

HANDBOOK  
**VALVES**

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 **Castel**<sup>®</sup>  
Italian technology

# CHAPTER 5

## VALVES WITH BALL SHUTTER

### FOR REFRIGERATION PLANTS THAT USE HC REFRIGERANTS



#### APPLICATIONS

The valves with ball shutter illustrated in this chapter have been developed by Castel for all those refrigeration applications that use the following HC refrigeration fluids: R290, R600, and R600a, belonging to Group 1, defined in Article 13, Chapter 1, Point (a) of Directive 2014/68/EU, with reference to EC Regulation No. 1272/2008.

**CAUTION! The valves with ball shutter illustrated in this chapter cannot be used with mineral oils or alkylbenzenes.**

#### CONSTRUCTION

The specific design of Castel valves with ball shutter:

- ensures the internal pressure equilibrium when the tap is closed,

- permits the two-directional flow of the refrigerant
  - prevents any risk of ejection or explosion of the spindle.
- The electric welding of the body and the seal gaskets, assembled on the spindle, ensure perfect hermetic seal of the valve. The valves with ball shutter in series 6570N are full port without charge access.

The main parts of the valves with ball shutter are made with the following materials:

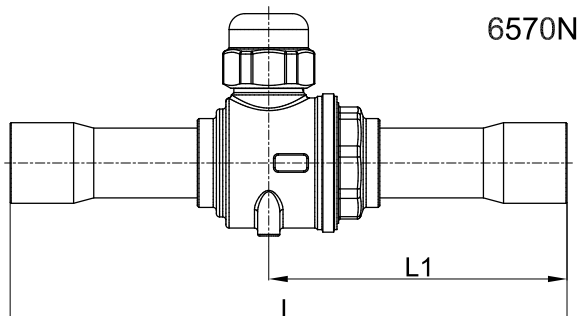
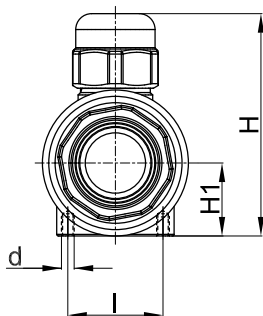
- Hot forged brass EN 12420 – CW 617N for the body
- Hot forged brass EN 12420 – CW 617N, chromium plated, for the ball
- Copper pipe EN 12735-1 – Cu--DHP for solder connections
- Steel, with proper surface protection, for the spindle.
- Hydrogenated nitrile butadiene rubber (HNBR) for outlet seal gaskets.
- P.T.F.E. for the ball seat gaskets
- Hot forged brass EN 12420 – CW 617N for the protective cap of the spindle

#### INSTALLATION

The valves with ball shutter can be installed in all sections of a refrigerating system, in compliance with the limits and capacities indicated in Table 31. Table 30 shows the following functional characteristics of a valve with ball shutter.

- PS
- TS
- Kv factor

Brazing of the valves with ball shutter with solder connections should be carried out with care, using a low melting point filler material (min. 5% Ag). It is important to avoid direct contact between the torch flame and the valve body, which could be damaged and compromise the proper functioning of the entire valve.



**TABLE 30: General characteristics of ball valves for HC refrigerants**

Catalogue Number	Connections		Ball Port Ø [mm]	Kv Factor [m³/h]	PS [bar]	TS [°C]		TA [°C]		Risk Category according to PED Recast
	ODS					min.	max.	min.	max.	
	Ø [in.]	Ø [mm]								
6570N/M6	–	6	10	0,8	45	-40	+150	-40	+50	Art. 4.3
6570N/2	1/4"	–								
6570N/3	3/8"	–		5						
6570N/M10	–	10								
6570N/M12	–	12								
6570N/4	1/2"	–	15	17						
6570N/5	5/8"	16								
6570N/M18	–	18								
6570N/6	3/4"	–								
6570N/7	7/8"	22								
6570N/M28	–	28	25	51						
6570N/9	1.1/8"	–								

**TABLE 31: Refrigerant flow capacity of ball valves for HC refrigerants [kW]**

Catalogue Number	Liquid line			Suction line			Hot Gas line		
	R290	R600	R600a	R290	R600	R600a	R290	R600	R600a
6570N/M6	16,3	19,1	17,0	2,4	1,0	1,3	10,2	5,2	6,0
6570N/2									
6570N/3	61	72	64	9,2	3,9	4,7	38	19	22
6570N/M10									
6570N/M12	102	120	106	15,3	6,5	7,9	64	32	37
6570N/4									
6570N/5	346	406	360	52	22	27	217	110	126
6570N/M18									
6570N/6									
6570N/7	591	693	615	88	37	46	370	187	216
6570N/M28	1039	1219	1081	156	66	81	651	329	379
6570N/9									

Standard rating conditions according to AHRI Standard 760-2007

Condensing temperature	110 °F	(43,3 °C)	Evaporator outlet temperature	50 °F	(9,9 °C)
Liquid temperature	100 °F	(37,8 °C)	Evaporator superheating	10 °R	(5,5 °K)
Subcooling	10 °R	(5,5 °K)	Suction line temperature	65 °F	(18,3 °C)
Evaporating temperature	40 °F	(4,4 °C)	Suction superheating	15 °R	(8,4 °K)
			Discharge temperature	160 °F	(71,1 °C)

**TABLE 32: Dimensions and weights of ball valves for HC refrigerants**

Catalogue Number	Dimensions [mm]						Weight [g]
	H	H <sub>1</sub>	L	L <sub>1</sub>	l	d	
6570N/M6	48	15	121	65	18	M4	198
6570N/2							
6570N/3							
6570N/M10							
6570N/M12							
6570N/4	55	19	139	73	25,5		311
6570N/5							
6570N/M18							
6570N/6	70	23	175	94	30		570
6570N/7							
6570N/M28							
6570N/9	79	27	204	109	30	708	

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