

While valves are designed to reseal after discharge, it is advisable that they are replaced, since system impurities such as piping debris, solder, and metal shavings can accumulate under the valve disc and inhibit the proper resealing of the valve.

Selection of a relief valve should be based on the discharge capacity required for the system or vessel, based on the size of the equipment and the refrigerant being used. Minimum settings for valves should be at least 25% above the designed Maximum Operating Pressure, while additional consideration must be given in the valve location may experience high ambient temperatures such as an equipment room or rooftop. Sizing valves to the maximum allowable setting will minimize the possibility of seepage or early discharge.

Relief valves operate automatically when the system pressure exceeds the valve set pressure and exerts a force on the valve disc that overcomes the opposing internal spring force. By code, valves may open with allowable tolerances within a +/- 3% range of stamped set pressure, with full discharge capacity realized at 10% above the actual opening pressure.

Relief valves conform to the American Standard Safety Code for Mechanical Refrigeration (ANSI/SHARAE 15), and are designed and manufactured in accordance with ASME Section VIII Division I., certifying specific capacities and identified by the ASME and National Board NB stamps on each valve. These valves are also compliant with European Union Pressure Equipment Directive (PED 2014/68/EU), and exhibit the appropriate EC marking and identification number.

A Pressure Relief Valve (PRV) is a system safety device that has been designed to function in accordance with specific country codes to prevent and protect the operation of systems and vessels above the allowable safe levels.

Discharge Capacity

The minimum required discharge capacity of the pressure relief device or fusible plug for each pressure vessel is determined by the following formula, specified by the ASHRAE Standard 15, Safety Code for Mechanical Refrigeration:

$C = fDL$ where:

C = minimum required discharge capacity of the relief device, lb. air/min (kg air/sec)

D = outside diameter of vessel, ft (m)

L = length of the vessel, ft (m)

f = factor dependent on the kind of refrigerant from Discharge Capacity Chart

Example of relief valve selection:

Information for vessel being protected:

Diameter = 1.33 ft

Length = 3.33 ft

Working Pressure = 350 psi

Information from the table for f values:

Application = R-22

Value of f = 1.6

From the information provided, the required discharge capacity to protect the vessel is determined by solving the minimum discharge capacity formula: $C = f D L$

$C = (1.6) (3.33) (1.33)$

$C = 7.1$ lbs of air/min

Using the calculated discharge 7.1 lbs of air/min and the required pressure of 350 psi, we can select from the product offering.

Using the discharge capacity table, select the row for 350 psi. Valves with capacities that meet the minimum discharge requirement, 7.1, are viable options. Discharge table values A-K allows for selection of a valve based on the inlet and outlet sizes and configurations.

If the desired valve is to have a 3/8" NPTFE inlet and 3/8" Flare outlet, with the outlet being 90°, valve A 15512 is acceptable since it has a discharge table rating of B.

Pressure Relief Valves

Selection Process

| Application | Value of F | Metric Value of F |
|-------------|------------|-------------------|
|-------------|------------|-------------------|

When used on the lowside of a limited-charge cascade system

| | | |
|--------|-----|-------|
| R-11 | 1.0 | 0.082 |
| R-113 | 1.0 | 0.082 |
| R-114 | 1.6 | 0.131 |
| R-115 | 2.5 | 0.203 |
| R-1150 | 1.0 | 0.082 |
| R-12 | 1.6 | 0.131 |
| R-123 | 1.0 | 0.082 |
| R-124 | 1.6 | 0.131 |
| R-1270 | 1.6 | 0.131 |
| R-13 | 2.0 | 0.163 |
| R-134a | 1.6 | 0.131 |
| R-13B1 | 2.0 | 0.163 |
| R-14 | 2.5 | 0.203 |
| R-142b | 1.0 | 0.082 |
| R-143a | 2.0 | 0.163 |
| R-152a | 1.0 | 0.082 |
| R-170 | 1.0 | 0.082 |
| R-22 | 1.6 | 0.131 |
| R-23 | 1.0 | 0.082 |
| R-290 | 1.0 | 0.082 |
| R-32 | 1.0 | 0.082 |
| R-401A | 1.6 | 0.131 |
| R-401B | 1.6 | 0.131 |
| R-401C | 1.6 | 0.131 |
| R-402A | 2.5 | 0.203 |
| R-402B | 2.0 | 0.163 |
| R-403A | 2.0 | 0.163 |
| R-403B | 2.5 | 0.203 |
| R-404A | 2.5 | 0.203 |
| R-405A | 1.6 | 0.131 |
| R-406A | 1.6 | 0.131 |

| Application | Value of F | Metric Value of F |
|-------------|------------|-------------------|
|-------------|------------|-------------------|

When used on the lowside of a limited-charge cascade system

| | | |
|--------|-----|-------|
| R-407A | 2.0 | 0.163 |
| R-407C | 1.6 | 0.131 |
| R-407D | 1.6 | 0.131 |
| R-407E | 1.6 | 0.131 |
| R-408A | 2.0 | 0.163 |
| R-409A | 1.6 | 0.131 |
| R-409B | 1.6 | 0.131 |
| R-407B | 2.5 | 0.203 |
| R-410A | 2.5 | 0.203 |
| R-410B | 2.5 | 0.203 |
| R-411A | 1.6 | 0.131 |
| R-411B | 1.6 | 0.131 |
| R-411C | 1.6 | 0.131 |
| R-412A | 1.6 | 0.131 |
| R-413A | 2.0 | 0.163 |
| R-414A | 1.6 | 0.131 |
| R-414B | 1.6 | 0.131 |
| R-500 | 1.6 | 0.131 |
| R-502 | 2.5 | 0.203 |
| R-503 | 2.0 | 0.163 |
| R-507A | 2.5 | 0.203 |
| R-508A | 1.0 | 0.082 |
| R-508B | 1.0 | 0.082 |
| R-509A | 2.5 | 0.203 |
| R-600 | 1.0 | 0.082 |
| R-600a | 1.0 | 0.082 |
| R-717 | 0.5 | 0.041 |
| R-718 | 0.2 | 0.016 |
| R-744 | 1.0 | 0.082 |
| R-764 | 1.0 | 0.082 |