

Air Pressure Relief Valves

Theory of Operation

All Bayco air relief valves are spring-loaded system-pressure actuated devices consisting of a valve disc held in a closed position against a valve seat by means of a spring. The pressure in the system to be protected acts on the valve disc and tends to open the valve; however, the spring load is set to ensure that at normal operating pressures, the pressure in the system is insufficient to open the valve. However, when the system pressure builds to a level where the pressure load on the valve disc is equal or near to the load exerted by the spring, the valve will begin to open. If the pressure in the system were to be held at this level, the load due to system pressure and the spring load would remain in equilibrium and the valve would be neither opened nor closed. In such circumstances the valve will tend to flutter on the valve seat and may release a small amount of air but will not be relieving significant pressure from the system. This point is known as the warning pressure, cracking pressure or hissing pressure.

If the pressure in the system continues to rise, the load acting on the face of the valve will also rise and will begin to exceed the load exerted by the spring. When the load due to system pressure exceeds the spring load, the valve will open and will remain open as long as the system pressure remains sufficient. This point is known as the opening pressure or set pressure (also referred to as rated or popping pressure). The difference between the crack pressure and opening pressure varies between valves and is related to the system flow rate. However, the two should not be confused as there is a significant difference in pressure between the two points.

If the system pressure continues to rise, the valve will continue to open and will relieve more and more air until the valve is fully open. At this point the valve will be relieving close to its maximum airflow rate; further increase in system pressure will show only relatively minor increases in flow rate. If the system pressure decreases, the relieving airflow rate will reduce and the valve will start to close. However, the valve will not fully re-seat until the pressure is below the opening pressure. This pressure is known as the Reseating Pressure and the difference between the two pressures is known as "blowdown".

In practice the valve should be matched to the system to be protected such that the maximum airflow rate of the valve is never utilized, i.e. the valve should be capable of relieving a sufficient volume flow rate of air at the opening pressure to ensure that the system pressure drops significantly. If the valve is open and the system pressure continues to rise above the opening pressure then the valve is relieving less air than is being put into the system. This is a potentially dangerous situation that may lead to over pressurization. The relieving airflow rate of an air relief valve at the maximum allowable system pressure, and ideally at the opening pressure, should be well in excess of the system input flow rate at that same pressure.

Periodic Inspection, Cleaning and Maintenance

Dixon Bayco air relief valves are designed and built to provide accurate and consistent operation; however periodic inspection, cleaning, and maintenance of these valves is required to ensure continued trouble free service.

Dixon Bayco air relief valves consist of a spring-loaded poppet valve that seals against a rigid annular valve seat. When the system pressure reaches the valve opening pressure, the poppet lifts and system air passes under the poppet and out to atmosphere. When a sufficient volume of air has been relieved, the system pressure will drop and the poppet will re-seat.

When these valves are used in applications that subject them to particulate laden air, there is potential for contamination of the valve. Larger particles such as grains, plastic pellets etc. can get trapped between the valve seating surfaces. Applications involving fine particles such as cement, fly ash, lime, flour etc. can result in a cementing of hardened product on the valve seat or poppet surface. These situations can prevent the valve from fully re-seating, prevent it from opening and can lead to early opening or leakage from the valve.

To prevent this from occurring we advise that air/vacuum relief valves be regularly inspected, cleaned and maintained. At a minimum the valve seat and poppet sealing surface should be inspected and cleaned, and the small air vent hole in the top casting checked for blockage. The inspection, cleaning, and maintenance should be carried out with the valve removed from the system, and in a clean environment.

All relief valves are available with threaded connections. In addition 2180, A2180 and A2182 series air relief valves are available with cam and groove adapter or grooved pipe connections. These types of connections make removal and installation of the valves much easier to allow for inspections, cleaning and maintenance.



Before servicing or removing any component from the pneumatic system, the blower must be turned off and all residual air released from the system.

Products for Blowers

Blower Air Relief Valves

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| Application: | Designed specifically for use on tractor mounted air blowers. The 2182 air relief valves have a temperature compensated pressure relief setting to accommodate the high temperatures and dynamic air produced by the blower. If a system blockage were to occur, the valves are designed to vent to atmosphere once the valve pressure setting is achieved. |
| Standards: | The 2182 valve will relieve at the ordered set pressure at a temperature of 400°F / 204°C. At room temperature (73°F / 22°C) the 2182 valve will relieve approximately 4 PSI higher than the ordered set pressure. The product label shows the set relief pressure at the blower operating temperature, plus the relief pressure at 73°F / 22°C (for testing purposes). Depending on the blower type, amount of vibration and operating temperature a difference of observable set pressure may occur. Example: 2182-18 is set to relieve at 18 PSI while at operating temperature. This same valve will test at 22 PSI while at room temperature on a test bench. Both set points are listed on the label. Available with 2" male or female NPT connections. |
| Materials: | Aluminum anodized hard coat body, white food grade silicone poppet and diaphragm |
| Features & Benefits: | <ul style="list-style-type: none"> • The popular pressure setting for truck mounted blowers is 20 PSI. Valves are available for other applications with temperature compensated pressure settings of between 3 PSI and 24 PSI. Customer should request set pressure at time of order. • High relieving capacity varies between 800 SCFM and 1700 SCFM depending upon the chosen set pressure. For specific relief rates please refer to our website or contact Dixon™. • Installed cup seal deters tampering • Anodized aluminum body reduces thread galling |

Dry Bulk Products



2182F




2182

| Part # | Connection |
|-----------------|--|
| 2182F/xx | 2" NPTF air relief valve with special factory setting, see note xx below |
| 2182F/18 | 2" NPTF air relief valve 18 PSI setting |
| 2182F/20 | 2" NPTF air relief valve 20 PSI setting |
| 2182/xx | 2" NPTM air relief valve with special factory setting, see note xx below |
| 2182/18 | 2" NPTM air relief valve 18 PSI setting |
| 2182/20 | 2" NPTM air relief valve 20 PSI setting |

- xx refers to choice of pressure setting, request the required pressure setting when ordering.
- See page 23 for air relief testing equipment

Trailer/Tank Mounted Air Relief Valves

Fixed Pressure Setting Valves

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|---------------------------------|--|
| Application: | Designed specifically for use on trailer tanks containing dry bulk products. If a system blockage were to occur the valves are designed to vent to atmosphere once the valve pressure setting is achieved. Not intended for blower service (for blower service applications see the 2182 series air relief valves shown on page 3)  |
| Standards: | Available with 2 set pressure tolerances: 1) 2180/3180 series have a +3/-0 set pressure tolerance (valve opens at set pressure plus 3 PSI) 2) A2180/A3180 series have a +1/-0 set pressure tolerance (valve opens at set pressure plus 1 PSI) • 2180/A2180 are available with 2" male or female NPT, cam and groove adapter or grooved pipe connections. • 3180/A3180 are available only with 3" female NPT connections |
| Materials: | Bayloy vent cowl with aluminum upper, bronze poppet with white food grade silicone diaphragm in the 2180/A2180, red silicone diaphragm in the 3180/A3180 |
| Features & Benefits: | <ul style="list-style-type: none"> • Available with a variety of pressure settings, see chart below for model specific available pressure settings. Customer should request set pressure at time of order. • Relieving capacity (SCFM) varies dependent upon model and pressure setting. See chart below, or for specific relief rates please refer to our website or contact Dixon™. • Installed cup seal deters tampering • Bayloy body eliminates thread galling • PVC coated wire lanyard available for securing air relief valves (see page 5) |



2180



2180B/15



2180V/15



3180

| Valve Series | Valve Connection | Available Factory Set Pressure Range (PSI) ¹ | Set Pressure Tolerance (PSI) | Diaphragm Material | Relieving Capacity (SCFM) ² |
|-----------------|---------------------------|---|------------------------------|---------------------------|--|
| 2180/xx | 2" female NPT | 2 to 25 | +3/-0 | white food grade silicone | 500 to 950 |
| 2180/15 | 2" NPTF air relief valve | 15 | +3/-0 | white food grade silicone | 500 to 950 |
| 2180/18 | 2" NPTF air relief valve | 18 | +3/-0 | white food grade silicone | 500 to 950 |
| A2180/xx | 2" female NPT | 2 to 27 | +1/-0 | white food grade silicone | 500 to 950 |
| 2180B/15 | 2" cam and groove adapter | 15 | +3/-0 | white food grade silicone | 500 to 950 |
| 2180V/15 | 2" grooved | 15 | +3/-0 | white food grade silicone | 500 to 950 |
| 3180/xx | 3" female NPT | 4 to 30 | +3/-0 | red silicone | 750 to 1500 |
| A3180/xx | 3" female NPT | 6 to 32 | +1/-0 | red silicone | 750 to 1500 |

¹ request the required pressure setting when ordering (xx refers to choice of pressure setting)

² relieving capacity (SCFM) varies with set pressure, for specific rates please refer to our website or contact Dixon™

- See page 28 for repair kits
- See page 23 for air relief testing equipment

Trailer/Tank Mounted Air Relief Valves

Adjustable Pressure Setting Valves

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|---------------------------------|---|
| Application: | <p>Designed specifically for use on trailer tanks containing dry bulk products. If a system blockage were to occur, the valves are designed to vent to atmosphere once the valve pressure setting is achieved. The advantage of the adjustable air relief valve is that the factory preset pressure can be tuned by -3/+3 PSI to meet tank/application specific pressure requirements (adjustments should be performed by either the tank builder or tank maintenance facility). Not intended for blower service (for blower service applications see the 2182 series air relief valves shown on page 3)</p> <p>Not Rated for ASME Coded Service Requirements</p> |
| Standards: | <p>Valves have a +1/-0 set pressure tolerance (valve opens at set pressure plus 1 PSI) and are adjustable by -3/+3 PSI.</p> <ul style="list-style-type: none"> A2180ADJ has a 2" female NPT and A3180ADJ has a 3" female NPT connection |
| Materials: | <p>Bayloy vent cowl with aluminum upper, bronze poppet with white food grade silicone diaphragm in the 2180/A2180, red silicone diaphragm in the 3180/A3180</p> |
| Features & Benefits: | <ul style="list-style-type: none"> Available with a variety of pressure settings, see chart below for model specific available pressure settings. Customer should request set pressure at time of order. The factory preset pressure can be tuned by -3/+3 PSI to meet tank/application specific pressure requirements (adjustments should be performed by either the tank builder or tank maintenance facility). Relieving capacity (SCFM) varies dependent upon model and pressure setting. See chart below, or for specific relief rates please refer to our website or contact Dixon™. Installed cup seal deters tampering Bayloy body eliminates thread galling |



Dry Bulk Products



A2180-xxADJ



A3180-xxADJ

| Valve Series | Valve Connection | Available Factory Set Pressure Range (PSI) ¹ | Set Pressure Tolerance (PSI) | Diaphragm Material | Relieving Capacity (SCFM) ² |
|--------------------|------------------|---|------------------------------|---------------------------|--|
| A2180/xxADJ | 2" female NPT | 9 to 30 | +1/-0 | white food grade silicone | 500 to 950 |
| A3180/xxADJ | 3" female NPT | 9 to 30 | +1/-0 | red silicone | 750 to 1500 |

¹ request the required pressure setting when ordering (xx refers to choice of pressure setting)

² relieving capacity (SCFM) varies with set pressure, for specific rates please refer to our website or contact Dixon™

- Relieving pressure is factory set at 21°C, high temperatures will affect the actual relieving pressure.
- See page 23 for air relief testing equipment

PVC Coated Lanyards



CAL15

| Part # | Description |
|--------------|--|
| CAL15 | 15" long PVC coated carbon steel cable, with aluminum crimp sleeves. One end is factory crimped, other end is un-crimped for field inspection. |
| CAL25 | 25" long PVC coated carbon steel cable, with aluminum crimp sleeves. One end is factory crimped, other end is un-crimped for field inspection. |

Product instruction sheets and technical data, can be viewed on our website at dixonvalve.com

Trailer/Tank Mounted Air Relief Valves

Dry Bulk Products

Vacuum Relief Valves

| | |
|----------------------|---|
| Application: | Designed specifically for use on trailer tanks containing dry bulk products. If a system blockage were to occur the valves are designed to open to atmosphere to help prevent the tank from imploding. |
| Standards: | These valves come with a set vacuum tolerance of +/-0.5 HG, available in 3 body sizes: <ul style="list-style-type: none"> • 1½" male NPT outlet (tank connection) x 1½" female NPT inlet (atmosphere) • 2" male NPT outlet (atmosphere) x 2" female NPT inlet (tank connection) • 3" female NPT outlet (tank connection) x 3" female NPT inlet (atmosphere) |
| Materials: | Bayloy body and bronze poppet |
| Features & Benefits: | <ul style="list-style-type: none"> • Available with a variety of vacuum settings, see chart below for model specific available pressure settings. Customer should request set pressure at time of order. • Relieving capacity (SCFM) varies deponent upon model and pressure setting. See chart below, or for specific relief rates please refer to our website or contact Dixon™. • Installed bolt seal deters tampering • Bayloy body eliminates thread galling |



1120



2120



3120

| Valve Series | Valve Outlet (Tank Connection) | Valve Inlet (Atmosphere) | Available Factory Set Vacuum Range (HG) ¹ | Set Pressure Tolerance (PSI) | Relieving Capacity (SCFM) ² |
|----------------|--|-----------------------------------|--|------------------------------|--|
| 1120/xx | 1½" male NPT outlet (tank connection) | 1½" female NPT inlet (atmosphere) | 6 to 24 | +/- 0.5 HG | 175 to 420 |
| 2120/xx | 2" male NPT outlet (tank connection) | 2" female NPT inlet (atmosphere) | 5 to 24 | +/- 0.5 HG | 280 to 600 |
| 3120/xx | 3" female NPT outlet (tank connection) | 3" female NPT inlet (atmosphere) | 11 to 25 | +/- 0.5 HG | 700 to 1350 |

¹ request the required pressure setting when ordering (xx refers to choice of pressure setting)

² relieving capacity (SCFM) varies with set pressure, for specific rates please refer to our website or contact Dixon™

Air Relief Valve Settings

Pressure Relief Valves Minimum and Maximum Settings

| Valve Series | Factory Setting | |
|------------------------------|---------------------|---------------------|
| | Minimum Setting | Maximum Setting |
| 2180 | 2 PSI | 25 PSI |
| A2180 | 2 PSI | 27 PSI |
| A2180ADJ ³ | 9 PSI ³ | 30 PSI ³ |
| 2182 | 3 PSI | 24 PSI |
| A2182 | 6 PSI | 27 PSI |
| 2215 ³ | 12 PSI ³ | 30 PSI ³ |
| 3180 | 4 PSI | 30 PSI |
| A3180 | 6 PSI | 32 PSI |
| A3180ADJ ³ | 9 PSI ³ | 30 PSI ³ |

Vacuum Relief Valves Minimum and Maximum Settings

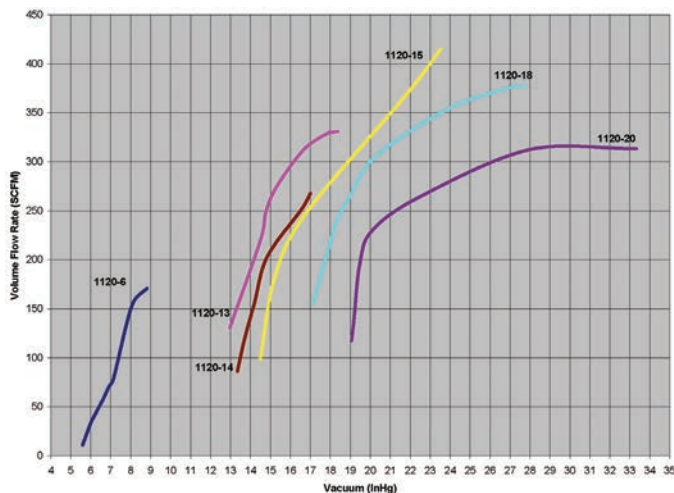
| Valve Series | Factory Setting | |
|--------------|-----------------|-----------------|
| | Minimum Setting | Maximum Setting |
| 1120 | 6" Hg | 24" Hg |
| 2120 | 5" Hg | 24" Hg |
| 3120 | 11" Hg | 25" Hg |

³ Customer adjustable by a further +/- 3 PSI. Settings below 9 PSI are obtainable by turning the valve adjustment screw. Example for an 8 PSI setting the valve adjustment would be +4/-2, for 7 PSI +5/-1 and for 6 PSI +6/-0. Settings above 30 PSI are obtainable by turning the valve adjustment screw. Example for a 31 PSI setting the valve adjustment would be +2/-4, for 32 PSI +1/-5 and for 33 PSI +0/-6

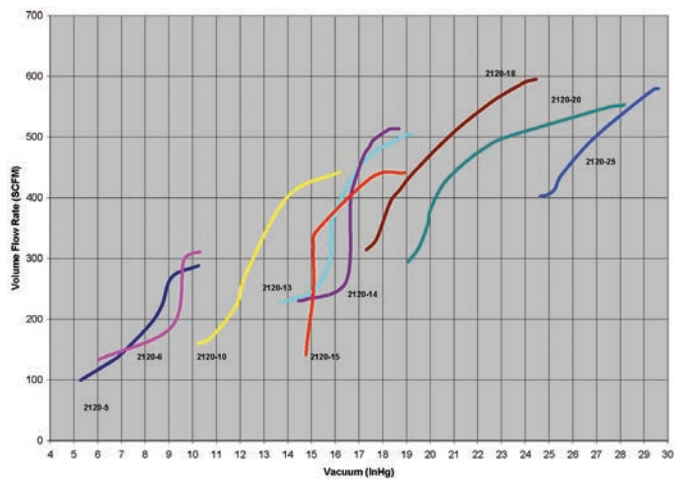
Trailer/Tank Mounted Air Relief Valves

Air Relief Valve Flow Rates

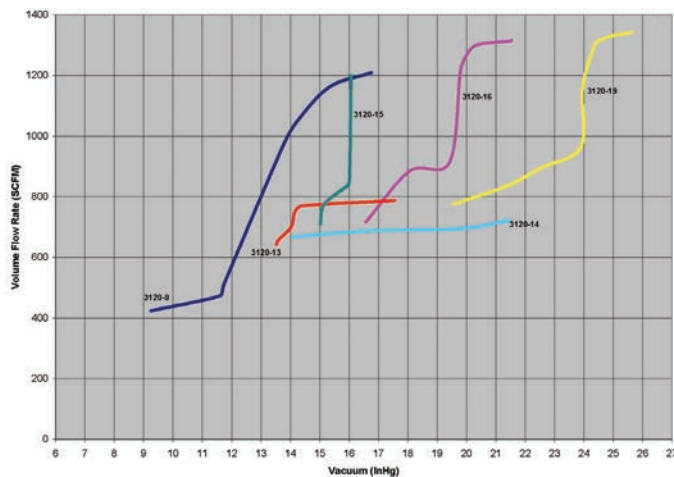
Flow Rate vs Vacuum



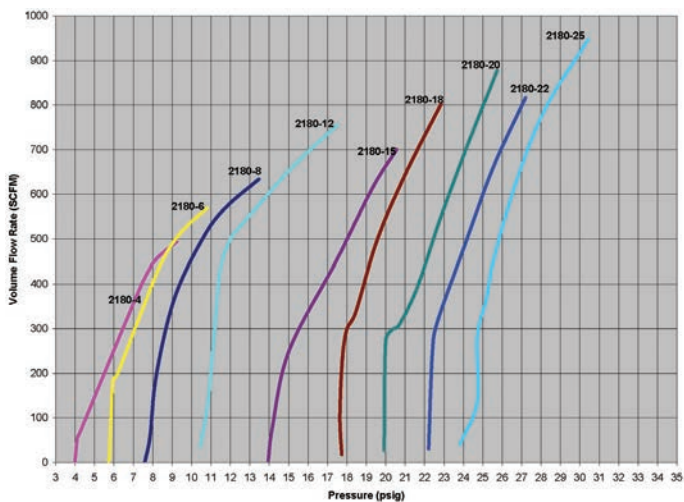
Flow Rate vs Vacuum



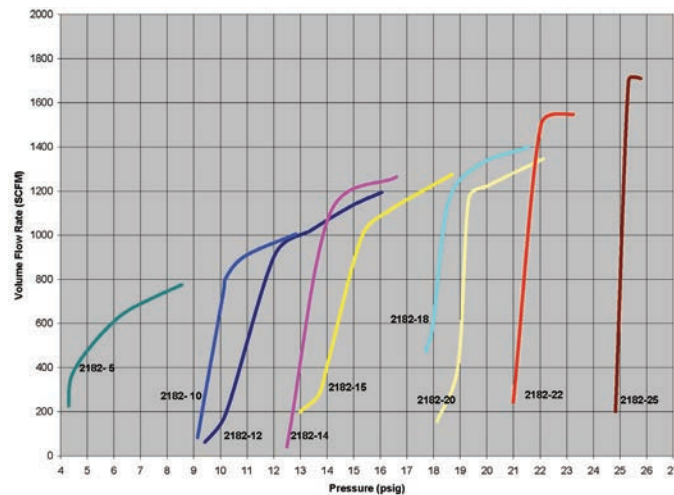
Flow Rate vs Vacuum



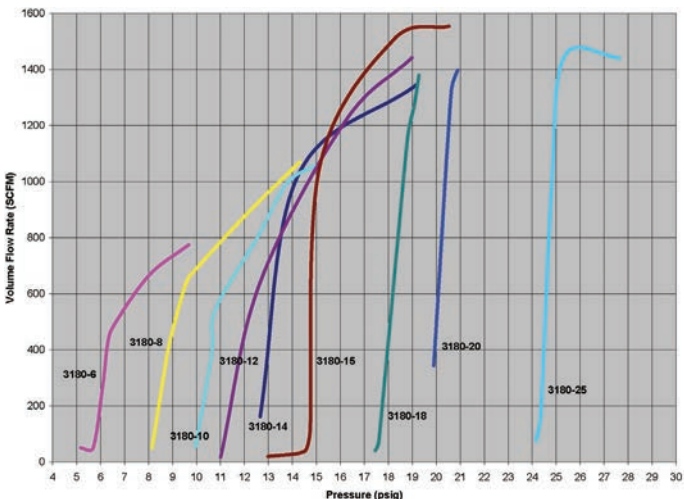
Flow Rate vs Pressure



Flow Rate vs Pressure



Flow Rate vs Pressure



Dry Bulk
Products