



MASTER PRESENTATION

Ball Valves

SANHUA EUROPE



15 / 04 / 2022

BALL VALVES

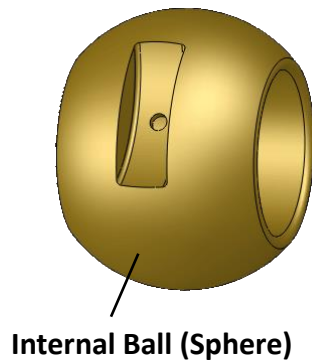
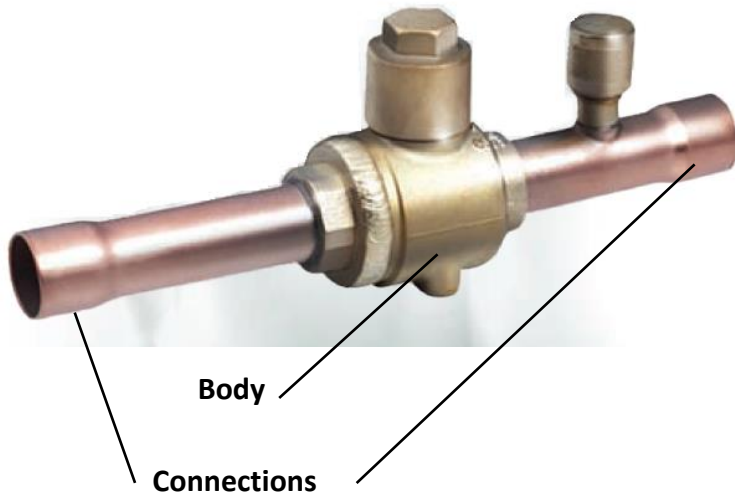
AGENDA:

- **Ball Valves Main Parts**
- **Applications & Working Principle**
- **Product Range (SBV, SBV-R, RBV-R, CBV, CBVT)**
- **Technical comparison**
- **Future Developments**
- **Sizing and Selection**

Ball Valve (SBV) – Main Parts

MAIN FUNCTION

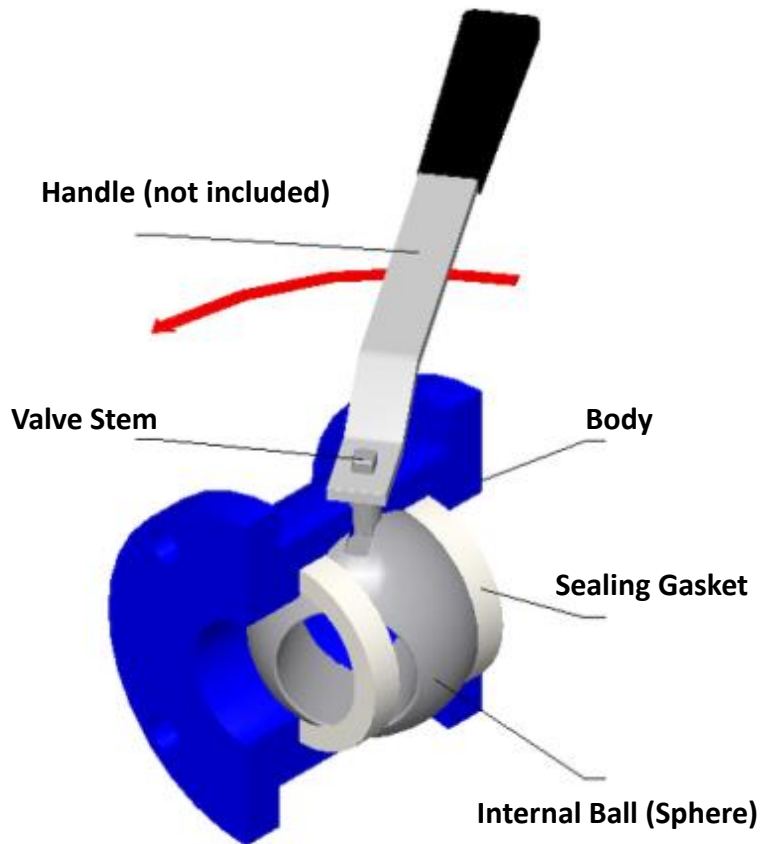
1. A ball valve is a mechanical device with a spherical disc, the part of the valve which controls the flow through it.
2. The main function of a ball valve is permitting to interrupt the refrigerant flux in any point of the system.
3. Ball valves are used in liquid, suction and hot gas lines in refrigeration, freezing and air conditioning systems.



VALVE BODY

Valve body:	BRASS
Connections:	COPPER
Internal Sphere:	BRASS/STAINLESS STEEL

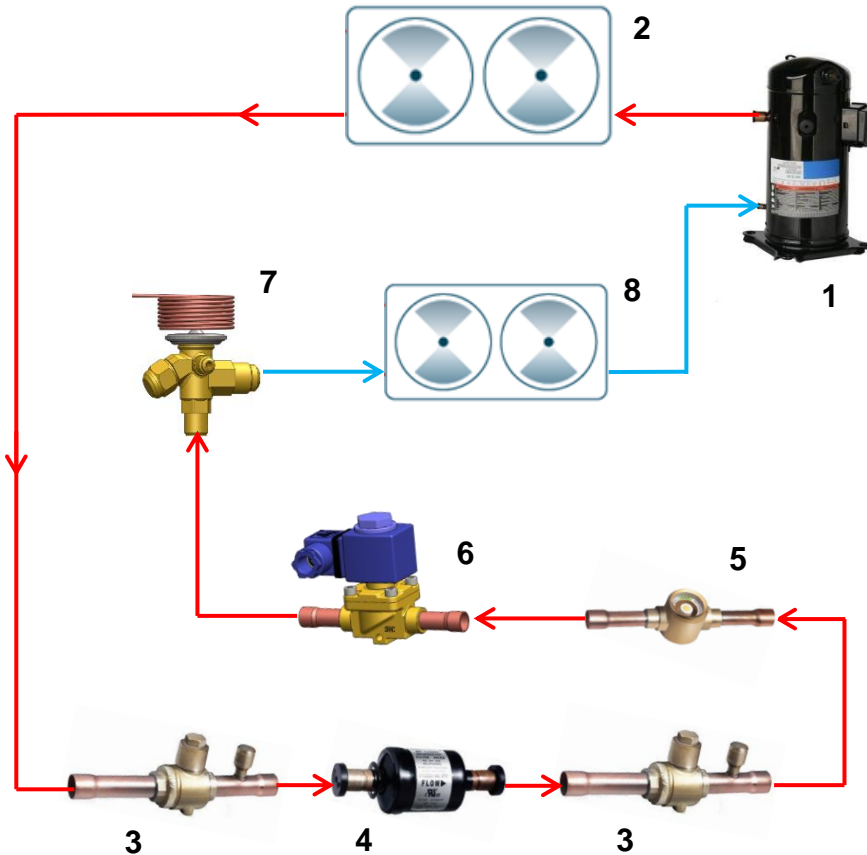
OPERATING PRINCIPLE



1. The internal ball (sphere) has a central hole (called port)
2. When the valve is in “open” position the refrigerant flow pass through the port that is in line with both ends of the valve.
3. When the valve is in “closed” position, the port is perpendicular to the ends of the valve, and flow is blocked.
4. The handle or lever (not included) will be inline with the port position in order to show the real status of the valve.

Ball Valve – Application & Working Principle

APPLICATION CASE N° 1 FILTER DRIER REPLACEMENT

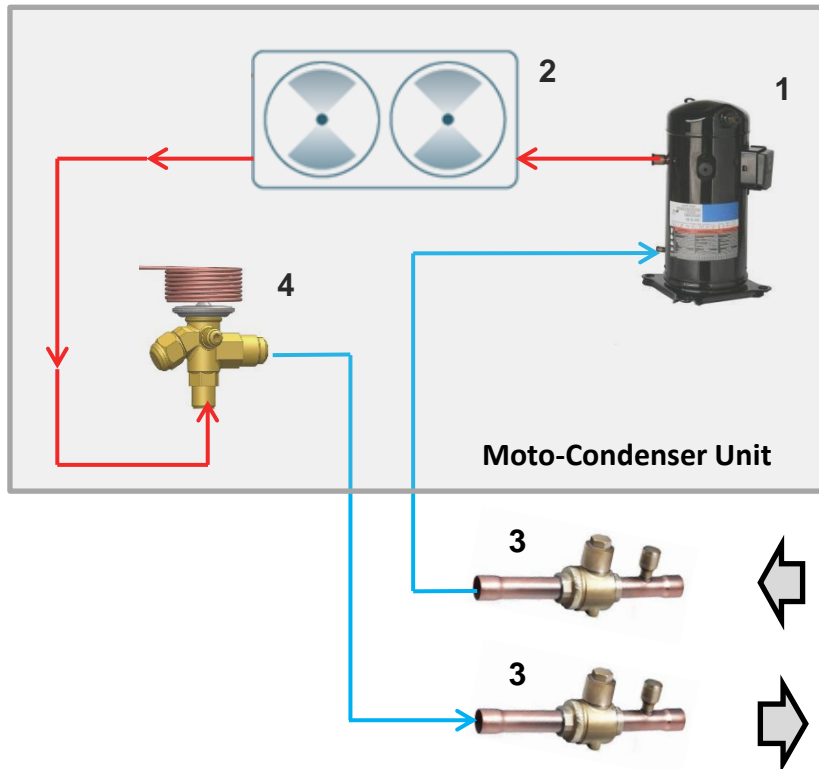


Ball Valves are installed before and after the filter drier. If it is necessary to replace the filter, it is sufficient to shut off the ball valve to substitute the filter.

1. Compressor
2. Condenser
3. Ball Valve
4. Filter Drier
5. Sight Glass
6. Solenoid Valve
7. TXV
8. Evaporator

Ball Valve – Application & Working Principle

APPLICATION CASE N° 2 SPLIT UNIT

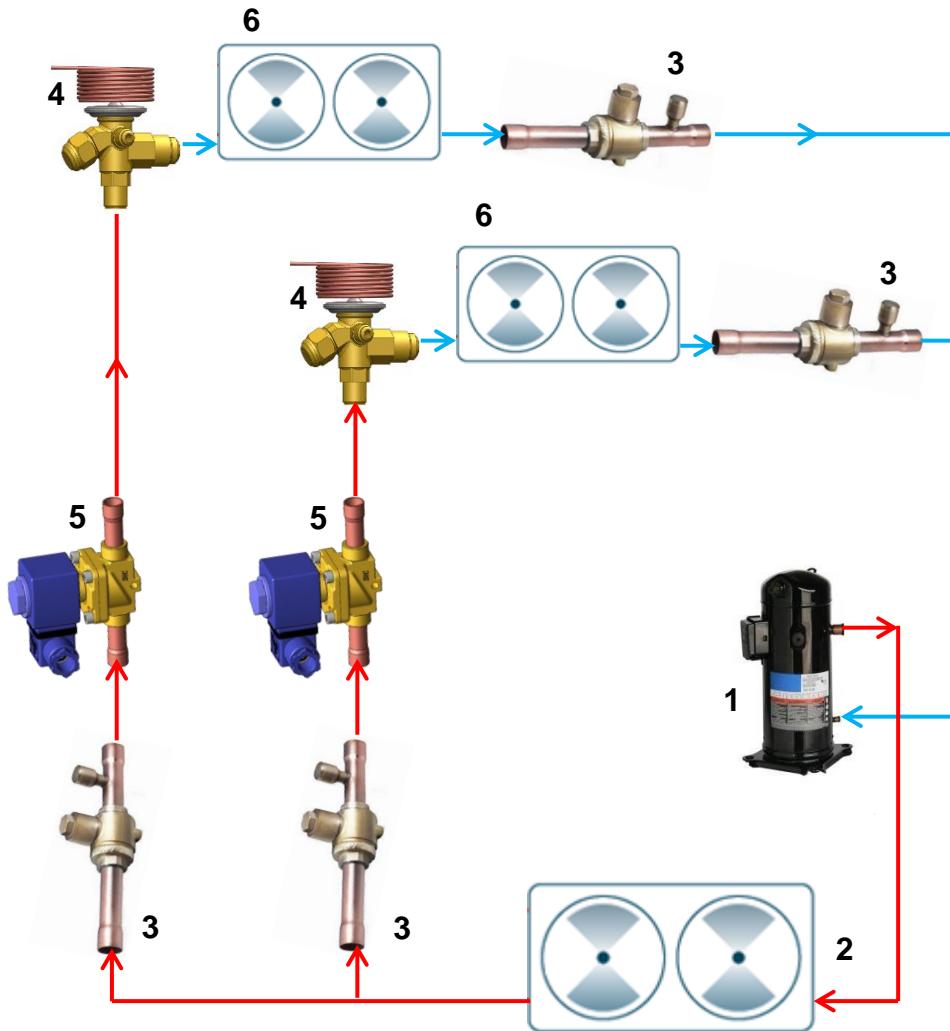


In refrigeration are used Moto-Condenser units connected to remote evaporators. Ball valves are installed in the inlet and outlet connections of the Moto-Condenser in order to shut off the refrigerant flow if necessary.

1. Compressor
2. Condenser
3. Ball Valve
4. TXV

Ball Valve – Application & Working Principle

APPLICATION CASE N° 3 MULTIPLE SYSTEMS



In a multiple system it is possible to install 2 ball valve for each evaporation line. Ball valves must be installed at the beginning and at the end of each line to permit the complete exclusion of each line.

1. Compressor
2. Condenser
3. Ball Valve
4. TXV
5. Solenoid Valve
6. Evaporator

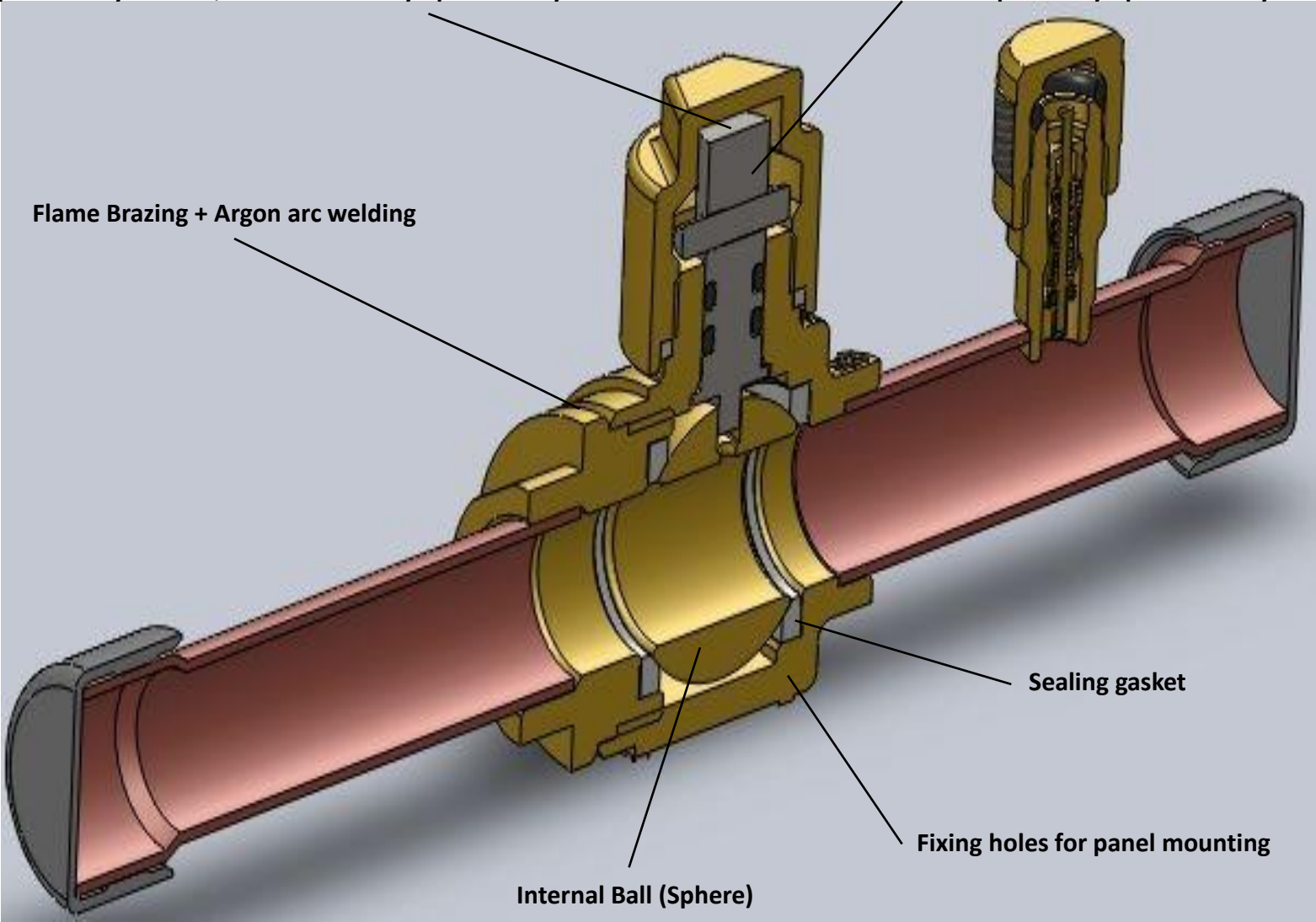
Ball Valve - Technical Details



Operation by wrench, ¼ turn from fully open to fully closed valve

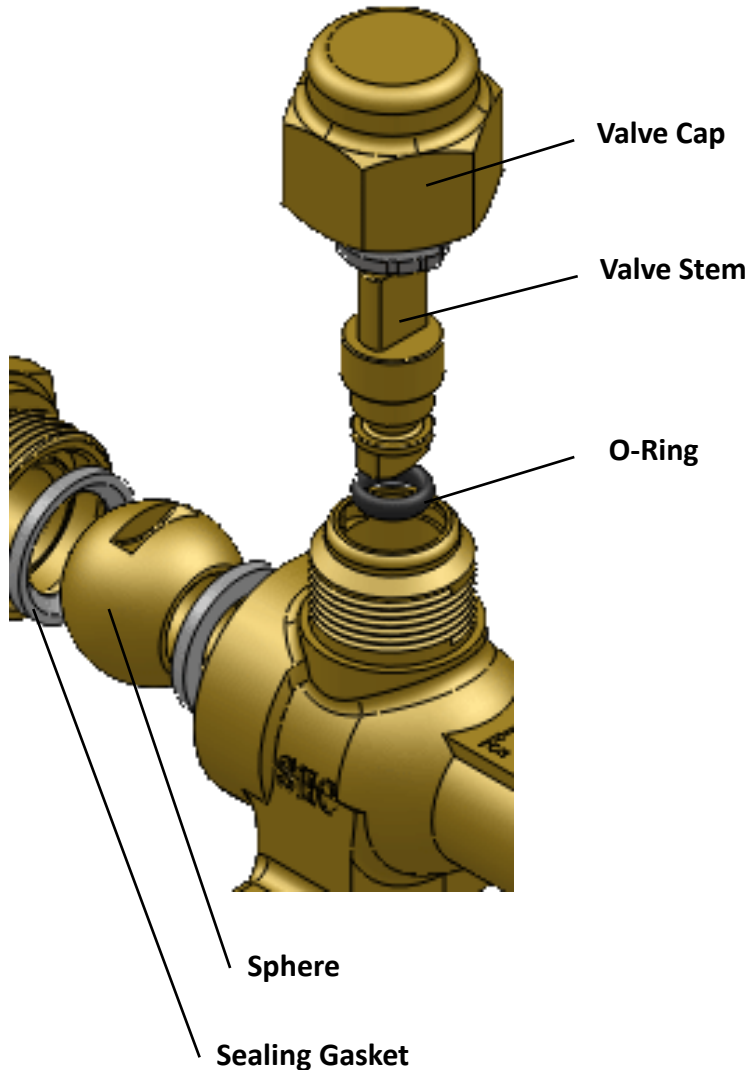
Rotation stop for fully open and fully closed valve

Flame Brazing + Argon arc welding

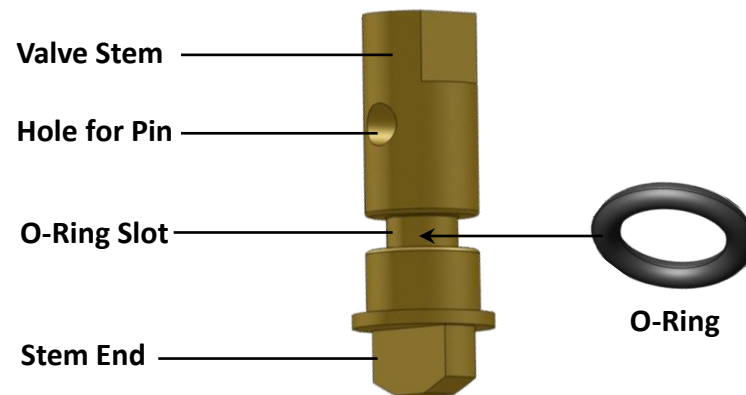


Ball Valve - Technical Details

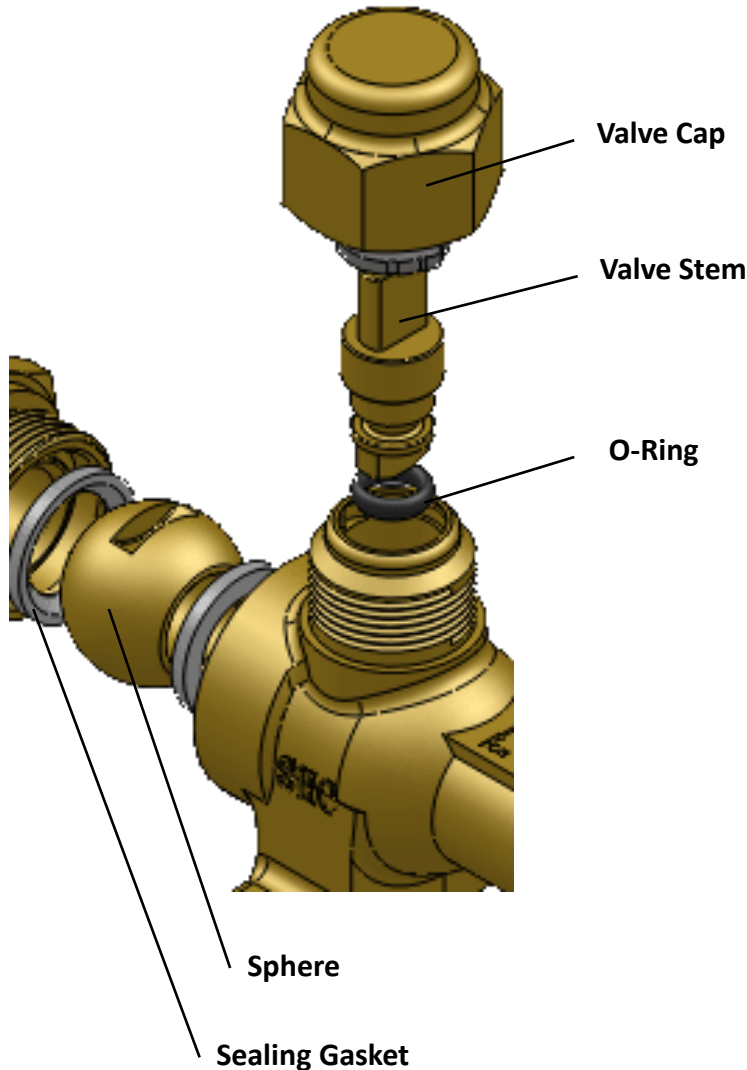
BALL VALVE PARTS



1. Valve stem: it is installed vertically in the valve body. The stem end enters the slot present in the sphere. Turning the valve stem from “open” to “close” position the sphere will do a clockwise rotation of 90°
2. The O-Ring presence on the stem is necessary to prevent leakage
3. On the stem lateral surface is present a hole for a small necessary to indicate the valve stem’s position

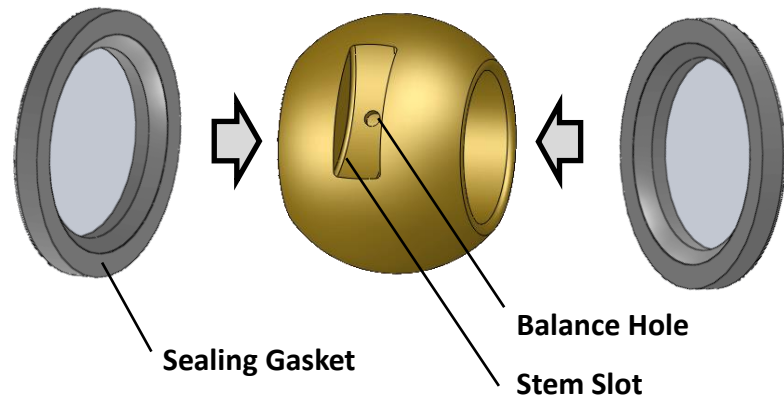


Ball Valve - Technical Details



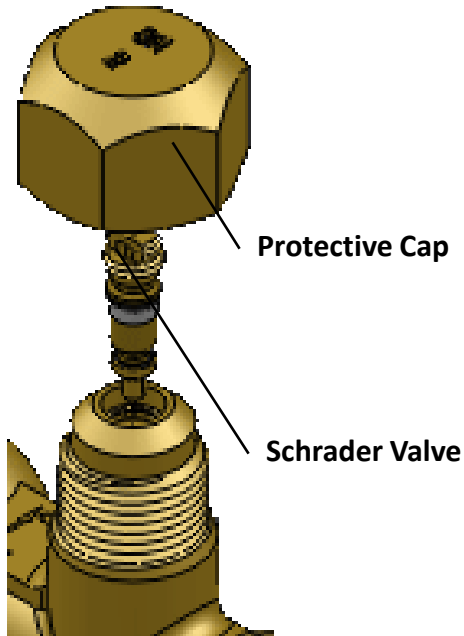
BALL VALVE PARTS

4. Internal Ball (Sphere): It is the core of the valve that permit to shut off the refrigerant flow. In the upper part is present a slot connected with the stem; it commands the sphere rotation.
5. Inside the stem slot is present a balance hole, used to balance the pressure between internal and external side of the sphere.
6. Sealing Gasket: The sphere is mounted between two gasket used to prevent internal leakage

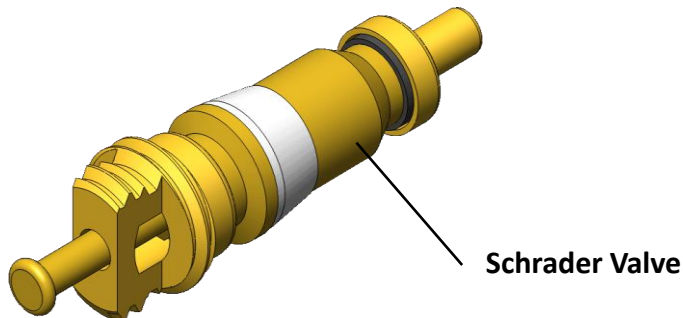


Ball Valve – Technical Details

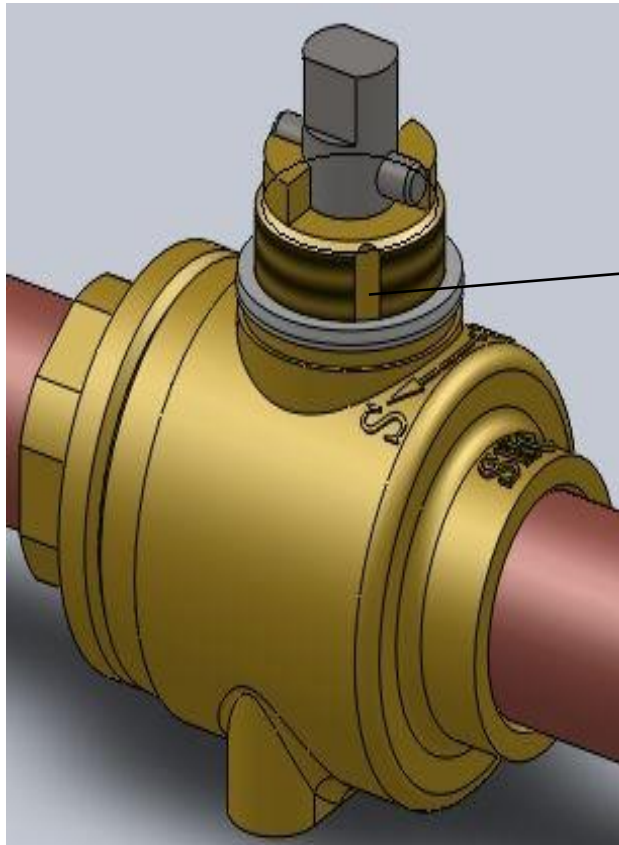
BALL VALVE PARTS – ACCESS PORT



7. SBV ball valves are available with external access port equipped with a Schrader valve protected by a brass cap.
8. Model with access port can work as a service valve. It can be used to generate the vacuum and to charge the refrigerant in the system



BALL VALVE PARTS

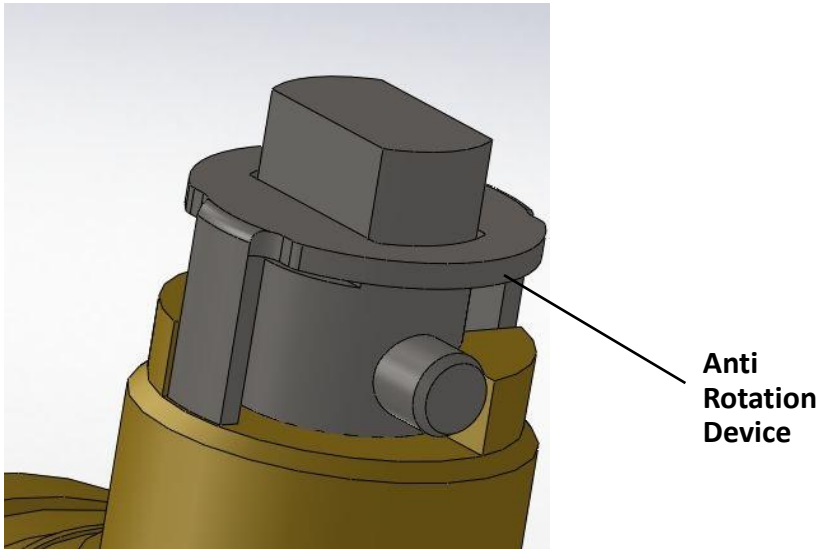


Vent Hole

9. VENT HOLE: All the SBV Ball Valves have a vent hole on the thread connection for the valve cap

In case of internal leakage, the refrigerant could fill the empty area under the valve cap and put in pressure it.

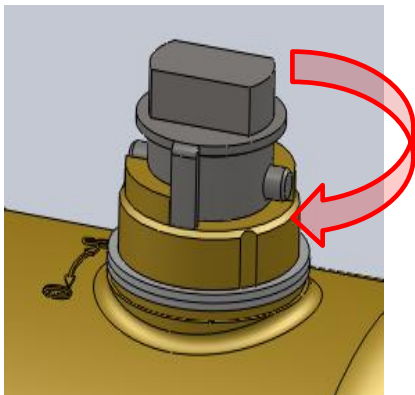
The VENT HOLE prevents injuries during the removal action of the valve cap; in case of leakage the vent hole permits a safe discharge of the refrigerant present under the cap.



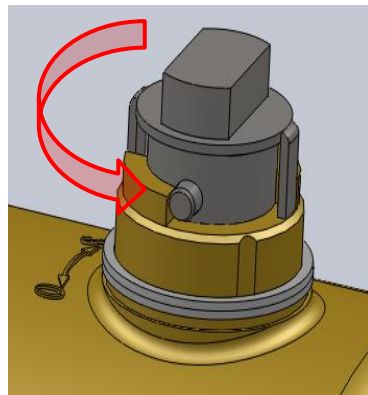
BALL VALVE PARTS

ANTI ROTATION DEVICE

10. SBV Ball Valves (models with connection size diameter $\geq 1\text{-}1/8''$) are equipped with a metallic ring placed on the valve stem able to prevent involuntary rotations of the sphere.



OPEN POSITION



CLOSED POSITION

The closed or open position is maintained thanks to the limited gap between the sphere and the gaskets. However, in critical applications (high quantity of vibrations) the ball valve can change position opening or closing by itself, causing a wrong functionality of the system. Anti Rotation Device can prevent this risk.

BALL VALVE – Standard Ranges Overview



- 1. SBV range:**
 - standard range for applications with HFC
 - PS=45bar and TS from -40 to +120° C*
- 2. SBV-R range:**
 - new range for applications with HFC and R32
 - PS=49bar and TS from -40 to +120° C*
- 3. RBV-R range:**
 - new range for applications with HFC and R32
 - suitable for high temperature discharge lines
 - PS=49bar and TS from -60 to +160° C
- 4. CBV range:**
 - series for applications with R744 sub-critical
 - PS=60bar and TS from -40 to +150° C*
- 5. CBVT range:**
 - series for applications with R744 trans-critical
 - PS=140bar and TS from -40 to +150° C*

- **Max. Allowed Temperature in continuous application:** +120° C
- **Max. Allowed Temperature (test 96 hours):** +135° C

Ball Valve – SBV Range



SBV Range – MAIN CHARACTERISTICS

1. Wide range with 46 different standard models
2. Ball valve sizes from 6mm (or 1/4") to 108mm (4" 1/4)
3. All the valve sizes are selectable with or without access fitting
4. All the models have a full port characteristic to maximize the system performances generating the smallest possible internal pressure drop
5. The 45 bar Design Pressure allows a safety application with almost all the refrigerants including R410A
6. Beside a nominal admitted refrigerant temperature range [from -40 to +120° C], SBV valves allow a temperature peak of +150° C
7. The full SBV range is CE and UL certified

Ball Valve – SBV Range





SBV Range – Portfolio Description

		Connection Size [INCH]	Connection Size [mm]	Kv (m3/h)	PED category Fluid Group 1	PED category Fluid Group 2	MOP (bar)
Models Without ACCESS FITTING	Models With ACCESS FITTING						
SBV02-020	SBV02-320	-	6	1,9	Art. 4.3	Art. 4.3	45
SBV02-019	SBV02-319	1/4	-	1,9	Art. 4.3	Art. 4.3	45
SBV03-019	SBV03-319	3/8	-	5,5	Art. 4.3	Art. 4.3	45
SBV03-020	SBV03-320	-	10	5,5	Art. 4.3	Art. 4.3	45
SBV04-020	SBV04-320	-	12	7,3	Art. 4.3	Art. 4.3	45
SBV04-019	SBV04-319	1/2	-	17,3	Art. 4.3	Art. 4.3	45
SBV(M)-A5YHSY-2-S	SBV(M)-JA5YHSY-2-S	-	15	13,8	Art. 4.3	Art. 4.3	45
SBV(M)-A5YHSY-1-S	SBV(M)-JA5YHSY-1-S	5/8	16	13,8	Art. 4.3	Art. 4.3	45
SBV(M)-A6YHSY-2-S	SBV(M)-JA6YHSY-2-S	-	18	20,6	Art. 4.3	Art. 4.3	45
SBV(M)-A6YHSY-1-S	SBV(M)-JA6YHSY-1-S	3/4	-	20,6	Art. 4.3	Art. 4.3	45

Ball Valve – SBV Range





SBV Range – Portfolio Description

		Connection Size [INCH]	Connection Size [mm]	Kv (m3/h)	PED category Fluid Group 1	PED category Fluid Group 2	MOP (bar)
Models Without ACCESS FITTING	Models With ACCESS FITTING						
SBV(M)-A7YHSY-1-S	SBV(M)-JA7YHSY-1-S	7/8	22	29,0	Art. 4.3	Art. 4.3	45
SBV(M)-A9YHSY-2-S	SBV(M)-JA9YHSY-2-S	-	28	54,3	Cat.II	Art. 4.3	45
SBV(M)-A9YHSY-1-S	SBV(M)-JA9YHSY-1-S	1 1/8	-	54,3	Cat.II	Art. 4.3	45
SBV(M)-A11YHSY-1-S	SBV(M)-JA11YHSY-1-S	1 3/8	35	85,5	Cat.II	Cat.I	45
SBV(M)-A13YHSY-2-S	SBV(M)-JA13YHSY-2-S	1 5/8	-	133,7	Cat.II	Cat.I	45
SBV(M)-A13YHSY-1-S	SBV(M)-JA13YHSY-1-S	-	42	133,7	Cat.II	Cat.I	45
SBV(M)-A17YHSY-1-S	SBV(M)-JA17YHSY-1-S	2 1/8	54	225,0	Cat.II	Cat.I	45
SBV(M)-A19YHSY-1-S	SBV(M)-JA19YHSY-1-S	-	64	225,0	Cat.II	Cat.I	45
SBV(M)-A21YHSY-2-S	SBV(M)-JA21YHSY-2-S	2 5/8	-	380,0	Cat.II	Cat.I	45
SBV(M)-A25YHSY-2-S	SBV(M)-JA25YHSY-2-S	3 1/8	80	530,0	Cat.II	Cat.I	45

Ball Valve – SBV Range

SBV Range – Portfolio Description

		Connection Size [INCH]	Connection Size [mm]	Kv (m3/h)	PED category Fluid Group 1	PED category Fluid Group 2	MOP (bar)
Models Without ACCESS FITTING	Models With ACCESS FITTING						
SBV(M)-A28YHSY-1-S	SBV(M)-JA28YHSY-1-S	3 1/2	89	700	Cat.II	Cat.I	45
SBV(M)-A29YHSY-1-S	SBV(M)-JA29YHSY-1-S	3 5/8	92	700	Cat.II	Cat.I	45
SBV(M)-A33YHSY-2-S	SBV(M)-JA33YHSY-2-S	4 1/8	105	950	Cat.II	Cat.I	45
SBV(M)-A34YHSY-1-S	SBV(M)-JA34YHSY-1-S	4 1/4	108	950	Cat.II	Cat.I	45

WARNING:

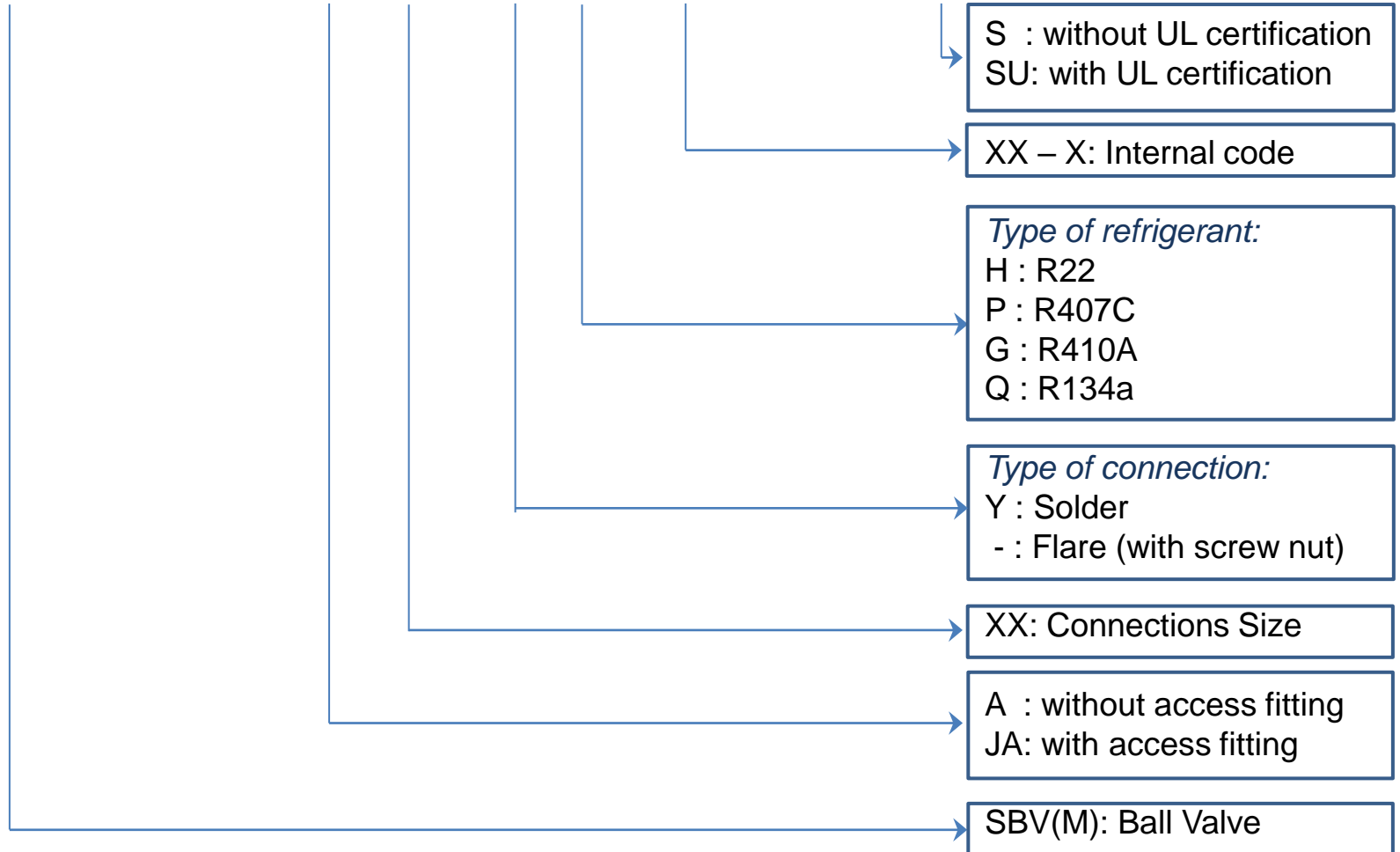
SBV models in PED category II, are not covered by a notified body certification, so they cannot be used with flammable refrigerants (Fluids Group 1)

Ball Valve – Product Range



NOMENCLATURE:

SBV(M) - JA 7 YHSY - 1 - S



Ball Valve – SBV Technical Details



SBV Range - FEATURES

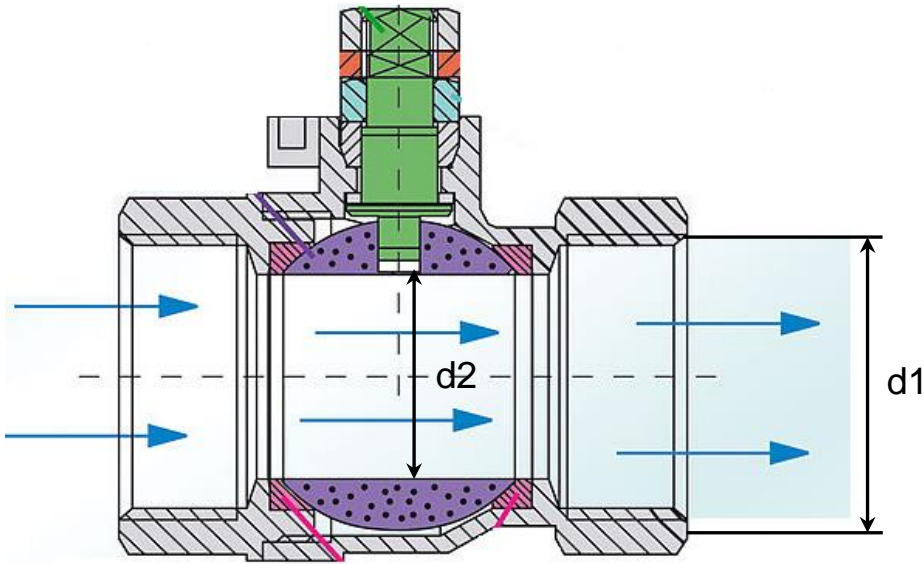
<i>ADVANTAGES</i>	<i>DISADVANTAGES</i>
<ol style="list-style-type: none">1. Bi-directional flow characteristics: for this reason, valve orientation is not important.2. Hermetic design.3. Vent Hole for a bigger safety4. Compatible for high pressure refrigerants as R410A.5. High Design Pressure PS=45bar for all the range.6. Full port design (minimal pressure drop)7. Available with external access port. It permit to save money avoiding the charge valve installation.8. Valve seat of special Teflon to secure maximum tightness and a long lifetime.9. Durable, can be used to achieve perfect shutoff even after years of disuse.	<ol style="list-style-type: none">1. SBV ball valves are only manually operated.2. Ball valves cannot offer a fine refrigerant flow control that may be necessary in throttling applications.



SBV Range - FEATURES

KEY FEATURES

1. Bi-directional flow characteristics.
2. Hermetic design.
3. Vent Hole for a bigger safety
4. Compatible for high pressure refrigerants as R410A.
5. High Design Pressure PS=45bar for all the range
6. Full port design (minimal pressure drop)
7. Available with external access port (no charge valve necessary).
8. Valve seat of special Teflon to secure maximum tightness and a long lifetime.
9. Durable: perfect shutoff even after years of disuse.



$$A1 = \frac{\pi d1^2}{4}$$

$$A2 = \frac{\pi d2^2}{4}$$

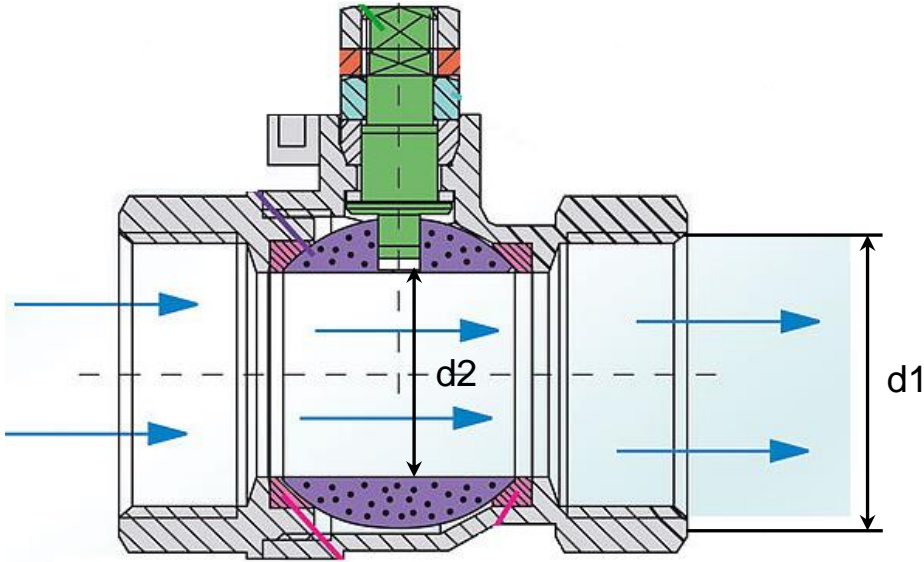
$$A1 \times v1 = A2 \times v2$$

$$d1 = d2 \Rightarrow A1 = A2 \Rightarrow v1 = v2$$

$$\Delta P = k \times v^2 \Rightarrow \Delta P1 = \Delta P2$$

FULL PORT

1. A full port or more commonly known full bore ball valve has an over-sized ball so that the hole in the ball is the same size as the pipeline resulting in lower friction loss.
2. Full port valves are used when free flow is required in order to minimize the internal pressure drop (ΔP) through the valve.
3. The disadvantages of this technical solution are larger dimensions and a bigger cost



$$A1 = \frac{\pi d1^2}{4}$$

$$A2 = \frac{\pi d2^2}{4}$$

$$A1 \times v1 = A2 \times v2$$

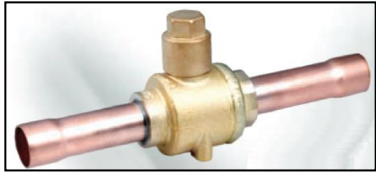
$$d1 > d2 \Rightarrow A1 > A2 \Rightarrow v1 < v2$$

$$\Delta P = k \times v^2 \Rightarrow \Delta P1 < \Delta P2$$

REDUCED PORT

1. In reduced port or more commonly known reduced bore ball valves, the internal ball has a size smaller than the connection pipes size.
2. The flow area inside the port (A2) is smaller than the flow area of the connection pipes (A1)
3. As the flow discharge remains constant and is equal to area of flow (A) times velocity (V), the velocity increases with reduced area of flow.
4. The pressure drops through the valve ($\Delta P2$) are proportional to the square of the refrigerant speed; so $\Delta P2$ will be $> \Delta P1$

Ball Valve – SBV Reduced Port Series

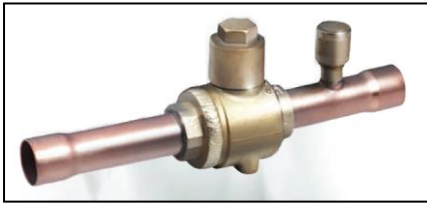


BALL VALVE – SBV Reduced Port: Range Overview

part 1: models without access fitting

Connections		Models	U11	Size	Models	U11	Size
(inch)	(mm)	Type 1: SBV models WITHOUT ACCESS FITTING			Type 1: SBV_RP models WITHOUT ACCESS FITTING		
-	6	SBV02-020	10150092002	2	No Alternative		
1/4	-	SBV02-019	10150091902	2	No Alternative		
3/8	-	SBV03-019	10150091802	3	No Alternative		
-	10	SBV03-020	10150092102	3	No Alternative		
-	12	SBV04-020	10150092202	4	No Alternative		
1/2	-	SBV04-019	10150090502	4	No Alternative		
-	15	SBV(M)-A5YHSY-2-SA	10150057602	5	No Alternative		
5/8	16	SBV(M)-A5YHSY-1-SA	10150053302	5	No Alternative		
-	18	SBV(M)-A6YHSY-2-SA	10150054602	6	SBV06-602	10150116502	6
3/4	-	SBV(M)-A6YHSY-1-SA	10150054302	6	SBV06-601	10150115002	6
7/8	22	SBV(M)-A7YHSY-1-SA	10150053502	7	SBV07-601	10150115302	7
-	28	SBV(M)-A9YHSY-2-SA	10150055102	9	SBV09-602	10150116302	9
1 1/8	-	SBV(M)-A9YHSY-1-SA	10150054702	9	SBV09-601	10150084902	9
1 3/8	35	SBV(M)-A11YHSY-1-SA	10150055002	11	SBV11-601	10150102702	11
1 5/8	-	SBV(M)-A13YHSY-2-SA	10150055502	13	SBV13-301	10150102502	13
-	42	SBV(M)-A13YHSY-1-SA	10150055302	13	SBV13-602	10150116102	13
2 1/8	54	SBV(M)-A17YHSY-1-SA	10150055702	17	SBV17-601	10150115502	17
-	64	SBV(M)-A19YHSY-1-SA	10150055902	19	No Alternative	-	
2 5/8	-	SBV(M)-A21YHSY-2-SA	10150056302	21	SBV21-601	10150102602	19
3 1/8	80	SBV(M)-A25YHSY-2-SA	10150056502	25	SBV25-601	10150115602	21
3 5/8	92	SBV(M)-A29YHSY-1-SA	10150057002	29	SBV29-601	10150115702	25
4 1/8	105	SBV(M)-A33YHSY-2-SA	10150056102	33	SBV33-601	10150115802	29
4 1/4	108	SBV(M)-A34YHSY-1-SA	10150057102	34	SBV34-601	10150115902	33

Ball Valve – SBV Reduced Port Series



BALL VALVE – SBV Reduced Port: Range Overview

part 2: models with access fitting

Connections		Models	U11	Size	Models	U11	Size
(inch)	(mm)	Type 2: SBV models WITH ACCESS FITTING			Type 2: SBV_RP models WITH ACCESS FITTING		
-	6	SBV02-320	10150094702	2	No Alternative		
1/4	-	SBV02-319	10150094602	2	No Alternative		
3/8	-	SBV03-319	10150094802	3	No Alternative		
-	10	SBV03-320	10150094902	3	No Alternative		
-	12	SBV04-320	10150095102	4	No Alternative		
1/2	-	SBV04-319	10150095002	4	No Alternative		
-	15	SBV(M)-JA5YHSY-2-SA	10150057702	5	No Alternative		
5/8	16	SBV(M)-JA5YHSY-1-SA	10150053402	5	No Alternative		
-	18	SBV(M)-JA6YHSY-2-SA	10150054502	6	SBV06-802	10150116402	6
3/4	-	SBV(M)-JA6YHSY-1-SA	10150054202	6	SBV06-801	10150115102	6
7/8	22	SBV(M)-JA7YHSY-1-SA	10150053602	7	SBV07-801	10150087602	7
-	28	SBV(M)-JA9YHSY-2-SA	10150055202	9	SBV09-802	10150116202	9
1 1/8	-	SBV(M)-JA9YHSY-1-SA	10150054802	9	SBV09-801	10150115402	9
1 3/8	35	SBV(M)-JA11YHSY-1-SA	10150054902	11	SBV11-801	10150093102	11
1 5/8	-	SBV(M)-JA13YHSY-2-SA	10150055402	13	SBV13-801	10150093202	13
-	42	SBV(M)-JA13YHSY-1-SA	10150057802	13	SBV13-802	10150116002	13
2 1/8	54	SBV(M)-JA17YHSY-1-SA	10150055802	17	SBV17-801	10150087502	17
-	64	SBV(M)-JA19YHSY-1-SA	10150056002	19	No Alternative		
2 5/8	-	SBV(M)-JA21YHSY-2-SA	10150056402	21	No Alternative		
3 1/8	80	SBV(M)-JA25YHSY-2-SA	10150056602	25	No Alternative		
3 5/8	92	SBV(M)-JA29YHSY-1-SA	10150056902	29	No Alternative		
4 1/8	105	SBV(M)-JA33YHSY-2-SA	10150056202	33	No Alternative		
4 1/4	108	SBV(M)-JA34YHSY-1-SA	10150057202	34	No Alternative		

Ball Valve – SBV Reduced Port Series



BALL VALVE – SBV Reduced Port: Range Overview

part 3: Analysis & Technical comparison

1. SBV with reduced port can bring a significant cost reduction
2. The Kv reduction is from -32% to 110% depending by the valve size
3. The reduced port Ball valves are available only for SBV (45bar) series
4. SBV reduced port series is not covered by PED cat.II certification

Models	Tech. Data		PED Category		Models	Tech. Data		PED Category		Analysis
(product model)	Kv (m3/h)	Ball Diameter ØD (mm)	Fluid Group 1	Fluid Group 2	(product model)	Kv (m3/h)	Ball Diameter ØD (mm)	Fluid Group 1	Fluid Group 2	Difference on Kv value (%)
Type 1: SBV models WITHOUT ACCESS FITTING					Type 1: SBV_RP models WITHOUT ACCESS FITTING					
SBV(M)-A6YHSY-2-SA	20,60	19	Art. 4.3	Art. 4.3	SBV06-602	13,8	14	Art.4.3	Art.4.3	-49%
SBV(M)-A6YHSY-1-SA	20,60	19	Art. 4.3	Art. 4.3	SBV06-601	13,8	14	Art.4.3	Art.4.3	-49%
SBV(M)-A7YHSY-1-SA	29,00	19	Art. 4.3	Art. 4.3	SBV07-601	13,8	14	Art.4.3	Art.4.3	-110%
SBV(M)-A9YHSY-2-SA	54,30	25	Cat. 2	Art. 4.3	SBV09-602	29,0	19	Art.4.3	Art.4.3	-87%
SBV(M)-A9YHSY-1-SA	54,30	25	Cat. 2	Art. 4.3	SBV09-601	29,0	19	Art.4.3	Art.4.3	-87%
SBV(M)-A11YHSY-1-SA	85,50	32	Cat. 2	Art. 4.3	SBV11-601	54,3	25	Cat. 2	Art. 4.3	-57%
SBV(M)-A13YHSY-2-SA	133,70	38	Cat. 2	Cat. 1	SBV13-301	85,5	32	Cat. 2	Art. 4.3	-56%
SBV(M)-A13YHSY-1-SA	133,70	38	Cat. 2	Cat. 1	SBV13-602	85,5	32	Cat. 2	Art. 4.3	-56%
SBV(M)-A17YHSY-1-SA	225,00	50	Cat. 2	Cat. 1	SBV17-601	133,7	38	Cat. 2	Cat. 1	-68%
SBV(M)-A21YHSY-2-SA	380,00	60	Cat. 2	Cat. 1	SBV21-601	225,0	50	Cat. 2	Cat. 1	-69%
SBV(M)-A25YHSY-2-SA	530,00	70	Cat. 2	Cat. 1	SBV25-601	380,0	60	Cat. 2	Cat. 1	-39%
SBV(M)-A29YHSY-1-SA	700,00	80	Cat. 2	Cat. 1	SBV29-601	530,0	70	Cat. 2	Cat. 1	-32%
SBV(M)-A33YHSY-2-SA	950,00	95	Cat. 2	Cat. 1	SBV33-601	700,0	80	Cat. 2	Cat. 1	-36%
SBV(M)-A34YHSY-1-SA	950,00	95	Cat. 2	Cat. 1	SBV34-601	700,0	80	Cat. 2	Cat. 1	-36%
Type 2: SBV models WITH ACCESS FITTING					Type 2: SBV_RP models WITH ACCESS FITTING					
SBV(M)-JA6YHSY-2-SA	20,60	19	Art. 4.3	Art. 4.3	SBV06-802	13,80	14	Art.4.3	Art.4.3	-49%
SBV(M)-JA6YHSY-1-SA	20,60	19	Art. 4.3	Art. 4.3	SBV06-801	13,80	14	Art.4.3	Art.4.3	-49%
SBV(M)-JA7YHSY-1-SA	29,00	19	Art. 4.3	Art. 4.3	SBV07-801	13,80	14	Art.4.3	Art.4.3	-110%
SBV(M)-JA9YHSY-2-SA	54,30	25	Cat. 2	Art. 4.3	SBV09-802	29,00	19	Art.4.3	Art.4.3	-87%
SBV(M)-JA9YHSY-1-SA	54,30	25	Cat. 2	Art. 4.3	SBV09-801	29,00	19	Art.4.3	Art.4.3	-87%
SBV(M)-JA11YHSY-1-SA	85,50	32	Cat. 2	Art. 4.3	SBV11-801	54,30	25	Cat. 2	Art.4.3	-57%
SBV(M)-JA13YHSY-2-SA	133,70	38	Cat. 2	Cat. 1	SBV13-801	85,50	32	Cat. 2	Art.4.3	-56%
SBV(M)-JA13YHSY-1-SA	133,70	38	Cat. 2	Cat. 1	SBV13-802	85,50	32	Cat. 2	Art.4.3	-56%
SBV(M)-JA17YHSY-1-SA	225,00	50	Cat. 2	Cat. 1	SBV17-801	133,70	38	Cat. 2	Cat. 1	-68%

Ball Valve – SBV-R Range



SBV-R Range – MAIN CHARACTERISTICS

1. Wide range with 38 different standard models
2. Ball valve sizes from 6mm (or 1/4") to 64mm (2" 5/8)
3. All the valve sizes are selectable with or without access fitting
4. All the models have a full port characteristic to maximize the system performances generating the smallest possible internal pressure drop
5. The 49 bar Design Pressure allows a safety application with almost all the refrigerants including R32
6. Beside a nominal admitted refrigerant temperature range [from -40 to +120° C], SBV valves allow a temperature peak of +150° C
7. All the SBV-R models with a Nominal Diameter (DN) bigger than 25mm are covered by a notify body certification for category II according to PED directive (2014/68/EU)



Ball Valve – SBV-R Range

SBV-R Range – Portfolio Description

		Connection Size [INCH]	Connection Size [mm]	Kv (m3/h)	PED category Fluid Group 1	PED category Fluid Group 2	MOP (bar)
Models Without ACCESS FITTING	Models With ACCESS FITTING						
SBV02-020R	SBV02-320R	-	6	1,9	Art. 4.3	Art. 4.3	49
SBV02-019R	SBV02-319R	1/4	-	1,9	Art. 4.3	Art. 4.3	49
SBV03-019R	SBV03-319R	3/8	-	5,5	Art. 4.3	Art. 4.3	49
SBV03-020R	SBV03-320R	-	10	5,5	Art. 4.3	Art. 4.3	49
SBV04-020R	SBV04-320R	-	12	7,3	Art. 4.3	Art. 4.3	49
SBV04-019R	SBV04-319R	1/2	-	7,3	Art. 4.3	Art. 4.3	49
SBV05-120R	SBV05-420R	-	15	13,8	Art. 4.3	Art. 4.3	49
SBV05-119R	SBV05-419R	5/8	16	13,8	Art. 4.3	Art. 4.3	49
SBV06-120R	SBV06-420R	-	18	20,6	Art. 4.3	Art. 4.3	49
SBV06-119R	SBV06-419R	3/4	-	20,6	Art. 4.3	Art. 4.3	49

Ball Valve – SBV-R Range

SBV-R Range – Portfolio Description

		Connection Size [INCH]	Connection Size [mm]	Kv (m3/h)	PED category Fluid Group 1	PED category Fluid Group 2	MOP (bar)
Models Without ACCESS FITTING	Models With ACCESS FITTING						
SBV07-119R	SBV07-419R	7/8	22	29,0	Art. 4.3	Art. 4.3	49
SBV09-120R	SBV09-420R	-	28	54,3	Cat.II	Art. 4.3	49
SBV09-119R	SBV09-419R	1 1/8	-	54,3	Cat.II	Art. 4.3	49
SBV11-119R	SBV11-419R	1 3/8	35	85,5	Cat.II	Cat.I	49
SBV13-119R	SBV13-419R	1 5/8	-	133,7	Cat.II	Cat.I	49
SBV13-120R	SBV13-420R	-	42	133,7	Cat.II	Cat.I	49
SBV17-119R	SBV17-419R	2 1/8	54	225,0	Cat.II	Cat.I	49
SBV19-120R	SBV19-420R	-	64	225,0	Cat.II	Cat.I	49
SBV21-119R	SBV21-419R	2 5/8	-	380,0	Cat.II	Cat.I	49

Ball Valve – SBV-R Technical Details



SBV-R Range - FEATURES

<i>ADVANTAGES</i>	<i>DISADVANTAGES</i>
<ol style="list-style-type: none">1. Bi-directional flow characteristics: for this reason, valve orientation is not important.2. Hermetic design.3. Vent Hole for a bigger safety4. Compatible for high pressure refrigerants as R32.5. Range suitable for applications with flammable refrigerants (A2L and A3 categories)6. Models with DN>25mm covered by a notify body certification for cat.II (PED)7. High Design Pressure PS=49bar for all the range.8. Full port design (minimal pressure drop)9. Available with external access port. It permit to save money avoiding the charge valve installation.10. Valve seat of special Teflon to secure maximum tightness and a long lifetime.11. Durable, can be used to achieve perfect shutoff even after years of disuse.	<ol style="list-style-type: none">1. SBV-R ball valves are only manually operated.2. Ball valves cannot offer a fine refrigerant flow control that may be necessary in throttling applications.3. Range limited to size 64mm (2" 5/8)4. Not indicated for installation on the discharge line of R32 systems not quipped with liquid injection

Ball Valve – SBV-R Range



SBV-R Range – Use with Flammable Refrigerants

TUV Certification – Category II according to PED Directive (2014/68/EU)



1	Ball Valves (Type: SBVXX-XXXR)	EN 12284-2003	Valve body and seat: C3771 (JIS H 3250); Pipe: TP(Y2) (GB/T 1527)	Size (ID): Ø25.58*1.5mm~ Ø60.68*3mm PED Category II Fluid: Group 1 PS: 49 bar TS :+135°C/-40°C
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- All the SBV-R models with Nominal Diameter (DN) > 25mm until the size SBV-21 (with a DN = 60,68mm) are covered by TUV certification for Cat.II according to PED Directive. **SBV-R can be used safely with flammable refrigerants.**
- The SBV-R design pressure (49bar) allows the use of these valves in all the R32 systems. However, the max continuous operating temperature is limited to +120° C so they are not indicated for installation on the discharge line of R32 systems without liquid injection solution. In this case Sanhua suggests to use RBV-R range



RBV-R Range – MAIN CHARACTERISTICS

1. Wide range with 15 different standard models
2. Ball valve sizes from 6mm (or 1/4") to 54mm (2" 1/8)
3. RBV-R ball valves are selectable only without access fitting
4. All the models have a full port characteristic to maximize the system performances generating the smallest possible internal pressure drop
5. The 49 bar Design Pressure allows a safety application with almost all the refrigerants including R32
6. The innovative graphite stem sealing solution guarantees a wide refrigerant temperature range [from -60 to +160° C
7. All the RBV-R models with a Nominal Diameter (DN) bigger than 25mm are covered by a notify body certification for category II according to PED directive (2014/68/EU)

Ball Valve – RBV-R Range



RBV-R Range – Portfolio Description

 Models Without ACCESS FITTING	Models With ACCESS FITTING	Connection Size [INCH]	Connection Size [mm]	Kv (m3/h)	PED category Fluid Group 1	PED category Fluid Group 2	MOP (bar)
RBV02-003R	N.A.	1/4	-	1,9	Art. 4.3	Art. 4.3	49
RBV02-004R	N.A.	-	6	1,9	Art. 4.3	Art. 4.3	49
RBV03-003R	N.A.	3/8	-	5,5	Art. 4.3	Art. 4.3	49
RBV03-004R	N.A.	-	10	5,5	Art. 4.3	Art. 4.3	49
RBV04-003R	N.A.	1/2	-	7,3	Art. 4.3	Art. 4.3	49
RBV04-004R	N.A.	-	12	7,3	Art. 4.3	Art. 4.3	49
RBV05-003R	N.A.	5/8	16	13,8	Art. 4.3	Art. 4.3	49
RBV06-003R	N.A.	3/4	19	20,6	Art. 4.3	Art. 4.3	49
RBV07-003R	N.A.	7/8	22	29,0	Art. 4.3	Art. 4.3	49
RBV09-003R	N.A.	1 1/8	-	54,3	Cat.II	Art. 4.3	49

Ball Valve – RBV-R Range

RBV-R Range – Portfolio Description

 Models Without ACCESS FITTING	Models With ACCESS FITTING	Connection Size [INCH]	Connection Size [mm]	Kv (m3/h)	PED category Fluid Group 1	PED category Fluid Group 2	MOP (bar)
RBV09-004R	N.A.	-	28	54,3	Cat.II	Art. 4.3	49
RBV11-003R	N.A.	1 3/8	35	85,5	Cat.II	Cat.I	49
RBV13-003R	N.A.	1 5/8	-	133,7	Cat.II	Cat.I	49
RBV13-004R	N.A.	-	42	133,7	Cat.II	Cat.I	49
RBV17-003R	N.A.	2 1/8	54	225,0	Cat.II	Cat.I	49

RBV-R Range:

- RBV-R is limited to size RBV-17 with a nominal diameter of 48,98mm as indicated on the extract of the notify body certification.
- RBV-R models have a PS=49bar and a max continuous operating temperature of +160° C guaranteed by innovative graphite sealing material on the stem;
- RBV-R are indicated for installation on the discharge line of R32 systems without liquid injection solution.



RBV-R Range - FEATURES

<i>ADVANTAGES</i>	<i>DISADVANTAGES</i>
<ol style="list-style-type: none">1. Bi-directional flow characteristics: for this reason, valve orientation is not important.2. Hermetic design.3. Vent Hole for a bigger safety4. Compatible for high pressure refrigerants as R32.5. Range suitable for applications with flammable refrigerants (A2L and A3 categories)6. Models with DN>25mm covered by a notify body certification for cat.II (PED)7. High Design Pressure PS=49bar for all the range.8. Wide Range of operative temperatures from - 60° C to +160° C9. Suggested for installation on the discharge line of R32 systems not quipped with liquid injection10. Full port design (minimal pressure drop)11. Valve seat of special Teflon to secure maximum tightness and a long lifetime.12. Durable, can be used to achieve perfect shutoff even after years of disuse.	<ol style="list-style-type: none">1. RBV-R ball valves are only manually operated.2. Ball valves cannot offer a fine refrigerant flow control that may be necessary in throttling applications.3. Range limited to size 64mm (2" 5/8)

Ball Valve – RBV-R Range



RBV-R Range – Use with Flammable Refrigerants

TUV Certification – Category II according to PED Directive (2014/68/EU)



7	Ball Valves (Type: RBVXX-XXXR)	EN 12284-2003	Valve body and seat: C3771 (JIS H 3250); Pipe: TP(Y2) (GB/T 1527)	Size (ID): Ø25.58*1.5mm-Ø48.98*2.5mm PED Category II Fluid: Group 1 PS: 49 bar TS:160°C/-60°C
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- All the RBV-R models with Nominal Diameter (DN) > 25mm until the size RBV-17 (with a DN = 48,98mm) are covered by TUV certification for Cat.II according to PED Directive. **RBV-R can be used safely with flammable refrigerants.**
- The **RBV-R design pressure (49bar)** allows the use of these valves in all the R32 systems.
- The **max continuous operating temperature (+160° C)** is guaranteed by an innovative graphite sealing material on the stem.
- RBV-R are indicated for **installation on the discharge line of R32 systems** without liquid injection solution.




CBV Range – MAIN CHARACTERISTICS

1. Wide range with 16 different standard models
2. Ball valve sizes from 6mm (or 1/4") to 54mm (2" 1/8)
3. CBV ball valves have a special design and materials to operate in systems with Carbon Dioxide.
4. CBV ball valves are selectable only without access fitting
5. All the models have a full port characteristic to maximize the system performances generating the smallest possible internal pressure drop
6. The 60 bar Design Pressure allows a safety application in R744 Sub-Critical systems
7. Compatibility between O-ring material and R744 + PAG oil
8. Presence of the relief hole in the sphere necessary to release the refrigerant stored inside the ball during standstills (Extraction made by pump down)
9. Maximum allowed temperature: +150° C


Ball Valve – CBV Range

CBV Range – Portfolio Description

 Models Without ACCESS FITTING	Connection Size [INCH]	Connection Size [mm]	Kv (m3/h)	PED category Fluid Group 1	PED category Fluid Group 2	MOP (bar)
CBV02-002	-	6	1,9	N.A.	Art. 4.3	60
CBV02-001	1/4	-	1,9	N.A.	Art. 4.3	60
CBV03-001	3/8	-	5,5	N.A.	Art. 4.3	60
CBV03-002	-	10	5,5	N.A.	Art. 4.3	60
CBV04-002	-	12	7,3	N.A.	Art. 4.3	60
CBV04-001	1/2	-	7,3	N.A.	Art. 4.3	60
CBV05-001	5/8	16	13,8	N.A.	Art. 4.3	60
CBV06-002	-	18	20,6	N.A.	Art. 4.3	60
CBV06-001	3/4	-	20,6	N.A.	Art. 4.3	60
CBV07-001	7/8	22	29,0	N.A.	Art. 4.3	60

Ball Valve – CBV Range

CBV Range – Portfolio Description

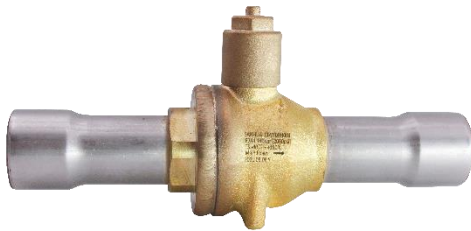
 Models Without ACCESS FITTING	Connection Size [INCH]	Connection Size [mm]	Kv (m3/h)	PED category Fluid Group 1	PED category Fluid Group 2	MOP (bar)
CBV09-002	-	28	54,3	N.A.	Art. 4.3	60
CBV09-001	1 1/8	-	54,3	N.A.	Art. 4.3	60
CBV11-001	1 3/8	35	85,5	N.A.	Cat.I	60
CBV13-002	1 5/8	-	133,7	N.A.	Cat.I	60
CBV13-003	-	42	133,7	N.A.	Cat.I	60
CBV17-001	2 1/8	54	225,0	N.A.	Cat.I	60

Ball Valve – CBV Technical Details



CBV Range - FEATURES

<i>ADVANTAGES</i>	<i>DISADVANTAGES</i>
<ol style="list-style-type: none">1. Bi-directional flow characteristics with a preferential direction for low internal leakage rate2. Hermetic design.3. Vent Hole for a bigger safety4. Designed for Sub-Critical R744 systems.5. High Design Pressure PS=60bar for all the models.6. Wide Range of operative temperatures from -40° C to +150° C7. Indicated for Refrigeration applications8. Full port design (minimal pressure drop)9. Valve seat of special Teflon to secure maximum tightness and a long lifetime.10. Durable, can be used to achieve perfect shutoff even after years of disuse.	<ol style="list-style-type: none">1. CBV ball valves are only manually operated.2. Ball valves cannot offer a fine refrigerant flow control that may be necessary in throttling applications.3. Range limited to size 54mm (2" 1/8)4. Not indicated for Trans-Critical systems5. Models with access fitting are not available



CBVT – ODF Bi-Metal connections version



CBVT – Stainless-Steel butt-welding connections version

CBVT Range – MAIN CHARACTERISTICS


1. Wide range with 25 different standard models
2. Ball valve sizes from 6mm (or 1/4") to 54mm (2" 1/8)
3. CBVT ball valves have a special design and materials to operate in systems with Carbon Dioxide.
4. CBVT ball valves are selectable only without access fitting
5. All the models have a full port characteristic to maximize the system performances generating the smallest possible internal pressure drop
6. The 140 bar Design Pressure allows a safety application in R744 Sub-Critical systems
7. Compatibility between O-ring material and R744 + PAG oil
8. Presence of the relief hole in the sphere necessary to release the refrigerant stored inside the ball during standstills (Extraction made by pump down)
9. Maximum allowed temperature: +150° C
10. CBVT series with ODF Bi-Metal connections (copper layer inside) for an easy brazing procedure in systems with copper K65 piping
11. CBVT series with Stainless-Steel butt-welding connections for an easy welding procedure in systems with Stainless-Steel piping

Ball Valve – CBVT Range



CBVT Range – Portfolio Description


CBVT – ODF Bi-Metal connections version

 Models Without ACCESS FITTING	Connection Size [INCH]	Connection Size [mm]	Kv (m3/h)	PED category Fluid Group 1	PED category Fluid Group 2	MOP (bar)
CBVT 02-002	-	6	1,9	N.A.	Art. 4.3	140
CBVT 02-001	1/4	-	1,9	N.A.	Art. 4.3	140
CBVT 03-001	3/8	-	5,5	N.A.	Art. 4.3	140
CBVT 03-002	-	10	5,5	N.A.	Art. 4.3	140
CBVT 04-002	-	12	7,3	N.A.	Art. 4.3	140
CBVT 04-001	1/2	-	7,3	N.A.	Art. 4.3	140
CBVT 05-002	-	15	13,8	N.A.	Art. 4.3	140
CBVT 05-001	5/8	16	13,8	N.A.	Art. 4.3	140
CBVT 06-002	-	18	20,6	N.A.	Art. 4.3	140
CBVT 06-001	3/4	-	20,6	N.A.	Art. 4.3	140

Ball Valve – CBVT Range

CBVT Range – Portfolio Description


CBVT – ODF Bi-Metal connections version

 Models Without ACCESS FITTING	Connection Size [INCH]	Connection Size [mm]	Kv (m3/h)	PED category Fluid Group 1	PED category Fluid Group 2	MOP (bar)
CBVT 07-001	7/8	22	29,0	N.A.	Art. 4.3	140
CBVT 09-002	-	28	54,3	N.A.	Art. 4.3	140
CBVT 09-001	1 1/8	-	54,3	N.A.	Art. 4.3	140
CBVT 11-001	1 3/8	35	85,5	N.A.	Cat.I	140
CBVT 13-001	1 5/8	-	133,7	N.A.	Cat.I	140
CBVT 13-002	-	42	133,7	N.A.	Cat.I	140
CBVT 17-001	2 1/8	54	225,0	N.A.	Cat.I	140

Ball Valve – CBVT Range

CBVT Range – Portfolio Description

CBVT – Stainless-Steel butt-welding connections version

 Models Without ACCESS FITTING	Connection Size [INCH]	Connection Size [mm]	Kv (m3/h)	PED category Fluid Group 1	PED category Fluid Group 2	MOP (bar)
CBVT 03H302	-	10	5,5	N.A.	Art. 4.3	140
CBVT 04H302	-	12	7,3	N.A.	Art. 4.3	140
CBVT 05H301	5/8	16	13,8	N.A.	Art. 4.3	140
CBVT 06H302	-	18	20,6	N.A.	Art. 4.3	140
CBVT 07H301	7/8	22	29,0	N.A.	Art. 4.3	140
CBVT 09H302	-	28	54,2	N.A.	Art. 4.3	140
CBVT 11H301	1 3/8	35	85,5	N.A.	Art. 4.3	140
CBVT 13H302	-	42	133,7	N.A.	Cat.I	140

Ball Valve – CBVT Technical Details

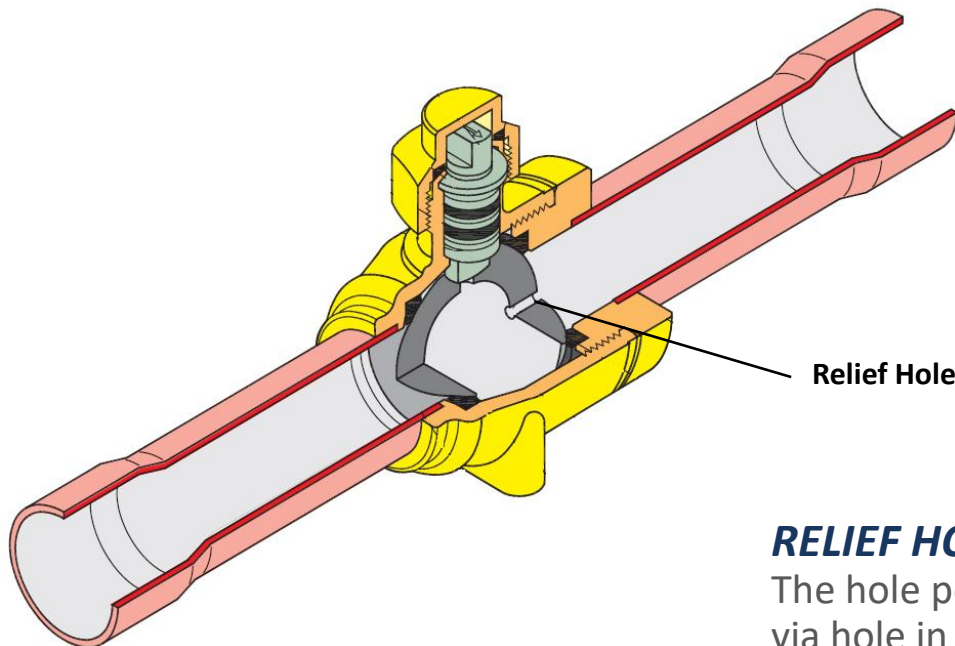


CBVT Range - FEATURES

ADVANTAGES	DISADVANTAGES
<ol style="list-style-type: none">1. Bi-directional flow characteristics with a preferential direction for low internal leakage rate2. Hermetic design.3. Vent Hole for a bigger safety4. Designed for Trans-Critical R744 systems.5. High Design Pressure PS=140bar for all the models.6. Wide Range of operative temperatures from -40° C to +150° C7. Indicated for Refrigeration applications8. Full port design (minimal pressure drop)9. Valve seat of special Teflon to secure maximum tightness and a long lifetime.10. Durable, can be used to achieve perfect shutoff even after years of disuse.11. Models with optimized connections for systems with K65 or stainless-steel piping	<ol style="list-style-type: none">1. CBVT ball valves are only manually operated.2. Ball valves cannot offer a fine refrigerant flow control that may be necessary in throttling applications.3. Range limited to size 54mm (2" 1/8)4. Models with access fitting are not available

BALL VALVES FOR APPLICATIONS WITH R744 MANDATORY CHARACTERISTICS

Relief hole in the sphere



RELIEF HOLE:

The hole permits the valve to release entrapped liquid via hole in the ball. During pump down phase it is so possible to extract all the refrigerant remained in the system.

The Ball Valves are only single direction



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