Ramén Ball Sector Valve

Control valves for the process industry

RaménValves

We know the flow

Ramén Valves
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About Ramén

Ramén Valves was established in 1945 and has been supplying thousands of valves to multiple industries over the past 70 years.

Our Journey

Back in the 60's, the Swedish pulp and paper industry was greatly in need of an efficient control valve solution for fibre suspensions. Swedish engineer Torsten Ramén initiated the development of a new solution for use especially in the accurate control of fibre suspensions. Thus Ramén Ball Sector Valve was born, and our journey started. The valve's genuinely versatile design attracted the attention of other industries such as mining, gas, chemical, water and wastewater, to name but a few. Decades of manufacturing, developing and refining the Ramén Ball Sector Valve have taught us how to adapt to our customers' needs and requirements. Our vision and ingenuity help us deliver smarter solutions that keep our customers one step ahead.

Expanding

In 2017, Ramén acquired Engelsberg Valves, a well-known Swedish brand founded back in 1949 and which specializes in manufacturing industrial valves in high grade alloys. Through the acquisition of Engelsberg, Ramén has strengthened its position as an established supplier of specialized flow technology with a more complete, competitive product portfolio complying with the most demanding services.

From Stockholm to the world

Ramén is located a few kilometres northwest of Stockholm, Sweden, where we have our sales office, workshop and warehouse. There is also a manufacturing site in Fagersta for the Engelsberg production line. Over the years, we have built up and maintained our reputation for reliability, excellence and innovation, while consciously working with our extensive global distribution network to help our customers all over the world. Ramén Valves' deliveries to the Americas, Asia, Europe, Australia and Africa are strong proof of how well we support our customers, wherever they may be.

Field of applications

Gas Industry

- Hydrocarbon gases (natural gas and heavier cuts C2+)
- Industrial gases (oxygen, ammonia, hydrogen, carbon dioxide, chlorine etc.)
- Off-spec gases (corrosive and dirty associated gas, flare gases, sour gases)
- Gases and vapours (instrument air, nitrogen and steam, corrosive vapours)
- Refrigeration and cooling systems

Pulp and Paper Industry

- Bleached pulp
- Recycled pulp
- ClO2- Chlorine dioxide (bleaching process
- Basis weight (throttling of pulp with high accuracy and speed)
- Liquor (black, green and white liquor flow)
- Steam (temperature control)

Mining Industry

- Ore concentrate (throttling and isolation of abrasive slurries)
- Sand pumping (granulate flow)
- Recycled water (water treatment)
- Mixing (density control)
- Dosing (throttling of chemical additives)
- Tank bottom valve (outflow from silo and hoppers)

Marine and Offshore

- Hydrocarbon gases (Corrosive and dirty associate gas and off-spec gases)
- Hydrocarbon liquids (treated and untreated crude oil, residual oil and C3+)
- Acid and alkaline solutions (industrial acids, caustic)
- Side products / Off-spec liquids (process/produced water, off spec slurry, emulsion)
- Utility services (fresh water, sea water, nitrogen, air, hydrogen, argon and steam)

Chemical and Fertilizers

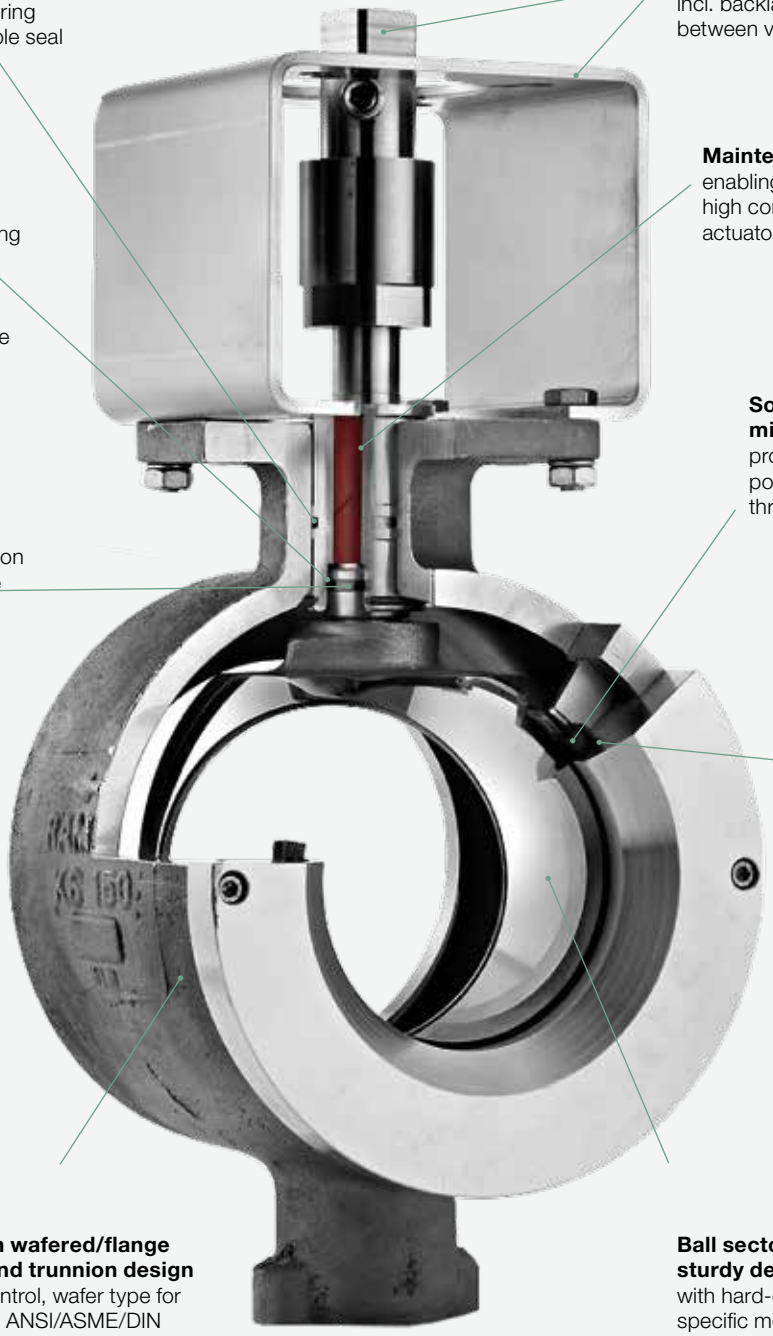
- Acids and corrosive media (e.g. nitric acid, sulphuric acid, hydrochloric acid ...)
- Resin production
- Dosing of acids and other chemical injections
- Toluene diisocyanate (TDI) production
- Alkaline solutions (sodium hydroxide, potassium hydroxide...)
- Ammonia and Urea production

Ball Sector Control Valve – KS series

Ramén ball sector valves are designed to be used as control valves for liquids, gases, steam, media with suspended solids, sludge, abrasive slurries, powder, pellets and viscous media.

Construction and design features

Ramén ball sector valves are made from ball sectors with an elliptical to circular opening, giving high resolution and equal percentage control characteristics in most demanding control applications. The centric, trunnion-mounted design offers easy and accurate operation covering process design and customer requirements.



Long-life, efficient outer seals, O-ring ensuring increased and reliable seal

Actuator mounting kit incl. backlash-free coupling between valve and actuator

Maintenance-free bearing enabling low-torque operation and high control accuracy with smaller actuators and lower costs

Shaft seal, O-ring protecting the bearing from exposure to media, ensuring long service life and sustained low torque operation

Soft or metal seat with minimum leakage fully protected in fully open position by the ball sector throttling edge

Low friction glide ring Prevents wear on the O-ring when the shaft is turning

Seat O-ring for improved seal off and pressing the seat against the ball sector, guaranteeing tight shut-off in both directions

Rugged body with wafered/flange end connection and trunnion design for backlash free control, wafer type for installation between ANSI/ASME/DIN flanges and flange design for specific sizes and models

Ball sector with a sturdy design. Main control element with hard-chrome surface coating for specific models with straight-through bore design

Benefits of the KS construction

- **Compact, robust and low weight design** with minimum footprint reducing cost and environmental impact.
- **Self-draining and centric design with no hidden cavities** ensuring no fluid entrapment in dead ends especially when throttling slurries, thus preventing valve damage caused by thermal expansion.
- **Elliptical to circular throttling edge** Maintaining flow consistency with no dewatering or plugging when controlling pulps and slurries, and reducing wear especially at small valve openings where velocity is high.
- **Ball Sectors with straight-through bore design** giving equal percentage control characteristic ensuring high capacity, high control accuracy and wide rangeability (300:1).
- **High-pressure recovery**, an optimized solution for low-pressure applications with low-pressure recovery factor (F_L).
- **Low torque operation** ensuring easy automation with small actuators saving cost.
- **Simple and minimal maintenance requirements** thanks to the optimum design of its mechanical components.
- **Excellent seat tightness** according to EN60534-4, leakage rate VI for soft seat and IV for metal seat.

Throttling Control Characteristics

It is important to observe the difference between inherent valve flow characteristics at a constant pressure drop and installed valve flow characteristics at a variable pressure drop.The left-hand graph below (Fig. 1) shows the inherent flow characteristics of Ramén KS for air and water when the pressure drop is constant. It is equal percentage. Shown also for comparison are the characteristics of a linear valve.

The right hand graph (Fig. 2) shows the installed characteristics for the same valves when located in a control loop where valve pressure drop increases as the valve closes. An equal percentage characteristic becomes more like linear, while a linear characteristic becomes more like quick opening. The greater the pressure drop for a certain change of flow, the more the installed characteristics change. The comparison shows that the installed flow characteristics of Ramén KS, with its equal percentage characteristics, is very suitable for the majority of control valve installations.

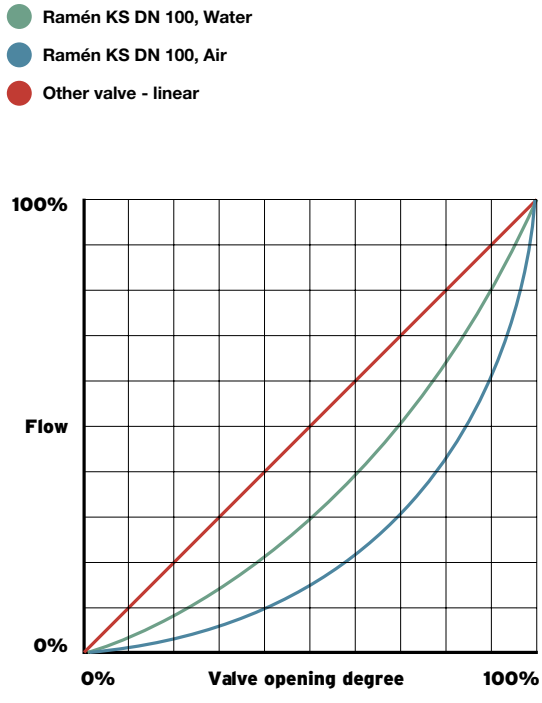


Fig 1. Inherent flow characteristic at constant pressure drop

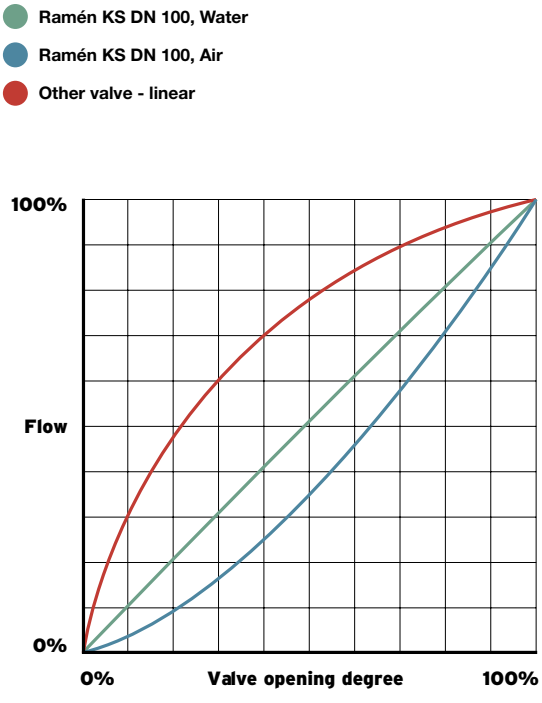
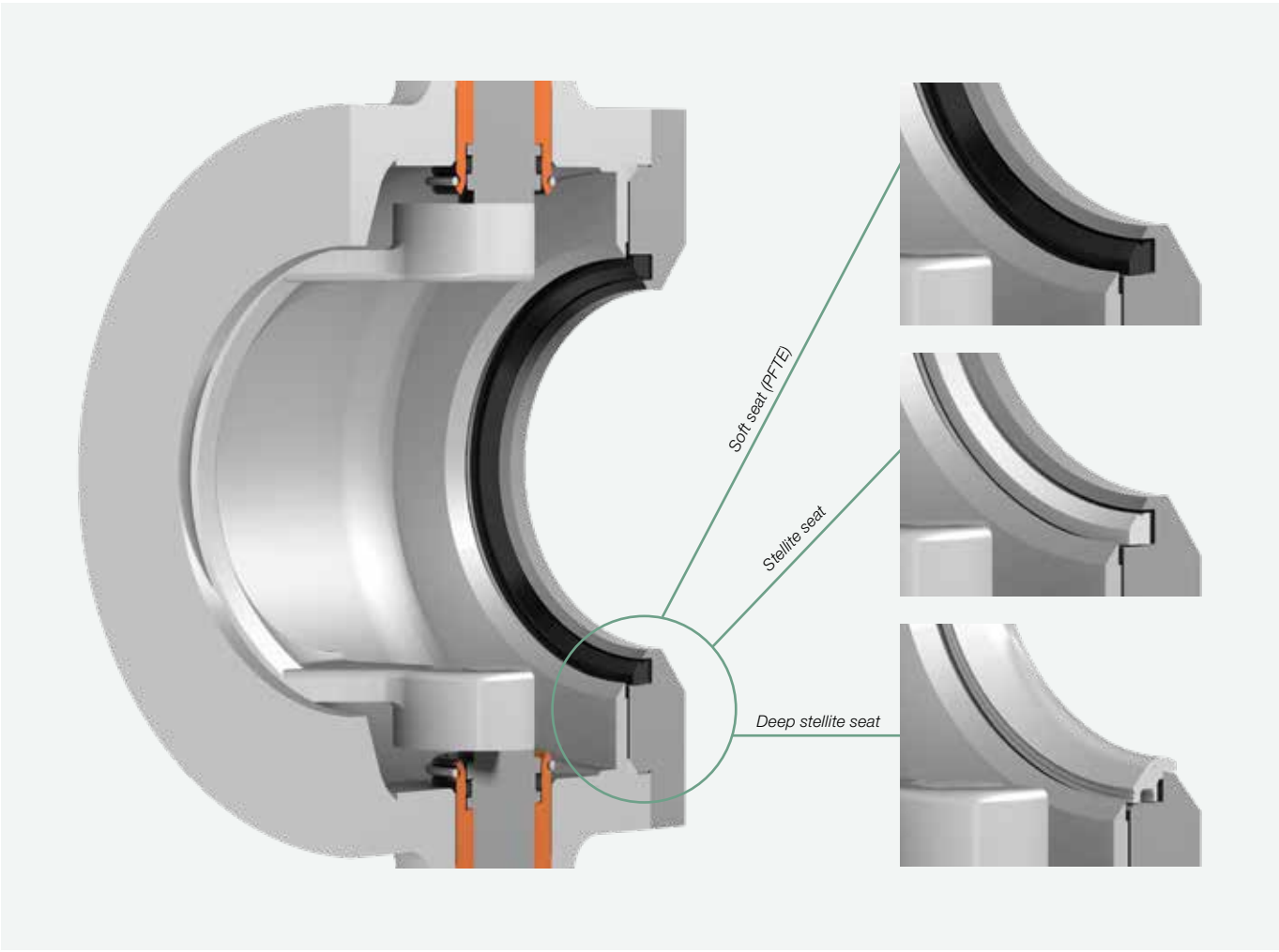


Fig 2. Example of installed flow characteristic with increasing pressure drop on closing vavle



KS Executions

KS-1 (Soft seat PTFE)

Ball sector control valve KS in execution 1 with stainless steel body and ball sector and carbon/graphite PTFE seat. Natural choice for clean and non-abrasive liquid or gas at moderate pressures, pressure drops and temperatures.

KS-1A (Soft seat PTFE)

KS in material execution 1A with hard chrome-coated ball sector, and soft PTFE seat ensures class VI shut-off. Excellent choice for wastewater, fibre suspensions and some abrasive media.

KS-1B (Stellite seat)

KS in material execution 1B, a Stellite metal seated valve with hard chrome-coated ball sector ensuring class IV compliance in shut-off services. Suitable for many abrasive fluids containing hard particles at elevated velocities and temperatures.

KS-1C (Stellite seat)

KS in material execution 1C, metal seated with hard chrome-coated ball sector and seat holding ring with increased protection against abrasion ensuring extended service life for throttling high-velocity process fluids.

KS-1E (Deep stellite seat)

KS in material execution 1E, with deep Stellite metal seat offering long service life for any applications with highly abrasive media containing hard particles within the pulp & paper industries, mining, wastewater in steel mills, sewage plants and many others.

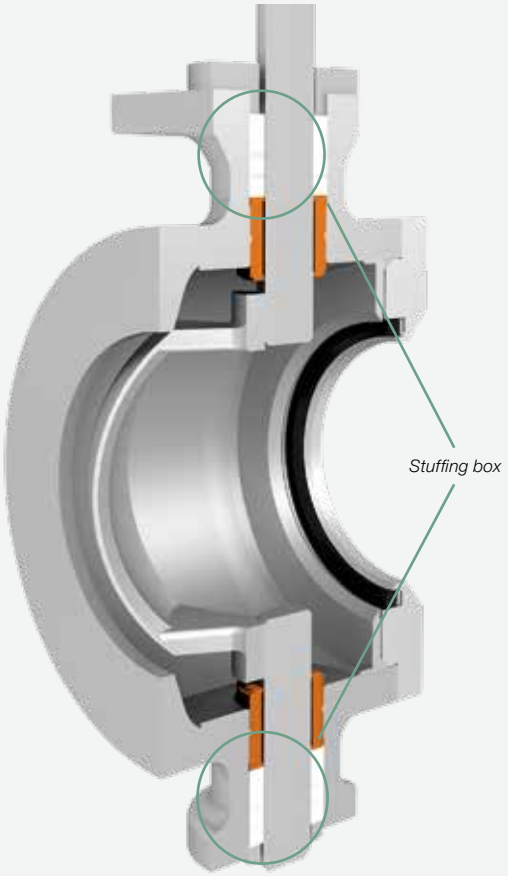
KSP/KSPF

The KSP model has a stuffing box with a self-lubricating braided PTFE packing for tightly sealing shafts and minimizing fugitive emissions.

This model is a suitable solution for elevated temperatures and/or corrosive and hazardous media that demand increased valve tightness.

- Size range: DN40 - DN200 / 1 1/2” – 8”
- Operating temperature: -40°C to 250°C
- Operating pressure: up to PN40
- Flanged or flangeless design adapting user’s special face to face length

Model KSPF flange design with different face-to-face length



KSG/KSGF

The Ramén KSG ball sector valve is a rubber-lined control valve that offers extended resistance to wear in mining, industrial and municipal water, wastewater and slurry applications. All wetted parts like body, ball sector and the outlet protection ring are lined with polyurethane (PUR) and natural rubber (NR), causing particles to bounce off rather than wear the metal material.

- Size range: DN80– DN200 / 3” – 8”
- Operating temperature: Max. 60°C
- Operating pressure: Max. 5 bar (g)
- Flanged or flangeless design

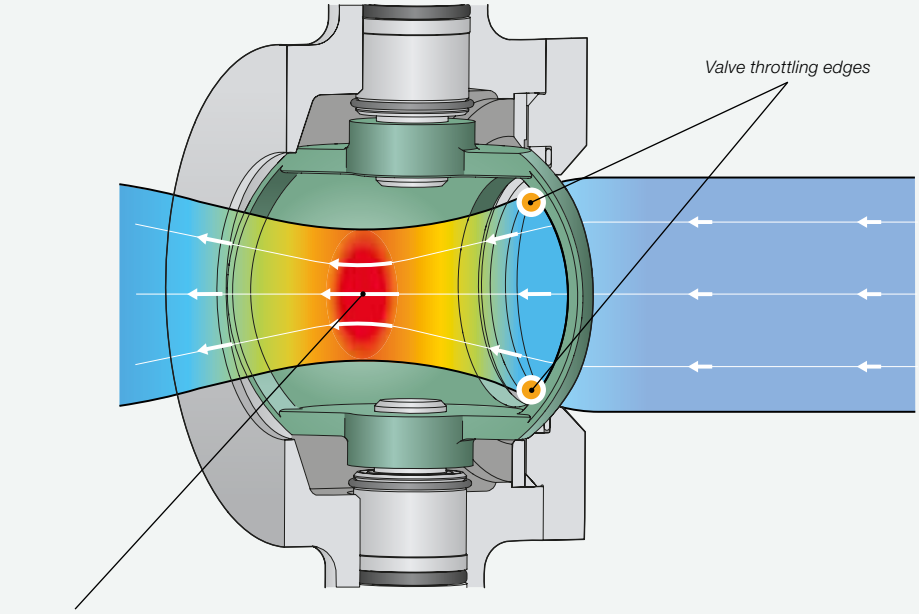
Ramén KSG

Ramén KSGF

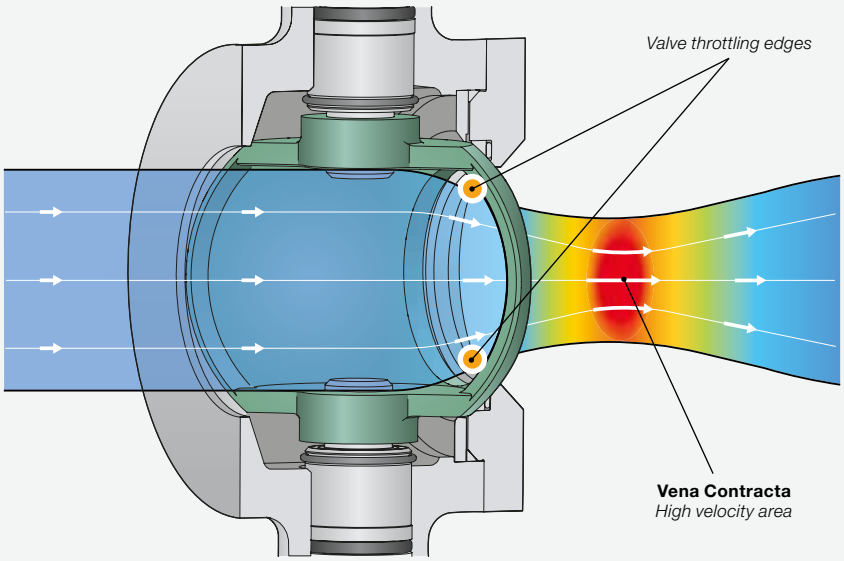
Design Features

Bidirectional design

Ramén KS is normally installed with the throttling ball sector edge on the inlet side of the valve. Thanks to its bidirectional design, it is more appropriate to mount the valve body in the opposite direction when controlling abrasive media. With the throttling orifice placed on the outlet side of the valve, velocity and thereby abrasion in the valve body is reduced to a minimum or more often to zero.



Normal installation
Possible damage to the valve



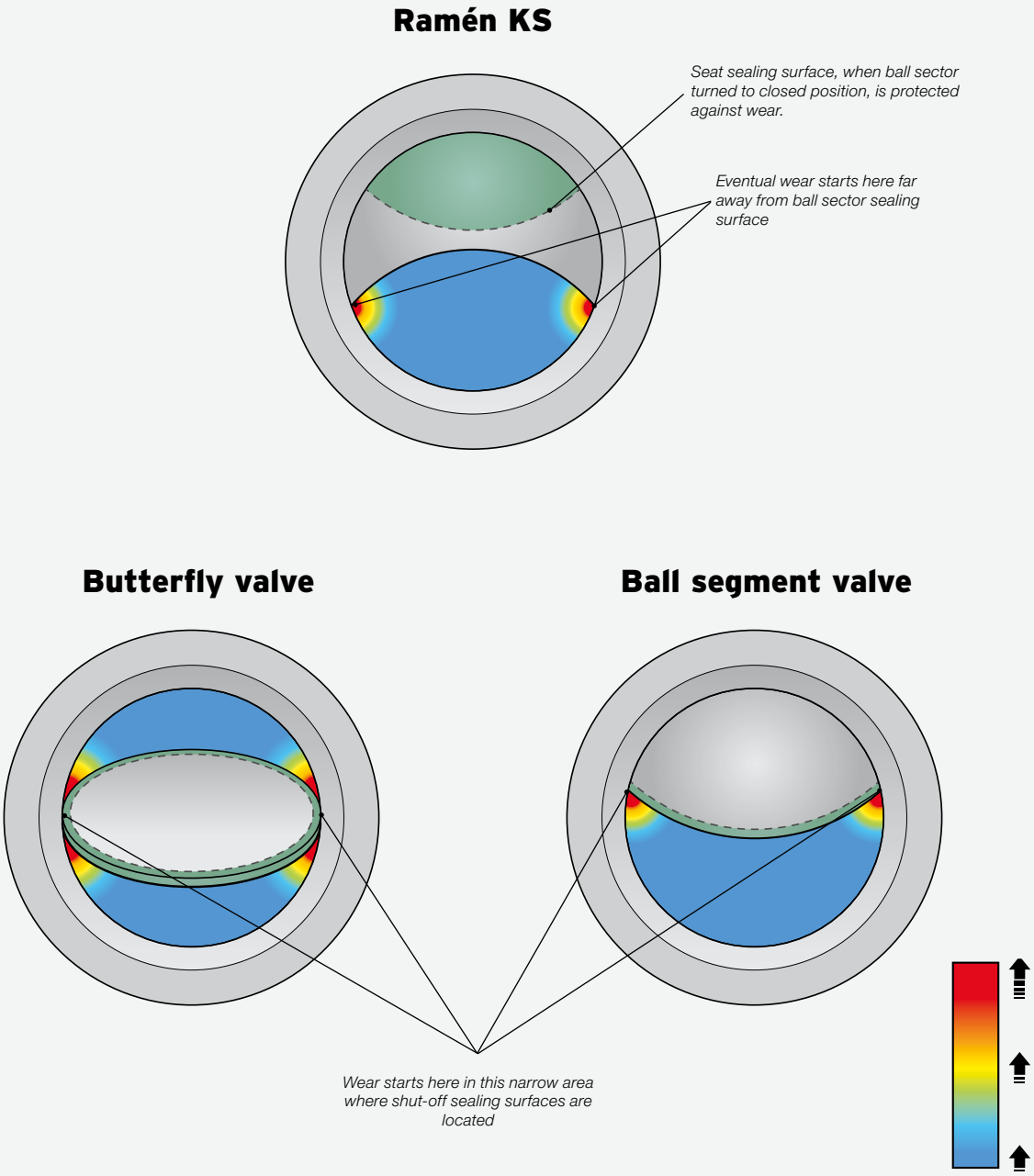
Opposite installation
Minimum damage to the valve

Increased protection of sealing components

The Ramén KS valve seat is fully protected by the ball sector in the open position and fully supported from 0° to 90°, whereas in other valve types such as segmented ball valves the seat is fully exposed to media and there is no segment support in the open position. The ball sector design in a Ramén KS offers increased wear-and-tear resistance for abrasive media and a secured tight shut-off with any media.

Ball Sector Valves enable excellent tightness in the closed position compared to butterfly and segmented ball valves. Leakage by abrasion is avoided thanks to lower sealing surface exposure to wear.

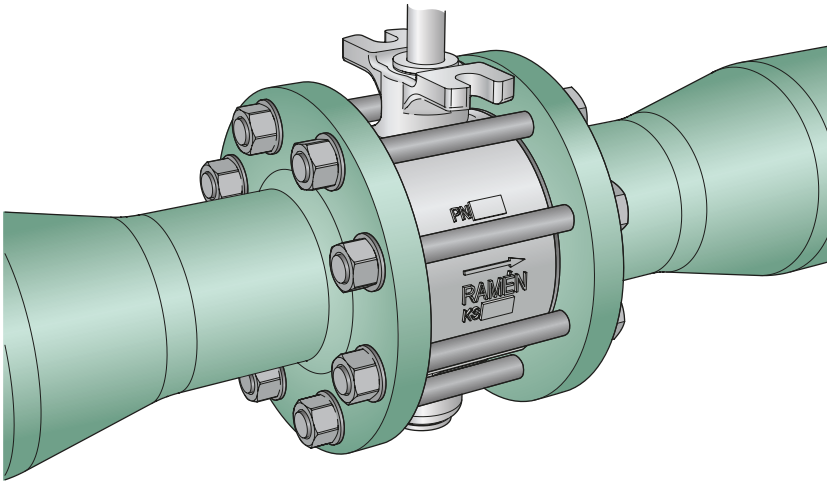
Comparision of different valve designs in throttling positions



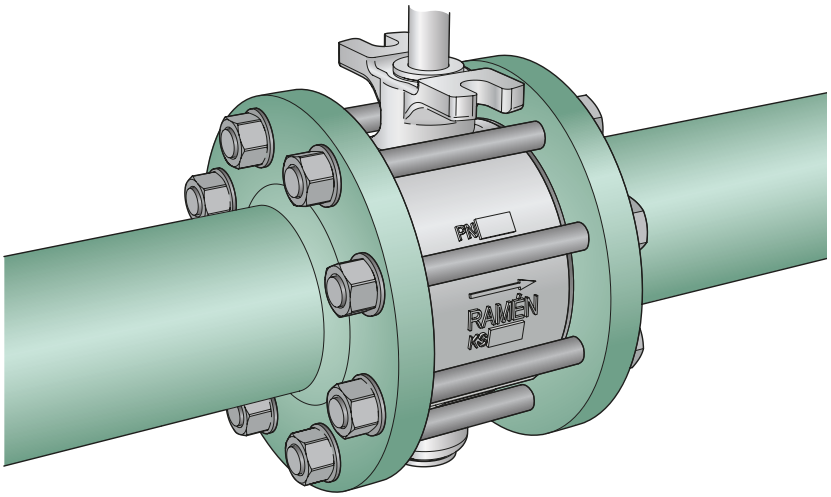
Installation

End Connections

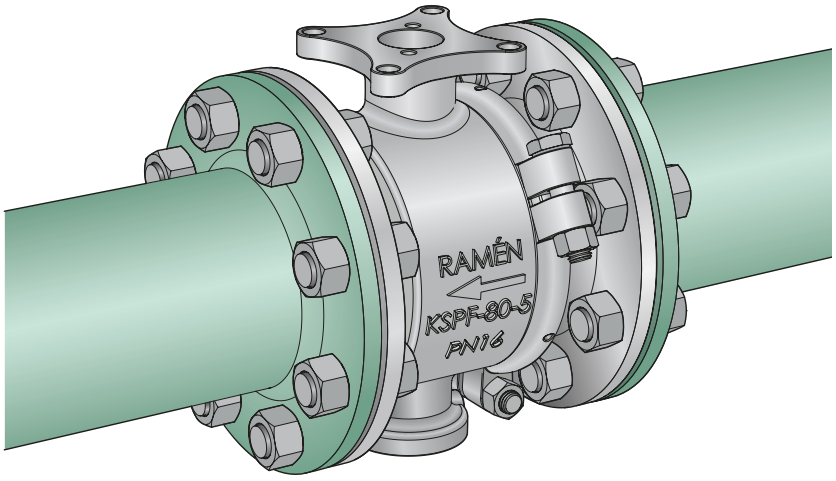
The standard end connection for Ramén KS 25-250 is of wafer type, which makes it an easy fit on new and existing plant, saving extra material and cost. KS-300, KSPF and KSGF comes with flanges. The Ball Sector Valves in wafer and flanged designs are according to ANSI, DIN/EN, ISO, API or JIS. Often the Ramén control valves are mounted with reducers as shown below.



Wafer type with pipe reduction



Wafer



Flanged

Valve Data

Kvs / Cv Ranges

Ramén ball sector valves present a broad range of Kvs (Cv) values from 0.025 (0.03) on DN25 to 3840 (4500) on DN300 valves. The higher Cv value for the same size valve, compared to other valve types, gives ball sector valves an extended control range. This makes them an excellent choice for higher flow capacities with higher turn-down ratios (max flow / min flow) in the process.

Ball sector DN40-300

Cv / Kvs values

DN	**40**	**50**	**80**	**100**	**150**	**200**	**250**	**300**
$\mathbf{K_{vs}}$ [m³/h]	34-64	94	255	390	810	1365	2220	3840
$\mathbf{C_v}$ [gpm]	40-75	110	300	460	950	1600	2600	4500

KS-25 offers 9 different trims for versatile solutions, controlling very low flowrates within various applications fields. To enable high accuracy and rangeability with zero hysteresis the KS-25 trims are engineered with individual geometries enabling an outstanding performance in low flow control of liquids and gases.

KS-25 Cv / Kvs values

Size	**25/0,03**	**25/0,3**	**25/0,7**	**25/1,3**	**25/2,5**	**25/5**	**25/10**	**25/15**	**25/20**
$\mathbf{K_{vs}}$ [m³/h]	0,025	0,25	0,6	1,1	2,1	5	7,5	12,5	21
$\mathbf{C_v}$ [gpm]	0,03	0,3	0,7	1,3	2,5	5,8	9	15	25

KS25/20

KS25/5

KS25/0,3

Technical Specifications

Technical specifications

Design		Flangeless, wafertype (size DN 300 flanged)	
Nominal sizes		DN 25 - DN 300	1”-12”
Material	Body	EN 1.4409	AISI 316L
	Shafts	EN 1.4460	AISI 329
	Ball Sector	EN 1.4409+Cr[1]	AISI 316L+Cr[1]
	O-rings	Viton®	
	Bearing	Rulon®	
	Seat	Soft seat: PTFE (Carbon/graphite reinforced) Metal seat: Stellite	
Nominal pressure	DN 25 - DN 50	PN 40 (for flange PN 10/40 and ANSI 150/300/600)	
	DN 80 - DN 100	PN 25 (for flange PN 10/25 and ANSI 150/300)	
	DN 150 - DN 250	PN 16 (for flange PN 10/16 and ANSI 150)	
	DN 300	PN 16 (Flanged PN 16 or ANSI 150)	
Operating temperature[2]		- 40° C to +250° C	- 40° F to +482° F
Leakage class according to EN60534-4		Soft seat: VI Metal seat: IV	
Characteristic		Equal percentage	
Rangeability		300:1	
Options	O-rings	EPDM, Nitril, Kalrez®, Viton GLT, EPDM 90	
	Alloy steels	254 SMO, Hastelloy, Duplex, Super Duplex, Titanium grade 5	
	Seat	White PTFE, PEEK	

(1) Hard chromed ball sector
(2) Depending on the sealing material

Pressure recovery factor F_L

Valve opening	Pressure recovery Factor, F_L
20%	0.85
40%	0.77
60%	0.67
80%	0.62
100%	0.6

Valve Automation and Accessories

Industrial automation requires accurate and repeatable control with the highest turn down ratios. Ramén supplies different types of automation from well-known global brands to meet these criteria. All automation solutions supplied by Ramén are thoroughly tested with our valve technology to meet the most demanding requirements

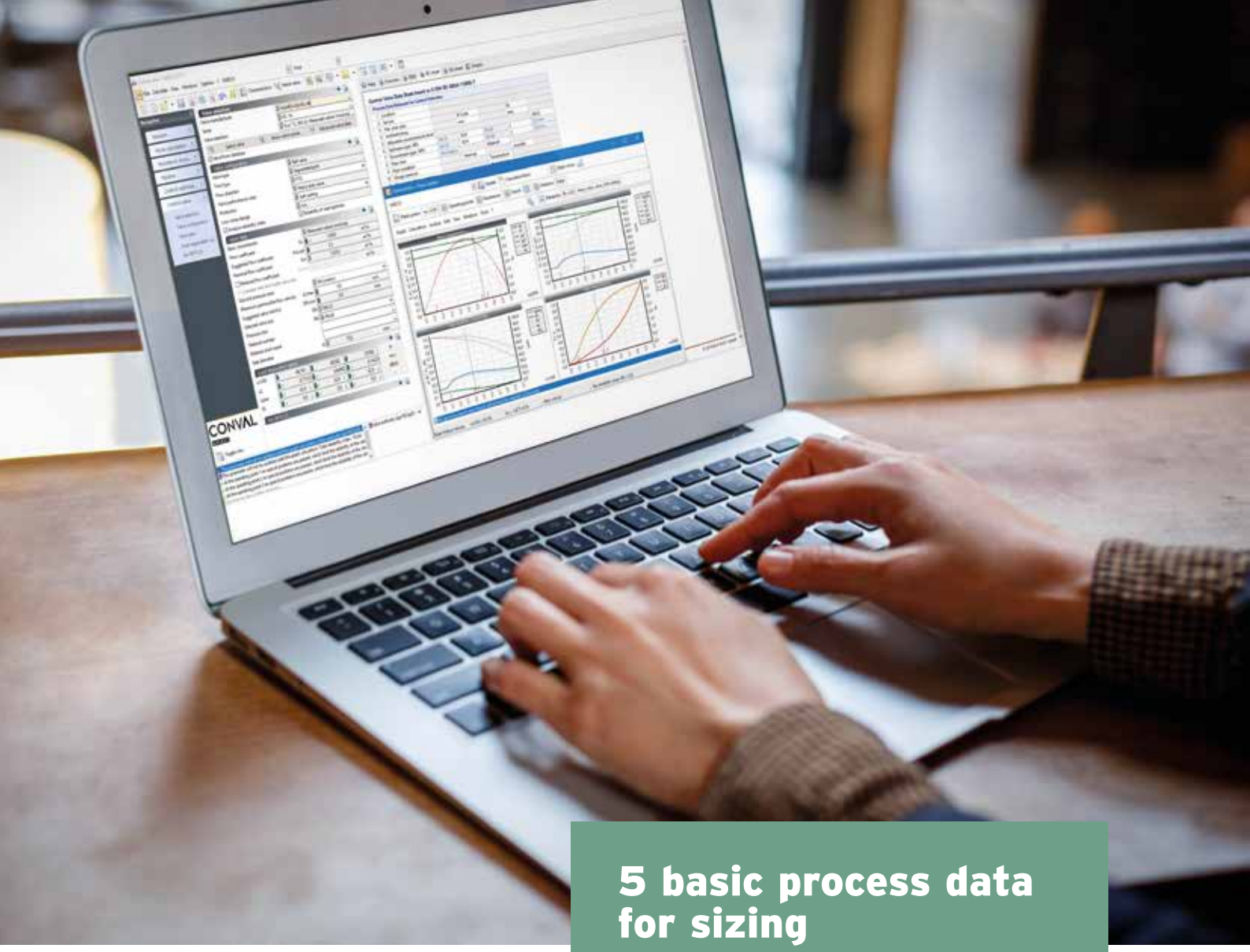
Automation options

- Pneumatic actuator SR (Spring Return) or DA (Double Acting)
- Digital/Electro pneumatic/Pneumatic positioner
- Electrical actuator
- Hydraulic actuator

Electric actuators with stepper motors for high-end solutions to solve the most demanding applications where accuracy, repeatability and rangeability are essential.

Pneumatic actuators, double-acting or fail-safe spring return with digital or pneumatic positioners for easy, robust operation. Positioners offer options for feedback signals, HART, ATEX, industrial bus systems such as Profibus, FF etc.

Electrical actuators with integrated positioners for simple installation in any power system. Can be supplied with different feedback signal options, HART, ATEX and industrial bus systems such as Profibus, FF etc.



Sizing and selection of Control Valves

Ramén is not only known for its high technical performance products, but also for being a customer-focused company where the provision of genuine service and know-how are of equal importance. With solutions adapted to meet each customer's specific requirements, Ramén guarantees quick, assured deliveries.

This is achieved through an accurate control valve sizing by CONVAL®, an advanced calculation software, which combined with our engineering expertise makes sure the best solution is offered while saving time and cost. If you are running CONVAL® yourself, be sure to load Ramén Valves into your CONVAL® database.

5 basic process data for sizing

- Media
- Flow rate: Min/Norm/Max
- Temperature at valve inlet
- Inlet (head) pressure
- Outlet (back) pressure or maximum allowable pressure drop over the valve

Other valuable data for optimal sizing

- Pressure drop at closed valve and at minimum and maximum flow
- Fluid parameters such as density, viscosity, concentration and presence of abrasive particles
- Pipe size and material
- Preference of valve material in media-wetted parts
- Type of actuator
- Type of positioner
- Accessories such as spring-return solenoid valves, limit switches, potentiometers, air filter regulators etc.

Ordering Code

I	II	III	IV	V	VI	VII	VIII	IX	X
KS	50	1	A	xK	K	T			

I	Model code
KS	Ball Sector valve/soft or metal seat with shaft/seat O-rings, wafered type (size DN300 in flanged)
KSP	Ball Sector valve/soft or metal seat with seat O-rings and braided PTFE packing box, wafered type
KSPF	Ball Sector valve/soft or metal seat with seat O-rings and braided PTFE packing box, flanged design
KSG	Rubber lined ball sector valve/ Elathane® seat and Nitrile O-rings
KSGF	Rubber lined ball sector valve/ Elathane® seat and Nitrile O-rings, flanged design

II	Nominal Size/trim size
25/03	i.e. DN25/03
...	
100	DN100
...	
300	DN300

III	Body and ball sector material
1	AISI316L (EN 1.4409)
5	Titanium grade 5
8	904L(EN 1.4539)
11	254SMO (EN1.4547)
12	Hastelloy C-276
13	Duplex (EN 1.4462)
14	Super Duplex (EN 1.4410)
4G	Body in ductile iron lined with Polyurethane (PUR) and natural rubber (NR) lined ball sector (EN GJS-400-15)

IV	Seat/ wetted part- material combination
A	Seat ring: PTFE, Ball Sector: AISI 316L+Cr (hard chrome coated)
B	Seat ring: stellite, Ball Sector: AISI 316L+Cr (hard chrome coated)
C	Seat ring: stellite, Ball Sector: AISI 316L+Cr (hard chrome coated), Seat holding ring: hard chrome coated
E	Seat ring: Deep stellite, Ball Sector: AISI 316L+Cr (chrome coated), Seat holding ring: hard chrome coated

V	Shaft sealing O-ring (item 13/14)*	ref. to table α
VI	Seat back-up O-ring (item 15)*	ref. to table α
VII	Sealing between inlet cover ring and body (item 16) *	ref. to table α

*If same material for all, please use one code for V,VI,VII (e.g. EPDM 70 peroxide for all V, VI,VII , coding will be xP)

Table α										
Sealing material	FKM (Viton)	Viton GLT	EPDM	EPDM90	EPDM70 Peroxide	FFKM (Kalrez)	Nitrile	Nitrile Polar	Silicoflon	Vitoflon
Code	–	L	E	F	P	K	N	C	S	T

VIII	Actuator	IX	Positioner	X	Other accessories

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Ramén Valves
We know the flow

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