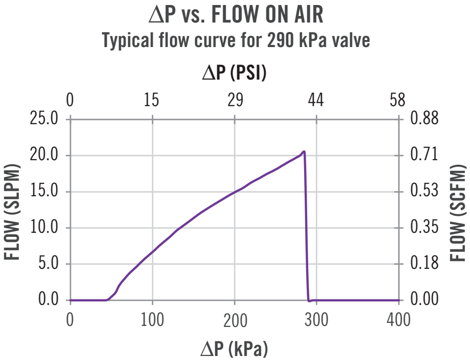
LEE IMH VENT VALVE - 4.5 mm PRESS-IN

The Lee Company introduces the new 4.5 mm Press-In Vent Valve for installation into plastics, specifically designed to remove trapped air in hydraulic systems. Air can become trapped in a hydraulic system during an initial green run, a key off event, or after maintenance or repair. This air can interfere with system startup/priming, cause slower system reaction times or a “spongy feel”, or produce NVH (noise, vibration, harshness) problems. Traditionally, trapped air was removed by hand bleeding the system or by drilling a hole in the manifold to allow the air to escape back to the sump. However, hand bleeding the system results in downtime and reduced productivity, and the drilled hole method allows hydraulic fluid to continuously flow out of the system, causing significant hydraulic losses, inefficient system performance, and wasted energy. Modern technology is pushing for higher system efficiencies, greater productivity, and reduced weight and size which makes eliminating these losses more critical.

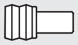
Our new 4.5 mm Press-In Vent Valve is a novel solution for removing trapped air while minimizing hydraulic losses. The vent valve is a normally closed valve which prohibits air from being drawn back into a system during shutdown. During startup, the system pressure increases and opens the vent valve, allowing any trapped air to start venting. The valve then closes as the system approaches its operating pressure, which eliminates further hydraulic losses. Our unique solution for removing this unwanted air will enable system designers to optimize system component sizing, leading to improved efficiencies, reduced weight and lower costs.

The new vent valve’s compact size, superior performance, and ease of installation make it ideal for high-volume applications in automotive, off-road, and other industrial hydraulic systems.

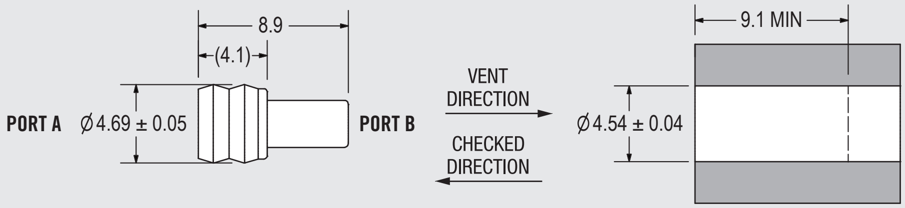


- Vents flow over specific pressure differential
  - Eliminates trapped air
  - Improves system efficiencies
  - Eliminates wasted energy
- Press-in design
  - Simple installation
- Miniature size
  - Allows designers to save space and weight
- Bidirectional installation provides forward or reverse flow capabilities
  - Design flexibility

ACTUAL SIZE



(As Installed)



All dimensions are in millimeters, except where noted.

PART NUMBER	CRACKING / OPENING PRESSURE	VALVE FLOW POINT			SHUT OFF PRESSURE
		MIN. FLOW (SLPM) REF.	AT (kPa)	MAX. LOHM* RATE	
CCVP4500120S	10 ± 5 kPa (1.5 ± 0.7 psid)	5	60 ± 10	1100	120 ± 30 kPa (17.4 ± 4.4 psid)
CCVP4500290S	50 ± 30 kPa (7.3 ± 4.4 psid)	10	200 ± 10		290 ± 60 kPa (42.1 ± 8.7 psid)
CCVP4500540S	100 ± 30 kPa (14.5 ± 4.4 psid)	17	400 ± 10		540 ± 120 kPa (78.3 ± 17.4 psid)

**Lohm is a measure of flow resistance. See reverse for more information.*

PERFORMANCE

- Valves are normally closed. Vent flow is from Port A to Port B over specified pressure range (from cracking/opening pressure to shut off pressure range).
- Cracking/opening pressure is the pressure at which vent flow begins.
- Shut off pressure is the pressure at which the valve closes, stopping vent flow.
- The valve maximum working pressure is dependent on the housing material, configuration and operating conditions.
- Materials: stainless steel
- All flows specified on air.

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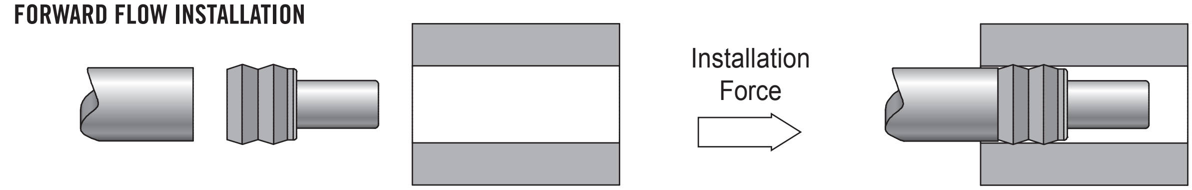
SIMPLE TO INSTALL

To install, simply press the valve into a plastic installation hole until the valve is flush minimum with the top of the installation hole.

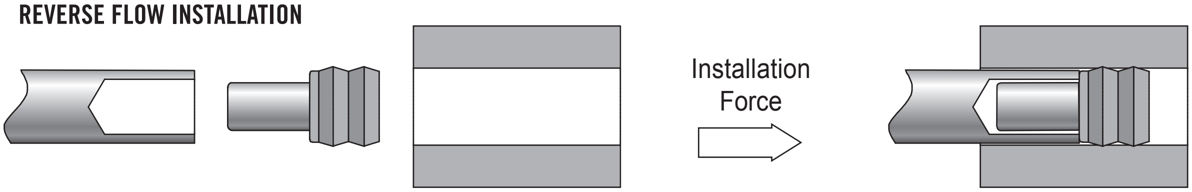
The valve can be installed in either direction, providing forward or reverse flow capabilities. For reverse flow orientation, use Lee Installation Tool Part Number CCRT0055036S. For forward flow orientation, use Lee Installation Tool Part Number CCRT0055034S.

These valves can be pressed directly into plastics that have sufficient elongation such as Nylon, Polyethylene, Polypropylene, Acetal and PEEK. For installation into other plastics contact your local Lee Sales Engineer for more information. CCVP Series Valves are not designed to be pressed into metal.

FORWARD FLOW INSTALLATION



REVERSE FLOW INSTALLATION



LOHM LAWS (Gases)

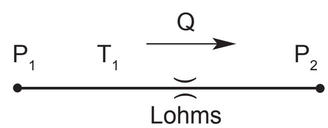
Every engineer will be interested in our simple system of defining the fluid resistance of Lee hydraulic components. Just as the OHM is used in the electrical industry, we find that we can use a liquid OHM or "Lohm" to good advantage on all hydraulic computations.

The Lohm Laws extend the definition of Lohms for gas flow at any pressure and temperature, and with any gas. The formulas work well for all gases because they are corrected for the specific gas, and for the flow region and incompressibility of low pressure gases.

The Lohm has been selected so that a 100 Lohm restriction will permit a flow of 250 standard liters per minute of nitrogen at a temperature of 59°F, and an upsteam pressure of 90 psia discharging to atmosphere.

$$L = \frac{K f_T P_1}{Q}$$ (Sonic region) i.e. $P_1/P_2 \geq 1.9$

$$L = \frac{2 K f_T \sqrt{\Delta P \, P_2}}{Q}$$ (Subsonic region) i.e. $P_1/P_2 < 1.9$



GAS FLOW – UNITS CONSTANT K

To eliminate the need to convert pressure and flow parameters into specific units such as "psia" and "std L/min.", the table below lists values of the Units Constant "K", which is used in the Gas Flow Lohm Formulas:

VOLUMETRIC FLOW UNITS							
Abs. Pres	psia			bar		kPa	mm. Hg
Flow	SLPM	SCFM	in³/min	SLPM	SCFM	SLPM	mL/min
He	771	27.2	47,100	11,200	395	112	14,900
N_2	276	9.73	16,800	4000	141	40.0	5330
Air	271	9.56	16,500	3930	139	39.3	5230
O_2	257	9.08	15,700	3730	132	37.3	4970
CO_2	213	7.52	13,000	3090	109	30.9	4110

For more information on Lohms, contact your local Lee Sales Engineer or visit us at www.leeimh.com.

NOMENCLATURE

- L = Lohms
- K = Units constant – gas (see chart on left)
- f_T = Temperature correction factor
- P_1 = Upstream absolute pressure
- P_2 = Downstream absolute pressure
- Q = Gas flow rate
- ΔP = $P_1 - P_2$

1. Compute the P_1/P_2 pressure ratio.
2. Select the correct formula for the flow region.
3. Look up the value of "K" for the gas.
4. Determine the temperature correction factor, "f_T".
   f_T = 1.0 at room temperature (70°F)

$$f_T = \sqrt{\frac{530}{T\,(°F) + 460}}$$

5. Use the formula to solve for the unknown.

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