



# SAFETY & RELIEF VALVES

## ASME SECTION I, IV & CIII

Leslie Pressure Relief valves are safety devices designed to protect pressurized vessels, lines or systems during an overpressure event. The recommendations below are general and it is the responsibility of the user to assure that installation and maintenance are in accordance with the applicable ASME Codes, API 520 Part II, local jurisdictional requirements and any other requirements. Neither Leslie Controls nor its agents assume any liability for valves improperly installed, maintained or troubleshot.

### **A. INSTALLATION - SINGLE VALVE**

1. Installation must be performed by qualified service personnel only.
2. Pressure relief devices intended for use in compressible fluid service shall be connected to the vessel in the vapor space above any contained liquid or to piping connected to the vapor space in the vessel that is to be protected. Pressure relief devices intended for use in liquid service shall be connected below the normal liquid level (ASME Section VIII, UG-135 (a), 1998).
3. The operating pressure of the system should be a minimum of 20% or 10 PSI, whichever is greater, below the set pressure of the valve. The set pressure of each pressure relief valve must be in conformance with pressure limits of the system and of the limits specified in the appropriate ASME codes.
4. Valves must be installed in an upright position with the spindle vertical. (ASME Section VIII, Appendix M, 1998). Mounting valves in any other position will cause additional friction on the guiding surfaces and the valve performance will be affected. Mounting valves in other positions may allow dirt and other foreign substances to accumulate in the valve and adversely affect the valve action.
5. The connection to the vessel should be provided with a radius to permit smooth flow to the valve - sharp corners should be avoided.
6. Pressure Relief Valves for use on steam, air and water (over 140(F) shall be supplied with a lifting device (ASME Section VIII, UG-136 (a)(3), 1998).
7. Do not plug or cap any drain or vent openings. Remove any and all shipping plugs.
8. Test gags must be removed (if supplied). Failure to do so renders the valve inoperable and, due to overpressure may damage the Pressure Relief Valve, the system and/or cause personal injury.
9. Make sure the system is clean and free of any dirt, sediment or scale that might become lodged on the valve seats.
10. Apply a small amount of sealant only to the male threads and tighten valve by hand. Use the proper

wrench on the hex area of the base, taking care not use excessive force during tightening.

11. The valve should be normally placed close to the protected equipment so that the valve will be fed properly under flowing conditions. However, valves should be mounted downstream from any device at a distance sufficient to avoid turbulence.
12. In a pressure reducing valve station, it is recommended that the pressure relief valve be installed a minimum of 20 pipe diameters from the outlet of the pressure reducing valve to avoid turbulent flow and an unstable condition.
13. When Pressure Relief Valves are left on line during an extended shutdown, the valves should be inspected and re-tested due to the potential of corrosion, fouling or tampering.

### **Inlet Piping**

14. The opening through all pipe, fittings, and nonreclosing pressure relief devices (if installed) between a pressure vessel and its pressure relief valve shall have at least the area of the pressure relief valve inlet. (ASME Section VIII, UG-135 (b)(1), 1998).
15. The flow characteristics of the upstream system shall be such that the cumulative total of all nonrecoverable inlet losses shall not exceed 3% of the valve set pressure (ASME Section VIII, Appendix M-7(a), 1998)

### **Outlet Piping**

16. Discharge pipes shall be at least of the same size as the pressure relief valve outlet (ASME Section VIII, Appendix M-8(a), 1998).
17. Where feasible, the use of a short discharge pipe or vertical riser, connected through long-radius elbows from each individual device, blowing directly to the atmosphere, is recommended (ASME Section VIII, Appendix M-8(a), 1998). Discharge piping should be designed to place the minimum load on the valve under all conditions of valve operation. See A.16.
18. When the nature of the discharge permits, whereby condensed vapor in the discharge line, or rain, is collected and piped to a drain, a Drip Pan Elbow is recommended. This construction has the further advantage of not transmitting discharge-pipe strains to the valve (ASME Section VIII, Appendix M, 1998).
19. The discharge piping should be anchored to prevent any swaying or vibration while the valve is discharging.
20. If excessive lengths of discharge piping and fittings are required, they should be sized larger than the valve outlet. Any discharge piping that appears to be excessive should be reviewed by calculation for back-pressure and piping strains.

21. Discharge lines from Pressure Relief Valves shall be designed to facilitate drainage or shall be fitted with drains to prevent liquid from lodging in the discharge side of the pressure relief device, and such lines shall lead to a safe place of discharge (ASME Section VIII UG-135(f), 1998).

### Stop Valves

22. ASME Section I - No valve of any description shall be placed between the required safety valve or safety relief valve or valves and the boiler, nor on the discharge pipe between the safety valve or safety relief valve and the atmosphere (ASME Section I PG 71.2, 1998).
23. ASME Section VIII - There shall be intervening stop valves between the vessel and its pressure relief device or devices, or between the pressure relief device or devices and the point of discharge, except as under the conditions as stated in ASME Section VIII UG-135(d)(1) and in Appendix M.

## B. INSTALLATION -MULTIPLE VALVES

---

1. All items listed above in the Installation of Single Valves should be followed.
2. When two or more required pressure relief devices are placed on one connection, the inlet internal cross-sectional area of this connection shall be either sized to avoid restricting flow to the pressure relief devices or made at least equal to the combined inlet areas of the safety devices connected to it. (ASME Section VIII UG-136 (c)1998)
3. The sizing of any section of a common-discharge header downstream from each of the two or more pressure relieving devices that may reasonably be expected to discharge simultaneously shall be based on the total of their outlet areas. The effect of the back-pressure that may be developed when certain valves operate must be considered (ASME Section VIII, Appendix M-8 (b), 1998).
4. It is recommended that the smaller orifice valve be set at the lower set pressure and that it is installed up stream of the other valves.

## C. MAINTENANCE

---

1. Valves are set and sealed to prevent tampering, guarantee is void if any seal is broken. The setting, adjustment or repair should be done only by an Authorized Pressure Relief Valve repair facility.
2. The valves should be checked periodically to see that they are not clogged or seized due to dirt or other foreign matter and that they will operate satisfactorily.
3. Installation conditions should be reviewed, seals should be checked to verify that they are not broken and no unauthorized adjustments have been made.
4. Valves may be manually operated by means of the lifting lever only when the system pressure is at least 75% of the nameplate set pressure. A Pressure Relief Valve should never be lifted without 75% of the nameplate set pressure.
5. Pressure Relief Valves should be re-tested as part a normal routine inspection program. The intervals between tests can vary in accordance with the severity of the service condition. Guidelines for inspection are provided in the API Inspection Code and the National

Board Inspection Code. However, consideration should be given to your local jurisdictional policies, your insurance company policies and/or your company policies.

6. Only original, unmodified manufacturer parts should be used to assure safe and proper operation.

## D. TROUBLESHOOTING

---

1. Valves are set and sealed to prevent tampering, guarantee is void if any seal is broken. The setting, adjustment or repair should be done only by an Authorized Pressure Relief Valve repair facility.
2. Occasionally a newly installed valve may leak as a result of shipping and handling or installation procedures. For valves with levers, apply pressure to the inlet side equal to 75% of the operating pressure so that the lift lever can be manually activated. For valves without lift levers, raise the system pressure to the point of valve operation. In most instances, the valve will properly reseal and the leakage will stop.
3. If a valve is leaking under normal operating conditions, the following three scenarios should be checked:
  - a. Make sure that a minimum operating to set point differential is maintained according to specifications.
  - b. It is possible that dirt or foreign material is lodged under the seat. Perform the check as outlined in part 2 of the troubleshooting.
  - c. Valve seating surface could be worn or damaged. Please contact your local Pressure Relief Valve Repair Facility.
4. If a valve is chattering it may be the result of the following:
  - a. Improper piping at valve inlet or outlet. See the appropriate ASME Codes.
  - b. Valves are oversized.
  - c. Back-pressure may be present which may not have been accounted for in the original sizing
  - d. Valve holes may be plugged. Check to make sure all holes are not plugged and any shipping plugs have been removed.
  - e. Valve may be worn or damaged. Please contact your local Pressure Relief Valve Repair Facility.
5. If a valve is not popping at the set pressure as stamped on the nameplate, the following should be checked:
  - a. All Pressure Relief Valves have tolerance built into the set pressure. Review the Leslie Controls Testing Specifications and/or the appropriate ASME codes to ensure the valve is operating within the allowed tolerances.
  - b. Make sure the gauge reading the pressure is properly installed and calibrated. Compensate for the water leg between the valve and gauge.
  - c. Review the inlet piping to make sure that the inlet piping is at least the area of the Pressure Relief Valve inlet. Review the inlet piping to ensure no other pressure drops can occur.
  - d. Review the outlet piping to ensure that backpressure has been accounted for in the original sizing and selection of the valve.

- e. Valve may be worn or damaged. Please contact your local Pressure Relief Valve Repair Facility.
- 6. If a valve is not closing or has an excessive blowdown, the following should be checked:
  - a. It is possible that dirt or foreign material is lodged under the seat. Perform the check as outlined in C.2.
  - b. Operating pressure may not be reduced below the reseating pressure of the valve. Reduce the operating pressure of the system to 50% of the normal operating pressure and then slowly bring the system back to the normal operating pressure. Make sure that a minimum operating to set point differential is maintained according to specifications.
  - c. Valve may be worn or damaged. Please contact your local Pressure Relief Valve Repair Facility.

**CAUTION!**

*The piping system must be adequately designed and supported to prevent extraordinary loads to the pressure equipment.*

*It is solely the responsibility of the system designer and the user to select products and materials suitable for their specific application requirements and to ensure proper installation, operation and maintenance of these products. Assistance shall be afforded with the selection of the materials based on the technical information supplied to Leslie Controls, Inc.; however, the system designer and user retain final responsibility. The designer should consider applicable Codes, material compatibility, product ratings and application details in the selection and application. Improper selection, application or use of the products described herein can cause personal injury or property damage. If the designer or user intends to use the product for an application or use other than originally specified, he must reconfirm that the selection is suitable for the new operating conditions.*

**WARNING:**

*Injury or death can occur due to failure to completely isolate valve from all sources of pressure before beginning disassembly. Do not proceed until valve has been completely isolated from process stream and vented to atmosphere.*



A division of CIRCOR International, Inc.

12501 Telecom Drive, Tampa, FL 33637  
Ph: (813) 978-1000 • Fax: (813) 978-0984  
[www.lesliecontrols.com](http://www.lesliecontrols.com)