



HCK5D

2-Step Gas-Powered Suction Stop Valve

## INTRODUCTION

These heavy-duty, flanged, gas-powered, 2-step suction stop valves are designed to control the flow of refrigerant in large industrial and commercial refrigeration systems. They remain normally open via a spring and require no pressure drop to operate. A single pilot solenoid valve is required to control a higher pressure refrigerant gas which closes these valves during defrosting. The HCK5D valve has an internal, controlled bleed-down (equalize) feature which will not allow the main seat to open until the pressure across the valve is at a lower, safer pressure differential. This eliminates the need for a separate bleed-down solenoid valve, greatly simplifying piping and reducing installed costs. If a loss of power occurs during defrost, evaporator pressure is utilized to keep the main valve seat closed until bleed-down is complete.

## APPLICATIONS

The HCK5D valve is ideally suited for positive closure of suction, liquid overfeed, and flooded evaporator gas return lines during defrost in low temperature applications. These valves can be installed in horizontal or vertical lines and are best installed on their sides for improved conveyance of liquid and oil. Because they are gas-powered to close, valves operate reliably even under viscous oil conditions. They are suitable for Ammonia, Halocarbons, CO<sub>2</sub> and other Hansen approved refrigerants and gases.

## ADVANTAGES

Unique self-equalizing piston design eliminates the need and cost for a separate equalizing solenoid valve and piping and associated wiring and controls. A single high pressure source is the only pilot piping required. Main piston/seat opens based on pressure difference between evaporator and suction pressure. Bleed rate is adjustable via screw-in orifice discs. The ductile iron body is much stronger and tougher than grey iron or "semi-steel" iron. Protective pilot line disc strainers are included. Manual opening stems are standard for positive opening during servicing or trouble shooting systems.

## Specifications, Applications, Service Instructions & Parts

**HCK5D  
GAS-POWERED, 2-STEP  
SUCTION STOP VALVE  
1-1/2" THRU 4" PORT  
(40 mm THRU 100 mm)**

**Flanged  
1-1/2" thru 4"  
SW, WN, ODS  
for refrigerants**

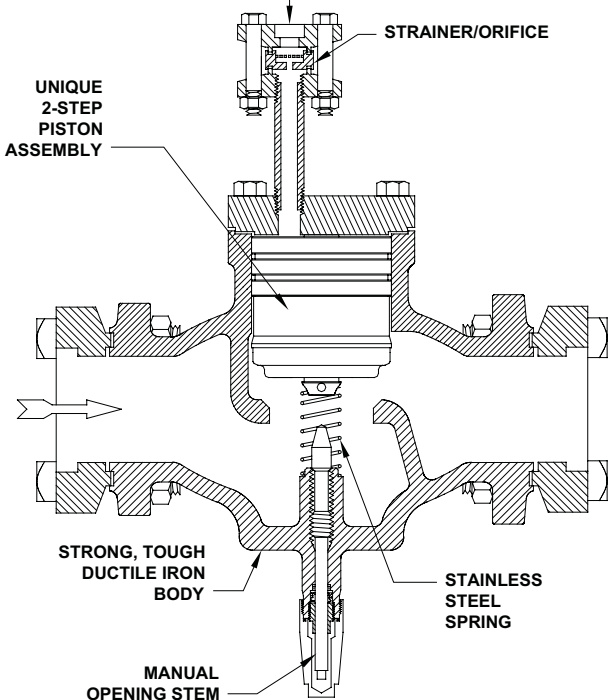
**CRN**  
Canadian Registration

## KEY FEATURES

ACTUATED BY HIGH  
PRESSURE GAS

UNIQUE  
2-STEP  
PISTON  
ASSEMBLY

STRAINER/ORIFICE



## ADDITIONAL FEATURES

Internal, self-equalizing piston assembly

Requires only one pilot solenoid valve for operation  
Remains closed until pressure is equalized, during loss of power

Adjustable bleed rate via orifice discs

No pressure drop required to open

Durable metal-to-metal seating

Tough ductile iron piston and body

Lower cost of installation

Flange-to-flange drop-in for standard Hansen HCK2  
Gas powered suction stop valve

## MATERIAL SPECIFICATIONS

Body: Ductile iron, ASTM A536

Top Cover: Steel, ASTM A36

Piston Seat: Ductile iron, ASTM A536

Spring: Stainless steel

Gaskets: Non-asbestos, graphite composite

Stem: Plated steel

Stem Seal: O-ring plus graphite composite packing

Seal Cap: Steel, zinc chromate plated

Companion Flanges: Forged steel ASTM A105

Safe Working Pressure: 400 psig (27 bar), 600 psig (40 bar) for CO<sub>2</sub>

Operating Temperature: -60°F to +240°F (-50° to 115°C)

## OPERATION

These valves are normally held fully open by means of a spring. When a high pressure refrigerant gas is introduced to the valve through the pilot line inlet, the Upper Piston and Lower Piston are forced down, compressing the Opening Spring and seating the Lower Piston firmly on the valve body taper seat. While the HCK5D is designed to withstand the shock of quick closing, if the noise or system or piping shock is excessive, a lower controlled refrigerant gas pressure may be advisable.

For valve equalization, the high pressure gas source is interrupted and the upstream pressure raises the Upper Piston while continuing to firmly force the Lower Piston against the valve body taper seat. This allows the refrigerant on the inlet side of the valve to escape through the bleed holes in a controlled manner.

The valve will fully open when the downward force on the Lower Piston caused by the difference in pressure between the valve inlet and the outlet is reduced below the upward force due to the compression of the Opening Spring. This typically occurs in the range of 8-12 psi differential. It is advisable to allow ample time

for the valve to equalize to a differential pressure below this range so the valve can open. For most applications 4 minutes should be adequate. Observation in the field may yield a more accurate bleed down time as the valve action is very repeatable.

Because of the constant bleed around the Upper Piston when fully closed, these valves are recommended where closure is for short periods, such as during defrost, or where bleed to suction is not objectionable. When a constant bleed to suction is not desired, use Hansen HS9B gas powered solenoid valve having piston seal ring and dual pilot solenoid valves.

## INSTALLATION

Protect the interior of the valves from dirt and moisture during storage and installation. These valves may be installed upright or on their sides in either a vertical or horizontal line. Arrow on valve body should be in normal direction of refrigerant flow. System should be free of dirt, weld slag, and rust particles. These valves require only a single pilot solenoid valve to close. A 5/32" (4 mm) port Hansen HS6 pilot solenoid valve with strainer is recommended to control the high pressure gas source to a 2" or smaller HCK5D; a 1/2" (13 mm) port Hansen HS8A solenoid valve with strainer is recommended for 2 1/2" and larger valves. (If using a refrigerant liquid for the high pressure source, a Hansen HS9B with bypass gas-powered solenoid valve is recommended, instead of the HCK5D.) The field installed pilot solenoid valve must be connected upstream of any hot gas defrost solenoid valve and should be located as close as possible to the main valve. This will help maintain full high pressure gas to top of piston/seat and minimize the amount of high pressure gas to be relieved past the piston/seat upon termination of the high pressure source. An integral orifice inside the pilot line disc strainer helps to retard piston/seat closing velocity. Where two HCK5D valves are to be operated simultaneously, a pilot line disk strainer/orifice assembly should be installed in each pilot line.

## SUCTION VAPOR CAPACITIES - TONS (KW)

(1 Ton=12,000 Btu/hr=3.517 kW)

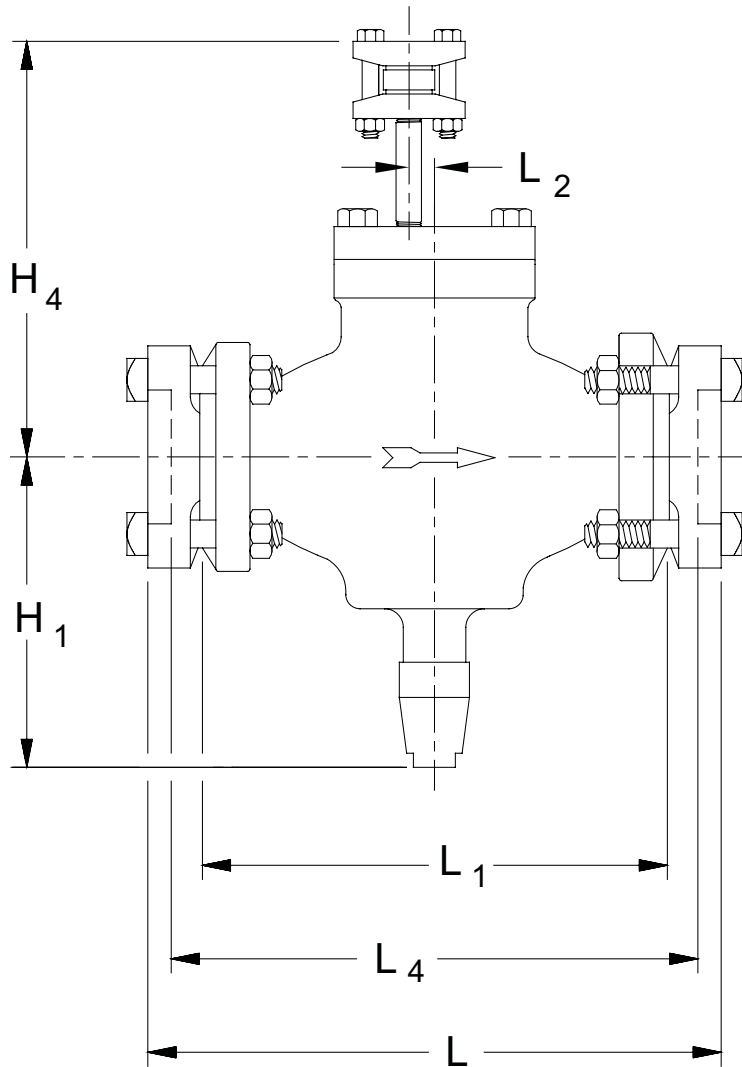
APPLICATION		PORT SIZE (mm)							
		1-1/4" (32)	1-1/2" (40)	2" (50)	2-1/2" (65)	3" (80)	4" (100)	5" (125)	6" (150)
R717	+20°F (-6.7°C)	24 (84)	58 (204)	68 (239)	110 (387)	156 (549)	341 (1199)	432 (1519)	556 (1955)
	0°F (-17.8°C)	20 (70)	47 (165)	55 (193)	90 (317)	127 (447)	278 (978)	353 (1242)	454 (1597)
	-20°F (-28.9°C)	16 (56)	38 (134)	44 (155)	73 (257)	101 (355)	221 (777)	281 (988)	361 (1270)
	-40°F (-40.0°C)	12 (42)	29 (102)	34 (120)	55 (193)	78 (274)	171 (601)	216 (760)	278 (978)
R22	+20°F (-6.7°C)	10 (35)	24 (84)	28 (98)	46 (162)	65 (229)	143 (503)	181 (637)	233 (819)
	0°F (-17.8°C)	9 (32)	21 (74)	24 (84)	39 (137)	55 (193)	121 (426)	154 (542)	197 (693)
	-20°F (-28.9°C)	7 (25)	17 (60)	20 (70)	32 (113)	45 (158)	99 (348)	126 (443)	162 (570)
	-40°F (-40.0°C)	5.9 (20.7)	14 (49)	16 (56)	26 (91)	36 (127)	80 (281)	101 (355)	130 (457)
Cv (Kv)		19.8 (17)	47 (40)	55 (47)	89 (76)	126 (108)	276 (236)	350 (300)	450 (385)

Above capacities are based on liquid temperature equal to evaporator temperature and 1 psi (0.07 bar) drop through the valve. For 0.5 psi (0.035 bar) drop, multiply above values by 0.71. For liquid overfeed systems, nominal 2:1 to 5:1 ratio, add 20% to the evaporator load and select a valve based on the increased load. For gravity flooded application, valve should be same port size as properly sized liquid leg or gas line. Consult flooded evaporator manufacturer for proper line sizing.



## INSTALLATION DIMENSIONS

1-1/2" thru 4"  
(40 mm thru 100 mm)



PORT SIZE (mm)	DIMENSIONS (mm)							
	H <sub>1</sub>	H <sub>4</sub>	L		L <sub>1</sub>	L <sub>2</sub>	L <sub>4</sub>	W
			SW	WN, ODS				
1-1/2", 2" (40), (50)	7.12" (107)	9.55" (243)	12.39" (315)	13.39" (340)	9.88" (251)	0.86" (22)	10.89" (277)	4.50" (114)
2-1/2" (65)	8.06" (205)	10.23" (260)	13.01" (330)	14.03" (356)	9.88" (251)	1.15" (29)	11.01" (280)	5.62" (143)
3" (80)	8.38" (213)	10.57" (268)	15.38" (391)	16.40" (417)	12.25" (311)	1.15" (29)	13.38" (340)	6.50" (165)
4" (100)	9.88" (251)	11.45" (291)	17.01" (432)	20.51" (521)	14.12" (359)	1.50" (38)	15.01" (381)	8.06" (205)

\*Allow additional 2.75" (70 mm) for seal cap removal. W= maximum width of valve.

## TROUBLESHOOTING

### FAILURE TO CLOSE

- Pilot solenoid valve is not opening due to an electrical problem.
- Disc strainer or high pressure pilot line may be plugged.
- Pilot pressure source may not be high enough. It should be at least 20 psi (1.4 bar) above pressure through the main valve.
- Manual opening stem is turned in.
- Dirt may have lodged between the upper piston and the valve body piston bore.

### FAILURE TO OPEN

- Pilot solenoid is jammed open with dirt.
- Pilot solenoid manual opening stem is turned in.
- Valve differential pressure is not being allowed to fall below 8 psi during bleed-down.
- Pilot pressure and pressure through main valve are not equalizing.
- Check for reverse installation of main valve.
- Dirt may be lodged between upper piston and valve body piston bore.
- The opening spring may be damaged or broken.

## SERVICE AND MAINTENANCE

### MANUAL OPERATION

If it is necessary to manually hold open the HCK5D valve:

- Cautiously remove the seal cap.
- Turn the manual opening stem inward (clockwise) as far as possible.
- The entire piston should be mechanically held open and the valve will not close until the manual opening stem is turned out (counterclockwise).
- Do not operate the HCK5D automatically when the manual opening stem is turned in or else stem may break after repeated cycles.

### LOSS OF POWER

The HCK5D, when used with a normally closed solenoid such as the recommended HS6 or HS8A, will equalize before opening in the event of loss of power to the pilot solenoid coil.

## DISASSEMBLY

If it is necessary to remove or disassemble valve for servicing, be sure the high pressure pilot line and main valve are completely isolated from the refrigeration system and all refrigerant is removed (pumped out to zero pressure). Be sure to follow refrigeration system safe procedures. Disconnect pilot line, clean or replace disc strainer/orifice assembly as necessary.

To inspect valve interior, after removing pressure, slowly loosen the cover bolts equally and break gasket seal, being careful to avoid any refrigerant which may still remain. Remove cover bolts and cover. Use tapped hole in the top of upper piston to remove. Use the same procedure to remove the lower piston. In most cases, the cover bolts can be used. A 5/8"-11 bolt is required to remove the 2" lower piston. Clean and inspect the 4 orifice holes. Verify that the path is clear in each. Clean and inspect the following surfaces for wear and damage:

- Taper seat in valve body
- Contact surfaces of lower piston
- Contact surfaces of upper piston

Slight marks and burrs can often be removed with emery paper by hand or power lapping. Damaged parts should be replaced. After cleaning and inspection, lightly lubricate the interior of the upper piston. Carefully slide the lower piston inside the upper piston. The upper piston should move smoothly on the lower piston and should make good contact with the ductile iron seal surface. Lightly lubricate main valve interior bore with refrigerant oil and install spring and piston assembly. Manually simulate valve operation by pushing on top of piston assembly. Action should be smooth and spring should readily push entire piston assembly back. Re-assemble cover, gasket and bolts, pilot line and disc strainer. Carefully check the entire valve for leaks prior to restoring the valve to service.

### BONNET BOLT TORQUE SPECIFICATIONS

PORT SIZE (mm)	BOLT TORQUE FT-LB (Nm)
1-1/2" - 2" (40, 50)	40 (55)
2-1/2" (65)	100 (140)
3" (80)	100 (140)
4" (100)	150 (210)

## HCK5D PARTS LIST

### 1-1/2" thru 4" (40 mm thru 100 mm)

ITEM	DESCRIPTION	QTY	PART NO
	<b>Piston/Seat Kit 1-1/2", 2"</b>		<b>75-1216</b>
	<b>Piston/Seat Kit 2-1/2"</b>		<b>75-1217</b>
	<b>Piston/Seat Kit 3"</b>		<b>75-1218</b>
	<b>Piston/Seat Kit 4"</b>		<b>75-1219</b>
	<i>Above kits consist of:</i>		
1a	Piston Assembly 1-1/2", 2"	1	75-2488
1b	Piston Assembly 2-1/2"	1	75-2486
1c	Piston Assembly 3"	1	75-2470
1d	Piston Assembly 4"	1	75-2499
2b	Opening Spring 1-1/2", 2"	1	75-2462
2c	Opening Spring 2-1/2"	1	75-0195
2d	Opening Spring 3"	1	75-2463
2e	Opening Spring 4"	1	75-2453
3a	Cover Gasket 1-1/2", 2"	1	75-2452
3b	Cover Gasket 2-1/2"	1	75-0128
3c	Cover Gasket 3"	1	75-2454
3d	Cover Gasket 4"	1	75-2453
20	Disc Strainer Flange Gasket	2	70-0065
	<b>Gasket Kit 1-1/2", 2"</b>		<b>75-1220</b>
	<b>Gasket Kit 2-1/2"</b>		<b>75-1008</b>
	<b>Gasket Kit 3"</b>		<b>75-1221</b>
	<b>Gasket Kit 4"</b>		<b>75-1222</b>
	<i>Above kits consist of:</i>		
3a	Cover Gasket 1-1/2", 2"	1	75-2452
3b	Cover Gasket 2-1/2"	1	75-0128
3c	Cover Gasket 3"	1	75-2453
3d	Cover Gasket 4"	1	75-2454
4a	Back-up Washer 1-1/2", 2", 2-1/2", 3"	1	75-0245
4b	Back-up Washer 4"	1	50-0351
5a	Stem O-Ring 1-1/2", 2", 2-1/2", 3"	1	50-0179
5b	Stem O-Ring 4"	1	50-0253
6a	Stem Washer 1-1/2", 2", 2-1/2", 3"	1	50-0046
6b	Stem Washer 4"	1	50-0247
7a	Packing 1-1/2", 2", 2-1/2", 3"	1	50-0045
7b	Packing 4"	1	50-0248
8a	Packing Nut 1-1/2", 2", 2-1/2", 3"	1	50-0013
8b	Packing Nut 4"	1	50-0251
9a	Seal Cap O-Ring 1-1/2", 2", 2-1/2", 3"	1	50-0432
9b	Seal Cap Gasket 4"	1	50-0270
20	Disc Strainer Flange Gasket	2	70-0065
15a	Flange Gasket 1-1/2", 2"	2	75-0138
15b	Flange Gasket 2-1/2"	2	75-0125
15c	Flange Gasket 3"	2	75-0137
15d	Flange Gasket 4"	2	75-0253

ITEM	DESCRIPTION	QTY	PART NO
10a	Stem 1-1/2", 2", 2-1/2"	1	75-0118
10b	Stem 3"	1	75-0135
10c	Stem 4"	1	75-0242
11a	Seal Cap 1-1/2", 2", 2-1/2", 3"	1	75-0139
11b	Seal Cap 4"	1	50-0260
12a	Cover 1-1/2", 2"	1	75-0107
12b	Cover 2-1/2", 3"	1	75-0121
12c	Cover 4"	1	75-0243
13a	Cover Bolts 1-1/2", 2"	4	75-0175
13b	Cover Bolts 2-1/2", 3"	4	65-0057
13c	Cover Bolts 4"	4	75-0291
14a	Body 1-1/2", 2"	1	75-2446
14b	Body 2-1/2"	1	75-2445
14c	Body 3"	1	75-2447
14d	Body 4"	1	75-2459
16	Flange (SW, WN, ODS)	2	FACTORY
17a	Flange Bolt 1-1/2", 2" (5/8"-11x3.25")	8	70-0135
17b	Flange Bolt 2-1/2", 3" (3/4"-10x3.75")	8	75-0202
17c	Flange Bolt 4" (7/8"-9x4")	8	75-0279
18a	Flange Nut 1-1/2", 2" (5/8"-11)	8	70-0136
18b	Flange Nut 2-1/2", 3" (3/4"-10)	8	75-0210
18c	Flange Nut 4" (7/8"-9)	8	75-0280
19	Disc Strainer/Orifice Assembly	1	78-0065
20	Disc Strainer Flange Gasket	2	70-0065
21	Nipple (1/2" x 3.5)	1	75-0677
22	Flange 1/2" SW	2	75-0238
23	Flange Bolt (7/16"-14x2.5")	2	70-0054
24	Flange Nut (7/16"-14)	2	70-0055



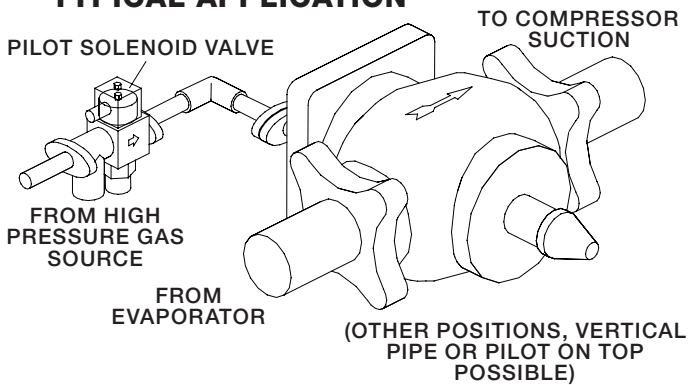
## CAUTION

Hansen valves are only for refrigeration systems. These instructions must be completely read and understood before selecting, using or servicing Hansen valves. Only knowledgeable, trained refrigeration mechanics should install, operate, or service these valves. Stated temperature and pressure limits should not be exceeded. Bonnets, solenoid tubes, etc. should not be removed from valves unless system has been evacuated to zero pressure. Must also see Safety Precautions in current List Price Bulletin and Safety Precautions Sheet supplied with product. Escaping refrigerant might cause personal injury, particularly to the eyes and lungs.

## WARRANTY

All Hansen products, except electronics, are guaranteed against defective materials or workmanship for one year F.O.B. factory. Electronics are guaranteed against defective materials or workmanship for 90 days F.O.B. factory. No consequential damages or field labor is included.

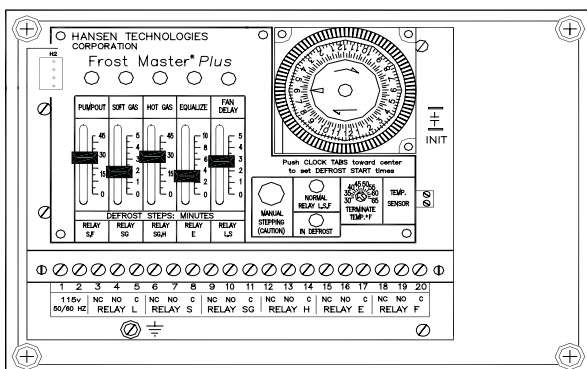
## TYPICAL APPLICATION



## DEFROST CONTROL

Control of the entire defrost process of large, low temperature evaporators, including those using HCK5D Gas-Powered Suction Stop Valves is ideally accomplished by the use of a Hansen Frost Master® or Frost Master® Plus Defrost Controller. In general, the Frost Master® is able to reduce the amount of cold liquid in the coil at the start of defrost, reduce the initial shock of hot gas entry (soft gas), efficiently terminate hot gas stage and to permit the evaporator to return to low pressure with minimum shock to the system and its piping and evaporator.

### FROST MASTER® PLUS



C429  
JUN 2007

## ORDERING INFORMATION

PORT SIZE INCHES (mm)	FLANGE CONNECTION STYLE & SIZES		
	SW, WN		ODS
	STD	ALSO	STD
1-1/2" (40)	1-1/2"	2"	1-5/8"
2" (50)	2"	1-1/2"	2-1/8"
2-1/2" (65)	2-1/2"	3"	2-5/8"
3" (80)	3"	-	3-1/8"
4" (100)	4"	-	4-1/8"

**TO ORDER:** Specify type HCK5D, port size, flange connection style and size, and pilot solenoid valve if desired. For pilot solenoid valve: specify HS6 for 2" and smaller HCK5D, or HS8A for 2½" and larger; connection style and size: ½" SW standard, FPT or WN available; voltages: 115V, 230V, 24V; 50/60Hz. Unless otherwise specified standard coil with ½" fitting for conduit will be supplied with pilot valve. Also available, DIN plug coil for grounded cord connection or quick disconnect connection.

## TYPICAL SPECIFICATIONS

"Gas-powered suction stop valves shall be normally open, 2 step opening, self-equalizing, operated with a single remote pilot pressure solenoid, with manual opening stem, pilot line disc strainer, and suitable for a safe working pressure of 400 psig (27 bar), as manufactured by Hansen Technologies Corporation or approved equal."

# HANSEN

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