rating	PN10, PN16, PN25, PN40 *
Leakage Class	ANSI FCI 70/2 Class V (Class VI on request)
Maximum Temperature	200 ^{O}C/392^{O}F **
Max Differential Temperature	100 ^{O}C/210^{O}F
Standard Ceramic Ball	ZrO2-Ce-TZP
Standard Ceramic Lining	ZTA (Zirconia-Toughened Alumina)
Flow Control	Shut-Off + EQ%
Flow Direction	Two Way (Reverse Flow Possible)
Overall Dimension	EN558-1 OAL
Integrated Reducers	Yes
Internal Bores	DN Full Bore Sizing
Ceramic Parts Interchangeable	Yes
Certification	Certified as per PED applicable module
Stem Design	Blow out proof as per ASME B16.34

***PN16 is the standard rating of the Hi*Life* Series, contact Carten for further options**
****If the temperature is to be constantly varied and the differential temperature is more than that allowed, gradual increase/decrease must be strictly adhered to. This avoids possible damage to the valve ceramics.**



Hi*Life* Key Features

The Carten Hi*Life* series provides an air tight seat closure seal, featuring reduced space between the ball and socket ceramic seat seal. Unique design features provide additional seat sealing compression advantage at lower pneumatic pressure required, for example, with the dilute pneumatic convey process.

Zirconia ceramic parts offer greater resistance against wear for any fine particles that attempt to interfere with the ceramic seals.
Flat-faced ceramic seal at the valve flange outlets is standard – therefore ensuring that the seals used will prevent immediate leakage to atmosphere if the ceramic cracks.

The stem sealing system protects against over-pressurisation of any system through a blow-out proof sealing feature.
The HiLife series also allows pressurisation from both sides, retaining the same leakage class performance.

Typical Applications

The Carten Hi*Life* Ceramic Ball Valve has been developed to react to new challenges in industries that require solutions to abrasive and corrosive media, in particular fine powder application including:

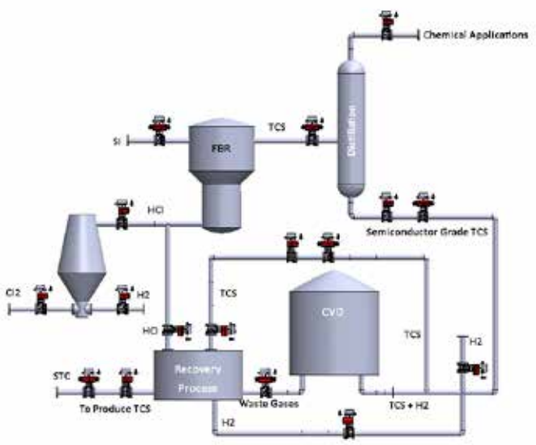
1. Polysilicon Processing
2. Pulverised Coal Injection (PCI) and
3. Titanium Dioxide (TiO^2)
4. Copper Mining
5. General Mining
6. Chemical Industry
7. Paper & Pulp
8. FGD
9. Milk and more..

Zirconia-Toughened Alumina is used in all stationary ceramic components for the Carten Hi*Life* Ceramic Ball Valve due to its high resistance to wear and abrasion. As the ceramic ball needs to be extremely strong, wear-resistant, chemically inert, have a fracture toughness of a high level, and resistance to degradation at low temperatures, Cerium-stabilised Zirconia is utilised. Dead Space is also reduced in this ceramic valve ensuring that aggressive fine particles are not lodged in any cavity – thereby avoiding any crystallisation causing cracking to ceramic components. The Hi*Life* Series has two-way flow capability, is available from ½" up to 6" line sizes (DN15-DN150) and is provided with air tight Class VI seat leakage classification. Taking into consideration the frequent maintenance and replacement costs required of comparative severe-service valves, the HiLife clearly improves on overall service life, accuracy and control and reduces the total cost of ownership in abrasive, erosive and corrosive systems.

Polysilicon Processing

The Carten Hi*Life* Ceramic Ball Valve is suitable for polysilicon processing as it is encompassing of the following features:

1. The additional seat sealing compression in the Hi*Life* Ceramic Ball Valve is an advantage at lower pneumatic convey pressure of Silica production.
2. The reduced dead space in the valve ensures the aggressive Si fine particles are not lodged in any cavity – thereby avoiding any crystallisation of Si powder causing cracking to ceramic components.
3. The Zirconia-Toughened Alumina used for all ceramic stationary components, possesses greater resistance to abrasion than Alumina. For the silica processing industry at this stage – abrasion is more important than corrosion
4. The flat-faced ceramic seal at flange outlet of the HiLife ceramic ball valve is standard – therefore ensuring that the seals used will prevent immediate leakage to atmosphere if the ceramic cracks. HCl gas can react with moisture in the atmosphere to form hydrochloric acid.

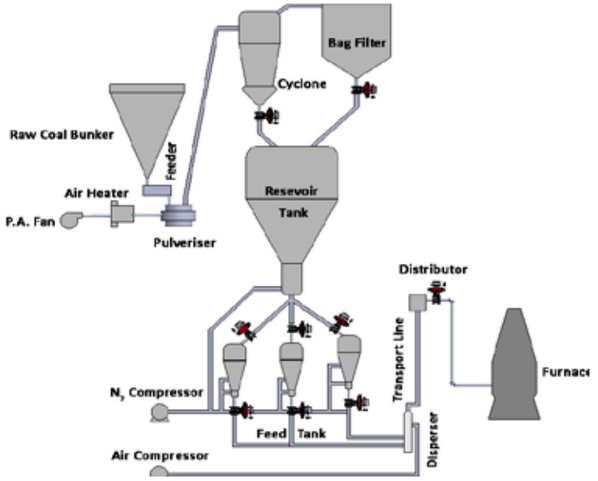


Pulverised Coal Injection (Steel Plant Applications)

Injection of carbon powder in electric arc furnaces (EAF); Raw iron desulphurisation (supply of additives: CaC, MgO^2...

Carten recommend the installation of the Hi-Life series in PCI applications, for the following reasons:

1. The PCI industry can utilise pressure of up to 16-17 BAR depending on the pneumatic convey process type selected; Dilute Phase or Dense Phase.
2. Moisture content of coal particles can cause sticking and handling problems – the zirconia material used in the HiLife series can withstand higher torque than other ceramic ball valves.
3. When fine particles are processed they require less dead space and Class VI leakage rates which are featured in the Hi*Life* Series.
4. Zirconia is a harder material than Alumina, which is critical depending on the type of coal used for PCI.



Titanium Dioxide (TiO^2)

Titanium dioxide is now the common white pigment in paints after the use of lead oxide was banned some years ago. The overall process of manufacture is to take an impure TiO^2 feedstock and to convert this into pure white TiO^2 pigment. Once titanium containing ores have been mined, they are converted into pure titanium oxide. The two main production methods are the sulphate process and the chloride process.

Carten recommend installation of the Hi*Life* series in TiO^2 applications, for the following reasons:

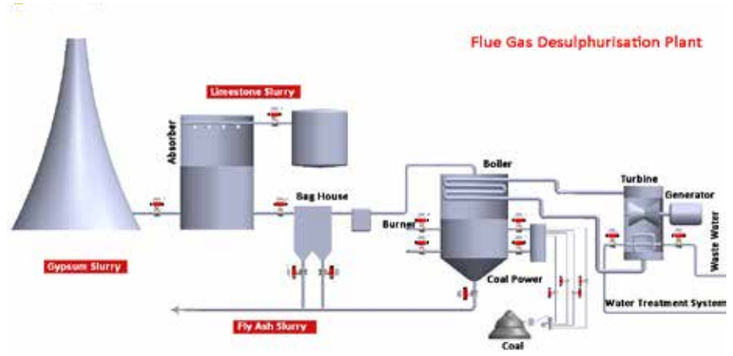
1. The TiO^2 industry utilise generally low pressures of 5-7 BAR depending on the process type selected.
2. Class VI leakage is often required depending on the area of install, and the type of process used. For the chlorine method, Hi*Life* is suited when processing gaseous or solid forms of process media.
3. The particular abrasion of finer TiO^2 particles make the Carten Hi*Life* model more suitable due to the Class VI leak rate.

Flue Gas Desulphurisation (FGD)

FGD plants remove sulphur and nitrogen oxides (released during the burning of fossil fuels) minimising pollution in the atmosphere, using a wet or dry alkali reagent.

Carten recommend the installation the Hi*Life* series in FDG applications, for the following reasons:

1. Floating ball concept – suits slurry media with low rotational forces necessary to move ball, reducing possibility of fracture
2. Raised ceramic face allows for minimum torque during installation
3. Wide array of available ball trims and flow curves



Exploded View and Part Descriptions

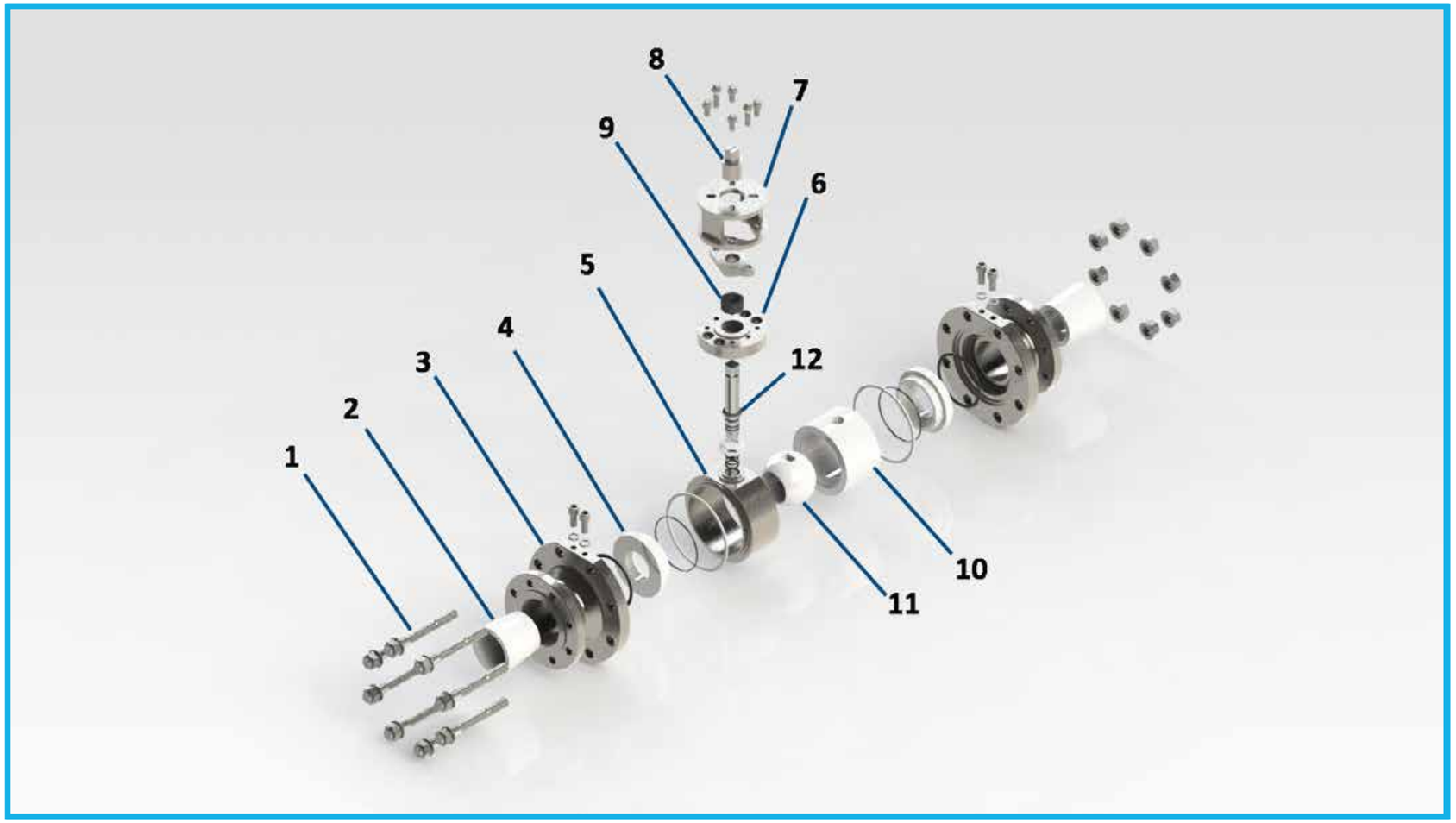
1 Stainless Steel Bolts & Nuts provides the ideal combination of strength and corrosion resistance to meet industry needs

2 Zirconia-Toughened Alumina Lining fitted to every inlet and outlet piece of the HiLife series to ensure maximum protection for end users piping systems against wear, corrosion, abrasion, and erosion. The flange steel component (3, below) effortlessly absorbs the adjustment forces, the ceramic lining ensures efficient wear protection

3 Stainless Steel Body Flange offers excellent corrosion-resistant properties and design strength to secure the appropriate leak-tightness specification, and allows the valve to be exposed to extremely harsh environments without external corrosive degradation. It securely encloses the ceramic components and protects them from any possible damage. Pipe stresses are not transferred to the ceramics but are absorbed by the stainless steel flange and body of the valve.

4 Zirconia-Toughened Alumina Ball Socket ensures increased mechanical strength and fracture toughness over alumina. ZTA has a high temperature stability and corrosion resistance.

5 Stainless Steel Body allows the valve to be exposed to extremely harsh environments without external corrosive degradation. It securely encloses the ceramic components and protects them from any possible damage. Pipe stresses are not transferred to the ceramics.



6 Stainless Steel Bonnet Flange offers excellent corrosion-resistant properties and design strength to secure the appropriate leak-tightness specification, in addition to compressing against the machined one-piece hastelloy stem lip - therefore providing a blow-out proof design feature

7 Stainless Steel Bracket meets the dimensional standards of ISO 5211 – which is the basis for a sturdy, clean, direct-fit onto most rotary actuator brands and models. This mounting pad may be removed to permit special automation packages, thus making the HiLife valve very automation-friendly. DIN 3337 version available upon request.

8 Stainless Steel Coupling meets ISO 5211 square-drive actuator dimensions – which is the basis for a sturdy, clean, direct fit onto most rotary actuator brands and models. DIN 3337 version available upon request.

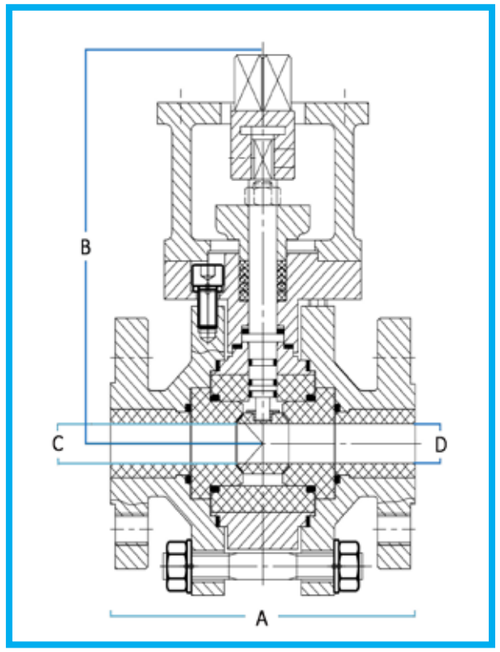
9 O-Rings are kept energized without the need for periodic packing re-adjustment. Carbon-Filled Teflon® utilised as it is stiffer, has a higher temperature limit and does not cold-flow.

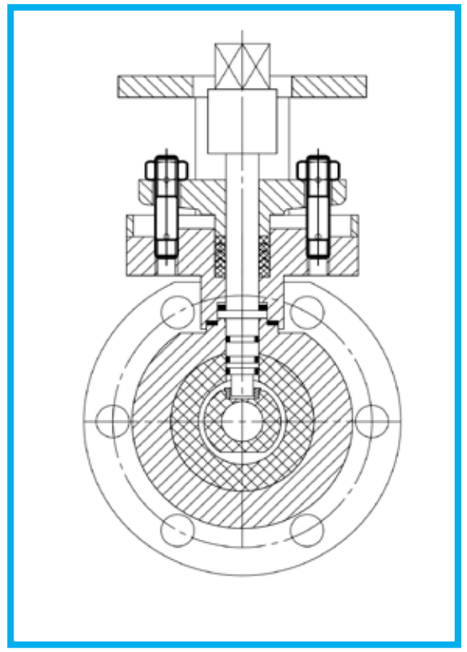
10 Solid Zirconia-Toughened Alumina Body fully encapsulates the ball and acts as the pressure containing vessel when assembled with the socket. This ensures that aggressive fluids do not come in contact with any of the external stainless steel components. ZTA ensures increased mechanical strength and fracture toughness over alumina, and has high temperature stability and corrosion resistance.

11 Solid Cerium-Stabilised Zirconia Ball resists corrosion and abrasion and is offered in a variety of equal-percent and round ported styles. Floating-ball design requires reduced actuation torque and minimizes the possibility of fracture due to over-torquing. Having a minimal amount of dead space allows the ability to handle high differentials, as well as having abundant strength to withstand any surface particulate accumulation. Ce-TZP ceramic is utilised as standard for the ceramic ball, as this component needs to be extremely strong, wear-resistant, chemically inert, have a fracture toughness of a high level and resistance to degradation at low temperatures.

12 Hastelloy-C® Stem offers excellent corrosion-resistant properties and sufficient hardness to drive the ball indefinitely. Standard stem may be replaced with virtually any material to maximize process compatibility and longevity.

Technical





Hi*Life* Technical Dimensions [metric/imperial]								
	A		B		C		D	
	mm	in	mm	in	mm	in	mm	in
DN 15-15-15	130	5.1”	130	5.1”	15	5/8”	15	5/8”
DN 20-20-20	150	5.9”	148	5.8”	20	3/4”	20	3/4”
DN 25-25-25	160	6.2”	137	5.3”	25	1”	25	1”
DN 40-25-40	200	7.8”	142	5.5”	25	1”	40	1.5”
DN 40-40-40	200	7.8”	162	6.3”	40	1.5”	40	1.5”
DN 50-40-50	230	9”	162	6.3”	40	1.5”	50	2”
DN 50-50-50	230	9”	210	8.2”	50	2”	50	2”
DN 65-40-65	290	11.4”	144	5.6”	40	1.5”	65	2.5”
DN 65-65-65	290	11.4”	255	10”	65	2.5”	65	2.5”
DN 80-65-80	310	12.2”	217	8.5”	65	2.5”	80	3”
DN 80-80-80	310	12.2”	265	10.4”	80	3”	80	3”
DN 100-80-100	350	13.7”	246	9.6”	80	3”	100	4”
DN 100-100-100	350	13.7”	330	12.9”	100	4”	100	4”
DN 150-100-150	480	18.8”	387	15.2”	100	4”	150	6”
DN 150-150-150	480	18.8”	450	17.7”	150	6”	150	6”

*Specifications and dimensions are subject to change without notice.
Please contact Carten for full specification details at the time of enquiry.

Dimensions

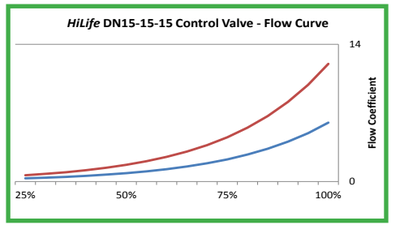
Cv Values

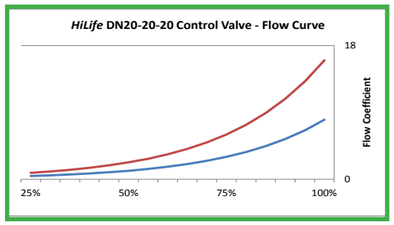
= 60 Degree EQ%

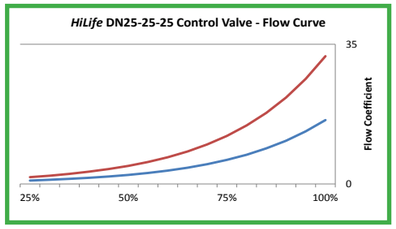
= 30 Degree EQ%

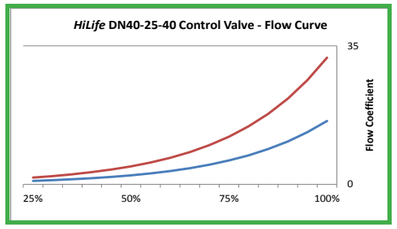
Bore Size	Round Port	30 Degree EQ%	60 Degree EQ%
DN 15-15-15	23	6	12
DN 20-20-20	44	8	16
DN 25-25-25	84	16	32
DN 40-25-40	84	16	32
DN 40-40-40	200	24	78
DN 50-40-50	200	24	78
DN 50-50-50	250	56	90
DN 65-40-65	200	24	78
DN 65-65-65	444	78	160
DN 80-65-80	444	78	160
DN 80-80-80	643	86	250
DN 100-80-100	643	86	250
DN 100-100-100	1041	198	450
DN 150-100-150	1041	198	450
DN 150-150-150*	1890	-	-

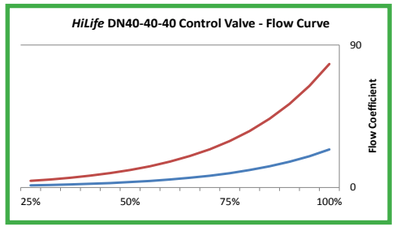
* For further information contact Carten

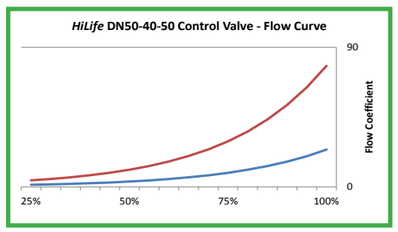


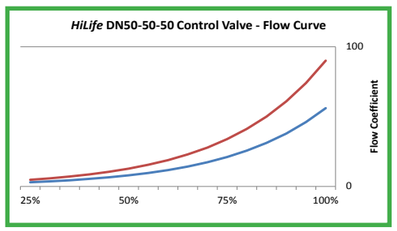


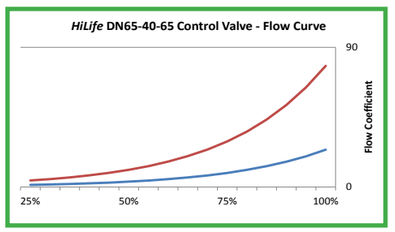


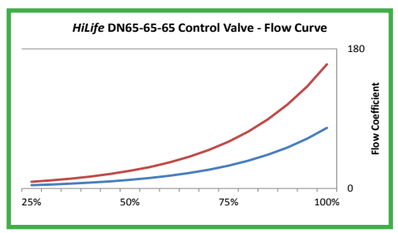


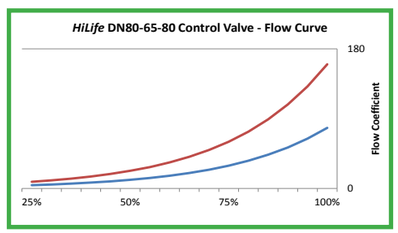


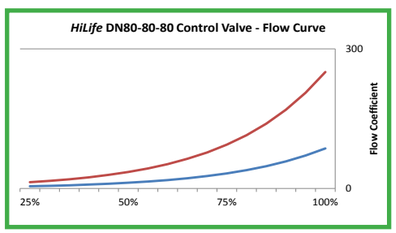


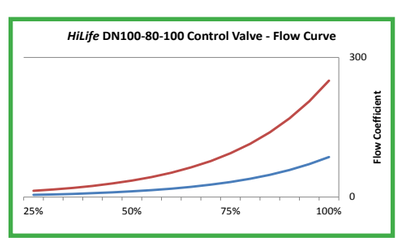


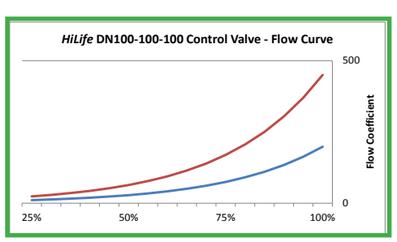


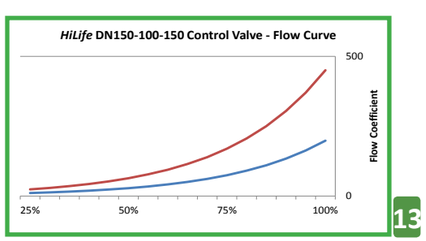












CARTEN HI*Life* BALL VALVE PRODUCT DESCRIPTION

0	1	2	3	4	5	6		7	8		9		10
CHL	-	CBV1	D	-	P	S	D	H	-	E	24	-	F07	-	ZTA

No.	Meaning		Supplementary Explanation
0	Carten HiLife		CHL
1	Ceramic Ball Valve		CBV1
2	Action Type	None	-
		D: Direct Action (Air to close)	D
		R: Reverse Action (Air to Open)	R
3	Positioner	None (No Positioner)	-
		P: Pneumatic Positioner	P
		E: Electropneumatic Smart	E
		S1: Solenoid	S1
4	Actuator	None (No Actuator)	-
		D: Double Acting	D
		S: Spring Back	S
		M: Motorised	M
5	Applied Standard for Flange	J: JIS10k	J
		A: ANSI 150	A
		A3: ANSI 300	A3
		D: DIN PN16	D
6	Nominal Diameter	D: 15A 1/2"	D
		E: 20A 3/4"	E
		F: 25A 1"	F
		H: 40A 1 1/2"	H
		I: 50A 2"	I
		J: 65A 2 1/2"	J
		K: 80A 3"	K
		M: 100A 4"	M
		O: 150A 6"	O
7	Valve Characteristic	E: EQ%	E
		O: ON/OFF	O
		L: Linear	L
8	Cv	(What Cv value do you require?)	
9	Stainless Steel Bracket Standard Call outs shown, Additional Options available on request	DN15-25 = F05	F05
		DN40 = F07	F07
		DN50-65 = F10	F10
		DN80-100 = F12	F12
		DN150 = F14	F14
10	Specification	KA: Kalrez O-Rings	KA
		FKJ: Standard Raised Face Flange	FKJ
		CR: Ceramic Lined Reducer	CR
		CP: Ceramic Lined Spool	CP
		HAN: Manual Handle	HAN
		GO: Gear Operated	GO
		ZTA: Zirconia Toughened Alumina	ZTA

DN	Round Port	3O° EQ%	60° EQ%	DN	Round Port	3O° EQ%	60° EQ%
15-15-15	23	6	12	65-65-65	444	78	160
20-20-20	44	8	16	80-65-80	444	78	160
25-25-25	84	16	32	80-80-80	643	86	250
40-25-40	84	16	32	100-80-100	643	86	250
40-40-40	200	24	78	100-100-100	1041	198	450
50-40-50	200	24	78	150-100-150	1041	198	450
50-50-50	250	56	90	*DN150 and above contact Carten			
65-40-65	200	24	78				

PED Certification*

In the case that the product specifications or the precautions outlined in the instruction manual are not followed, the product may not be covered by the PED. Therefore, customers are responsible for correct operation of the product in order to ensure its safe use within the limits of PED. Carten Controls is certified to the European Pressure Equipment Directive, through the monitoring from an authorised notified body (NOBO). Product bears the notified body number (or CE mark identification) where applicable. HiLife valves produced in Carten, are certified to bear this mark through annual assessment.
As part of the certification process, the Carten HiLife series is designed and manufactured in full compliance with ASME B16.34 Carten Controls Ltd. is an IS EN ISO 9001:2015 registered and certified company, and its quality systems are monitored by the National Standards Authority of Ireland (N.S.A.I).

Pressure	Size	Fluid Group			
		Group 1 Liquid	Group 2 Liquid	Group 1 Gas	Group 2 Gas
10 bar and Under	≤25A	SEP	SEP	SEP	SEP
	>25A ; ≤100A	SEP	SEP	I	SEP
	150A	SEP	SEP	II	SEP (6 bar and under)
					I

The table above illustrates which Pressure Equipment Directive (PED - CE) category is applicable to a HiLife valve dependent on its maximum pressure, nominal size and operating fluid group. Note; Fluid group classification as per PED 97/23/EC.

*For additional certification requests contact Carten

*Note that 2014/68/EU has become the active revision of the Pressure Equipment Directive since July 2016, superseding 97/23/EC

Customer Order Requirements

1. All Valves (Please enter your requirements below)		
Media	Characteristic/Particle Size/Media Type	
Mass Density	Calculated using Specific Gravity	
Media Flow	Flow velocity of system (m^3/h)	
Upstream Pressure	Pressure maintained at Valve Inlet (MPa)	
Downstream Pressure	Pressure maintained at Valve Outlet (MPa)	
Delta P	Differential Pressure Across Valve (MPa)	
Ball Trim/Valve Function	Control or Shut-Off Function	
Pressure Rating	Maximum Shell Rating of Valve	
Operating Temperature	Maximum Temperature of Media	
Differential Temperature	Max. Allowed Temperature Differential (°C)	
Flange Connection	Type of Connection (ANSI, DIN etc)	
Cv Calculation	Flow Capacity of Customer System	
Face-to-Face Length	Standard for OAL	
2. Control Valves		
Control Range	Rangeability of Valve to Control Flow	
Minimum Cv Calculation	To Ensure System Flow can be Controlled	
3. Automation - Actuators		
Actuation Type	Double-Acting, Spring-Return, Electric	
Actuation Mode	Reverse (NC), Direct (NO)	
Failure Position	Signal Failure Position	
Actuator Force/Sizing	Connection Data, Rotational Torque Force	
Instrument Control	What pressure, electric signal is available	
Pressure Reducing Regulator	To Enable Control of Actuator Thrust	
4. Automation - Positioners		
Signal Type	SMART, Analogue, Pneumatic	
Protection Class	ATEX, Ex, PED etc.	

Fujikin Cosmix

Ceramic Ball Valve

Fujikin Cosmix Fine Ceramic Ball Valves

Cosmix Ball Valves feature fine ceramics in all wetted parts. These ceramic materials offer greater hardness and excellent abrasion and corrosion resistance.

Fujikin Cosmix Ceramic Ball Valves feature:

- Excellent Durability due to ceramic materials
- Excellent flow control performance
- Floating ball structure, specifically beneficial in slurry applications
- Simple Construction, lightweight and compact design
- Ease of Maintenance

Figure 1: Hardness Comparison

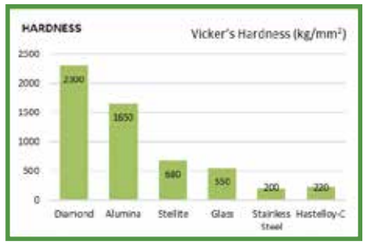
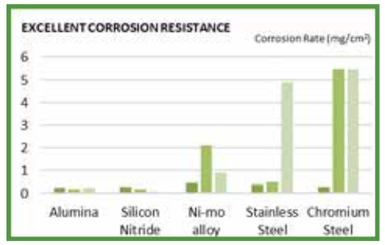


Figure 2 : Corrosion Resistance



Properties of Ceramics	Units	Materials						
		99.5% Alumina Al2O3 (A-479M)	99.5% Alumina Al2O3 (A-479SS)	99.9% Alumina Al2O3 (A-601D)	Y Zirconia ZrO2 (Z-201N)	Mg Zirconia ZrO2 (Z220)	Silicon Carbide SiC (SC-221)	Silicon Nitride Si3N4 (SN-220)
Colour	-	White	White	Ivory	Ivory	Yellow	Black	Black
Bulk Density	g/cm3	3.8	3.8	3.9	6.0	5.7	3.0	3.2
Water Absorbency	%	0	0	0	0	0	0	0.1
Hardness (500g)	HV 0.5	1650	1700	1750	1250	1100	2400	1450
	GPa	16.2	16.7	17.2	12.8	10.8	23.5	14.2
Flexural Strength	MPa	304	323	490	980	686	490	588
Compressive Strength	MPa	2157	2353	-	5686	-	4902	3824
Thermal Conductivity @ 20°C	W/mKMPa	25.1	25.1	33.5	3.8	3.3	71.2	16.7
Fracture Toughness	MPaVm	3.4	3.4	3.4	6.0	11.5	3.1	3.9
Maximum Use Temperature (in valve)	°C	1600	1600	1750	200	800	1400	1200
Thermal Shock Resistance	°C	50	50	50	75	110	100	150
Relative Cost	-	1	1.5	2	7	3.5-4	6-7	6-7
Young's Modulus of Elasticity	GPa	343	-	386	-	-	373	294
Poisson's Ratio	-	0.25	-	-	-	-	0.16	0.27
Linear Expansion Coefficient (40-800°C)	10-6 K-1	7.7	-	-	-	-	4.4	3.7

Fujikin Cosmix Technical Specifications

Fujikin Cosmix Ball Valve Techncial Specifications

Maximum Pressure Rating	PN10
Leakage Class	ANSI FCI 70/2 Class IV
Maximum Temperature	200 °C/392°F **
Max Differential Temperature	50 °C/122°F
Standard Ceramic Ball	Alumina 99.5%
Standard Ceramic Lining	Alumina 99.5%
Flow Control	Shut-Off + EQ%
Flow Direction	One Way
Overall Dimension	Fujikin-Carten Original
Internal Bores	Fujikin Original
Ceramic Parts Interchangeable	Yes
Certification	Certified as per PED applicable module

***PN10 is the standard rating of the Fujikin Cosmix Series, contact Carten for further options**
****If the temperature is to be constantly varied and the differential temperature is more than that allowed, a step by step gradual increase/decrease must be strictly adhered to. This avoids possible damage to the valve ceramics.**

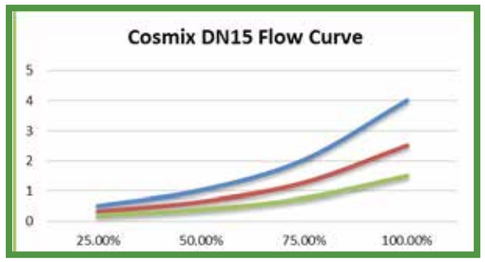
Fujikin Cosmix Key Features

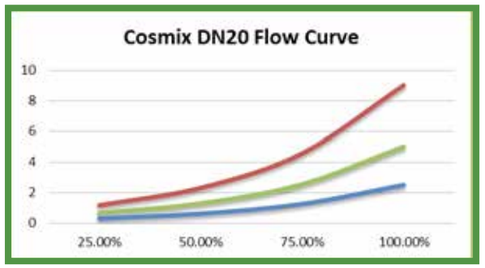
In 1975, Fujikin developed the first fine ceramic valve in response to customer concerns about conventional metal valves. Featuring fine ceramic materials with significant abrasion and corrosion resistance, Cosmix Fine Ceramic Valves have been sold around the world over the last 30 years .

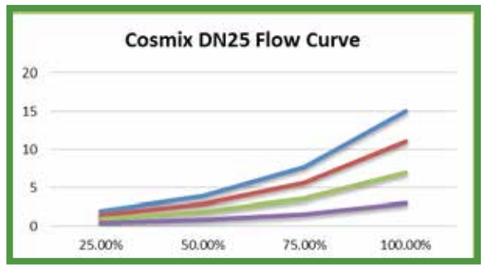
The Fujikin Cosmix series provides excellent durability for abrasive and corrosive fluids due to all wetted parts being made from solid fine ceramics (Alumina 99.5%). Each Valve sizes offers 3-4 EQ% (equal percentage) triangular ports for precise flow control and a round port ball for on/off service. This enhances Fujikin Cosmix superior flow controllability.

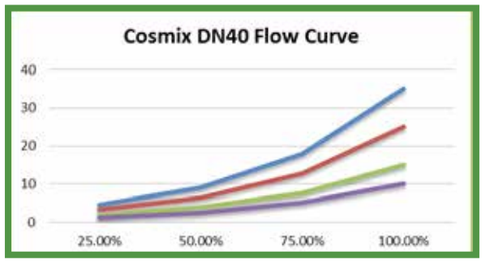
Fujikin Cosmix Cv Values

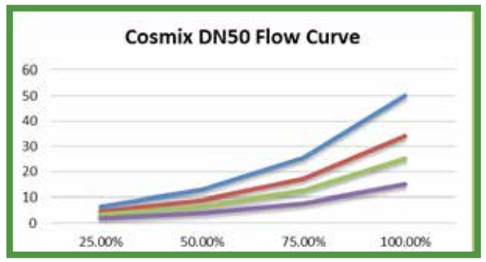
Valve Size	Cv Value				
	Round Port	Triangular Port			
DN15	8	4	2.5	1.5	-
DN20	14	9	5	2.5	-
DN25	24	17	11	7	3
DN40	55	35	25	15	10
DN50	90	50	34	25	15
DN65	130	80	54	35	25
DN80	195	120	80	58	40
DN100	340	200	130	85	57
DN150	750	500	350	250	-

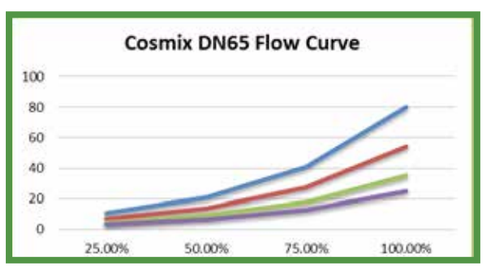


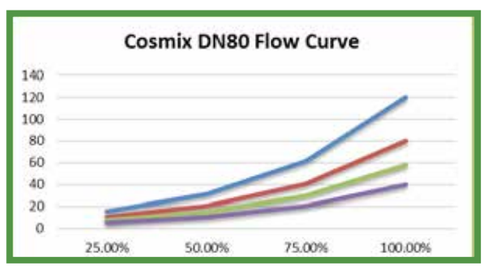


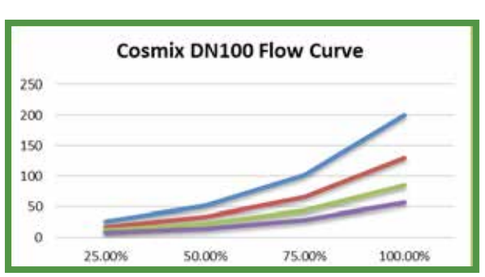


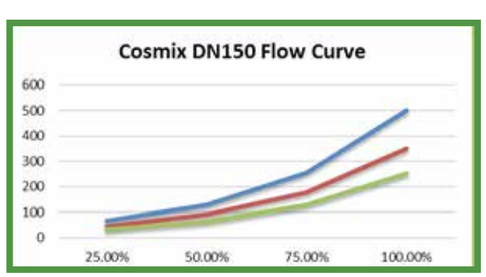












Fujikin Cosmix Ball Valve Product Description

0	1	2	3	4	5		6	7	8	9
CBV3	D	-	P	S	D	F	-	E	24 -	SR -	KA

No.	Meaning		Supplementary Explanation
0	Fujikin Cosmix	Ceramic Ball Valve	CBV3
1	Action Type	None	-
		D: Direct Action (Air to close)	D
		R: Reverse Action (Air to Open)	R
2	Positioner	None (No Positioner)	-
		P: Pneumatic Positioner	P
		E: Electropneumatic Smart	E
		S1: Solenoid	S1
3	Actuator	None (No Actuator)	-
		D: Double Acting	D
		S: Spring Back	S
		M: Motorised	M
4	Applied Standard for Flange	J: JIS10k	J
		A: ANSI 150	A
		A3: ANSI 300	A3
		D: DIN PN16	D
5	Nominal Diameter	D: 15A 1/2"	D
		E: 20A 3/4"	E
		F: 25A 1"	F
		H: 40A 1 1/2"	H
		I: 50A 2"	I
		J: 65A 2 1/2"	J
		K: 80A 3"	K
		M: 100A 4"	M
		O: 150A 6"	O
6	Valve Characteristic	E: EQ%	E
		O: ON/OFF	O
		L: Linear	L
7	Cv	(What Cv value do you require?)	
8	Yoke Type	SR: ELO-MATIC actuator, spring back type (with yoke and joint)	SR
		DA: ELO-MATIC actuator, double action type (with yoke and joint)	DR
9	Specification	KA: Kalrez O-Rings	KA
		FKJ: Standard Raised Face Flange	FKJ
		CR: Ceramic Lined Reducer	CR
		CP: Ceramic Lined Spool	CP
		HAN: Manual Handle	HAN
		GO: Gear Operated	GO
		ZTA: Zirconia Toughened Alumina	ZTA

Valve Size	Cv Value				
	Round Port	Triangular Port			
DN15	8	4	2.5	1.5	-
DN20	14	9	5	2.5	-
DN25	24	17	11	7	3
DN40	55	35	25	15	10
DN50	90	50	34	25	15
DN65	130	80	54	35	25
DN80	195	120	80	58	40
DN100	340	200	130	85	57
DN150	750	500	350	250	-

Ceramic- Lined Gate Valves

Why Choose a Carten Hi*Life* Ceramic Gate Valve?

Extreme hardness and high temperature capabilities give ceramics exceptional resistance to cavitation- even continuous, aggressive cavitation does not affect the material. Unlike other ceramic materials, zirconium oxide (ZrO^2 –also known as zirconia) is a material with very high resistance to abrasion, and crack propagation.

Specialised Technical Ceramic is utilised as standard for the ceramic lining of this Hi*Life* Gate valve utilising a stabilising element to increase resistance to wear, abrasion and micro structure cracks. This provides additional mechanical strength and fracture toughness over standard alumina and provides a high temperature stability and corrosion resistance.

Properties of Hi*Life* Ceramic Gate Valves

Property	Units	Standard Zirconia Toughened Alumina	Optional Cerium Stabilised Zirconia
Colour	-	Ivory	Ivory
Bulk Density	g/cm^3	4.2	5.6
Water Absorbency	%	0	0
Hardness	Kgf/mm^2	1300	850
Flexural Strength	MPa	480	1150
Compressive Strength	MPa	2000	1850
Thermal Conductivity @ 20°C/68 °F	W/mk	22	2.7
Fracture Toughness	MPa√m	5.5	10
Maximum Use Temperature (in valve)	°C/ °F	200/392	200/392
Thermal Shock Resistance	°C/ °F	<250/482	<200/392
Young's Modulus of Elasticity	GPa	320	207
*Coefficient of thermal expansion	200 °C /392 °F ($*10^{-6}$/ °C)	7-8	9-11

Double Disk and Knife Gate Valves

Carten-Fujikin can offer three different series of Gate Valve;

It is essential to inform Carten of the installation position of the gate valve. Different series can be suitable for only vertical pipe installation, others for only horizontal pipe installation, and in some unique design both orientation is possible.

G-Series Double Disk Gate Valve

- Suitable for pneumatic convey of fine and abrasive powders
- Available from DN50 to DN200 line sizes as standard (higher sizes upon request)
- Must be installed in pipework in the vertical position only
- Metal double disc gate is used to seal against structural ceramic discs
- Purge ports are supplied as standard to ensure no media is lodged within the valve structure
- Provides bidirectional sealing with pressure
- Temperature is suitable from -40°C to 240°C (-40°F to 464°F)

H-Series Double Disk Gate Valve

- Suitable for pneumatic convey systems with gas-solid two-phase medium
- Available from DN50 to DN200 line sizes as standard (higher sizes upon request)
- Must be installed in pipework in the horizontal position only
- Structural ceramic sealing (disc and seat) resist corrosion
- Rotating metal gate removes the powder media from sealing
- Unique design of large cavity prevents gate from sticking and accumulation of powder residue
- Temperature is suitable from -40°C to 240°C (-40°F to 464°F)

F-Series Knife Gate Valve

- Suitable for the transport of liquid and slurry conveying systems
- Liquid/solid mediums - such as ash, slurry, mine residue, coal residue and sewage are suitable
  - Can be installed in the horizontal and vertical positions
  - Available from DN50 to DN200 line sizes as standard (higher sizes upon request)
  - Temperature is suitable from -40°C to 240°C (-40°F to 464°F)
  - Available in manual and pneumatic versions
  - Structural ceramic sealing and metal gate resist corrosion providing high durability
  - Purge system available to clean the internal body and reduce medium accumulation
  - Provides bidirectional sealing with pressure

Gate Valve Sealing Structure

Generally, all gate valve series are supplied with stainless steel grade – or enhanced alloy – discs, providing the necessary tensile strength against system loading and forces. However, the extreme wear impacted from the sliding gate seals and abrasive media combinations is negated by ceramic seats and seat discs, in addition to ceramic surfaces embedded onto any sealing surface – providing resistance against wear and extending valve durability and service life.

HI*Life* CERAMIC GATE VALVE COMPONENTS

F-Series

1 Zirconia Toughened Alumina Seat Lining

Fitted to every piece of the Hi*Life* Gate valve, this ensures maximum protection for end users piping systems against wear, corrosion, abrasion, and erosion. The flange steel component effortlessly absorbs the adjustment forces; the ceramic lining ensures efficient wear protection therefore the flow-path is fully enclosed by ceramic components ensuring exceptional wear, corrosion, abrasion, and erosion-resistance for all components used for flow control (Ce-ZTP available on request).

2 Solid Zirconia-Toughened Alumina Disc

Utilised as standard as this component needs to be extremely strong, wear-resistant, abrasion, erosion and corrosion-resistant, chemically inert, and have a fracture toughness of a high level**.**

3 Zirconia-Toughened Alumina

Ensures increased mechanical strength and fracture toughness over alumina. ZTA has a high temperature stability and corrosion resistance.

H-Series

4 Gate Steel Alloy

Cast Carbon Steel (WCB) is utilised to provide efficient economical housing for the ceramic lined components. The WCB is coated for additional corrosion protection.

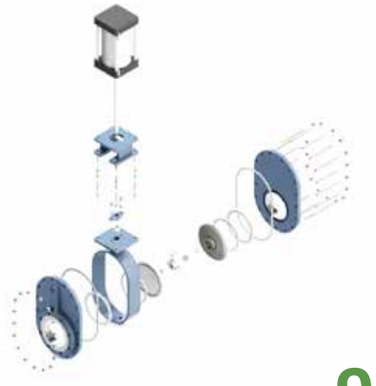
5 Cavitation Resistant

Carten Zirconia-Toughened Alumina ceramics are not affected by cavitation, and will not degrade in high differential-pressure applications that are subject to cavitation.

6 EPDM Lining

Available to create ANSI FCI 70/2 Class VI leak rate for shutoff leak rate if required, and suitable to application.

G-Series



7 Serialised Valves

Serialised valves provided as standard to ensure traceability to all production records, raw material, chemical and mechanical composition data.

8 ISO Mounting Pad

Ensures compatibility with all major actuator brands (DIN3337 available as option).

9 Line Size Availability

available from DN50 (2”) to DN200 (8”).

CARTEN HI*Life* GATE VALVE PRODUCT DESCRIPTION

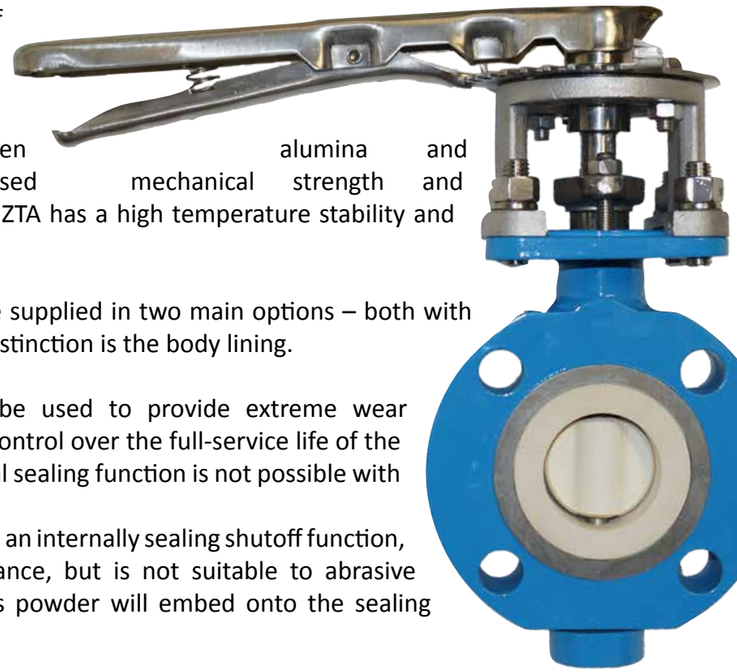
0	1	2	3	4	5	6		7	8		9
CHL	-	CGV1	D	-	P	S	D	H	-	E	-	24	-	F07

| No. | Meaning | | Supplementary Explanation | | |

Ceramic- Lined Butterfly Valves

Carten Hi*Life* Butterfly Valves

Zirconia Toughened Alumina (ZTA) ceramic is utilised as standard for the ceramic lining of this HiLife butterfly valve, due to its high resistance to wear and abrasion. In effect, it is an intermediate solution between alumina and zirconia – but with the increased mechanical strength and fracture toughness over alumina. ZTA has a high temperature stability and corrosion resistance.



The Carten butterfly series can be supplied in two main options – both with solid ceramic discs. The primary distinction is the body lining.

- A ceramic-lined option can be used to provide extreme wear resistance, and superior flow control over the full-service life of the valve. However, shutoff internal sealing function is not possible with this series
- An EPDM-lined option provides an internally sealing shutoff function, and extreme corrosion resistance, but is not suitable to abrasive pneumatic convey systems, as powder will embed onto the sealing lining.

Properties of Hi*Life* Ceramic Butterfly Valves

Property	Units	Material Zirconia Toughened Alumina
Colour	-	Ivory
Bulk Density	g/cm^3	4.2
Water Absorbency	%	0
Hardness	Kgf/mm^2	1300
Flexural Strength	MPa	480
Compressive Strength	MPa	2000
Thermal Conductivity @ 20°C	W/mk	22
Fracture Toughness	MPa√m	5.5
Maximum Use Temperature (in valve)	°C/ °F	200/392
Thermal Shock Resistance	°C/ °F	<250/482
Young's Modulus of Elasticity	GPa	320
***Coefficient of thermal expansion**	200 °C (*10-6/ °C)	7-8

Hi*Life* Butterfly Valve Components

1 **Zirconia-Toughened Alumina Seat Lining** fitted to every piece of the Hi*Life* Butterfly series ensures maximum protection for end users piping systems against wear, corrosion, abrasion, and erosion. The flange steel component effortlessly absorbs the adjustment forces; the ceramic lining ensures efficient wear protection therefore the flow-path is fully enclosed by ceramic components ensuring exceptional wear, corrosion, abrasion, and erosion-resistance for all components used for flow control.

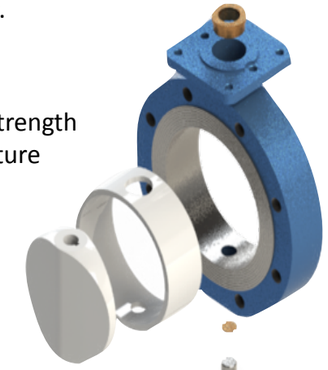
2 **Cavitation Resistant** Carten Zirconia-Toughened Alumina ceramics are not affected by cavitation, and will not degrade in high differential-pressure applications that are subject to cavitation.

3 **Solid Zirconia-Toughened Alumina Disc**
Utilised as standard as this component needs to be extremely strong, wear-resistant, abrasion, erosion and corrosion-resistant, chemically inert, and have a fracture toughness of a high level.

4 **Serialised Valves** as standard to ensure traceability to all production records, raw material, chemical and mechanical composition data

5 **Lining** A ceramic lined option can be used to provide extreme wear resistance, and superior flow control over the full-service life of the valve. An EPDM-lined option provides an internally sealing shutoff function, and extreme corrosion resistance, but is not suitable to abrasive pneumatic convey systems, as powder will embed onto the sealing lining.

6 **Zirconia-Toughened Alumina** ensures increased mechanical strength and fracture toughness over alumina. ZTA has a high temperature stability and corrosion resistance.



7 **Line Size** available from DN50 (2") to DN300 (12") available

8 **ISO Mounting Pad** to ensure compatibility with all major actuator brands (DIN3337 available as option)

Carten HiLife Butterfly Valve Product Description

0	1	2	3	4	5	6		7	8		9
CHL	-	CGV1	D	-	P	S	D	H	-	E	- 24 - F07

No.	Meaning		Supplementary Explanation
0	Carten HiLife		CHL
1	Valve Type	Ceramic Butterfly Valve	CBFV1
2	Action Type	None: Hand Valve; valve body only type	-
		D: Direct Action (Air to close)	D
		R: Reverse Action (Air to Open)	R
3	Positioner	None (No Positioner)	-
		P: Pneumatic Positioner	P
		E: Electropneumatic Smart	E
		S1: Solenoid	S1
4	Actuator	None (No Actuator)	-
		D: Double Acting Actuator	D
		S: Spring Back Type	S
		M: Motorised Actuator	M
5	Applied Standard for Flange	J: JIS10K	J
		A: ANSI 150	A
		A3: ANSI 300	A3
		D: DIN PN16	D
6	Nominal Diameter	D: 15A 1/2"	D
		E: 20A 3/4"	E
		F: 25A 1"	F
		H: 40A 1 1/2"	H
		I: 50A 2"	I
		J: 65A 2 1/2"	J
		K: 80A 3"	K
		M: 100A 4"	M
		O: 150A 6"	O
7	Valve Characteristic	C: Control	C
		O: ON/OFF	O
8	Yoke Type Standard Call outs shown, Additional Options available on request	Ceramic Lined	
		DN50-65 = F07	F07
		DN80-150 = F07	F07
		DN200 = F10	F10
		EPDM Lined	
		DN50-80 = F05	F05
		DN100-150 = F07	F07
		DN200 = F10	F10
9	Specification	KA: Kalrez O-Rings	KA
		FKJ: Standard Raised Face Flange	FKJ
		CR: Ceramic Lined Reducer	CR
		CP: Ceramic Lined Spool	CP
		HAN: Manual Handle	HAN
		GO: Gear Operated	GO
		ZTA: Zirconia Toughened Alumina	ZTA
		CER = Ceramic Lining	CER
		EPDM = EPDM Lining	EPDM
		L: Liquid Only	L
		G: Gas Only	G

HiLife

Ceramic- Lined Piping

Carten Ceramic piping is utilised to protect customer systems where abrasion can be at it's highest level – post the control valve installation, where high-velocity media streams can cause high levels of wear. This protects the customer core piping system with our 95% Alumina ceramic, and can be assembled without disrupting the pipelines

Ceramic Piping Specifications

Maximum Pressure Rating	PN16 (16 BAR)
Leakage Class	ANSI FCI 70/2 Class VI
Maximum Temperature	200 Degrees Celsius
Maxi Differential Temperature	100 Degrees Celsius
Standard Ceramic Lining	ZTA (Zirconia-Toughened Alumina)
Certification	As per PED applicable module

Elbows

Carten ceramic-lined elbows give greater resistance to abrasion and wear then more commonly utilised linings including rubber, basalt, glass and other coatings and are usually used to prolong the piping systems lifecycle. In addition to abrasion and wear resistance, elbows are also extremely corrosion-resistant and are frequently used to prolong the life of piping systems.

T and Y pieces

T and Y pieces are used to divert flow at the required angle dependent on facility requirements. Angle deflection can cause severe turbulence leading to excessive abrasion concentrated at this point.
Ceramic lined T and Y pieces can resist this wear and ensure a long service life.

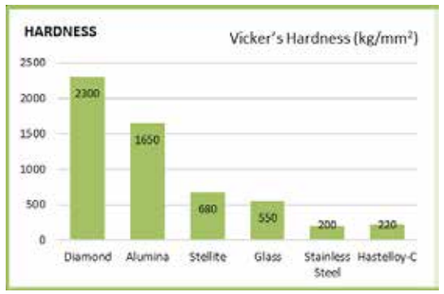
Ceramic- Lined Piping

Carten Hi*Life* Ceramic-Lined Piping Materials

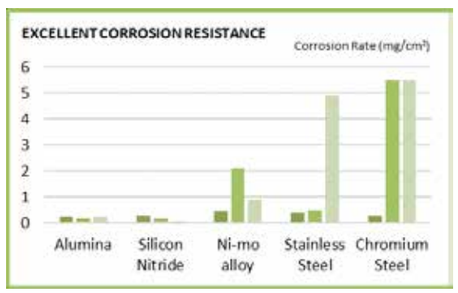
Alumina

Aluminium Oxide (Al2O3) is the most important technical oxide ceramic material due to its widespread use, and has the widest range of applications. A densely sintered aluminium oxide exhibits high strength and hardness, temperature stability, and high wear and corrosion resistance - including high temperature exposure.

Aluminium oxide contents ranging from 80 % to more than 99% have been proven in practice. The choice of this material is determined by technical and economic criteria, with a material with higher aluminium oxide content not always resulting in the best fit for an application. Alumina exhibits a very high level of corrosion resistance — even at high temperatures — and is the ideal material for high wear applications where corrosive fluids are present.



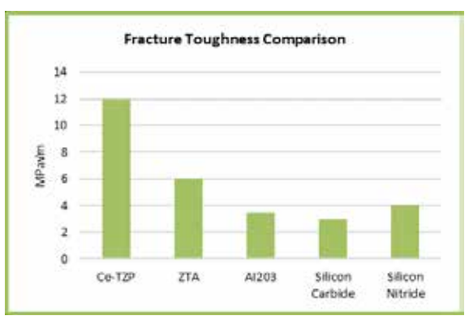
Left: Unique Hardness of AI203



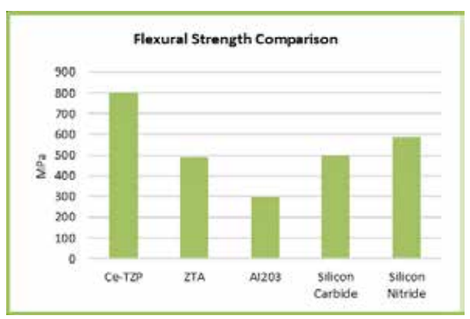
Right: Unique Corrosion Resistance of AI203

Zirconia-Toughened Alumina (ZTA)

The properties of ZTA are dependent on the mixing ratio of aluminium oxide to zirconium oxide, and on the specific details of the manufacturing process. Zirconium oxide will achieve improved metrics in comparison with aluminium oxide, in terms of bending strength, modulus of elasticity, and coefficients of linear expansion. ZTA allows the zirconia particles - when placed under stress - to change their crystal structure from tetragonal to a monoclinic pattern. This results in a 3-5% volume expansion, which compresses the surrounding alumina, making it more resistant to cracks.



Left: Fracture Toughness Comparison



Right: Flexural Strength Comparison

HiLife

Ceramic- Lined Piping

Why Choose Carten Hi*Life* Ceramic-Lined Spools?

Carten-Fujikin HiLife spools ensure piping systems that are exposed to abrasive, wear, corrosive, and erosive conditions, can decrease line maintenance and extend service life.

- Resistant to abrasive solids damage and wear in pneumatic convey powder systems
- Not affected by cavitation
- Ideal solution where piping reduces within short distances, or flow becomes restricted
- Superior option where piping location makes maintenance difficult
- Ideally situated downstream of restriction orifices and control valves

Ceramic Lined Spools

- Designed to outlast linings including glass, rubber, basalt, plastics and other materials that are commonly used to extend the life of piping systems.
- All Flanged Fittings meet or exceed ASME B16.5 Requirements
- Ceramic linings are never smaller than the ID of the mating piping system.
- The maximum diameter spool possible is DN500
- The maximum length of spool using a single ceramic sleeve is 800mm
- The maximum length of spool using ceramic segments is unlimited – flanges or welding can be used to extend the steel housing
- The maximum degree of angle for Y-type fittings is unlimited is we use ceramic segments

The correctly selected ceramic material provides protection against extreme environments – cavitation can occur immediately after a restrictive of flow in piping systems, such as directly after control valves. An increase in fluid velocity results in a rapid loss of pressure - in control valve terminology this refers to the zone known as the Vena Contracta.

Ceramic Lined Spools

PN16/PN16*

Spool Line Size	Type	OAL	6.25 x DN
DN15 PN16-DN15 PN16	CERAMIC LINED SPOOL	56.0 mm	93.75 mm
DN20 PN16-DN20 PN16	CERAMIC LINED SPOOL	67.5 mm	125.0 mm
DN25 PN16-DN25 PN16	CERAMIC LINED SPOOL	72.0 mm	156.25 mm
DN32 PN16-DN32(DN20) PN16	CERAMIC LINED SPOOL	97.5 mm	125.0 mm
DN40 PN16-DN40 PN16	CERAMIC LINED SPOOL	86.0 mm	250.0 mm
DN50 PN16-DN50 PN16	CERAMIC LINED SPOOL	107.0 mm	312.5 mm
DN65 PN16-DN65 PN16	CERAMIC LINED SPOOL	147.0 mm	406.25 mm
DN80 PN16-DN80 PN16	CERAMIC LINED SPOOL	142.5 mm	500.0 mm
DN100 PN16-DN100 PN16	CERAMIC LINED SPOOL	153.5 mm	625.0 mm
DN150 PN16-DN150 PN16	CERAMIC LINED SPOOL	227.0 mm	937.5 mm
DN200 PN16-DN200 PN16	CERAMIC LINED SPOOL	315.0 mm	1250 mm

Ceramic- Lined Piping

Carten Hi*Life* Ceramic-Lined Adaptors

Carten HiLife adapters and reducers offer cost-effective wear protection, always ensuring a smooth transition between differing line size internal diameters. This smooth transition avoids heavy turbulence within the process media flow, when combined with suitable technical ceramic wall thickness – maximum service life is guaranteed, with protection against even the most aggressive and erosive fluids.

Ceramic-lined adaptors can also be utilised to target fluids where additional velocity is required to gain accurate control over slow-moving medias in large piping sizes. The smooth and gradual reduction in line size allows the control valve to gain greater accuracy on output flow rates, when installed just prior to the valve installation – and often can be used before and after valves to further protect piping wear. In addition, ceramic adapters transition between piping and pump, and offer very long service life when transporting the slurries or abrasive fluids used by pumps in applicable installations.

Ceramic Lined Adaptors

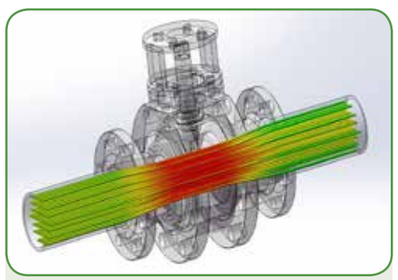
- Available from 1/2” to 12”
- Ceramic reducers offer protection from abrasive slurries both on the upstream as well as downstream side of the system
- Particularly utilised in areas following pumps as an extention or at points downstreamof elbow pieces or control valves.
- Various connection types available
- Pressure Ranges PN10-PN40 and ANSI Class 150 and Class 300 (Others on request)

Ceramic Lined Spools and Adaptors

PN10/PN16*		
Adaptor Line Size	**OAL**	**6.25 x DN**
DN15 PN10-DN20 PN16	36.5 mm	93.75 mm
DN15 PN10-DN25 PN16	41.5 mm	93.75 mm
DN20 PN10-DN25 PN16	37.25 mm	125 mm
DN20 PN10-DN32 PN16	47.25 mm	125 mm
DN20 PN10-DN40 PN16	57.25 mm	125 mm
DN25 PN10-DN40 PN16	54.5 mm	156.25 mm
DN25 PN10-DN50 PN16	69.5 mm	156.25 mm
DN25 PN10-DN65 PN16	99.5 mm	156.25 mm
DN40 PN10-DN50 PN16	56.5 mm	250 mm
DN40 PN10-DN65 PN16	86.5 mm	250 mm
DN40 PN10-DN80 PN16	96.5 mm	250 mm
DN50 PN10-DN65 PN16	82.0 mm	312.5 mm
DN50 PN10-DN80 PN16	92.0 mm	312.5 mm
DN65 PN10-DN80 PN16	82.0 mm	406.25 mm
DN65 PN10-DN100 PN16	102.0 mm	406.25 mm
DN80 PN10-DN100 PN16	89.75 mm	500 mm
DN80 PN10-DN125 PN16	114.75 mm	500 mm
DN80 PN10-DN150 PN16	154.75 mm	500 mm
DN100 PN10-DN125 PN16	100.25 mm	625 mm
DN100 PN10-DN150 PN16	140.25 mm	625 mm
DN150 PN10-DN200 PN16	172.0 mm	937.5 mm

*** Special Sizes available on request**

Carten provide customisable short-length adaptors where space is at a premium, but a smooth transition of flow remains a priority to prolong service life. This is achieved through unique design features incorporating bespoke mating flanges and high precision ceramic sintering processes.



As can be seen in the velocity graph above once the orifice is reduced in size you can see the speed increases through the smaller internal bore

HiLife

Ceramic- Lined Piping

Features of Carten Hi*Life* Ceramic Spools and Adaptors

Corrosion-Resistant: Ceramic lined spools and reducers are designed with higher endurance than spools lined with glass, rubber or plastics. They have a high endurance to most chemicals, including strong acids and alkalis.

Abrasion Resistant: Ceramics are almost equivalent to diamonds in terms of hardness as they are highly resistant to wear.

Cavitation Resistant: Unlike stainless steel, they can handle continuous cavitation without cracking or wearing down.

Ceramic spools and reducers are **not affected by changes in the pressure** across the valve.
Zirconia along with a number of other materials offers **high thermal shock resistance.**

Thin Dimension Ceramic Adaptors

Carten can supply thin-dimension ceramic adaptors that allow the customer to meet small gaps in pipeline, or achieve standard lengths. In addition, Carten’s unique design allows the user to maintain the orientation of the current pipeline bolting.

Carten Hi*Life* Ceramic-Lined Orifice

For flow control, orifice plates can be used as restriction devices to regulate fluid flow or simply to reduce pressure downstream of the orifice plate. It is an economically efficient method of flow control in challenging environments. Orifice plates are exposed to severe flow conditions due to significant pressure reductions, and additional fluid dynamic conditions possible in liquid fluid systems such as flashing and/or cavitation.

- Orifice plates provide low maintenance
- Contain no moving parts in the assembly
- Reduce demands on additional flow system assemblies and components
- Provide longer life, reduced system maintenance, and lower total cost of ownership.

Ceramic Lined Orifice

- Installed in a straight run of piping to avoid disturbance of flow patterns from components – such as control valves, and utilised to provide flow control at exact points in a piping system.
- Technical ceramic lined orifices provide longer life, reduced system maintenance, and lower total cost of ownership in challenging applications.

Orifice Plates are mounted between orifice flanges and should be installed in a straight run of piping to avoid disturbance of flow patterns from components – such as control valves, and utilised to provide flow control at exact points in a piping system

- Can be utilised as a restriction orifice downstream
- Provides small individual pressure drops which can prevent cavitation at the vena contracta
- Provides back pressure on the control valve to prevent cavitation through the valve

Stainless Steel Ball Valves

Carten Hi*Life* 2-Piece and 3-Piece PTFE Seated Stainless Steel Ball Valve

Carten provide both 2-piece and 3-piece high performance PTFE-seated ball valve suitable for use in multiple industrial applications.

- Fully compliant to ASME B16.34
- Highest standard of safety in high performance demanding applications
- High performance polymer compounds of TFM4215 or TFM1600
- Bespoke designs
- Provides ease of maintenance to suit the application requirement and installation necessity
- High performance synthetic polymer seats & seals ensure Class VI leakage
- ISO5211 international standard mounting brackets
- Blow-out proof stem design ensures safety is not compromised

Carten Hi*Life* 2-Piece Metal Seated Stainless Steel Ball Valve

Carten's 2-piece high performance metal seated ball valve with ISO mounting pad is designed for use in high temperature, abrasive media in power generation, petrochemical industries, mining industries, and pulp & paper.

- Fully compliant to ASME B16.34
- Highest standard of safety in high performance demanding applications
- Hardened chrome-coated stainless steel ball
- Stellite is used as standard material for the metal seat
- High Velocity Oxygen Fuel (HVOF) coating is utilised to coat core SS316 material
- Increased erosion and wear resistance, and corrosion protection
- Unique split seat design ensures a minimum of Class V leakage class
- Inconel springs ensuring a durable and permanent seat leakage integrity
- Graphite seats and seals provide high temperature resistance up to 400 degrees Celsius
- ISO5211 international standard mounting brackets
- Blow-out proof stem design ensures safety is not compromised

PTFE v Metal Seated Stainless Ball Valve

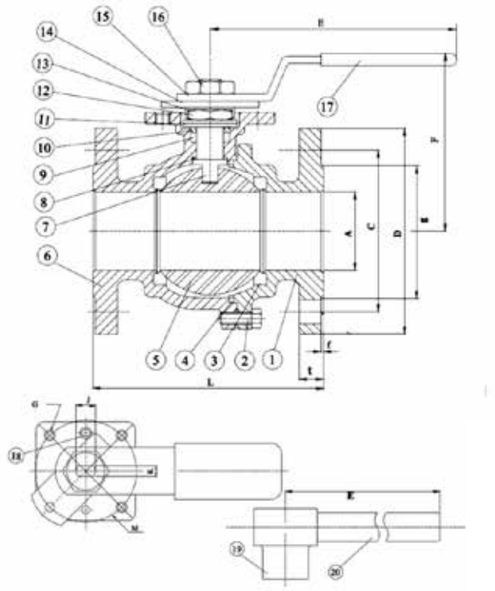
PTFE seated stainless ball valves provide extreme corrosion resistance at the dynamic sealing surface, and superior leak integrity (Class VI is standard). Where additional wear resistance is required, in addition to high temperature resistance, a spring-loaded metal-seated stainless ball valve can be utilised.

HiLife

Stainless Steel Ball Valves

2-Piece PTFE Seat Stainless Steel Valves 1/2" to 4"

Carten's Stainless Steel Ball Valve Series with ISO direct mounting pad is designed for all types of industrial piping. The mating components can be ANSI 150/ PN16/ JIS10K.



2-Piece Features

- Body & end caps quality investment casting
- Blow-out proof stem design
- ISO 5211 mounting pad
- Class 150 & 300 (PN16/ 40) construction design
- Adjustable stem packing
- Anti-static device
- End type: ANSI 150/300, PN16/ 40
- Fire safe design*

Material of Construction

Item	Part	Material
1	Flanged End	CF8M/WCB (1.4408/1.0619)
2	Bolt	SS 304
3	Ball Seat	PTFE/RPTFE
4	Gasket	PTFE
5	Ball	SS316/SS304
6	Body	CF8M/WCB (1.4408/1.0619)
7	Stem	SS316/SS304
8	Thrust Washer	RPTFE
9	Stem Packing	PTFE
10	Gland	SS304

Item	Part	Material
11	Disk Washer	SS301
12	Stem Nut	SS304
13	Nut Stop	SS304
14	Stopper Plate	SS304
15	Handle	SS304
16	Handle Nut	SS304
17	Sleeve	Plastic
18	Stop Pin	SS304
19	Lever Head	CF8
20	Pipe Handle	Steel Pipe

Dimensions (mm)/ANSI 150 (1/2” to 4”)

Size	A	F	E	L	K	M	G	J	Flange Dimensions (Class 150)								
									D	C	H	N	t	g	B	O	f
1/2”	15	76	145	108	6.5	42	M5	10	89	60.5	16	4	11.2	35	13.9	10.7	1.6
3/4”	20	80	145	117	6.5	42	M5	10	98	70	16	4	11.2	43	14.2	10.9	1.6
1”	25	88	195	127	9.7	50	M6	14	108	79.5	16	4	11.2	51	21.6	16.8	1.6
1- 1/4”	32	92	195	140	9.7	50	M6	14	117	89	16	4	12.7	64	21.3	16.5	1.6
1-1/2”	38	114	250	165	9.7	70	M8	18	127	98.5	16	4	14.3	73	24.9	18.0	1.6
2”	50	123	250	178	9.7	70	M8	18	152	120.5	19	4	15.9	92	23.9	19.6	1.6
2-1/2”	65	142	310	190	12	102	M10	20	178	139.5	19	4	17.8	105	22.9	16.3	1.6
3”	80	152	310	203	12	102	M10	20	190	152.5	19	4	19.1	127	21.9	16.3	1.6
4”	100	182	310	229	15	102	M10	24	229	190.5	19	8	24.0	157	29.7	24.4	1.6

Dimensions (mm)/ANSI 300 (1/2” to 4”)

Size	A	F	E	L	K	M	G	J	Flange Dimensions (Class 300)								
									D	C	H	N	t	g	B	O	f
1/2”	15	76	145	139.7	6.5	42	M5	10	95	66.5	16	4	14.5	35	13.9	10.7	1.6
3/4”	20	80	145	152.4	6.5	42	M5	10	117	82.5	19	4	16	43	14.2	10.9	1.6
1”	25	88	195	165.1	9.7	50	M6	14	124	89	19	4	17.5	51	21.6	16.8	1.6
1-1/2”	38	114	250	190.5	9.7	70	M8	18	156	114.5	22	4	21	73	24.9	18.0	1.6
2”	50	123	250	215.9	9.7	70	M8	18	165	127	20	8	22.5	92	23.9	19.6	1.6
2-1/2”	65	142	310	241.3	12	102	M10	20	190	149	22	8	25.5	105	22.9	16.3	1.6
3”	80	152	310	282.7	12	102	M10	20	210	168	22	8	29	127	21.9	16.3	1.6
4”	100	182	310	304.8	15	102	M10	24	254	200	22	8	32	157	29.7	24.4	1.6

Dimensions (mm)/PN16 (1/2” to 4”)

Size	A	F	E	L(F4)	L(F1)	K	M	G	J	Flange Dimensions (PN16)								
										D	C	H	N	t	g	B	O	f
1/2”	15	76	145	115	130	6.5	42	M5	10	95	65	14	4	14	45	13.9	10.7	2
3/4”	20	80	145	120	150	6.5	42	M5	10	105	75	14	4	16	58	14.2	10.9	2
1”	25	88	195	125	160	9.7	50	M6	14	115	85	14	4	16	68	21.6	16.8	2
1- 1/4”	32	92	195	130	180	9.7	50	M6	14	140	100	18	4	16	78	21.6	16.8	2
1-1/2”	38	114	250	140	200	9.7	70	M8	18	150	110	18	4	16	88	24.9	18.0	3
2”	50	123	250	150	230	9.7	70	M8	18	165	125	18	4	18	102	23.9	19.6	3
2-1/2”	65	142	310	170	290	12	102	M10	20	185	145	18	4	18	122	22.9	16.3	3
3”	80	152	310	180	310	12	102	M10	20	200	160	18	8	20	138	21.9	16.3	3
4”	100	182	310	190	350	15	102	M10	24	220	180	18	8	20	158	29.7	24.4	3

Dimensions (mm)/PN40 (1/2” to 4”)

Size	A	F	E	L(F4)	K	M	G	J	Flange Dimensions (PN40)								
									D	C	H	N	t	g	B	O	f
1/2”	15	76	145	115	6.5	42	M5	10	95	65	14	4	16	45	13.9	10.7	2
3/4”	20	80	145	120	6.5	42	M5	10	105	75	14	4	18	58	14.2	10.9	2
1”	25	88	195	125	9.7	50	M6	14	115	85	14	4	18	68	21.6	16.8	2
1-1/2”	38	114	250	140	9.7	70	M8	18	150	110	18	4	18	88	24.9	18.0	3
2”	50	123	250	150	9.7	70	M8	18	165	125	18	4	20	102	23.9	19.6	3
2-1/2”	65	142	310	170	12	102	M10	20	185	145	18	8	22	122	22.9	16.3	3
3”	80	152	310	180	12	102	M10	20	200	160	18	8	24	138	21.9	16.3	3
4”	100	182	310	190	15	102	M10	24	235	190	22	8	24	162	29.7	24.4	3

Stainless Steel Ball Valves

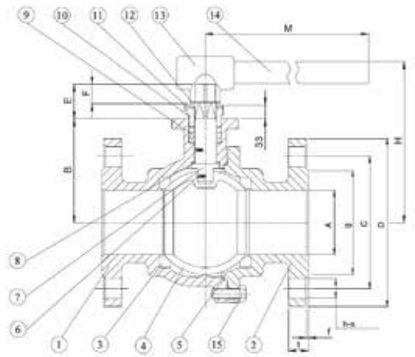
2-Piece PTFE Seat Stainless Steel Valves 5” to 12”

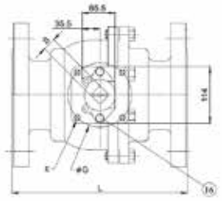
Carten’s Stainless Steel Ball Valve Series with ISO direct mounting pad is designed for all types of industrial piping. The mating components can be ANSI 150/ PN16/ JIS10K in Clamp, Butt Weld or Threaded Connection. This 2-piece valve comes with different material soft kits will be applicable for different working circumstance.

2-Piece Features

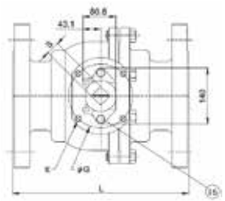
- Body & end: SS 5” and 6” investment casting, 8” to 12” sand casting
- Body & end: CS 5” to 12” sand casting
- ISO 5211 mounting pad
- Adjustable stem packing
- Blow-out proof stem design
- Working pressure: Class150/PN16
- Temperature range -20 F to 450 F
- 5” to 8” solid ball & hollow ball; 10” and 12” cored cavity

Material of Construction





5”- 6”



8”- 12”

Item	Part	Material
1	Body	CF8M/WCB (1.4408/1.0619)
2	Flanged End	SS 304
3	Ball Seat	PTFE/RPTFE
4	Ball	SS316/SS304
5	Gasket	PTFE
6	Anti Static	SS316
7	Stem	SS316
8	Thrust Washer	RPTFE
9	Stem Packing	PTFE
10	Gland	SS304
11	Stopper Plate	SS304
12	Lever Head	FCD45
13	Pipe Handle	Steel Pipe
14	Bolt	SS304
15	Gland Bolt	SS304

Dimensions (mm)/ANSI 150 (5” to 12”)

Size	A	B	E	F	G	H	M	L	K	S	Flange Dimensions (Class 150)						
											D	C	n	h	g	t	f
5”	125	150	58	34	125	265	700	356	M12	28	254	216	8	22	186	23.9	1.6
6”	150	170	58	34	125	285	850	394	M12	28	279	241.5	8	22	216	25.4	1.6
8”	200	219	64	38	125	354	1100	457	M12	36	343	298.5	8	22	270	28.6	1.6
10”	250	255	64	38	125	390	1200	533	M12	36	406	362	12	25	324	30.2	1.6
12”	300	307	79	46	140	442	1500	610	M16	36	483	432	12	25	381	31.8	1.6

Dimensions (mm)/ANSI 300 (6” to 10”)

Size	A	B	E	F	G	H	M	L	K	S	Flange Dimensions (Class 300)						
											D	C	n	h	g	t	f
6”	150	170	58	34	125	285	850	394	M12	28	279	241.5	8	22	216	25.4	1.6
8”	200	219	64	38	125	354	1100	457	M12	36	343	298.5	8	22	270	28.6	1.6
10”	250	255	64	38	125	390	1200	533	M12	36	406	362	12	25	324	30.2	1.6

Dimensions (mm)/ PN16-F5 (5” to 12”)

Size	A	B	E	F	G	H	M	L	K	S	Flange Dimensions (PN16)						
											D	C	n	h	g	t	f
5”	125	150	58	34	125	265	700	325	M12	28	250	210	8	18	188	22	3
6”	150	170	58	34	125	285	850	350	M12	28	285	240	8	22	212	22	3
8”	200	219	64	38	125	354	1100	400	M12	36	340	295	12	22	268	24	3
10”	250	255	64	38	125	390	1200	450	M12	36	405	355	12	26	320	26	3
12”	300	307	79	46	140	442	1500	500	M16	36	460	410	12	26	378	28	4

Break-Torque Value for ANSI150/ PN16 (Nm/ at 0 psi)

Size	1/2”	3/4”	1”	1-1/4”	1-1/2”	2”	2-1/2”	3”	4”	5”	6”	8”	10”	12”
Grease	5.5	7.2	8.8	13	20	24	54	62	124	230	250	550	650	1200
Non-Grease	7.2	9.4	13.2	18.2	30	36	95	132	245	-	-	-	-	-

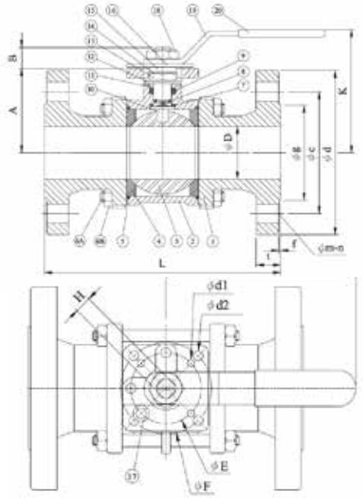
Break-Torque Value for ANSI300/ PN40 (Nm)

Size	1/2”	3/4”	1”	1-1/2”	2”	2-1/2”	3”	4”
Grease	8.2	9.8	12.8	26.9	33.7	71.3	84.6	156.5
Non-Grease	11.5	13.7	19.2	43.7	60.7	142.6	177.6	328.7

Stainless Steel Ball Valves

3-Piece PTFE Seat Stainless Steel Valves (1/2” to 4”)

Carten’s 3-piece ball valve with ISO direct mounting pad is designed for all types of industrial piping as full port product. The mating components can be ASME150/ PN16/ JIS10K- As Flanged/Thread/ Socket Weld/Butt Weld connection.
This valve design makes it repairable in line and can be provided with different material kits for different working circumstances.



3-Piece Features

- Body & end caps quality investment casting
- With ISO 5211 direct mounting pad
- Adjustable stem packing
- Available in stainless steel or carbon steel
- Blow-out proof stem design
- 100% air tested under water at 80-100 psi
- Working pressure: Class150/ PN16/ JIS10K
- Temperature range -20 to 450
- With locking function
- End type: flange end ANSI 150/ DIN PN16/ JIS 10K

Material of Construction

Item	Part	Material
1	Flanged End	CF8M/WCB (1.4408/1.0619)
2	Body	CF8M/WCB (1.4408/1.0619)
3	Ball	SS316
4	Seat	PTFE
5	Gasket	PTFE
6A	Bolts	SS304
6B	Nuts	SS304
7	Thrust Washer	RPTFE
8	O-Ring	Viton
9	Stem Packing	PTFE
10	Stem	SS316
11	Gland	SS304

Item	Part	Material
12	Disk Washer	SS301
13	Stem Nut	SS304
14	Nut Stop	SS304
15	Space Washer	SS304
16	Plater	SS304
17	Stop Pin	SS304
18	Handle Nut	SS304
19	Handle	SS304
20	Handle Cover	Plastic
21	Set Bolt	SS304
22	Lever Head	CF8
23	Lever	Steel Pipe

Stainless Steel Ball Valves

Dimensions (mm)/ANSI 150

Size	A	B	D	d1	d2	K	E	F	H	P	L	Flange Dimensions (Class 150)						
												g	c	d	f	t	m	n
1/2”	37	11	15	6.0	6.0	98	36	42	9	127	130	35	60.5	89	1.6	11.2	16	4
3/4”	40	11	20	6.0	6.0	101	36	42	9	127	150	43	70	98	1.6	11.2	16	4
1”	48	14	25	6.0	7.0	94	42	50	11	160	160	51	79.5	108	1.6	11.2	16	4
1- 1/4”	53	14	32	6.0	7.0	99	42	50	11	160	180	64	89	117	1.6	12.7	16	4
1-1/2”	63	18	38	7.0	9.0	115	50	70	14	205	200	73	98.5	127	1.6	14.3	16	4
2”	72	18	50	7.0	9.0	124	50	70	14	205	230	92	120.5	152	1.6	15.9	19	4
2-1/2”	92	22	65	9.0	11.3	140	70	102	17	300	290	105	139.5	178	1.6	17.8	19	4
3”	102	22	78	9.0	11.3	150	70	102	17	300	310	127	152.5	190	1.6	19.2	19	4
4”	132	26	100	11.3	13.5	190	102	125	22	350	350	157	190.5	229	1.6	24	19	8

Dimensions (mm)/PN16

Size	A	B	D	d1	d2	K	E	F	H	P	L	Flange Dimensions (PN16)						
												g	c	d	f	t	m	n
1/2”	37	11	15	6.0	6.0	98	36	42	9	127	130	45	65	95	2.0	14	14	4
3/4”	40	11	20	6.0	6.0	101	36	42	9	127	150	58	75	105	2.0	16	14	4
1”	48	14	25	6.0	7.0	94	42	50	11	160	160	68	85	115	2.0	16	14	4
1- 1/4”	53	14	32	6.0	7.0	99	42	50	11	160	180	78	100	140	2.0	16	18	4
1-1/2”	63	18	38	7.0	9.0	115	50	70	14	205	200	88	110	150	3.0	16	18	4
2”	72	18	50	7.0	9.0	124	50	70	14	205	230	102	125	165	3.0	18	18	4
2-1/2”	92	22	65	9.0	11.3	140	70	102	17	300	290	122	145	185	3.0	18	18	4
3”	102	22	78	9.0	11.3	150	70	102	17	300	310	138	160	200	3.0	20	18	8
4”	132	26	100	11.3	13.5	190	102	125	22	350	350	180	180	220	3.0	20	18	8

Dimensions (mm)/JIS 10K

Size	A	B	D	d1	d2	K	E	F	H	P	L	Flange Dimensions (JIS 10K)						
												g	c	d	f	t	m	n
1/2”	37	11	15	6.0	6.0	98	36	42	9	127	130	51	70	95	1.0	12	15	4
3/4”	40	11	20	6.0	6.0	101	36	42	9	127	150	56	75	100	1.0	14	15	4
1”	48	14	25	6.0	7.0	94	42	50	11	160	160	67	90	125	1.0	14	19	4
1- 1/4”	53	14	32	6.0	7.0	99	42	50	11	160	180	76	100	135	2.0	16	19	4
1-1/2”	63	18	38	7.0	9.0	115	50	70	14	205	200	81	105	140	2.0	16	19	4
2”	72	18	50	7.0	9.0	124	50	70	14	205	230	96	120	155	2.0	16	19	4
2-1/2”	92	22	65	9.0	11.3	140	70	102	17	300	290	116	140	175	2.0	18	19	4
3”	102	22	78	9.0	11.3	150	70	102	17	300	310	126	150	185	2.0	18	19	8
4”	132	26	100	11.3	13.5	190	102	125	22	350	350	151	175	210	2.0	18	19	9

Break-Torque Value for ANSI 150/ PN16/ JIS 10K (Nm/ at 0 psi)

Size	1/2”	3/4”	1”	1-1/4”	1-1/2”	2”	2-1/2”	3”	4”
Grease	5	5.5	7	11	17	23	35	46	72
Non-Grease	6	7	9.5	16	27	30	68	85	105

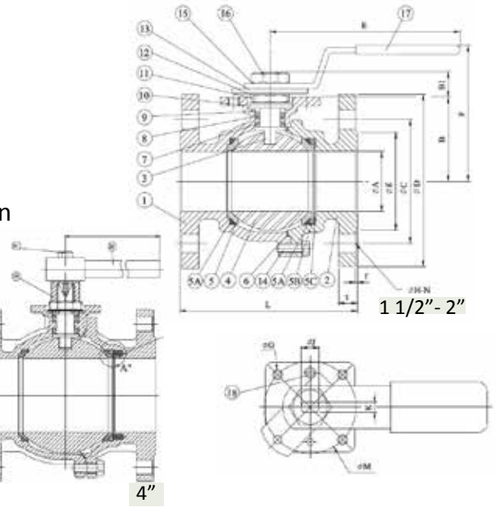
2-Piece Metal Seat Stainless Steel Valves 1/2” to 4”

Carten’s Stainless Steel Series, 2-piece high performance metal seated ball valve is designed for use in high temperature, abrasive media in power generation, petrochemical industries, mining industries, and pulp & paper ones.

The ASME B16.34 standard valve structure and wall thickness make this series safe in high performance applications. The standard material for metal seat & ball is Co element (known as Stellite) or SS 316 with Hard Chrome/ HVOF coating. The Stellite material is known for its hardness, corrosion resistance and stable under high temperature. With a minimum leakage class of Class V this seat design provides the perfect seal around the seat area.

2-Piece Design Features

- Body & end caps quality investment casting
- Valve construction & thickness follow ANSIB16.34
- Inconel spring design provide better sealing function
- Class 150 & 300 (PN16/ 40) construction design
- ISO 5211 mounting pad
- Adjustable stem packing
- Blow-out proof stem design
- Anti-static device
- End type: ANSI 150/ 300, PN16/ 40



Material of Construction

Item	Part	Material
1	Body	CF8M/WCB (1.4408/1.0619)
2	Flanged End	CF8M/WCB (1.4408/1.0619)
3	Stem	SS316/ 17-4
4	Ball	Co.Base/Ni Base
5	Ball Seat	SS316+Stellite
5A	Seat Back Seal	Graphite
5B	Seat Housing	SS316
5C	Spring Disk	Inconel
6	Gasket	Graphite
7	Thrust Washer	Graphite
8	Stem Packing	Graphite
9	Gland	SS304

Item	Part	Material
10	Belleville Washer	17-7 PH
11	Stem Nut	SS304
12	Nut Lock	SS304
13	Stop Plate	SS304
14	Bolts	SS304
15	Handle	SS304
16	Handle Nut	SS304
17	Handle Cover	Plastic
18	Stop Pin	SS304
19	Lever Head	CF8
20	Lever	Steel Pipe
21	Set Bolt	SS304

Stainless Steel Ball Valves

Dimensions (mm)/ANSI 150 (1/2” to 4”)

Size	A	B	B1	F	E	L	K	M	G	J	Flange Dimensions (Class 150)						
											D	C	H	N	T	g	f
1/2”	15	34.5	14	76	145	108	6.5	42	M5	10	89	60.5	16	4	11.2	35	1.6
3/4”	20	39	14	80	145	117	6.5	42	M5	10	98	70	16	4	11.2	43	1.6
1”	25	44	21.5	88	195	127	9.7	50	M6	14	108	79.5	16	4	11.2	51	1.6
1- 1/4”	32	49	21.5	92	195	140	9.7	50	M6	14	117	89	16	4	12.7	64	1.6
1-1/2”	38	68	24	114	250	165	9.7	70	M8	18	127	98.5	16	4	143.	73	1.6
2”	50	77	24	123	250	178	9.7	70	M8	18	152	120.5	19	4	15.9	92	1.6
2-1/2”	65	89.5	23	142	310	190	12	102	M10	20	178	139.5	19	4	17.8	105	1.6
3”	80	100	23	152	310	203	12	102	M10	20	190	152.5	19	4	19.1	127	1.6
4”	100	120.5	29	182	310	229	15	102	M10	24	229	190.5	19	8	24	157	1.6

Dimensions (mm)/ANSI 300 (1/2” to 4”)

Size	A	B	B1	F	E	L	K	M	G	J	Flange Dimensions (Class 300)						
											D	C	H	N	T	g	f
1/2”	15	34.5	14	76	145	140	6.5	42	M5	10	95	66.5	16	4	14.5	35	1.6
3/4”	20	39	14	80	145	152	6.5	42	M5	10	117	82.5	19	4	16	43	1.6
1”	25	44	21.5	88	195	165	9.7	50	M6	14	124	89	19	4	17.5	51	1.6
1-1/2”	38	68	24	114	250	190	9.7	70	M8	18	156	114.5	22	4	21	73	1.6
2”	50	77	24	123	250	216	9.7	70	M8	18	165	127	20	8	22.5	92	1.6
2-1/2”	65	89.5	23	142	310	241	12	102	M10	20	190	149	22	8	25.5	105	1.6
3”	80	100	23	152	310	283	12	102	M10	20	210	168	22	8	29	127	1.6
4”	100	120.5	29	182	310	305	15	102	M10	24	254	200	22	8	32	157	1.6

Dimensions (mm)/PN16 (1/2” to 4”)

Size	A	B	B1	F	E	L(F4)	K	M	G	J	Flange Dimensions (PN16)						
											D	C	H	N	T	g	f
1/2”	15	34.5	14	76	145	115	6.5	42	M5	10	95	65	14	4	14	45	2
3/4”	20	39	14	80	145	120	6.5	42	M5	10	105	75	14	4	16	58	2
1”	25	44	21.5	88	195	125	9.7	50	M6	14	115	85	14	4	16	68	2
1- 1/4”	32	49	21.5	92	195	130	9.7	50	M6	14	140	100	18	4	16	78	2
1-1/2”	38	68	24	114	250	140	9.7	70	M8	18	150	110	18	4	16	88	3
2”	50	77	24	123	250	150	9.7	70	M8	18	165	125	18	4	18	102	3
2-1/2”	65	89.5	23	142	310	170	12	102	M10	20	185	145	18	4	18	122	3
3”	80	100	23	152	310	180	12	102	M10	20	200	160	18	8	20	138	3
4”	100	120.5	29	182	310	190	15	102	M10	24	220	180	18	8	20	158	3

Dimensions (mm)/PN40 (1/2” to 4”)

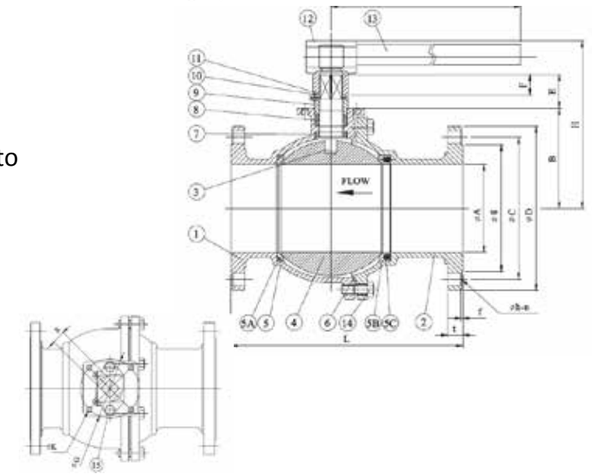
Size	A	B	B1	F	E	L(F4)	K	M	G	J	Flange Dimensions (Class 300)						
											D	C	H	N	T	g	f
1/2”	15	34.5	14	76	145	115	6.5	42	M5	10	95	65	14	4	16	45	2
3/4”	20	39	14	80	145	120	6.5	42	M5	10	105	75	14	4	18	58	2
1”	25	44	21.5	88	195	125	9.7	50	M6	14	115	85	14	4	18	68	2
1-1/2”	38	68	24	114	250	140	9.7	70	M8	18	150	110	18	4	18	88	3
2”	50	77	24	123	250	150	9.7	70	M8	18	165	125	18	4	20	102	3
2-1/2”	65	89.5	23	142	310	170	12	102	M10	20	185	145	18	8	22	122	3
3”	80	100	23	152	310	180	12	102	M10	20	200	160	18	8	24	138	3
4”	100	120.5	29	182	310	190	15	102	M10	24	235	190	22	8	24	162	3

2-Piece Metal Seat Stainless Steel Valves 5” to 12”

Carten’s Stainless Steel Series, 2-piece high performance metal seated ball valve is designed for use in high temperature, abrasive media in power generation, petrochemical industries, mining industries, and pulp & paper ones.
The ASME B16.34 standard valve structure and wall thickness make this series safe in high performance applications.
The standard material for metal seat & ball is Co element (known as Stellite) or SS 316 with Hard Chrome/ HVOF coating. The Stellite material is known for its hardness, corrosion resistance and stable under high temperature. With a minimum leakage class of Class V this seat design provides the perfect seal around the seat area.

2-Piece Design Features

- Body & end: SS 5” & 6” investment casting, 8” to 12” sand casting
- Body & end: CS 5”to12” sand casting
- ISO 5211 mounting pad
- Adjustable stem packing
- Blow-out proof stem design
- 100% air tested under water at 80-100 psi
- Working pressure: Class150/ Class300/ PN16



Material of Construction

Item	Part	Material
1	Body	CF8M/WCB (1.4408/1.0619)
2	Flanged End	CF8M/WCB (1.4408/1.0619)
3	Stem	SS316/ 17-4 PH
4	Ball	SS316 + Hard Chrome
5	Ball Seat (A)	SS316+Stellited
5A	Back Seat	Graphite
5B	Ball Seat (B)	SS316+Stellited
5C	Seat Spring	Inconel
6	Gasket	Graphite

Item	Part	Material
7	Thrust Washer	Graphite
8	Stem Packing	Graphite
9	Gland	ASTM A351 Gr. CF8
10	Stopper	SS304
11	Stop Plate	SS304
12	Handle Head	ASTM 65-45-12
13	Handle Tube	Carbon Steel
14	Haz. Bolt	SS304
15	Gland Bolt	SS304

Dimensions (mm)/ANSI 150 (5” TO 12”)

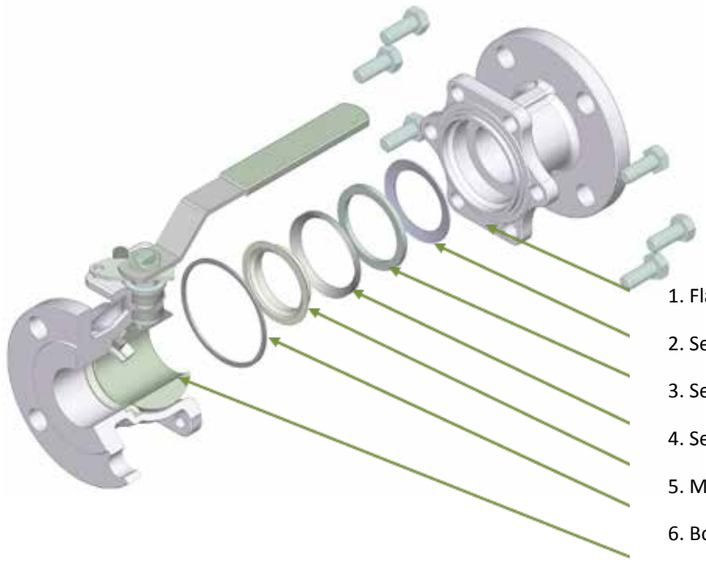
Size	A	B	E	F	G	H	M	L	K	S	Flange Dimensions (Class 150)						
											D	C	n	h	g	t	f
5”	125	150	58	34	125	265	700	356	M12	28	254	216	8	22	186	23.9	1.6
6”	150	170	58	34	125	285	850	394	M12	28	279	241.5	8	22	216	25.4	1.6
8”	200	219	64	38	125	354	1100	457	M12	36	343	298.5	8	22	270	28.6	1.6
10”	250	255	64	38	125	390	1200	533	M12	36	406	362	12	25	324	30.2	1.6
12”	300	307	79	46	140	442	1500	610	M16	36	483	432	12	25	381	31.8	1.6

Dimensions (mm)/ANSI 300 (6” TO 10”)

Size	A	B	E	F	G	H	M	L	K	S	Flange Dimensions (Class 300)						
											D	C	n	h	g	t	f
6”	150	170	58	34	125	285	850	403	M12	28	318	270	12	22	213	37	1.6
8”	200	219	64	38	125	354	1100	502	M12	36	381	330.2	12	26	270	41.5	1.6
10”	250	255	64	38	125	390	1200	568.5	M12	36	445	387.3	16	29	324	48	1.6

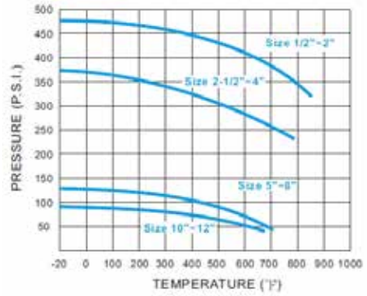
Dimensions (mm)/PN16-F5 (5” TO 12”)

Size	A	B	E	F	G	H	M	L	K	S	Flange Dimensions (PN16)						
											D	C	n	h	g	t	f
5”	125	150	58	34	125	265	700	325	M12	28	250	210	8	18	188	22	3
6”	150	170	58	34	125	285	850	350	M12	28	285	240	8	22	212	22	3
8”	200	219	64	38	125	354	1100	400	M12	36	340	295	12	22	268	24	3
10”	250	255	64	38	125	390	1200	450	M12	36	405	355	12	26	320	26	3
12”	300	307	79	46	140	442	1500	500	M16	36	460	410	12	26	378	28	4



1. Flange – 1.4408/CF8M
2. Seat Spring – Inconel
3. Seat Housing – 1.4408/CF8M
4. Seal – Graphite
5. Metal Seal – SS316/Stellite
6. Body Gasket – Graphite
7. Ball – SS316/Hardened Chrome Coating

Pressure/Temperature Chart



Carten Stainless Steel Valve Product Description

1	2		3	4	5	6		7	8		9		10
CBV	500	-	P	S	D	D	-	E	24	-	F12	-	SSM

| No. | Meaning | Supplementary Explanation | | | | | | | | | | |

CARTEN HiLife

ZIRCONIA

ASME B16.34

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CARTEN'S CORE PRODUCTS

- BELLOWS VALVES
- BALL VALVES
- CHECK VALVES
- DIAPHRAGM VALVES
- TANK VALVES
- CERAMIC VALVES
- INTEGRATED GAS STICKS AND SYSTEMS

Carten Controls and Fujikin Deutschland are members of the Fujikin Carp Group (FCG) with Headquarters in Osaka Japan.