



# VAREC SERIES 5800B PRESSURE AND VACUUM RELIEF VALVE WITH FLAME ARRESTER ASSEMBLY INSTRUCTION, OPERATION AND MAINTENANCE MANUAL

Before installation these instructions must be fully read and understood



The Varec 5800B Pressure and Vacuum Relief Valves with Flame Arrester Assembly have not been tested by Varec under all possible operational conditions, and Varec does not have all the data relative to your application. The information in this instruction manual is not all-inclusive and does not and cannot take into account all unique situations. Consequently, you should review this product literature in view of your application. If you have any further questions, please contact Varec for assistance.

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Use of parts that are not manufactured or supplied by Varec voids any Varec warranty and relieves Varec of any obligation to service the product under warranty. Varec recommends the use of only Varec manufactured or supplied parts to maintain or service Varec 5800B Series Pressure and Vacuum Relief Valve with Flame Arrester Assembly.

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# VAREC SERIES 5800B PRESSURE AND VACUUM RELIEF VALVE WITH FLAME ARRESTER ASSEMBLY

## INSTRUCTION, OPERATION AND MAINTENANCE MANUAL

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### SAFETY PRECAUTIONS

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Read and understand this instruction manual before installing, operating or performing maintenance on Varec 5800B Series Pressure And Vacuum Relief Valve With Flame Arrester Assembly. Follow all precautions and warnings noted herein when installing, operating or performing maintenance on this equipment.

#### WARNING!

- *Unit must be isolated from tank pressure before servicing. All gas must be blocked and pressure safely vented.*
- *Flame Arrester should be installed upstream and no more than 15 feet from the ignition source for use in accordance with UL approval.*
- *Flame Arresters are not capable of stopping a flame front in mixtures of air with hydrogen, acetylene, ethylene oxide, or carbon disulfide.*

### SAFETY PRECAUTION DEFINITIONS

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#### CAUTION

*Damage to equipment may result if this precaution is disregarded.*

#### WARNING!

*Direct injury to personnel or damage to equipment which can cause injury to personnel may result if this precaution is not followed.*

### GENERAL

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The 5800B Series Pressure and Vacuum Relief Valve and Flame Arrester Assembly is a combination of the Varec 2010B/2020B Series Pressure and Vacuum Relief Valve and the Varec 5000 Series Flame Arrester. The unit is designed to protect low-pressure storage tanks, anaerobic digesters and gas-holders from excessive pressure and/or vacuum. In addition, it maintains system operating pressure so biogas is not routinely vented to atmosphere. The Flame Arrester protects from accidental ignition of the sludge gas within the low-pressure storage tank, anaerobic digesters, and gas-holders. The Arrester is designed to stop the propagation of flame from external sources. The combination valve and Flame Arrester is installed on the roof of low-pressure storage tanks, anaerobic digesters and gas-holders.

The 5810B Series Unit relieves pressure directly to the atmosphere. A weatherhood and mesh screen protects the valve pressure pallet and guideposts. In-breathing ambient air relieves vacuum pressure.

The 5820B Series Unit relieves pressure through an enclosed outlet adapter. Product vapors may be piped away rather than relieving directly to the atmosphere. In-breathing ambient air relieves vacuum pressure.

#### WARNING!

*Flame Arresters are not capable of stopping a flame front in mixtures of air with hydrogen, acetylene, ethylene oxide, or carbon disulfide.*

**Note:** Varec Flame Arresters bearing UL approval are tested for use in oil storage tanks, installed at no more than 15 feet from the open end of a vent pipe (Reference UL 525). These test conditions may not represent the actual service conditions or piping system design. API Publication 2028 states that the Flame Arrester should be independently tested under actual service conditions before installation.

### CONSTRUCTION

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Refer to Figure 01 for construction and assembly detail.

Standard materials of construction for the valve include cast body and cover(s). Pallets are dead weight loaded with lead or coated steel weights and include a flexible membrane-sealing insert. The pallet is loosely guided through a center stem and pallet guide posts. Protective screen is manufactured from high-density polyethylene.

The Flame Arrester is constructed of a heavy cast housing containing a removable multi-plate bank assembly with an extensible aluminum frame or a fixed stainless steel frame.

The "All-Weather" Models 5811B and 5821B Series Unit includes a special coating on portions of the pallets, seat rings and guides to eliminate ice accumulation.

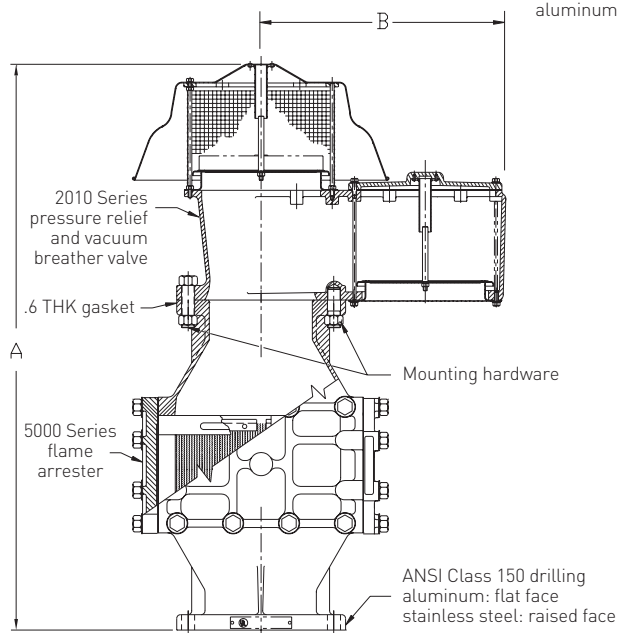
The maximum working pressure for the 5800B Series Unit is 2 PSIG (13.8 kPa). For material selection see Product Data Sheet PDS 5810WT.

# VAREC SERIES 5800B PRESSURE AND VACUUM RELIEF VALVE WITH FLAME ARRESTER ASSEMBLY

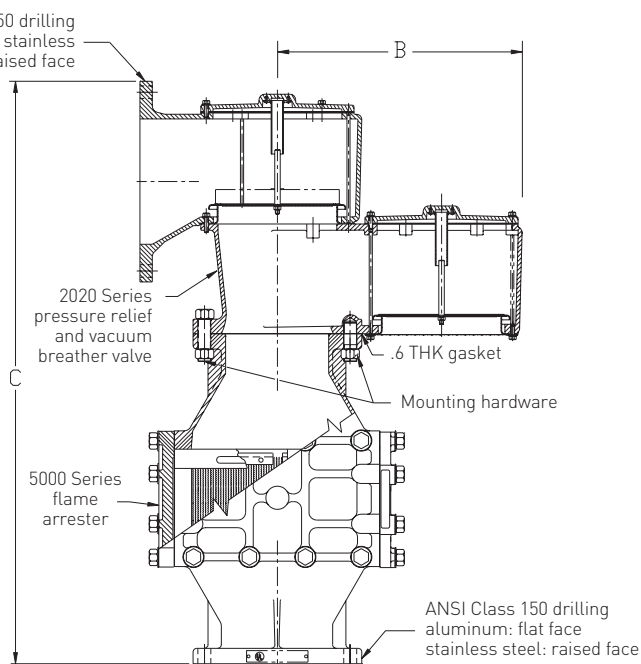
## INSTRUCTION, OPERATION AND MAINTENANCE MANUAL

### Dimensional layout and assembly

MODEL 5810B 'VENT TO ATMOSPHERE'



MODEL 5820B 'PIPE AWAY'



### SIZES AND DIMENSIONS

| Size | A<br>in. (mm)   | B<br>in. (mm)  | C<br>in. (mm)   |
|------|-----------------|----------------|-----------------|
| 2"   | 23.12<br>(587)  | 9.88<br>(251)  | 21.75<br>(552)  |
| 3"   | 26.25<br>(667)  | 12.25<br>(311) | 24.75<br>(629)  |
| 4"   | 31.25<br>(794)  | 12.44<br>(316) | 29.5<br>(749)   |
| 6"   | 39.81<br>(1011) | 15.56<br>(395) | 40.38<br>(1026) |
| 8"   | 49.12<br>(1248) | 19.56<br>(497) | 49.5<br>(1257)  |
| 10"  | 56.06<br>(1424) | 24.94<br>(633) | 56.06<br>(1424) |
| 12"  | 67.31<br>(1710) | 29.38<br>(746) | 66.44<br>(1688) |

# VAREC SERIES 5800B PRESSURE AND VACUUM RELIEF VALVE WITH FLAME ARRESTER ASSEMBLY

## INSTRUCTION, OPERATION AND MAINTENANCE MANUAL

### PRACTICAL LIMITATIONS

While Flame Arresters decrease the possibility of flame propagation in a system, certain variables must be evaluated to ensure safety. The relative fire hazard of flammable mixtures can be judged by the upper and lower explosive limits. These limits are expressed as percents by volume of the gas or vapor in air. The explosive range is that span of concentrations lying between the lower and upper limits. The upper limit is the point at which the mixture is too rich to burn, i.e., contains minimal oxygen to support combustion. The broader the explosive range, the easier it is to create an air-gas explosive mixture. Conversely, when an explosive range is narrow, the chance of developing a hazardous air-gas mixture disappears. Refer to Table 1 for lower and upper limits of gases and vapors.

### WARNING!

*In all cases where the ratio of the upper limit/lower limit exceeds 10, the use of Flame Arresters is not recommended. Also, the presence of any O<sub>2</sub> is dangerous because of the lack of homogeneity, which is possible in gas mixtures. Any surplus of oxygen provides the potential for rapid explosion.*

**TABLE 1**

| Product           | Limits in air percent |       | Product           | Limits in air percent |       | Product              | Limits in air percent |       |
|-------------------|-----------------------|-------|-------------------|-----------------------|-------|----------------------|-----------------------|-------|
|                   | Lower                 | Upper |                   | Lower                 | Upper |                      | Lower                 | Upper |
| Acetaldehyde      | 4.1                   | 55.0  | Ethyl-alcohol     | 4.3                   | 19.0  | Methyl-alcohol       | 7.3                   | 36.0  |
| Acetone           | 3.0                   | 11.0  | Ethyl-bromide     | 6.7                   | 11.3  | Methyl-chloride      | 10.7                  | 17.4  |
| Acetylene         | 2.5                   | 81.0  | Ethyl-chloride    | 3.8                   | 15.4  | Methyl-ethyl-ketone  | 1.8                   | 10.0  |
| Ammonia           | 15.0                  | 28.0  | Ethyl-ether       | 1.9                   | 48.0  | Methyl-formate       | 5.9                   | 20.0  |
| Benzene           | 1.4                   | 7.1   | Ethyl-formate     | 2.7                   | 13.5  | Methyl-propyl-ketone | 1.5                   | 8.0   |
| Benzine           | 1.1                   | -     | Ethylene          | 3.1                   | 32.0  | Natural gas          | 3.8                   | 17.0  |
| Blast furnace gas | 35.0                  | 74.0  | Furfural          | 2.1                   | -     | Norane               | 0.8                   | -     |
| Butadiene         | 2.0                   | 11.5  | Gasoline          | 1.4                   | 7.6   | Octane               | 1.0                   | -     |
| Butane            | 1.9                   | 8.5   | Hexane            | 1.2                   | 7.5   | Pentane              | 1.5                   | 7.8   |
| Butylene          | 2.0                   | 9.6   | Heptane           | 1.2                   | 6.7   | Propane              | 2.1                   | 9.5   |
| Carbon disulphide | 1.3                   | 44.0  | Hydrocyanic acid  | 6.0                   | 41.0  | Propyl-alcohol       | 2.1                   | 13.5  |
| Carbon monoxide   | 12.5                  | 74.0  | Hydrogen          | 4.0                   | 75.0  | Propylene            | 2.4                   | 10.3  |
| Cyclohexane       | 1.3                   | 8.0   | Hydrogen-sulphide | 4.3                   | 5.0   | Pyridine             | 1.8                   | 12.4  |
| Cyclopropane      | 2.4                   | 10.4  | Isobutane         | 1.8                   | 8.4   | Styrene              | 1.1                   | 6.1   |
| Decane            | 0.8                   | 5.4   | Isopentane        | 1.4                   | 7.6   | Toluene              | 1.4                   | 6.7   |
| Ethane            | 3.0                   | 12.5  | Isopropyl-alcohol | 2.0                   | 12.0  | Water gas            | 7.0                   | 72.0  |
| Ethyl-acetate     | 2.5                   | 9.0   | Methane           | 5.3                   | 14.0  | Xylene               | 1.0                   | 6.0   |

Reference: Bureau of mines bulletin 503, limits of flammability of gases and vapors, 1952

# VAREC SERIES 5800B PRESSURE AND VACUUM RELIEF VALVE WITH FLAME ARRESTER ASSEMBLY

## INSTRUCTION, OPERATION AND MAINTENANCE MANUAL

### OPERATION

When the internal tank pressure approaches the valve setting, the pressure pallet in the valve begins to lift. As the pressure exceeds the valve setting, the pressure pallet lifts off the seat ring. Excess product vapor is allowed to vent to the atmosphere, or through the pipe away system adapter, relieving the over pressure condition. The valve pallet automatically re-seats as the tank pressure drops below the valve setting.

If a vacuum within the tank approaches the valve setting, the vacuum pallet in the valve begins to lift. As the vacuum exceeds the valve setting, the vacuum pallet lifts off the seat ring. Atmospheric air is allowed to flow into the tank, relieving the excess vacuum condition. The pallet automatically re-seats as the vacuum drops below the valve setting.

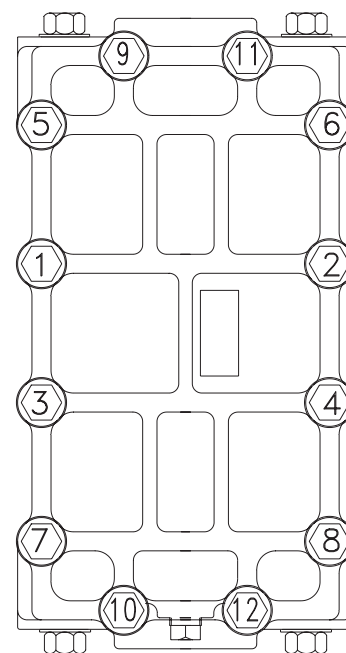
Flame Arresters in the unit does not prevent the ignition of flammable mixtures, but prevents the propagation of flame in case of ignition. The Flame Arrester stops the propagation of flame by absorbing and dissipating heat through the surface area of the bank sheets. Heat is absorbed as ignited gas attempts to pass through the small passages within the bank assembly. This action lowers the temperature of the gas below its ignition point and quenches the flame.

### INSTALLATION

The 5800B Series Pressure and Vacuum Relief Valve with Flame Arrester Assembly must be mated with the appropriate flange(s). Note that a Flame Arrester with aluminum housing should be mated with an ANSI 125 Flat Face Flange. The 316 SS housing should be mated with an ANSI 150 RF Flange. The Flame Arrester must be located with clearance allowed for removal of the bank assembly. The nozzle must be plumb and the inlet flange face level to ensure proper operation of the pressure and vacuum relief valve.

1. Remove the unit from the shipping container. Remove flange protectors. Inspect for and remove any packing or other loose material in the inlet/outlet chambers of the Flame Arrester housing, and check to see if extra loading weights for the valve were bagged and packed separately.
2. Remove the weather hood and/or cover(s) and all packing material above the pallets and within the valve. Remove the cover and extract bank assembly. Inspect for shipping debris or damage, and correct as required. Insert bank assembly and replace cover. Install all cap screws hand tight. Cross Tighten all cap screws evenly around cover per Bolt Tightening Sequence. Torque to 40-50 ft-lbs.

### BOLT TIGHTENING SEQUENCE



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### WARNING!

The aluminum back assembly weighs anywhere from 10 to 80 pounds (4 to 40 kg). The 316 SS assembly is substantially heavier. Use the appropriate tools and equipment when handling these units to avoid injury.

### CAUTION

Whenever the valve weather hood and/or cover(s) is removed and reinstalled, the end of the pallet stem must engage the stem guide in the weather hood and/or the stem guide chamber in the cover(s) for proper seating and valve operation.

3. To load vacuum pallet weights on the valve, perform the following:
  - a) With vacuum cover and gasket removed, remove vacuum pallet assembly from body.
  - b) Remove grip ring from pallet stem.
 

**Note:** spun sheet metal pallets have a compensating weight on top of the pallet. Do not remove this weight. Refer to Table 2 for incremental weight information.

- c) Non-variable setting: locate weight marked "Vacuum" and place on top of compensating weight and/or pallet. Secure with grip ring.
 

**Note:** if setting is less than 2" WC, weight will be pre-loaded on the pallet.
- d) Variable setting: each lead weight is calibrated from 1" WC increment. (Increments of ¼" WC and ½" WC may be supplied on special order). Those weights necessary for the initial specified setting will be tagged separately from any extra weight provided. Remove the packaging on the weights tagged from the initial specified setting and place the weights on top of the compensating weight. Secure with grip ring. Store remaining weights for future use (in case the setting needs to be increased).
- e) Weigh entire pallet assembly (including installed weights). Using Table 2, confirm that the assembly is the proper weight to achieve the required setting. Allowable weight tolerance is: +5%, -5%.

**TABLE 2 - PALLET LOADING (INCLUDES WEIGHT OF PALLET)**

| Valve size | Ounces of weight required per ounce of setting | Ounces of weight required per inch of WC setting |
|------------|--|--|
| 2"         | 8.3  | 4.8  |
| 3"         | 16.8   | 9.7  |
| 4"         | 22.1   | 12.8   |
| 6"         | 43.4   | 25.1   |
| 8"         | 72.7   | 42.0   |
| 10"        | 120.1  | 69.4   |
| 12"        | 179.9  | 104.0  |

Weight tolerance: + 5%/- 5%  
 Setting tolerance: + 0%/- 10%

# VAREC SERIES 5800B PRESSURE AND VACUUM RELIEF VALVE WITH FLAME ARRESTER ASSEMBLY

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- f) Remove any remaining packing material from valve body. Wipe vacuum seat ring, guide posts and pallet assembly with a soft cloth to remove any material which could affect valve operation.
  - g) Place pallet assembly on valve body seat. Ensure that pallet moves freely within guideposts and rests flat on the seat ring.
  - h) Replace the cover gasket and cover. Tighten cover screws uniformly. As shown in Bolt Tightening Sequence (see page 5).
- f) Remove any remaining packing material from valve body. Wipe pressure seat ring, guide posts and pallet assembly with a soft cloth to remove any material which could affect valve operation.
  - g) Place pallet assembly on seat. Ensure that pallet moves freely within guideposts and rests flat on the seat ring.
  - h) Replace the weatherhood on Model 2010B or the pressure cover and gasket on Model 2020B. Tighten all nuts and screws uniformly.

### CAUTION

*The end of the pallet stem must engage the stem guide chamber in the cover for proper seating and valve operation.*

4. To load pressure pallet weights on the valve, perform the following:
  - a) With weather hood from Model 2010B, or pipe away adapter cover and gasket from Model 2020B removed, remove pressure pallet assembly from body.
  - b) Remove grip ring from pallet stem.  
**Note:** spun sheet metal pallets have a compensating weight on top of the pallet. Do not remove this weight. Refer to Table 2 for incremental weight information.
  - c) Non-variable setting: locate weight marked "Pressure" and place on top of compensating weight and/or pallet. Secure with grip ring. If setting is less than 2" WC, weight will be pre-loaded on the pallet.
  - d) Variable setting: each lead weight is calibrated from 1" WC increment. (Increments of ¼" WC and ½" WC may be supplied on special order). Those weights necessary for the initial specified setting will be tagged separately from any extra weight provided. Remove the packaging on the weights tagged from the initial specified setting and place the weights on top of the compensating weight. Secure with grip ring. Store remaining weights for future use (in case the setting needs to be increased).
  - e) Weigh entire pallet assembly (including installed weights). Using Table 2 (see page 6), confirm that the assembly is the proper weight to achieve the required setting. Allowable weight tolerance is: +5%, -5%.

### CAUTION

*The end of the pallet stem must engage the stem guide in the weather hood or the stem guide chamber in the cover for proper seating and valve operation.*

5. Place the valve in a level position. Reach up through the inlet flange and carefully push up on the pressure pallet, then lower it onto the seat. Pallet should move up and down freely and rest flat on the seat ring.
6. Check the vacuum pallet by using a non-sparking tool, which will pass through the center of the mesh screen. Push up on the vacuum pallet, then lower it onto the seat. Pallet should move freely and rest flat on the seat ring.
7. Place the appropriate full-face flange gasket (by others) on the flange.

### CAUTION

*Do not mate a flat face flange to a raised face flange.*

*If it necessary to mate an ANSI Class 125 F.F. flange with an ANSI Class 150 R.F. flange, use the proper spacer to convert the raised face to a flat face.*

8. Verify that the unit is level to permit proper operation of the valve pallets and the Flame Arrester bank assembly can be readily extracted for inspection and maintenance. Install mounting hardware, and tighten uniformly.
9. When using Model 5820B Series, install connecting piping (if required) to outlet flange. Use a full-faced gasket and tighten all mounting hardware uniformly.
10. The unit is now installed and ready for use.  
**Note:** it is recommended that steel and iron valves be given a coat of paint immediately after installation is completed. Apply paint to external surfaces only.

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### MAINTENANCE

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The unit should be inspected and cleaned at periodic intervals. The frequency of inspection is determined by the application. Consideration should be given to the amount of nature of water or solids in the gas, and the corrosiveness of the process stream. Most importantly, the Flame Arrester bank sheets must be kept clean to prevent a decrease in gas flow through the system and loss of heat absorbing efficiency.

Generally, the first inspection should be made approximately 30 days after commissioning. Subsequent inspections should be made every 30 days unless excessive deposits or foreign matter accumulation is apparent. Thus, inspection frequency should be increased. Adjust the inspection frequency to ensure free and unrestricted flow through the Flame Arrester.

#### WARNING!

*Failure to properly maintain the unit could result in reduction of safety and impairment of system operation.*

#### WARNING!

- *The unit must be isolated from tank pressure before servicing. All gas must be blocked and pressure safely vented. If no isolation valve is present, carefully open vacuum cover or lift pressure pallet, allowing pressure to vent slowly.*
- *Ensure that the Flame Arrester is cool after a fire.*
- *Wear appropriate gloves and/or breathing apparatus if hazardous vapors are present.*

#### A. Pressure and vacuum relief valve

1. To inspect valve proceed as follows:
  - a) Remove the weather hood and/or cover(s).
  - b) Remove pallets one at a time. Identify the pallets to ensure they are returned to the correct valve seat.

- c) Inspect pallet inserts for ripples, tears, or nicks, as well as seating surfaces for debris, abrasion or pitting. Pallet edges and guide posts should be free of burrs, corrosion or other obvious damage. Clean all components, replacing any showing excess wear or damage. On the "All-Weather" versions, inspect the Teflon coating for any damage that would affect operation.
- d) Reassemble in reverse order.

#### CAUTION

*The end of the pallet stem must engage the stem guide in the weather hood and/or the stem guide chamber in the cover(s) for proper seating and valve operation.*

#### CAUTION

*During periods of freezing weather, extra maintenance is required for Models 2010B/2020B/3500. Either remove the pallets or apply generous portions of silicone grease to the pallets, seat rings and guide posts. When using silicone grease, inspect valves at least weekly. This procedure is not required for "All-Weather" Models 2011B, 2021B or 3501.*

2. To replace pallet insert proceed as follows:
  - a) Remove weather hood and/or cover(s) and then pallet assembly.
  - b) Remove nut from base of pallet stem. Remove retainer plate and insert. Clean all surfaces and threads. Install new insert, handling carefully to avoid damaging insert or pallet. Apply a bead of silicone at base of pallet stem threads prior to installing securing nut.
  - c) Reassemble pallet and place on seat of valve body. Ensure pallet assembly moves freely within guideposts and rests flat on seat ring.
  - d) Reinstall weather hood and/or cover(s).

#### CAUTION

*The end of the pallet stem must engage the stem guide in the weather hood and/or the stem guide chamber in the cover(s) for proper seating and valve operation.*



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3. To replace pressure seat ring perform the following:
  - a) For Model 2010B, remove weather hood, screen, spacer ring, pallet assembly and guide posts. For Model 2020B, remove pressure cover, spacer (high setting), gaskets, pallet assembly, outlet adapter, and guide posts.
  - b) Remove seat ring from valve body. Clean body and outlet adapter mating surfaces and apply a thin, uniform coat of silicone evenly on mating surfaces.
  - c) Install new seat ring carefully to avoid distortion. Reassemble guides posts (2010B) or outlet adapter (2020B) to secure seat. Ensure that seat is flush and level with valve body.
  - d) Reassemble guides posts (2020B).
  - e) Place pallet assembly on valve body seat. Ensure pallet assembly moves freely within guide posts and rest flat on seat ring.
  - f) Reassemble remaining parts in reverse order.
5. Seat ring repair:
  - a) Seat may be ground or ground and lapped (in place) to improve seal. Use a lapping plate and medium valve grinding compound, applying light pressure.
  - b) Finish lapping with a fine compound. Avoid scoring or removing excessive amounts of material.
  - c) Clean all compound from valve parts.
  - d) Hand buff seat with a medium grade 'Scotch-Brite' (#7447) pad and light oil.

### CAUTION

*Whenever the weather hood and/or cover(s) is removed and reinstalled, the end of the pallet stem must engage the stem guide in the weather hood and/or the stem guide chamber in the cover(s) for proper seating and valve operation.*

### B. Flame arrester

1. Remove the cover cap screws and cover plate. Pull-out the bank assembly by using the bank handle. If desired, the bank assembly may be removed from the housing.

### CAUTION

*The end of the pallet stem must engage the stem guide in the weather hood or the stem guide chamber in the cover for proper seating and valve operation.*

4. To replace vacuum seat ring perform the following:
  - a) Remove vacuum cover, spacer (high setting), gaskets, pallet assembly, screen retainer, screen and guide posts.
  - b) Remove seat ring from valve body. Clean body-mating surface and apply a thin, uniform coat of silicone evenly on mating surfaces.
  - c) Install new seat ring carefully to avoid distortion. Reassemble screen and retaining ring to secure seat ring. Ensure that seat is flush and level with valve body.
  - d) Reassemble guides posts.
  - e) Place pallet assembly on valve body seat. Ensure pallet assembly moves freely within guideposts and rests flat on seat ring.
  - f) Reassemble spacer, cover and gaskets.

### CAUTION

*The end of the pallet stem must engage the stem guide chamber in the cover for proper seating and valve operation.*

### WARNING!

*The aluminum back assembly weighs anywhere from 10 to 80 pounds (4 to 40 kg). The 316 SS assembly is substantially heavier. Use the appropriate tools and equipment when handling these units to avoid injury.*

- a) Aluminum Frame – extend the frame to its full open position. Both sides of each grid sheet may be inspected and cleaned without removal from the frame.
  - b) 316 SS Frame – It is non-extensible and must be disassembled to access the bank sheets.
2. Check for corrosion, bent, warped, or otherwise damaged sheets that could cause an opening for a direct flame path. Replace with a full bank sheet if necessary.
  3. Bank assembly cleaning procedure is based on the type of residue to be removed. Determine if residue type is Group I, II, or III. Follow the cleaning procedures for the selected group.

### WARNING!

*Use all volatile and flammable solvents carefully to avoid ignition or prolonged breathing. Use protective clothing and gloves when using acid to avoid burns from contact with skin.*

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### Group I

Residue type: soil, sand, pollen, and metallic salts.

Cleaning procedure:

- a) Wash bank sheets with a mild solvent such as petroleum naphtha or commercial petroleum derived cleaning fluids.
- b) Rinse sheets with a solvent that does not leave an oily film. This is necessary to avoid collecting foreign matter.
- c) Blow-out dry particles with compressed air.
- d) Wash bank sheets with hot water.
- e) Steam bank assembly clean.

### Group II

Residue type: metallic oxides and metallic carbonates

Cleaning procedures:

- a) Wash bank sheets as described in Group I, Step a.
- b) Soak entire bank assembly in cold 35% nitric acid.

### CAUTION

Use acid only on aluminum or stainless steel bank assemblies. Do not use on carbon steel or monel.

**Note:** if residue still remains, place the bank assembly in boiling 35% nitric acid. Once all residue is removed, soak the bank assembly in a solution of baking soda and water (8 ounce baking soda to 3 gallons water) to neutralize any remaining acid. Blow dry using compressed air.

### Group III

Residue type: organic tars, organic gums and sulfur organic residues

Cleaning procedures:

- a) Wash bank sheets as described in Group I, Step a.
- b) Blow-out with compressed air.
- c) Wash bank sheets with a strong solvent such as benzol, xyol, carbon tetrachloride, acetone, carbon disulfide, paint thinner (not lacquer), or a mixture of 1/3 each of benzol, alcohol and acetone.

4. If residue cannot be removed by the above procedures, replace with a new bank assembly.

### WARNING!

*Clogged bank assembly can restrict the flow and reduce its ability to stop flame propagation.*

5. Place the bank assembly into the arrester housing. Install new gasket, cover plate, and cap screws.
  - a) Aluminum frame – it may not go entirely back into place. The force needed to compress the bank into place is supplied by tightening cover plate cap screws.
  - b) 316 SS frame – the cover should close readily.
6. Install all cap screws hand tight. Cross tighten all cap screws evenly around cover per Bolt Tightening Sequence (see page 5). Torque to 40-50 ft-lbs.
7. The flame arrester is ready to be placed back in service. Perform soap test. If any leakage is detected, tighten the cap screws again (maximum torque not to exceed 60 ft-lb).

### CALIBRATION

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It is important to verify setting of the pressure and vacuum relief valve of the assembly, calculate the total necessary weight using Table 2 (see page 6). Check this value against the actual weight of the pallet assembly (including loading weights). Adjust loading weights as required per Installation Steps 3 or 4.

# VAREC SERIES 5800B PRESSURE AND VACUUM RELIEF VALVE WITH FLAME ARRESTER ASSEMBLY

## INSTRUCTION, OPERATION AND MAINTENANCE MANUAL

### REPLACEMENT PARTS

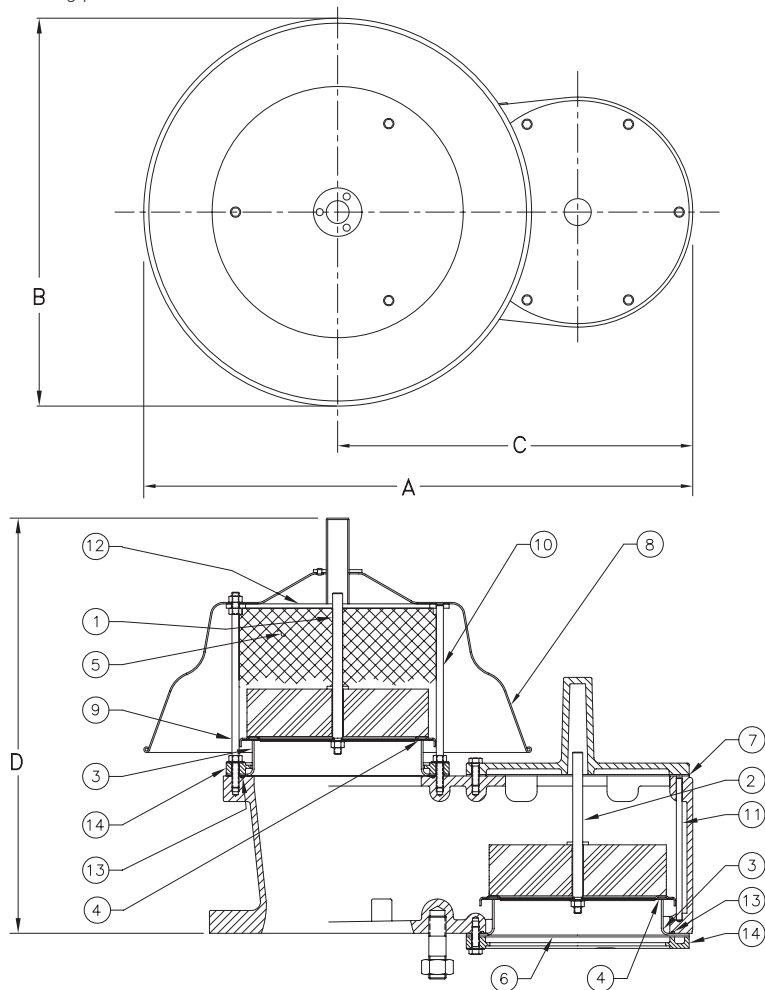
#### Pressure and vacuum relief valve

##### A. Model 2010B

When ordering replacement parts, specify relief valve by model number, pipe size and serial number. Identify replacement parts by part number, description and material where possible.

FIGURE 1 - 2010B LOW SETTING

Drilling per ANSI Class 150



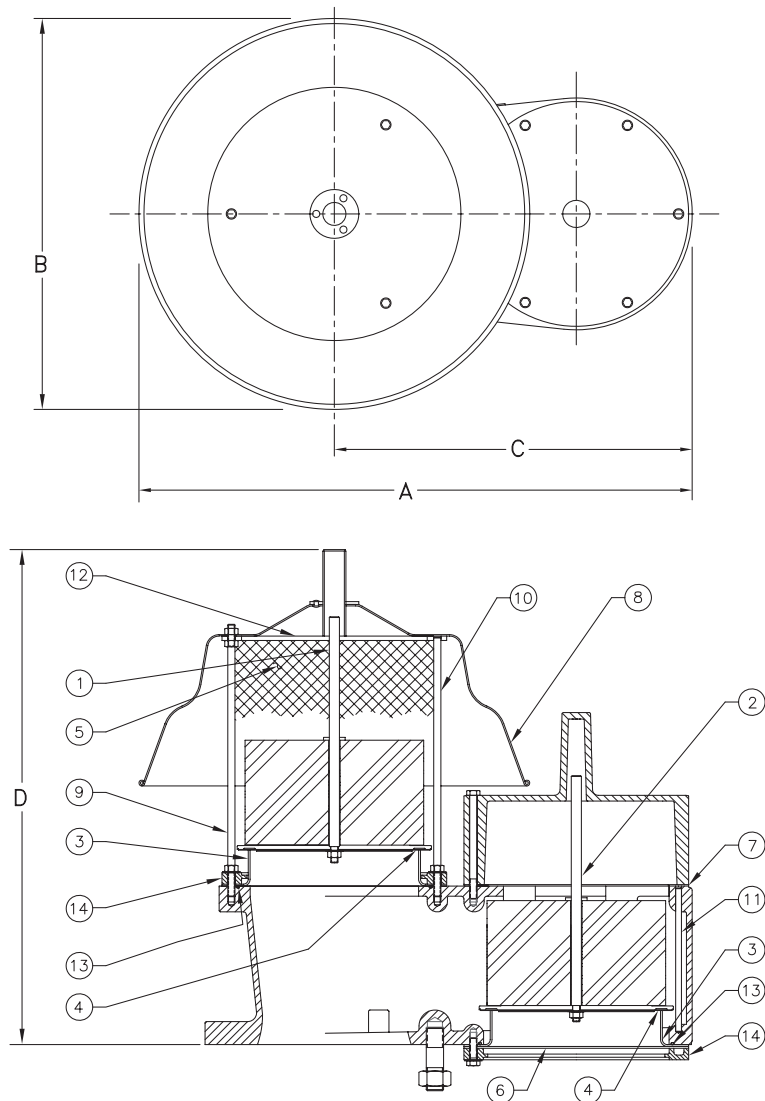
#### SIZES AND DIMENSIONS

| Size | A<br>in. (mm)   | B<br>in. (mm)  | C<br>in. (mm)  | D<br>in. (mm)  |
|------|-----------------|----------------|----------------|----------------|
| 2"   | 14.12<br>(359)  | 8.50<br>(216)  | 9.88<br>(251)  | 10.44<br>(265) |
| 3"   | 17.56<br>(446)  | 10.75<br>(273) | 12.12<br>(311) | 12.31<br>(313) |
| 4"   | 19.12<br>(486)  | 13.38<br>(340) | 12.44<br>(316) | 14.56<br>(370) |
| 6"   | 24.00<br>(610)  | 17.00<br>(432) | 15.56<br>(395) | 18.25<br>(464) |
| 8"   | 29.88<br>(759)  | 20.63<br>(524) | 19.56<br>(497) | 21.75<br>(552) |
| 10"  | 38.44<br>(976)  | 27.00<br>(686) | 24.94<br>(633) | 27.56<br>(700) |
| 12"  | 46.38<br>(1178) | 34.00<br>(864) | 29.38<br>(746) | 32.94<br>(837) |

# VAREC SERIES 5800B PRESSURE AND VACUUM RELIEF VALVE WITH FLAME ARRESTER ASSEMBLY

## INSTRUCTION, OPERATION AND MAINTENANCE MANUAL

FIGURE 2 - 2010B HIGH SETTING  
Drilling per ANSI Class 150



### SIZES AND DIMENSIONS

| Size | A<br>in. (mm)   | B<br>in. (mm)  | C<br>in. (mm)  | D<br>in. (mm)  |
|------|-----------------|----------------|----------------|----------------|
| 2"   | 14.12<br>(359)  | 8.50<br>(216)  | 9.88<br>(251)  | 13.31<br>(338) |
| 3"   | 17.56<br>(446)  | 10.75<br>(273) | 12.25<br>(311) | 15.25<br>(387) |
| 4"   | 19.12<br>(486)  | 13.38<br>(340) | 12.44<br>(316) | 17.25<br>(438) |
| 6"   | 24.00<br>(610)  | 17.00<br>(432) | 15.56<br>(395) | 21.56<br>(548) |
| 8"   | 29.88<br>(759)  | 20.63<br>(524) | 19.56<br>(497) | 24.81<br>(630) |
| 10"  | 38.44<br>(976)  | 27.00<br>(686) | 24.94<br>(633) | 29.50<br>(749) |
| 12"  | 46.38<br>(1178) | 34.00<br>(864) | 29.38<br>(746) | 32.94<br>(837) |

# VAREC SERIES 5800B PRESSURE AND VACUUM RELIEF VALVE WITH FLAME ARRESTER ASSEMBLY INSTRUCTION, OPERATION AND MAINTENANCE MANUAL

**TABLE 3 - MODEL 2010B REPLACEMENT PARTS**

| Item |                          |                                   |                                | Nominal pipe size |              |              |              |              |              |              |              |              |
|------|--------------------------|-----------------------------------|--------------------------------|-------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| No.  | Description              | Usage                             | Material                       | 2"                | 3"           | 4"           | 6"           | 8"           | 10"          | 12"          |              |              |
| 1*   | Pressure pallet assembly | Low set                           | Alum.                          | 06-11485-301      | 06-11485-401 | 06-11485-501 | 06-11485-601 | 06-11485-701 | 06-11485-801 | 06-11485-901 |              |              |
|      |                          | High set                          | Alum.                          | 06-11486-101      | 06-11486-201 | 06-11486-301 | 06-11486-401 | 06-11486-501 | 06-11486-601 | 06-11486-701 |              |              |
|      |                          | Low set                           | 316 SST                        | 06-11485-306      | 06-11485-406 | 06-11485-506 | 06-11485-606 | 06-11485-706 | 06-11485-806 | 06-11485-906 |              |              |
|      |                          | High set                          | 316 SST                        | 06-11486-106      | 06-11486-206 | 06-11486-306 | 06-11486-406 | 06-11486-506 | 06-11486-606 | 06-11486-706 |              |              |
| 2*   | Vacuum pallet assembly   | Low set                           | Alum.                          | 06-11485-101      | 06-11485-201 | 06-11485-001 | 06-11485-601 | 06-11485-701 | 06-11485-801 | 06-11485-901 |              |              |
|      |                          | High set                          | Alum.                          | 06-11486-101      | 06-11486-201 | 06-11486-301 | 06-11486-401 | 06-11486-501 | 06-11486-601 | 06-11486-701 |              |              |
|      |                          | Low set                           | 316 SST                        | 06-11485-106      | 06-11485-206 | 06-11485-006 | 06-11485-606 | 06-11485-706 | 06-11485-806 | 06-11485-906 |              |              |
|      |                          | High set                          | 316 SST                        | 06-11486-106      | 06-11486-206 | 06-11486-306 | 06-11486-406 | 06-11486-506 | 06-11486-606 | 06-11486-706 |              |              |
| 3*   | Seat ring                | All                               | Alum.                          | 02-10438-001      | 02-10251-001 | 02-05464-001 | 02-05478-001 | 02-05482-001 | 02-05487-001 | 02-05499-001 |              |              |
|      |                          | All                               | 316 SST                        | 02-10438-006      | 02-10251-006 | 02-05464-006 | 02-05478-006 | 02-05482-006 | 02-05487-006 | 02-05499-006 |              |              |
| 4    | Pallet insert            | All                               | PTFE                           | 02-10361-093      | 02-09704-093 | B12741-093   | B12742-093   | B12743-093   | B12744-093   | B13288-093   |              |              |
| 5    | Pressure screen          | Low set                           | HDPE                           | 02-10439-051      | 02-10323-051 | B16209-351   | B14390-151   | B14390-251   | B14390-351   | B14390-451   |              |              |
|      |                          | High set                          | HDPE                           | 02-10439-151      | 02-10323-151 | B16209-451   | B14390-551   | B14390-651   | B14390-751   | B14390-851   |              |              |
| 6    | Vacuum screen            | All                               | HDPE                           | 02-11547-051      | 02-11547-151 | 02-11547-251 | 02-11547-351 | 02-11547-451 | 02-11547-551 | 02-11547-651 |              |              |
| 7    | Cover and spacer gasket  | Low set                           | Fiber                          | 02-11380-071      | 02-11381-071 | 02-11382-071 | 02-11383-071 | 02-11384-071 | 02-11385-071 | 02-11386-071 |              |              |
|      |                          | High set                          | NBR                            | 02-11380-075      | 02-11381-075 | 02-11382-075 | 02-11383-075 | 02-11384-075 | 02-11385-075 | 02-11386-075 |              |              |
| 8    | Hood                     | Low press. set with low vac set   | Alum.                          | 06-11136-01       | 06-11136-02  | 06-11136-08  | 06-11137-01  | 06-11137-02  | 06-11137-03  | 06-11137-04  |              |              |
|      |                          |                                   | Steel                          | 02-10455-003      | 02-10310-003 | 02-10066-103 | D6064-203    | C6433-203    | C6436-203    | C6500-203    |              |              |
|      |                          | High press. set with low vac set  | Alum.                          | 06-11136-01       | 06-11136-02  | 06-11136-03  | 06-11137-01  | 06-11137-02  | 06-11137-03  | 06-11137-04  |              |              |
|      |                          |                                   | Steel                          | 02-10455-003      | 02-10310-003 | 02-10066-103 | D6064-203    | C6433-203    | C6436-203    | C6500-203    |              |              |
|      |                          | Low press. set with high vac set  | Alum.                          | 06-11545-01       | 06-11545-02  | 06-11545-03  | 06-11137-05  | 06-11137-06  | 06-11137-07  | 06-11137-08  |              |              |
|      |                          |                                   | Steel                          | 02-11197-003      | 02-11199-003 | 02-11045-203 | 02-11004-003 | 02-11006-003 | 02-11007-003 | C6500-203    |              |              |
|      |                          | High press. set with high vac set | Alum.                          | 06-11545-01       | 06-11545-02  | 06-11545-04  | 06-11137-01  | 06-11137-02  | 06-11137-03  | 06-11137-04  |              |              |
|      |                          |                                   | Steel                          | 02-11197-103      | 02-11199-103 | 02-11045-303 | D6064-203    | C6433-203    | C6436-203    | C6500-203    |              |              |
|      |                          | 9*                                | Press. guide post (hood atm't) | Low set           | 316 SST      | 02-11411-106 | 02-11411-206 | 02-11412-106 | 02-11413-106 | 02-11413-206 | 02-11415-106 | 02-11415-206 |
|      |                          |                                   |                                | High set          | 316 SST      | 02-11411-306 | 02-11411-406 | 02-11412-206 | 02-11413-306 | 02-11413-406 | 02-11415-306 | 02-11415-406 |
| 10*  | Pressure guide post      | Low set                           | 316 SST                        | -                 | -            | -            | 02-11414-106 | 02-11414-206 | 02-11416-106 | 02-11416-206 |              |              |
|      |                          | High set                          | 316 SST                        | -                 | -            | -            | 02-11414-306 | 02-11414-406 | 02-11416-306 | 02-11416-406 |              |              |
| 11*  | Vacuum guide post        | All                               | 316 SST                        | 02-11015-106      | 02-11015-206 | 02-11432-106 | B14384-106   | B14384-206   | B14384-506   | 02-11433-106 |              |              |
| 12   | Spacer ring              | All                               | Alum.                          | -                 | -            | -            | B14389-011   | B14439-011   | B14449-011   | B16113-011   |              |              |
|      |                          | All                               | Steel                          | -                 | -            | -            | B14389-003   | B14439-003   | B14449-003   | B16113-003   |              |              |
|      |                          | All                               | 316 SST                        | -                 | -            | -            | B14389-006   | B14439-006   | B14449-006   | B16113-006   |              |              |
| 13   | O-ring                   | All                               | NBR                            | P014-03-285       | P014-03-273  | P014-03-286  | P014-03-287  | P014-03-288  | P014-03-289  | P014-03-290  |              |              |
| 14   | Retaining ring           | All                               | Polypropylene                  | 02-11396          | 02-11397     | 02-11398     | 02-11399     | 02-11400     | 02-11401     | 02-11402     |              |              |

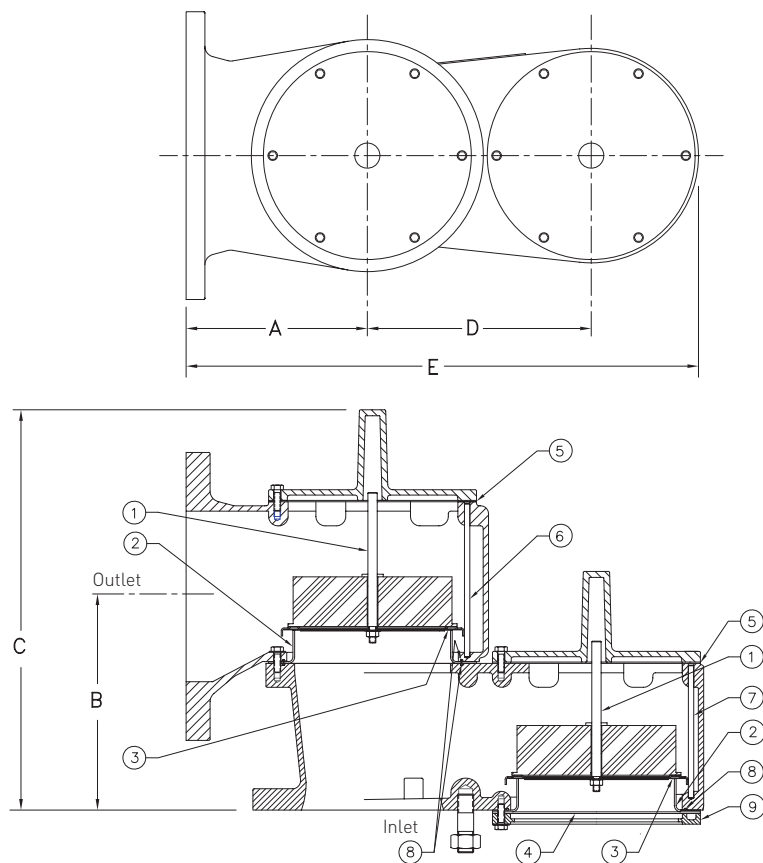
\* For all weather parts, add -1 to end of listed part numbers.

# VAREC SERIES 5800B PRESSURE AND VACUUM RELIEF VALVE WITH FLAME ARRESTER ASSEMBLY INSTRUCTION, OPERATION AND MAINTENANCE MANUAL

## B. Model 2020B

When ordering replacement parts, specify relief valve by model number, pipe size and serial number. Identify replacement parts by part number, description and material where possible.

FIGURE 3 - 2020B LOW SETTING  
Drilling per ANSI Class 150



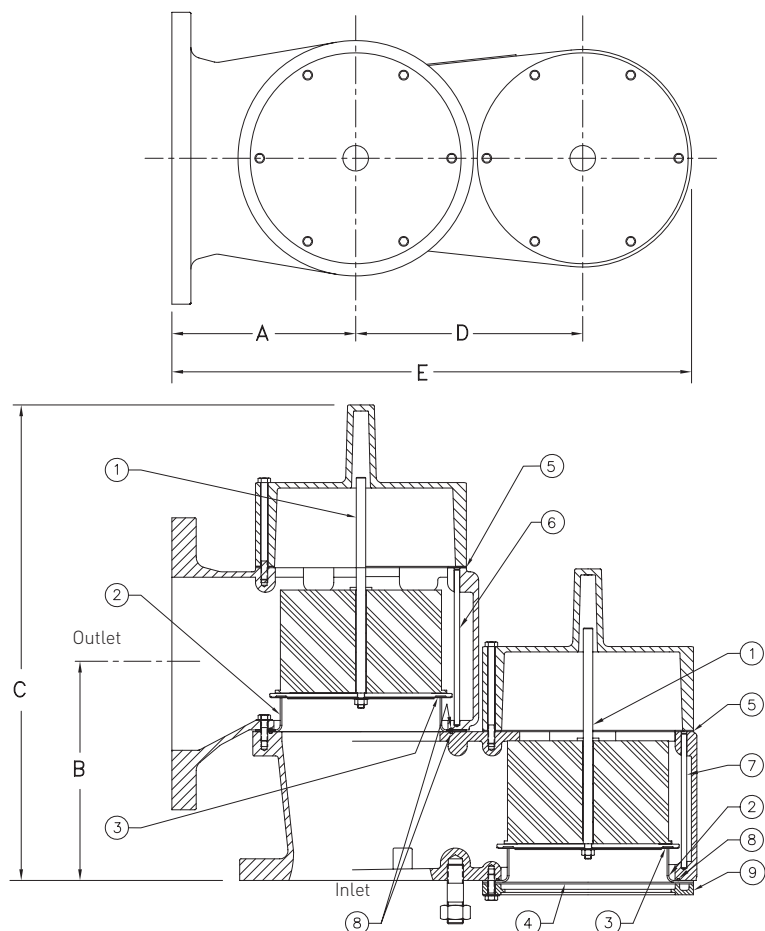
### SIZES AND DIMENSIONS

| Size  |        | A              | B              | C              | D              | E               |
|-------|--------|----------------|----------------|----------------|----------------|-----------------|
| Inlet | Outlet | in. (mm)       | in. (mm)       | in. (mm)       | in. (mm)       | in. (mm)        |
| 2"    | 3"     | 4.94<br>(125)  | 5.25<br>(133)  | 9.06<br>(230)  | 6.75<br>(171)  | 14.15<br>(375)  |
| 3"    | 4"     | 6.38<br>(162)  | 5.88<br>(149)  | 10.81<br>(275) | 8.38<br>(213)  | 18.56<br>(471)  |
| 4"    | 6"     | 8.75<br>(222)  | 6.81<br>(173)  | 12.81<br>(325) | 8.44<br>(214)  | 20.44<br>(519)  |
| 6"    | 8"     | 8.56<br>(217)  | 10.00<br>(254) | 18.81<br>(478) | 10.50<br>(267) | 24.25<br>(616)  |
| 8"    | 10"    | 11.19<br>(284) | 12.12<br>(308) | 22.12<br>(562) | 13.12<br>(333) | 30.75<br>(781)  |
| 10"   | 12"    | 13.63<br>(346) | 16.25<br>(413) | 27.56<br>(700) | 16.88<br>(429) | 38.56<br>(979)  |
| 12"   | 14"    | 15.38<br>(391) | 18.88<br>(480) | 32.06<br>(814) | 19.75<br>(502) | 44.75<br>(1137) |

# VAREC SERIES 5800B PRESSURE AND VACUUM RELIEF VALVE WITH FLAME ARRESTER ASSEMBLY

## INSTRUCTION, OPERATION AND MAINTENANCE MANUAL

FIGURE 4 - 2020B HIGH SETTING  
Drilling per ANSI Class 150



### SIZES AND DIMENSIONS

| Size  |        | A              | B              | C              | D              | E               |
|-------|--------|----------------|----------------|----------------|----------------|-----------------|
| Inlet | Outlet | in. (mm)       | in. (mm)       | in. (mm)       | in. (mm)       | in. (mm)        |
| 2"    | 3"     | 4.94<br>(125)  | 5.25<br>(133)  | 13.62<br>(346) | 6.75<br>(171)  | 14.75<br>(375)  |
| 3"    | 4"     | 6.38<br>(162)  | 5.88<br>(149)  | 15.56<br>(395) | 8.38<br>(213)  | 18.56<br>(471)  |
| 4"    | 6"     | 8.75<br>(222)  | 6.81<br>(173)  | 16.88<br>(429) | 8.44<br>(214)  | 20.44<br>(519)  |
| 6"    | 8"     | 8.56<br>(217)  | 10.00<br>(254) | 22.06<br>(560) | 10.50<br>(267) | 24.25<br>(616)  |
| 8"    | 10"    | 11.19<br>(284) | 12.12<br>(308) | 24.62<br>(625) | 13.12<br>(333) | 30.75<br>(781)  |
| 10"   | 12"    | 13.63<br>(346) | 16.25<br>(413) | 29.31<br>(744) | 16.88<br>(429) | 38.56<br>(979)  |
| 12"   | 14"    | 15.38<br>(391) | 18.88<br>(480) | 32.06<br>(814) | 19.75<br>(502) | 44.75<br>(1137) |

# VAREC SERIES 5800B PRESSURE AND VACUUM RELIEF VALVE WITH FLAME ARRESTER ASSEMBLY INSTRUCTION, OPERATION AND MAINTENANCE MANUAL

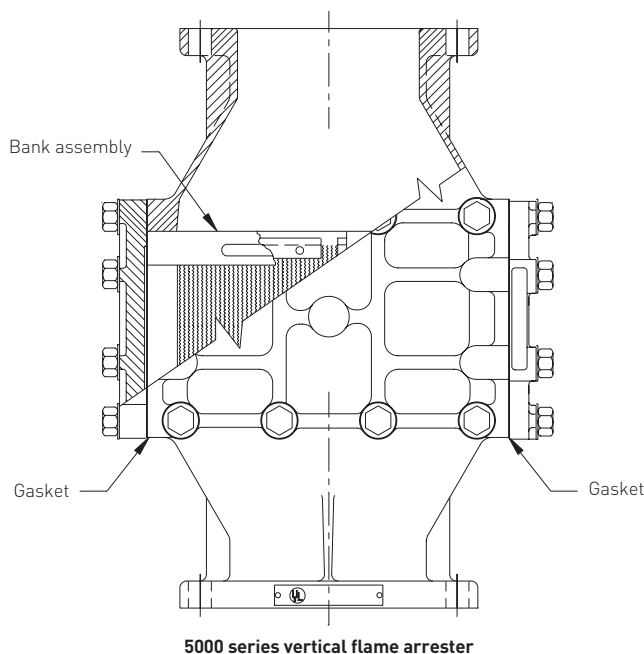
**TABLE 4 - MODEL 2020B REPLACEMENT PARTS**

| Item no. | Description             | Usage     | Material      | Nominal pipe size (inlet x outlet) |              |              |              |              |              |              |
|----------|-------------------------|-----------|---------------|------------------------------------|--------------|--------------|--------------|--------------|--------------|--------------|
|          |                         |           |               | 2" x 3"                            | 3" x 4"      | 4" x 6"      | 6" x 8"      | 8" x 10"     | 10" x 12"    | 12" x 14"    |
| 1*       | Pallet assembly         | Low set.  | Alum.         | 06-11485-101                       | 06-11485-201 | 06-11485-001 | 06-11485-601 | 06-11485-701 | 06-11485-801 | 06-11485-901 |
|          |                         | High set. | Alum.         | 06-11486-101                       | 06-11486-201 | 06-11486-301 | 06-11486-401 | 06-11486-501 | 06-11486-601 | 06-11486-701 |
|          |                         | Low set.  | 316 SST       | 06-11485-106                       | 06-11485-206 | 06-11485-006 | 06-11485-606 | 06-11485-706 | 06-11485-806 | 06-11485-906 |
|          |                         | High set. | 316 SST       | 06-11486-106                       | 06-11486-206 | 06-11486-306 | 06-11486-406 | 06-11486-506 | 06-11486-606 | 06-11486-706 |
| 2*       | Seat ring               | All       | Alum.         | 02-10438-001                       | 02-10251-001 | 02-05464-001 | 02-05478-001 | 02-05482-001 | 02-05487-001 | 02-05499-001 |
|          |                         | All       | 316 SST       | 02-10438-006                       | 02-10251-006 | 02-05464-006 | 02-05478-006 | 02-05482-006 | 02-05487-006 | 02-05499-006 |
| 3        | Pallet insert           | All       | PTFE          | 02-10361-093                       | 02-09704-093 | B12741-093   | B12742-093   | B12743-093   | B12744-093   | B13288-093   |
| 4        | Screen                  | All       | HDPE          | 02-11547-051                       | 02-11547-151 | 02-11547-251 | 02-11547-351 | 02-11547-451 | 02-11547-551 | 02-11547-651 |
| 5        | Cover and spacer gasket | Low set.  | Fiber         | 02-11380-071                       | 02-11381-071 | 02-11382-071 | 02-11383-071 | 02-11384-071 | 02-11385-071 | 02-11386-071 |
|          |                         | High set. | NBR           | 02-11380-075                       | 02-11381-075 | 02-11382-075 | 02-11383-075 | 02-11384-075 | 02-11385-075 | 02-11386-075 |
| 6*       | Press. guide post       | All       | 316 SST       | 02-11015-106                       | 02-11015-306 | 02-11432-106 | B16553-406   | B16553-206   | B16553-506   | 02-11433-106 |
| 7*       | Vacuum guide post       | All       | 316 SST       | 02-11015-106                       | 02-11015-206 | 02-11432-106 | B14384-106   | B14384-206   | B14384-506   | 02-11433-106 |
| 8        | O-ring                  | All       | NBR           | P014-03-285                        | P014-03-273  | P014-03-286  | P014-03-287  | P014-03-288  | P014-03-289  | P014-03-290  |
| 9        | Retaining ring          | All       | Polypropylene | 02-11396                           | 02-11397     | 02-11398     | 02-11399     | 02-11400     | 02-11401     | 02-11402     |

\* For all weather parts, add -1 to end of listed part numbers.

### D. Model 5000/5010 flame arrester

When ordering replacement parts, specify flame arrester by Model Number, Serial Number, and pipe size. Identify replacement parts by item number, description, and material as shown on the reference drawings. Include part numbers where possible.



**5000 series vertical flame arrester**

**TABLE 5 - MODEL 5000/5010 REPLACEMENT PARTS**

| 5000 / 5010  | 2           | 3           | 4           | 6           | 8           | 10          | 12          |
|--|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Nominal pipe size                                    | 2 in        | 3 in        | 4 in        | 6 in        | 8 in        | 10 in       | 12 in       |
|  | 50 mm       | 75 mm       | 100 mm      | 150 mm      | 200 mm      | 250 mm      | 300 mm      |
| Gasket kit: (2) cover w/(4) side plate: non-asbestos | 13-09101-02 | 13-09101-03 | 13-09101-04 | 13-09101-06 | 13-09101-08 | 13-09101-10 | 13-09101-12 |
| Bank sheet set: aluminum                             | BA17040     | BA17046     | BA17052     | BA17058     | BA17064     | BA17070     | BA17076     |
| Bank sheet: 316 SS                                   | BA17044     | BA17050     | BA17056     | BA17062     | BA17068     | BA17074     | BA17080     |
| Bank assembly: aluminum w/316 SS sheet (extensible)  | BM18996-000 | BM18998-000 | BM19000-000 | BM18956-000 | BM18958-000 | BM19002-000 | BM19004-000 |
| Bank assembly: 316 SS (non-extensible)               | BM19882-600 | BM19883-600 | BM19884-600 | BM19885-600 | BM19886-600 | BM19887-600 | BM19888-600 |
| Bank assembly: aluminum (extensible)                 | BM6027      | BM6055      | BM6090      | BM6126      | BM6245      | BM6269      | BM6716      |