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## INTRODUCTION

The Thief Hatch is a pressure and vacuum relief valve used on liquid storage tanks and other process vessels or systems to prevent structural damage due to excess internal pressure or vacuum. The Thief Hatch also permits access to the contents of the tank.

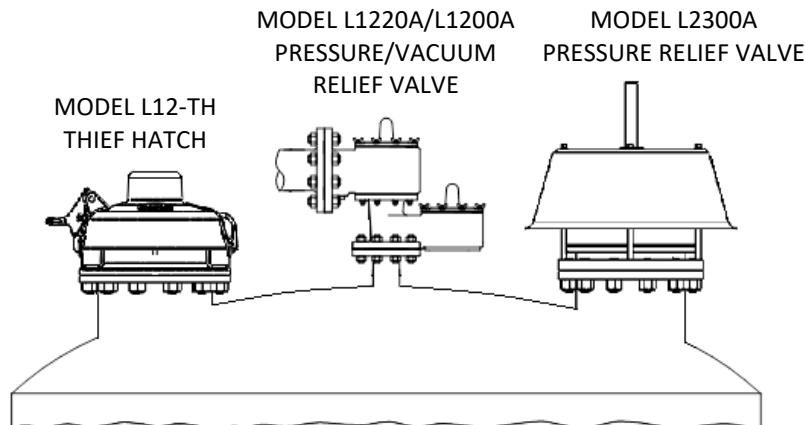
Storage tanks are pressurized when liquid is pumped in, compressing the existing vapor or when rising temperatures cause increased evaporation or expansion of existing vapor. Conversely, a vacuum condition may be created when pumping out or due to falling temperature. To prevent tank damage, vapor must be allowed into or out of the tank at specified pressure/vacuum conditions. The volume rate of venting depends upon the tank size, volatility of the tank contents, the pumping rates and the temperature. Refer to API Standard 2000, ISO 28300, or local regulations for the procedures to determine venting requirements.

A relief valve must be carefully maintained by a qualified valve technician. It should only be assembled under clean conditions, preferably in a service shop environment. Carefully read and understand this manual before installing or attempting to repair a valve.

For information not contained in this manual, please contact:

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[www.grothcorp.com](http://www.grothcorp.com)

## DESIGN AND FUNCTION



**Figure 1: Typical Tank Installation**

Tank protection equipment typically includes an operating valve which is designed to provide pressure/vacuum relief under normal pump in/out and thermal breathing conditions. An emergency relief valve can also provide both pressure and vacuum relief and normally it is sized to provide pressure relief if there is a fire in the immediate vicinity of the tank. It may also be sized by the tank designer to provide protection in the event of equipment failure (such as the rupture of a process steam line or an inert gas blanketing system failing “wide open”) or operator error.

A typical tank installation is shown in **Figure 1** which includes the following LAMOT products:

Model L12-TH or L12-TL Spring Loaded Thief Hatch

Model L1200/L1220A Pressure/Vacuum Weight Loaded Valve

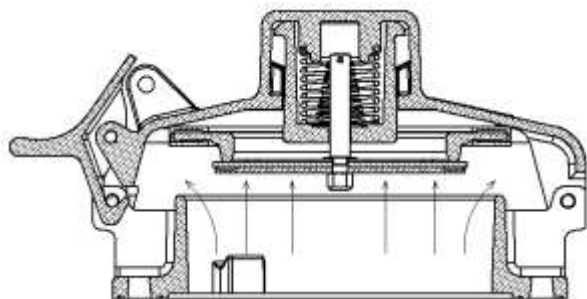
Model L2300A Pressure Weight Loaded Valve

### PRESSURE RELIEF CONDITION:

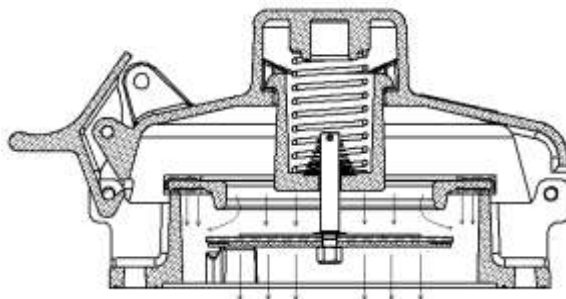
As the pressure in the storage tank increases, the vacuum pallet is held shut along with the pressure pallet assembly. When the set pressure is reached, the pressure pallet lifts and relieves tank pressure to the atmosphere. See **Figure 2**.

### VACUUM RELIEF CONDITION:

As a vacuum is drawn in the storage tank (for example, when fluid is being pumped out), the pressure pallet is held shut. When the vacuum setting is reached, the vacuum pallet opens and air is drawn into the tank from the atmosphere. See **Figure 3**.



**Figure 2: Pressure Relief Condition**



**Figure 3: Vacuum Relief Condition**

## SAFETY WARNINGS

This section is an overview of safety guidelines that should be followed during the installation, operation and maintenance of LAMOT Spring Loaded Thief Hatch. To understand the context of these instructions and warnings, it is necessary to completely read and understand the contents of this manual.

The purpose of a spring loaded Thief Hatch relief valve is to prevent excessive pressure or vacuum in a tank or process system. The valve must be designed for the proper Maximum Allowable Working Pressure (MAWP) and flow requirements of the system. Consult API Standard 2000, ISO 28300, or local regulations for tank protection sizing procedures. An improperly specified or functioning relief valve may result in structural damage to the tank or system, and can cause severe personal injury or death.

Valves are set at the factory according to purchase order specifications. **DO NOT** change pressure ratings by adding additional weights to the pallet assembly without consulting the factory or your local LAMOT representative. Adding weights to a valve may restrict pallet lift and reduce the valve's rated flow capacity.

**DO NOT** mix pressure/vacuum pallet assemblies. Failure to ensure that both pallet assemblies are installed in the correct location can change the pressure and vacuum relief settings or restrict lift of the pallet. This can cause a tank failure.

**DO NOT** attempt to remove the valve from the tank or process vessel without first bleeding all pressure from the system. **ALTERNATIVE MEANS OF PRESSURE RELIEF MUST BE PROVIDED WHEN THE VALVE IS OUT OF SERVICE.**

If the valve has been exposed to process vapors while in service, observe all plant procedures and Material Safety Data Sheets (MSDS) for the products in the system when inspecting, adjusting or servicing the valve. Take appropriate safety precautions regarding eye protection, respiration and skin contact.

The tank pressure required to discharge the normal or emergency venting requirements of the tank will be increased by the amount of back pressure in the discharge header, on a pipe away valve configuration. Maximum possible discharge header pressure must be considered when sizing the pressure relief valve.

## INSPECTION AND STORAGE

The Thief Hatch is carefully packaged to prevent damage or contamination during shipping. Inspect all equipment when it is received; report any damage to the carrier immediately. The valve should be protected during handling and storage. Before installation, inspect the unit for indications of physical damage or internal contamination. If these are observed, the valve must be disassembled, cleaned and repaired before installation.

## INSTALLATION

A typical Thief Hatch installation on a tank or vessel is illustrated in **Figure 1**, Page 4. LAMOT's spring loaded Pressure/Vacuum Relief Valves are designed to provide tank protection for both pressure and/or vacuum. The valve is marked with a rated flow capacity at 100% over-pressure. Consult factory for performance under other conditions.

**WARNING: The valve must be installed in a vertical position as shown in Figure 1, Page 4. To achieve nominal flow capacity, the tank nozzle bore must be at least the same nominal dimension as the relief valve inlet body.**

This series of Thief Hatch valves all have API 12 flange drilling. Torque guidelines are listed in **Table 1**. The valves are NOT rated for full flange pressure and do not require high bolting torque. Consult factory for special applications.

The following guidelines should be observed at installation:

1. Inspect the gasket seating surface of the tank nozzle flange. It must be clean, flat and free of scratches, corrosion and tool marks.
2. Aluminum valves are furnished as a standard with flat face flanges; they should only be installed on a mating flat face flange with a full faced gasket. Note: 1/8" thk. FF non-asbestos gaskets are recommended for aluminum.
3. Inspect the gasket; make sure that the material is suitable for the application.
4. Lubricate all bolts and nuts with an appropriate thread lubricant. If the valve will see high temperature service or stainless steel fasteners are used, apply an anti-seize compound such as moly-disulfide.
5. Center the gasket within the bolt circle.
6. Set the valve carefully on the nozzle and install the bolts and nuts.

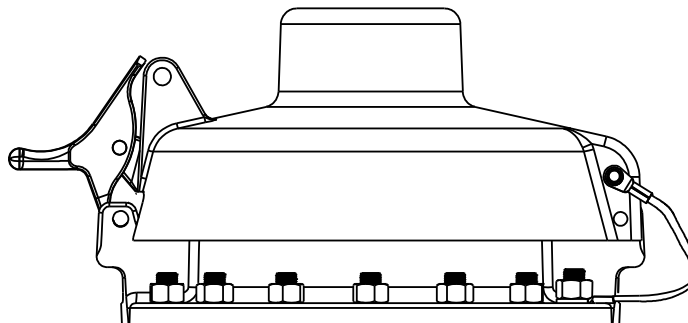
**NOTE: When installing the bolts and nuts, be sure to fasten the bonding strap to one of the bolts to ensure continuity of the cover to the base. See Figure 4. For bolt selection, see Table 1.**

7. Torque all fasteners to half the value listed in **Table 1**, in a cross torquing pattern.
8. Make sure that the flanges are not distorted and that the gasket is evenly compressed. Make up the final torque and check that no further nut rotation occurs at the torque value specified in **Table 1**.

**Table 1 - Recommended Torque Values\***

Mounting	Bolt Torque	Number of Bolts	Bolt Specifications	
	Lb-Ft(N-m)		Thread UNC	Bolt Length
Flange	Flat Face- Alum.	Total		
8"	25 (34)	16	1/2-13	1.50"

*\*Note: Torque values are based on a gasket factor  $m=3.5$ , Gasket factor  $y=2000$  psi, maximum pressure = 2 psi.*

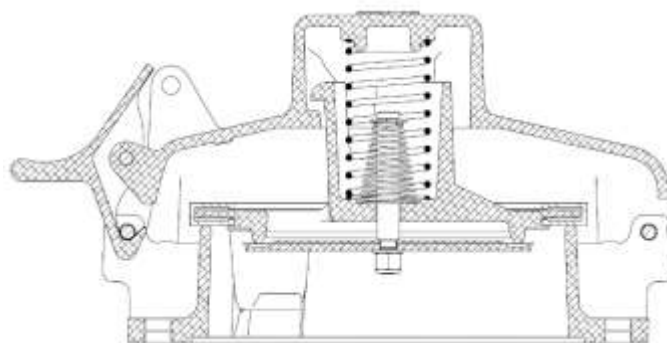


**Figure 4 – Bonding Strap Installation**

## MAINTENANCE

Groth Corporation recommends that all service performed on a LAMOT Thief Hatch valve is done at a factory Authorized Repair Dealer. Contact Groth Corporation for your local authorized repair dealer. Trained mechanics with specialized test equipment will ensure that the valve is accurately set.

It is important to regularly inspect the envelope gasket, diaphragm, and seating surfaces to ensure the valve can open freely. Refer to **Figure 5** which illustrates a typical Thief Hatch relief valve when disassembling the unit.



**Figure 5 – Thief Hatch Cross Section**

**WARNING: Before disassembling the valve, carefully read and understand the Safety Warnings listed on page 5. DO NOT attempt to remove the Thief Hatch relief valve from the tank or process vessel without first bleeding all pressure from the system.**

Refer to **Figure 6**, and **Table 2** on page 8 for Part References

1. Remove the Thief Hatch assembly from the tank.
2. Place the Thief Hatch assembly on a work table.
3. Remove the clevis pin by pressing on the spring loaded plunger and pulling the pin, and disengaging the latch.
4. Detach the cover/pallet sub-assembly from the base.

**WARNING: The pressure pallet assembly may cause injury to personnel, and/or damage to equipment, if the Thief Hatch is not properly secure, and the spring force is not reduced in a slow manner during the disassembly/assembly operation.**

5. Secure the cover/pallet sub-assembly to prevent any movement, spinning or rocking.
6. Disassemble the pressure pallet sub-assembly by applying force to the blue vacuum pallet to overcome the spring force, pushing the pressure pallet sub-assembly downward until it becomes bottomed out in the cast cover, and then rotating the pallet sub-assembly 60 degrees CW/CCW.
7. After rotating it 60 degrees, slowly decrease the force applied to the blue vacuum pallet such that the pressure spring does not pop the pressure pallet sub-assembly out.
8. Remove the pressure spring from the pallet sub-assembly.
9. Remove the retaining clip and place the conical vacuum spring aside.
10. Remove the vacuum pallet sub-assembly from the pressure pallet subassembly.
11. Carefully remove the envelope gasket from the pressure pallet and set it aside.
12. Protect the pressure pallet seating surface so that it does not get nicked, gouged or scratched on the sealing surface, as this will cause leaks.
13. Unscrew the nylon lock hex nut off of the vacuum stem and separate the vacuum pallet, vacuum gasket, retainer plate, and the pressure sealing washer from the vacuum stem.
14. Carefully inspect all metal sealing surfaces on the base, pressure pallet, and vacuum pallet for corrosion, damage or product build up. Also inspect the cover locking system for product build up. Inspect the springs for any damage, corrosion or product build-up. It is recommended to replace all springs, and soft goods (envelope gasket, vacuum diaphragms, and pressure sealing washer) at every maintenance interval and/or repair to the Thief Hatch.

**NOTE: If the metal seating surfaces are damaged, they must be lapped using a flat ground metal disc and fine grit emery cloth attached to the disc, achieving a flatness better than 0.002". Wipe the seating surface clean before proceeding.**

15. It is recommended to replace the retaining ring and vacuum stem at every maintenance interval and/or repair to the Thief Hatch to prevent wearing of the vacuum stem in the groove area, and to maintain a tight fit with the retaining ring.
16. After inspection of all the components for damage, and replacement as needed; clean all the components and sealing surfaces.
17. Assemble in reverse order, apply 4-10 complete wraps of fluoropolymer thread sealing tape to the vacuum stem, and apply 120 In•Lb of torque to tighten the nylon lock washer onto the vacuum stem.
18. Verify that the pallets are back in their proper location. Make sure that the pallet assemblies sit flat on the seat and that it is not cocked when the cover is latched.

SPRING LOADED THIEF HATCH ASSEMBLY DRAWING

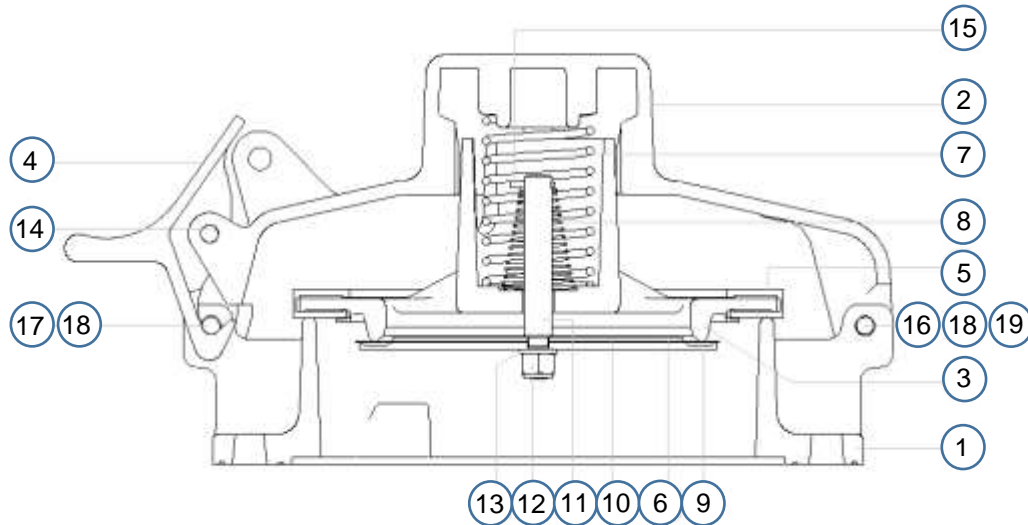


Figure 6- Thief Hatch Assembly Sectional View



TABLE 2 - BILL OF MATERIAL

Item #		Part	Part Description	Material	Part Number	Qty.
1		L12-TH Base	8" API FF - Aluminum	AL (319-F)	BAS12TH08CLD	1
			8" API FF - Aluminum with Polyester/PTFE Coating	AL (319-F)/Polyester PTFE	BAS12TH08CLDE	
		L12-TL Base	8" API FF - Aluminum	AL (319-F)	BAS12TL08CLD	1
			8" API FF - Aluminum with Polyester/PTFE Coating	AL (319-F)/Polyester PTFE	BAS12TL08CLDE	
2		L12-TH Cover	12-TH 8" Aluminum	AL (319-F)	CVR12TH08CL	1
		L12-TL Cover	12-TL 8" Aluminum	AL (319-F)	CVR12TL08CL	
3		Pressure Pallet	Aluminum	AL (319-F)	PLM12TH08CL01	1
			Aluminum with Polyester / PTFE Coating	AL (319-F)/Polyester PTFE	PLM12TH08CL01E	
4		Latch	12-TH 8" Aluminum	AL (319-F)	LTH12TH08CL	1
5	*	Envelope Gasket	12-TH 8" HNBR	HNBR (Black)	GKT12TH08CK01	1
			12-TH 8" FKM	FKM (Blue)	GKT12TH08CJ01	
			12-TH 8" FVMQ	Fluorosilicone (Yellow)	GKT12TH08BO01	
6	*	Vacuum Diaphragm	12-TH 8" FEP	Fluoropolymer (FEP, Clear)	DPH12TH08CK30	1
			12-TH 8" FVMQ	Fluorosilicone (Yellow)	DPH12TH08CJ30	
			12-TH 8" FKM	FKM (Blue)	DPH12TH08BO30	
			12-TH 8" HNBR	HNBR (Black)	DPH12TH087310	
7	*	Pressure Spring	Reference Table 3			1
8	*	Vacuum Spring		Inconel X-750	SPR12TH08**Z4	1
9		Vacuum Pallet	12-TH 8"	6061-T6 Alum/Blue Anodize	PLM12TH08CL02	1
10		Retainer Plate	12-TH 8"	6061-T6 Aluminum	RPL12TH08A7	1
11		Vacuum Stem	12-TH 8"	6061-T6 Aluminum	STM12TH08A7	1
12		Vacuum Pallet Stem Nut	Hex Locknut (3/8"-16 UNC)	SS/Nylon	1203600D3	1
13		Vacuum Pallet Stem Washer-Seal	Washer SealNut 3/8" Znc/Buna N	Buna-N/ Zinc plated steel	196361035	1
14		Locking Clevis Pin for Latch Pivot	SLIC Pin, 5/16 X 1-1/2 CS	Zinc plated steel	490340620	1
15	*	Vacuum Pallet Stem Retainer Clip	Ret Ring, HD Side Mt. 1/2 CS	Zinc plated steel	489400020	1
16		L12-TH Locking Clevis Pin for Cover Hinge	SLIC Pin, 5/16 X 3-1/8 CS	Zinc plated steel	49034E820	1
		L12-TL Locking Clevis Pin for Cover Hinge	SLIC Pin, 5/16 X 9 CS	Zinc plated steel	490343620	
17		Locking Clevis Pin for Latch Catch	SLIC Pin, 5/16 X 2-7/16 CS	Zinc plated steel	490349420	1
18		Pin Spacer	Spacers (Not shown)	Nylon 6/6	479348149	4
19		Hinge Pin Compression Spring	Spring (Not shown)	Carbon Steel	47834H220	2

\*SPARE PARTS AVAILABLE FOR ORDER.

**TABLE 3 - PRESSURE SPRINGS**

Part Description	Material	Part Number
Spring 8" 4 osig (Red/Yellow)	Galvanized Steel	SPR12TH0801DM
Spring 8" 4 osig (Red)	Inconel X-750	SPR12TH0801Z4
Spring 8" 6 osig (Blue/Yellow)	Galvanized Steel	SPR12TH0802DM
Spring 8" 6 osig (Blue)	Inconel X-750	SPR12TH0802Z4
Spring 8" 8 osig (Gray/Yellow)	Galvanized Steel	SPR12TH0803DM
Spring 8" 8 osig (Gray)	Inconel X-750	SPR12TH0803Z4
Spring 8" 12 osig (Green/Yel)	Galvanized Steel	SPR12TH0804DM
Spring 8" 12 osig (Green)	Inconel X-750	SPR12TH0804Z4
Spring 8" 16 osig (White/Yel)	Galvanized Steel	SPR12TH0805DM
Spring 8" 16 osig (White)	Inconel X-750	SPR12TH0805Z4
Spring 8" 24 osig (Orange/Yel)	Galvanized Steel	SPR12TH0806DM
Spring 8" 24 osig (Orange)	Inconel X-750	SPR12TH0806Z4
Spring 8" 32 osig (Purple/Yel)	Galvanized Steel	SPR12TH0807DM
Spring 8" 32 osig (Purple)	Inconel X-750	SPR12TH0807Z4
Spring 8" 0.4 osig (Blue/Yel)	Galvanized Steel	SPR12TH0808DM
Spring 8" 0.4 osig (Blue)	Inconel X-750	SPR12TH0808Z4
Spring 8" 0.9 osig (Orang/Yel)	Galvanized Steel	SPR12TH0809DM
Spring 8" 0.9 osig (Orange)	Inconel X-750	SPR12TH0809Z4
Spring 8" 3.5 osig (Green/Yel)	Galvanized Steel	SPR12TH0810DM
Spring 8" 3.5 osig (Green)	Inconel X-750	SPR12TH0810Z4
Spring 8" 10 osig (Pink/Yel)	Galvanized Steel	SPR12TH0811DM
Spring 8" 10 osig (Pink)	Inconel X-750	SPR12TH0811Z4

## VALVE TESTING PROCEDURE

### General Information

1. Use only appropriate testing equipment designated by local regulations (API 2000, ISO 28300, EN14015).
2. Calibrate all measuring devices according to device manufacturer schedule.

### Seat Leakage Test (Pressure/Vacuum)

1. Test the pressure and/or vacuum seat leakage three times to verify leak tightness. Record all test pressure and vacuum readings on the *Shop Data Sheet*.
2. Slowly open the Test Stand Pressure Test or Vacuum Test valve (supply pressure).
3. Adjust the appropriate flow meter to achieve the specified flow rate listed **Table 3** below.
4. With the valve flowing at the flow rate indicated in **Table 4**, read the test stand supply pressure using the manometer or gauge.
5. The acceptance criteria for this test are that the peak pressure attained at the specified flow rate be **at least 90% for Pressure / 75% for Vacuum** of the specified set pressure or vacuum listed on the sales order.  
*Perform this test three times to verify proper operation.*
6. If the valve fails to meet the 90% for pressure / 75% for Vacuum criteria, it must be disassembled and the pallet, envelope gasket, diaphragm or seat repaired or replaced, and retest the valve.
7. Record the test results under the *Seat Leakage Test 1-3 (Pressure/Vacuum)* on a *Shop Data Sheet*.

**Table 4 - Seat Leakage Test Criteria**

Relieving Direction	Test Flow Rate
Pressure	1.0 ft <sup>3</sup> /hr (0.0284 m <sup>3</sup> /hr)
Vacuum	5.0 ft <sup>3</sup> /hr (0.1416 m <sup>3</sup> /hr)

### Set Pressure and/or Vacuum Test

1. Test the set pressure and/or vacuum three times to verify proper operation. Record all test pressure and vacuum readings on the *Shop Data Sheet*.
2. With the valve mounted on the test stand from previous test, slowly increase the pressure while monitoring the air supply pressure flow rate. For vacuum tests, the block valve is opened sufficiently to allow a steady increase in vacuum condition. As the setting is approached, continue to open the valve.
3. The set pressure (vacuum) will be the point at which the test pressure (vacuum) does not increase with a corresponding increase in flow rate. Normally, at this point, the test pressure (vacuum) will fluctuate up and down as the valve relieves, while the flow rate remains steady. The set pressure or set vacuum is the maximum pressure or vacuum achieved during the test.
4. Repeat this test two more times to achieve a total of three measurements of set pressure and vacuum.
5. The acceptable tolerance range for set pressure (vacuum) is +/- 10%. All three test results must fall within the specified tolerances for the pressure and vacuum settings listed on the sales order. Record the three set pressures and vacuum measurements on the *Shop Data Sheet*.
6. If all three set test values are not within the allowable tolerance, disassemble the valve; inspect the pallet, seat and diaphragms. It may be necessary to lap the seat or replace one or more components. If the pallet weight falls within the limits, but still exceeds either the pressure or vacuum setting tolerance, consult Groth Corporation.

### SOFT GOODS KITS

Maintenance Kits are available upon request. Kits includes envelope gasket, diaphragm, springs, pressure seal washers, vacuum stem, and retaining clip to repair a valve. Kits are based on Model Number, Pressure/Vacuum setting, and Material. The kits only apply to LAMOT Thief Hatch valves. Please contact your LAMOT representative with the Serial Number, Model Number, Size, and Material to be recommended the appropriate kit for your Thief Hatch valve.

### MODEL NUMBER IDENTIFICATION

The nameplate on the Valve contains the Model Number, Serial Number, set pressures and flow capacity at a specified over-pressure. The Model Number contains additional information about materials of construction, soft goods and options. The following chart will assist in relating the Model Number to the characteristics of your valve:

MODEL #	SIZE	MATERIAL				OPTIONS		
L		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
L   1   2   -   T   H	-   0   8	-   1	<input type="checkbox"/> H	<input type="checkbox"/> H	-	<input type="checkbox"/> 1	<input type="checkbox"/> 1	<input type="checkbox"/> 0
		<input type="checkbox"/> AL	Pr. Gasket	Vac. Diaphragm	Pr. Setting	Vac. Setting	Coating	
		<input type="checkbox"/> H HNBR <input type="checkbox"/> V FKM <input type="checkbox"/> F FVMQ	<input type="checkbox"/> H HNBR <input type="checkbox"/> V FKM <input type="checkbox"/> F FVMQ <input type="checkbox"/> T FEP		<input type="checkbox"/> 1 4 osig <input type="checkbox"/> 2 6 osig <input type="checkbox"/> 3 8 osig <input type="checkbox"/> 4 12 osig <input type="checkbox"/> 5 16 osig <input type="checkbox"/> 6 24 osig <input type="checkbox"/> 7 32 osig	<input type="checkbox"/> 1 0.4 osig <input type="checkbox"/> 2 0.9 osig <input type="checkbox"/> 3 3.5 osig	<input type="checkbox"/> 0 No Option <input type="checkbox"/> E Polyester/PTFE	

EXAMPLE: L12-TH-08-1HH-110 indicates an 8" Model L12-TH with Aluminum body and seat, HNBR envelope gasket, and diaphragms, 4 osig pressure setting, 0.4 vacuum setting and no coatings.

The nameplate below shows the basic information that is listed for each relief valve:

<b>LAMOT®</b>				MD:		
				S/N:		
				TAG:		
				FLANGE:		
SETTING	TYPE	% OP	FLOW [SCFH]	ASSEMBLED IN USA		
	PRESS.	100				
	VAC.	100				
LAMOT VALVE & ARRESTOR						

**PRODUCT LIMITED WARRANTY**

Only Groth's Product Limited Warranty terms apply to purchase orders accepted by Groth Corporation for LAMOT product.

Seller warrants that products that are manufactured by Seller are manufactured in accordance with published specifications and free from defects in materials and/or workmanship for a period of (12) twelve months. Seller, at its option, will repair or replace any products returned intact to the factory, transportation charges prepaid, which Seller, upon inspection, determines to be defective in material and/or workmanship. The foregoing shall constitute the sole remedy for any breach of Seller's warranty.

THERE ARE NO UNDERSTANDINGS, AGREEMENTS, REPRESENTATIONS, OR WARRANTIES, EXPRESS OR IMPLIED (INCLUDING MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE REGARDING PRODUCTS) UNLESS SPECIFIED IN THE SALES CONTRACT. THIS CONTRACT STATES THE ENTIRE OBLIGATION OF SELLER.

Seller makes no warranties, either express or implied, except as provided herein, including without limitation thereof, warranties as to marketability, merchantability, for a particular purpose or use, or against infringement of any patent of products. In no event shall Seller be liable for any direct, incidental or consequential damages of any nature, or losses or expenses resulting from any defective new product or the use of any such product, including any damages for loss of time, inconvenience, or loss of use of any such product.

The original Manufacturer shall be solely responsible for the design, development, supply, production, and performance of its products hereunder, and the protection of its trade name or names, if any. It assumes no responsibility, for products modified or changed by its agent or customer, or any other third party. Any such modifications or changes to products sold by Seller hereunder shall make the product limited warranty null and void.

Groth assumes no responsibility for products modified or changed by Customer or any other third party. Any such modifications or changes to products sold by Groth hereunder shall make the product limited warranty null and void. Groth shall be under no obligation to manufacture, sell or supply, or to continue to manufacture, sell, or supply any of the products.

LaMOT® Valve & Arrestor has representatives throughout North America.  
Contact us or visit us on the web for the authorized representative in your area.



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