Bulletin G510a
May, 2000

HANSEN TECHNOLOGIES CORPORATION

1¼" RT125H Globe Hand Expansion Valve

Specifications, Applications, Service Instructions & Parts

HAND EXPANSION VALVES (REGULATORS)

Threaded ³/₈" through 1¼"
(10 mm - 32 mm)
Welding ½" through 4"
(13 mm - 100 mm)
Globe or Angle for refrigerants

INTRODUCTION

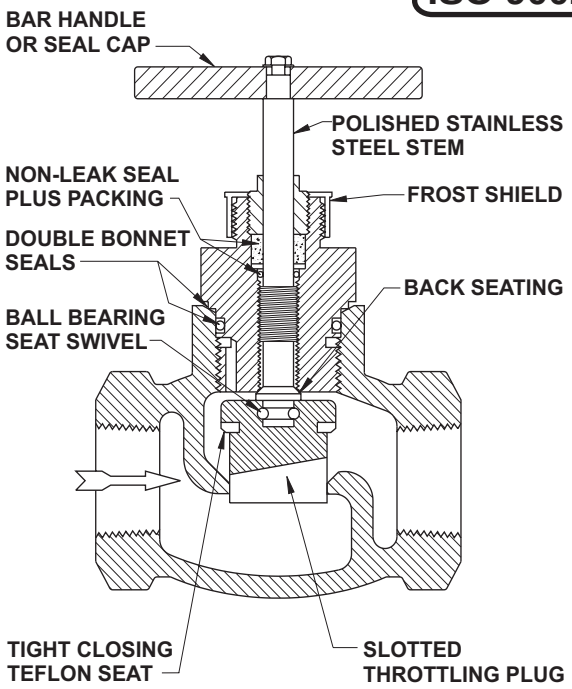
These precision-calibrated, adjustable, slotted plug flow regulating valves (hand expansion valves) are ideal for metering or flashing expansion of liquid refrigerants. Their slotted plugs are more tolerant of dirt particles than are common metal-seated tapered-plug expansion valves, and are less susceptible to wire drawing. Valves 2½" (65 mm) and larger have a characterized plug. All valves have near linear flow characteristics per turn open and are tight closing with Teflon seats. These valves have stainless steel stems with back seating for seal replacement. The patented non-leak seal plus packing design permits low torque operation for valve adjustments since the packing nut requires little tightening. Bar handle or yellow seal caps distinguish them from shut-off valves. Suitable for ammonia or halocarbons.

APPLICATIONS

Liquid feed or circulating liquid overfeed evaporators
High pressure or intermediate pressure liquid feed to accumulators, intercoolers, or recirculators
Defrost condensate relief
Hot gas feed to evaporators
Equalize evaporator to suction pressure after defrost

KEY FEATURES

ISO 9002



CAPACITIES, TONS (kW)

REFRIGERANT & APPLICATION		NOMINAL SIZE inch (mm)																			
		³/₈ (10)		¹/₂ (13)		³/₄ (20)		1 (25)		1¹/₄ (32)		1¹/₂ (40)		2 (50)		2¹/₂ (65)		3 (80)		4 (100)	
		min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max
R717	Circulating 4:1	1.5 (6.3)	12 (42)	1.5 (6.3)	17 (63)	1.5 (6.3)	37 (130)	1.5 (6.3)	62 (220)	1.5 (6.3)	110 (390)	9.2 (31)	150 (530)	18 (63)	290 (1000)	66 (230)	410 (1400)	99 (350)	630 (2200)	150 (540)	1100 (3900)
	Liquid Makeup	7.4 (30)	36 (130)	7.4 (30)	60 (210)	7.4 (30)	110 (390)	7.4 (30)	180 (630)	7.4 (30)	330 (1200)	45 (150)	450 (1600)	89 (300)	860 (3000)	320 (1100)	1200 (4200)	480 (1700)	1900 (6700)	740 (2600)	3300 (12000)
R22	Circulating 2:1	0.7 (2.8)	5.6 (19)	0.7 (2.8)	7.7 (28)	0.7 (2.8)	18 (63)	0.7 (2.8)	29 (100)	0.7 (2.8)	52 (180)	4.2 (14)	72 (250)	8.4 (28)	140 (490)	30 (100)	200 (700)	46 (150)	300 (1100)	70 (240)	520 (1800)
	Liquid Makeup	1.6 (6.7)	7.4 (26)	1.6 (6.7)	12 (42)	1.6 (6.7)	23 (81)	1.6 (6.7)	38 (130)	1.6 (6.7)	68 (240)	9.8 (33)	93 (330)	20 (67)	180 (630)	71 (250)	250 (880)	110 (370)	390 (1400)	160 (580)	670 (2400)

Circulating capacities assume a 10 psi drop. **See page 2 for more detailed information on conditions and sizing.**

MATERIAL SPECIFICATIONS

Body, Threaded, 3/8"– 1¼": ductile iron ASTM A536
Body, Welding, ½" and ¾": ASTM A108
(connections are ASTM A513)
1"– 4": cast steel, ASTM A352 grade LCB
Bonnet, 3/8" – 1¼": zinc chromate plated steel
1½" – 4": ductile iron ASTM A536
Stem: stainless steel
Seal Cap, 3/8" – 1¼": glass-filled polymer, safety vented (yellow)
1½" – 4": zinc plated steel, painted yellow
Throttling Plug, 3/8" – 1¼": stainless steel
1½" – 4": zinc chromate plated steel
Seat Disc: Teflon
Ball Bearings: stainless steel
Stem Packing: graphite composite plus neoprene o-ring
Packing Nut: plated steel
Bonnet Seal, 3/8" – 1¼": neoprene o-ring, steel knife edge
1½" – 4": flat composite gasket
Safe Working Pressure: 400 psig (27 bar)
Temperature Range: –60°F to +240°F (–50°C to +115°C)

CONNECTION DIMENSIONS

Threaded 3/8" through 1 1/4": US NPT female tapered pipe thread
Socket Welding ½" through 2": US steel pipe
Butt Welding 2" through 4": schedule 40 US steel pipe

VALVE SIZING AND SETTING

To properly size and set hand expansion valves, determine the refrigerant, estimated pressure drop through the valve (not the system), evaporator load in tons (kW) and the circulating rate, or desired capacity of liquid makeup in tons (kW). In general, the valve size selection should be based on the valve adjusted to ½ open. Select liquid line sizes so that velocity is limited to 7 ft/s (2.1 m/s) for ammonia, and 5 ft/s (1.5 m/s) for R22, to reduce the potential for liquid velocity shock (water hammer).

For Circulating Liquid Overfeed: **The steps below determine the required flow coefficient, Cv (Kv), and required turns open. For sizing assistance, contact Hansen. The circulating capacities assume 0°F (–20°C) evaporator temperature liquid. For other evaporator temperatures these values will change only slightly due to density and latent heat variations.**

1. **Evaporator load, tons(kW) times the circulating rate =** equivalent load, tons (kW) **=_____.**
2. Tons/Cv (kW/Kv) **from table below =_____.**
3. Equivalent load, tons (kW) **divided by** tons/Cv (kW/Kv) **=** required flow coefficient Cv (Kv) **= _____.**
4. **Refer to Cv (Kv) Per Turns Open table.** Valve size and turns open **= _____.**

TONS/Cv (kW/Kv) CIRCULATING LIQUID OVERFEED

REFRIG	TEMP	PRESSURE DROP (ΔP)*				
		5 psi (0.3 bar)	10 psi (0.7 bar)	15 psi (1.0 bar)	20 psi (1.4 bar)	30 psi (2.0 bar)
R717	0°F (-20°C)	43 (165)	61 (250)	75 (301)	86 (350)	106 (426)
R22	0°F (-20°C)	10 (39)	14 (55)	18 (70)	20 (80)	25 (100)

***Pressure drop across the hand expansion valve.**

For Liquid Makeup: **Maximum capacities are possible with appropriate line sizing. The valve should be sized for intermittent, float-switch-operated flow. For example, a valve open 50% of the time feeding a 100 ton (350 kW) accumulator should be sized for 200 tons (700 kW). When the required valve size is greater than 1½", two expansion valves and solenoid valves staged in parallel should be used to help reduce the potential of liquid velocity shock (water hammer).**

To determine required flow coefficient, Cv (Kv), estimate the approximate capacity in tons (kW) of liquid makeup desired and divide by 74.2 tons per Cv (302 kW per Kv) for ammonia, 16.4 tons per Cv (66.7 kW per Kv) for R22. These ratings are based on 86°F (30°C) saturated liquid and 0°F (–20°C) evaporating temperature. Refer to the table Cv (Kv) Per Turns Open for the appropriate valve size and turns open. For other evaporator temperatures, the values will change only slightly.

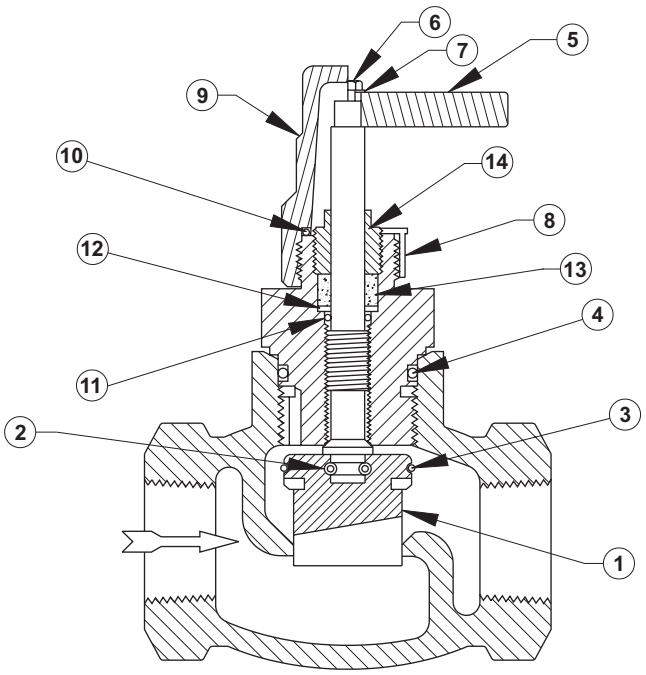
Cv (Kv) PER TURNS OPEN

NOMINAL SIZE inch (mm)		TURNS OPEN							
		1	2	3	4	5	6	7	7.5
THREADED	3/8 (10)	0.1 (0.1)	0.2 (0.2)	0.4 (0.3)	0.6 (0.5)	0.8 (0.7)	—	—	—
	1/2 (13)	0.1 (0.1)	0.3 (0.3)	0.6 (0.5)	0.9 (0.8)	1.1 (1.0)	—	—	—
	3/4 (20)	0.1 (0.1)	0.8 (0.7)	1.5 (1.3)	2.2 (1.9)	2.9 (2.5)	—	—	—
	1 (25)	0.1 (0.1)	0.3 (0.3)	0.6 (0.5)	1.2 (1.0)	2.2 (1.9)	3.3 (2.9)	4.2 (3.6)	4.5 (3.9)
	1 1/4 (32)	0.1 (0.1)	0.3 (0.3)	0.9 (0.8)	2.0 (1.7)	4.0 (3.5)	5.8 (5.0)	7.0 (6.1)	7.4 (6.4)
WELDING	1/2 (13)	0.1 (0.1)	0.2 (0.2)	0.3 (0.3)	0.4 (0.3)	0.6 (0.5)	0.8 (0.7)	0.9 (0.8)	1.1 (1.0)
	3/4 (20)	0.1 (0.1)	0.2 (0.2)	0.5 (0.4)	0.9 (0.8)	1.4 (1.2)	2.0 (1.7)	2.6 (2.2)	2.9 (2.5)
	1 (25)	0.1 (0.1)	0.3 (0.3)	0.6 (0.5)	1.2 (1.0)	2.2 (1.9)	3.3 (2.9)	4.2 (3.6)	4.5 (3.9)
	1 1/4 (32)	0.1 (0.1)	0.3 (0.3)	0.9 (0.8)	2.0 (1.7)	4.0 (3.5)	5.8 (5.0)	7.0 (6.1)	7.4 (6.4)
	1 1/2 (40)	0.6 (0.5)	1.5 (1.3)	4.5 (3.9)	7.0 (6.1)	10 (8.7)	14 (12)	15 (13)	—
	2 (50)	1.2 (1.0)	4.0 (3.5)	7.5 (6.5)	11 (9.5)	15 (13)	18 (16)	22 (19)	—
	2 1/2 (65)	4.3 (3.7)	8.7 (7.5)	15 (13)	22 (19)	28 (24)	35 (30)	43 (37)	—
	3 (80)	6.5 (5.6)	13 (11)	23 (20)	33 (29)	42 (36)	52 (45)	65 (56)	—
	4 (100)	10 (8.7)	20 (17)	35 (30)	50 (43)	65 (56)	80 (69)	100 (87)	—

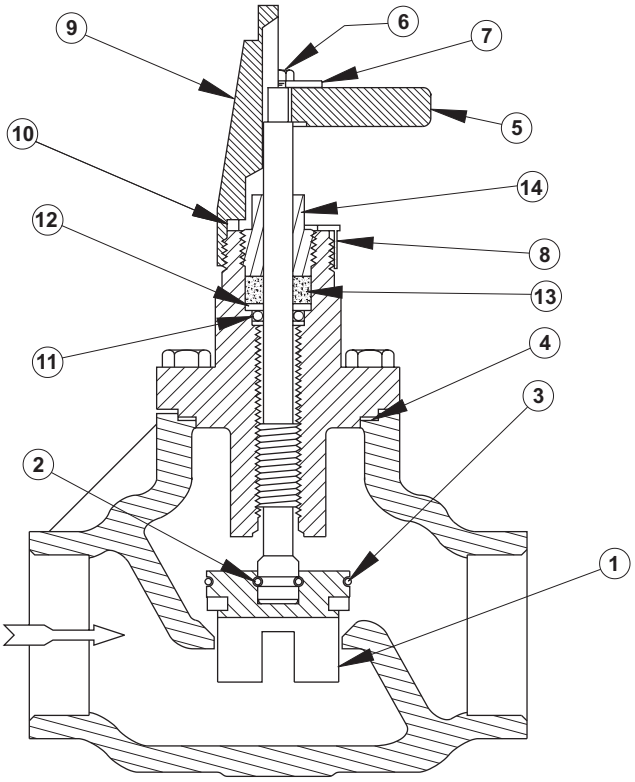
INSTALLATION

Valves should be installed with the stem horizontal or upright. For liquid makeup, valves should be located within 2 ft (0.6 m) of the upstream solenoid valve. The available pressure drop should occur across the hand expansion valve, not through the solenoid valve. Proper pipe sizing is essential for optimal control.

3/8" to 1¼"
(10 mm to 32 mm)



1½" to 4"
(40 mm to 100 mm)



THREADED

DESCRIPTION	NOMINAL SIZE inch (mm)				
	3/8 (10)	1/2 (13)	3/4 (20)	1 (25)	1 1/4 (32)
Throttling Plug Kit	50-1060	50-1061	50-1062	50-1015	50-1016
Bar Handle Kit	50-1012	50-1012	50-1012	50-1012	50-1012
Seal Cap Kit	50-1049	50-1049	50-1049	50-1049	50-1049
Gasket Kit	50-1040	50-1040	50-1040	50-1040	50-1040

SOCKET WELD

DESC.	NOMINAL SIZE inch (mm)					
	1/2 (13)	3/4 (20)	1 (25)	1 1/4 (32)	1 1/2 (40)	2 (50)
Throttling Plug Kit	50-1053	50-1054	50-1015	50-1016	50-1046	50-1047
Bar Handle Kit	50-1012	50-1012	50-1012	50-1012	50-1039	50-1039
Seal Cap Kit	50-1049	50-1049	50-1049	50-1049	50-1048	50-1048
Gasket Kit	50-1040	50-1040	50-1040	50-1040	50-1023	50-1023

BUTT WELD

DESCRIPTION	NOMINAL SIZE inch (mm)			
	2 (50)	2 1/2 (65)	3 (80)	4 (100)
Throttling Plug Kit	50-1047	50-1059	50-1058	50-1063
Bar Handle Kit	50-1039	50-1051	50-1051	50-1051
Seal Cap Kit	50-1048	50-1050	50-1050	50-1050
Gasket Kit	50-1023	50-1043	50-1043	50-1065

PARTS LIST

ITEM	DESCRIPTION
	Throttling Plug Kit:
1	Throttling Plug
2	Ball Bearings
3	Ball Retainer
4a	Bonnet O-Ring
4b	Bonnet Gasket
	Bar Handle Kit:
5	Bar Handle
6	Screw
7	Washer
8	Bonnet Thread Cap
	Seal Cap Kit:
9	Seal Cap (Yellow)
10a	Seal Cap O-Ring
10b	Seal Cap Gasket
	Gasket Kit:
4a	Bonnet O-Ring
4b	Bonnet Gasket
10a	Seal Cap O-Ring
10b	Seal Cap Gasket
11	Stem O-Ring
12	Stem Washer
13	Graphite Packing
14	Packing Nut

SERVICE AND MAINTENANCE

Hansen hand expansion valves require minimum service or maintenance. The combination of polished stainless steel stems and reliable o-ring stem seals plus packing almost entirely eliminates stem leakage.

VALVE SEAT

To inspect or replace the valve throttling plug, isolate the valve from the system and safely pump out all refrigerant to zero pressure. With the stem open several turns, carefully remove the bonnet assembly. If the conical seat surface in the body is marred, remove the marks with emery paper. If the valve throttling plug is damaged, replace the entire throttling plug by first removing the ball retainer ring and ball bearings. Install a new throttling plug assembly including new bearings and retainer ring. Install new stem packing, stem o-ring, and bonnet o-ring/gasket, if necessary. Reassemble the bonnet into the valve body with the stem open several turns. The 3/8" through 1¼" valve bonnets are threaded and require a minimum torque of 75 ft-lbs (100 Nm). The 1½" through 4" valve bonnets are bolted. Bonnet bolts for 1½" and 2" require 40 ft-lbs (55 Nm) of torque, 2½" and 3" require 60 ft-lbs (80 Nm), and 4" require 180 ft-lbs (245 Nm). Test for leaks and reset the valve to the correct number of turns open before returning it to service. Refer also to the current edition of Hansen shut-off valve bulletins:

G109 - Threaded Shut-off Valves
G209 - Socket Weld Shut-off Valves
G359 - Butt Weld Shut-off Valves.

CAUTION

Hansen valves are for refrigeration systems only. These instructions and related safety precautions must be read completely and understood before selecting, using, or servicing these valves. Only knowledgeable, trained refrigeration technicians should install, operate, or service these valves. Stated temperature and pressure limits should not be exceeded. Valves should not be opened or removed from the system unless the system has been evacuated to zero pressure. See also Safety Precautions in the current List Price Bulletin and the Safety Precautions Sheet supplied with the product. Escaping refrigerant can cause injury, especially to the eyes and lungs.

WARRANTY

Hansen valves are guaranteed against defective materials or workmanship for one year F.O.B. our plant. No consequential damages or field labor is included.

TYPICAL SPECIFICATIONS

"Refrigerant hand expansion (flow regulating) valves shall have slotted or characterized throttling plugs, tight-closing Teflon seats, stainless steel stems, back-seating design for packing replacement, exterior bonnet threads for installation of stem seal caps on any valve, and be suitable for a safe working pressure of 400 psig (27 bar), as manufactured by Hansen Technologies Corporation or approved equal."

OTHER PRODUCTS

For liquid make up applications requiring a feed rate that more closely matches the system load and minimizes fluctuations in vessel pressure, use a Hansen Level Pulse Control System. See bulletin P479.

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ORDERING INFORMATION

NOMINAL SIZE inch (mm)	DESCRIPTION	CAT. NO.
3/8 (10)	Globe, Threaded, Bar Handle	RT038H
	Globe, Threaded, Seal Cap	RT038C
	Angle, Threaded, Bar Handle	VT038H
	Angle, Threaded, Seal Cap	VT038C
1/2 (13)	Globe, Threaded, Bar Handle	RT051H
	Globe, Threaded Seal Cap	RT051C
	Globe, Socket Weld, Bar Handle	RS051H
	Globe, Socket Weld, Seal Cap	RS051C
	Angle, Threaded, Bar Handle	VT051H
	Angle, Threaded, Seal Cap	VT051C
	Angle, Socket Weld, Bar Handle	VS051H
	Angle, Socket Weld, Seat Cap	VS051C
3/4 (20)	Globe, Threaded, Bar Handle	RT076H
	Globe, Threaded, Seal Cap	RT076C
	Globe, Socket Weld, Bar Handle	RS076H
	Globe, Socket Weld, Seal Cap	RS076C
	Angle, Threaded, Bar Handle	VT076H
	Angle, Threaded, Seal Cap	VT076C
	Angle, Socket Weld, Bar Handle	VS076H
	Angle, Socket Weld, Seal Cap	VS076C
1 (50)	Globe, Threaded, Bar Handle	RT100H
	Globe, Threaded, Seal Cap	RT100C
	Globe, Socket Weld, Bar Handle	RS100H
	Globe, Socket Weld, Seal Cap	RS100C
	Angle, Threaded, Bar Handle	VT100H
	Angle, Threaded, Seal Cap	VT100C
	Angle, Socket Weld, Bar Handle	VS100H
	Angle, Socket Weld, Seal Cap	VS100C
1 1/4 (32)	Globe, Threaded, Bar Handle	RT125H
	Globe, Threaded, Seal Cap	RT125C
	Globe, Socket Weld, Bar Handle	RS125H
	Globe, Socket Weld, Seal Cap	RS125C
	Angle, Threaded, Bar Handle	VT125H
	Angle, Threaded, Seal Cap	VT125C
	Angle, Socket Weld, Bar Handle	VS125H
	Angle, Socket Weld, Seal Cap	VS125C
1 1/2 (40)	Globe, Socket Weld, Bar Handle	RS150H
	Globe, Socket Weld, Seal Cap	RS150C
	Angle, Socket Weld, Bar Handle	VS150H
	Angle, Socket Weld, Seal Cap	VS150C
2 (50)	Globe, Socket Weld, Bar Handle	RS200H
	Globe, Socket Weld, Seal Cap	RS200C
	Globe, Butt Weld, Bar Handle	RW201H
	Globe, Butt Weld, Seal Cap	RW201C
	Angle, Socket Weld, Bar Handle	VS200H
	Angle, Socket Weld, Seal Cap	VS200C
	Angle, Butt Weld, Bar Handle	VW201H
	Angle, Butt Weld, Seal Cap	VW201C
2 1/2 (65)	Globe, Butt Weld, Bar Handle	RW251H
	Globe, Butt Weld, Seal Cap	RW251C
	Angle, Butt Weld, Bar Handle	VW251H
	Angle, Butt Weld, Seal Cap	VW251C
3 (80)	Globe, Butt Weld, Bar Handle	RW301H
	Globe, Butt Weld, Seal Cap	RW301C
	Angle, Butt Weld, Bar Handle	VW301H
	Angle, Butt Weld, Seal Cap	VW301C
4 (100)	Globe, Butt Weld, Bar Handle	RW402H
	Globe, Butt Weld, Seal Cap	RW402C
	Angle, Butt Weld, Bar Handle	VW402H
	Angle, Butt Weld, Seal Cap	VW402C

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