



Valve Concepts, Inc.  
ISO Registered Company

# Model 3700

## BOTTOM GUIDED Emergency Relief Vent

### SECTION I

#### I. 3000 SERIES DESIGN AND FUNCTION

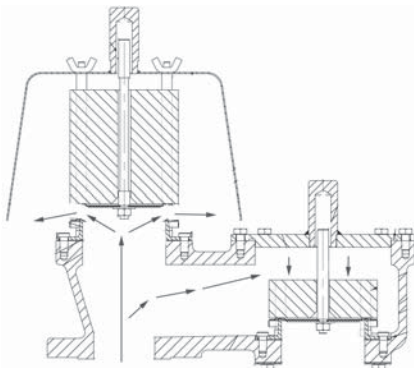
| MODEL | P | V | DESCRIPTION                    |
|-------|---|---|--------------------------------|
| 3100  | P | V | Vent to Atmosphere             |
| 3200  | P | V | Vent to Header                 |
| 3300  |   | V | Top Mounted                    |
| 3400  | P |   | Vent to Atmosphere             |
| 3500  | P |   | Vent to Header                 |
| 3600  |   | V | Side Mounted                   |
| 3700  | P |   | Emergency/Bottom Guided Relief |

Models 3100 through 3600 Pressure and/or Vacuum Vents are used for the normal venting requirements. Normal venting is defined as venting required because of operational requirements (i.e. filling and emptying the tank) or atmospheric changes. The Model 3700 Emergency Relief Vent is used to meet additional venting required when an abnormal condition, such as an external fire or such as ruptured internal heating coils, exist either outside or inside the tank.

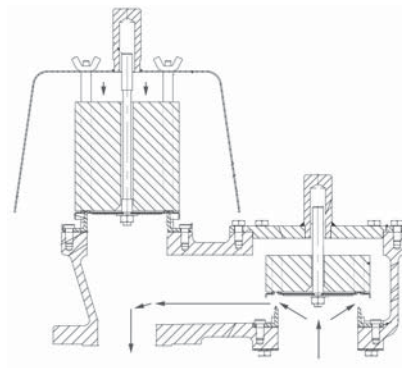
All of these devices are sized in accordance with API Standard 2000. Improperly specified relief vents may result in structural damage to the tank or system and can cause severe personal injury or death.

**Figure 1** illustrates the operation of the Pressure/ Vacuum Relief Vent under overpressure conditions. As the tank pressure increases as a result of product being pumped into the tank and/or because of thermal expansion of the product and vapors, the pressure pallet remains closed until the set pressure of the vent is reached. When the tank pressure reaches the pressure setting of the vent, the pressure pallet lifts allowing the tank pressure to bleed off.

**Figure 2** illustrates the operation of the Pressure/ Vacuum Relief Vent under vacuum conditions. As the tank pressure decreases as a result of product being pumped out of the tank and/or because of thermal contraction of the product and vapors, the vacuum pallet remains closed until the set vacuum of the vent is reached. When the tank vacuum reaches the vacuum setting of the vent, the vacuum pallet lifts allowing air to be drawn into the tank.



**Figure 1 - Pressure Relief**



**Figure 2 - Vacuum Relief**

## SECTION II

### II. SAFETY WARNINGS

Tank or system protection is the primary function of the weight loaded Pressure and/or Vacuum Relief Vent. It must be selected to meet the total pressure and vacuum flow requirements within the Maximum Allowable Working Pressure and Vacuum of the system on which it is installed. Consult API Standard 2000 for tank protection sizing procedures. Improperly specified relief vents may result in structural damage to the tank or system and can cause severe personal injury or death.

When Pipe-Away relief vents are used, back pressure in the header system will affect the set point of weight loaded vents by the amount of the header pressure. Maximum possible header pressure must be considered when sizing the pressure relief vent.



#### CAUTION

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



#### CAUTION

**DO NOT change pressure ratings by adding additional weight to the pallet assembly without consulting Cashco Inc. or your VCI representative.**

## SECTION III

### III. INSPECTION AND STORAGE

The emergency relief vent is carefully packaged to prevent damage or contamination during shipping. Inspect the equipment when it is received and report any damage to the carrier immediately. The vent should be stored with all the protective covers

in place. Make sure that any loading weights that might have been shipped separately, to protect the vent during shipping, are accounted for and stored with the vent. All supplied weights should be installed during installation. See Section IV.

## SECTION IV

### IV. INSTALLATION



#### WARNING

**The Model 3700 must be installed in a vertical position. The tank nozzle on which the vent is mounted should have the same nominal diameter as the venting device. It is recommended that the tank nozzle flange face be within 1 degree of horizontal for best performance of the venting device.**

The standard flange base for Model 3700 is designed to mate with a 150# ASME flange. This ERV is **NOT** rated for full flange pressure and does not require high bolting torque. Refer to flange torque guidelines on page 3.

Before installation, remove all packing materials from inside and outside the emergency vent.

Model 3700 Vents are furnished with flat faced flanges. It is recommended that they be installed on mating flat face flanges with a full faced gasket. If the flat face of the vent is sealing against a raised face steel flange, a spacer or filler ring must be used to fill the annular space of the raised face steel flange. Refer to flange torque guidelines on page 3.

Inspect the gasket seating surface of the tank nozzle flange. It must be clean, free of scratches, corrosion, tool marks and flat.

Make sure the gasket is suitable for the application and is in good condition.

Fiberglass flanges require the use of a full-face 150 lb. gasket. For full face gaskets, we recommend the use of a 1/8-inch thick PTFE expanded gasket.

Center the gasket within the bolt circle of the tank flange and carefully set the emergency vent on the flange nozzle and align the bolt holes.

All stud threads must be lubricated to obtain proper torque results. A washer should be used under each stud nut.

Install the studs, washers and nuts and tighten nuts hand tight. Check proper alignment of flange faces. Misalignment of flange faces will cause bending stresses at the flange and flange joint and damage may result. Correct any misalignment prior to applying torque to nuts.

All nuts must be tightened in proper sequence and in equal increments. Proceed through the tightening sequence until the recommended torque is attained.

Recheck the torque on each bolt in the same sequence, as bolts previously tightened may have relaxed through the torque sequence.

Place all supplied weights on top of the pallet.

### Gasket Dimensions

| FLANGE |                 | O.D. in. | I.D. in. | B.C. in | Bolt Hole in. | Quantity |
|--------|-----------------|----------|----------|---------|---------------|----------|
| SIZE   | TYPE            |          |          |         |               |          |
| 16"    | ASME<br>150#    | 23.50    | 16.00    | 21.25   | 1.13          | 16       |
| 18"    |                 | 25.00    | 18.00    | 22.75   | 1.25          | 16       |
| 20"    |                 | 27.50    | 20.00    | 25.00   | 1.25          | 20       |
| 24"    |                 | 32.00    | 24.00    | 29.50   | 1.38          | 20       |
| 20"    | API 650<br>150# | 26.00    | 20.00    | 23.50   | .75           | 16       |
| 24"    |                 | 30.00    | 24.00    | 27.50   | .75           | 20       |

| Flange Torque Requirements for<br>Aluminum and Stainless Steel Vents   |      |                       |                 |
|--|------|-----------------------|-----------------|
| Flange<br>Type   | Size | Bolt<br>(in)<br>(UNC) | Torque (ft-lbs) |
|  |      |                       | Raised Face *   |
| 150# ASME  | 16"  | 1" - 8                | 201             |
|  | 18"  | 1.125" - 7            | 286             |
|  | 20"  |                       |                 |
|  | 24"  | 1.250" - 7            | 403             |
| API # 650  | 20"  | 5/8" - 11             | 35              |
|  | 24"  | 5/8" - 11             | 43              |
| * Flat Face Flange may require up to 80% more torque than<br>Raised Face Flange.<br>(Dependent on type of gasket used, the gasket material and thickness.) |      |                       |                 |

## SECTION V

### V. MAINTENANCE

As a safety device, it is very important that maintenance/inspection be done on a regular interval for Emergency Vents. Maintenance should only be done by a qualified technician. Valve Concepts recommends that all service be performed at the factory or a factory authorized repair center. For information on repair centers in your area, please contact factory.

Any maintenance requires that the ERV be removed to a work area for disassembly. Use an overhead hoist with cables attached to the lifting brackets to lift unit and place on a flat work surface.

Rotate cap screws (08) counter clockwise to remove. Thread an eyenut onto the threads of the pallet cap screw. Connect a cable with hoist to the eyenut and carefully lift pallet assembly and weights off the flange seat (01) and place on a flat work surface.



#### CAUTION

**The weight of the pallet assembly with loading weights may be considerable, and is contingent on the set point of the vent. Utilize caution when lifting from the base.**

#### Diaphragm Inspection / Replacement:

Rotate jam nut (13) counter clockwise to remove. Remove washer (15).

Remove loading weights (14) that may be stacked on the pallet (03). **NOTE:** *Maintain stack orientation, do not remove or add any weight as that will change the factory calibrated pressure setpoint.*

Remove cap screw (12), gasket (09) and washers (15) from center of pallet assembly. Turn pallet assembly over and lay it flat so pallet guides (33) are upwards.

Remove cap screws (34) and detach pallet guides (33). Remove cap screws (05) and nuts (07) and gasket (06), so the diaphragm retainer (04) can be separated from the pallet (03) and diaphragm(s) (02). **NOTE:** *Pressure set point will dictate the quantity and stack orientation of diaphragms.* Record the number of diaphragm's in the stack and orientation for re-assembly. \_\_\_\_\_

Clean and inspect pallet (03) and diaphragm retainer (04).

Position the pallet (03) on a flat work surface, grooved side up. Apply TFE paste around hole in the center of the pallet (03) and lay the diaphragm(s) (02) onto the pallet, align with the center hole. **NOTE:** *Refer back to previous step for the number of diaphragms in the stack and orientation.*

Lay diaphragm retainer (04) on top of the new diaphragms (02). Replace gasket (06). Refasten nuts (07) to cap screws (05). Reattach the pallet guides (33) using the cap screws (34). Tighten nuts and cap screws to 4 ft./lbs.

Turn pallet assembly over. Position the washers (15) and the stack of pallet weights (14) on top of the pallet (03), align with the center hole. Insert the cap screw (12) with gasket (09) from below the pallet through the center hole in the diaphragms, pallet, and weights. Slide another washer (15) over the end of the cap screw (12). Rotate jam nut (13) CW, secure tight against pallet weights.

Clean and inspect seating surface on the flange seat (01). Use a Scotch-Brite pad first and then a clean cloth with Easy Clean sprayed on it. Check seat surface for any nicks, corrosion, pitting or product build up. Seat surfaces must be clean and smooth for vent to perform properly.

Thread an eyenut onto the threads of the pallet cap screw(12). Connect a cable with hoist to the eyenut and carefully lift and position pallet assembly into the flange base. Align holes for cap screws (08) in the flange base with the opening in the center of each pallet guide (33).

Thread cap screws (08) into the flange base and secure tight.

Return to Section IV for installation.

## SECTION VI

### VI. TEST PROCEDURE

**To Calculate Weight of Pallet Assembly:**

Table 2 shows the pallet weight per unit of pressure or vacuum setting. The total pallet assembly weight is determined by multiplying the desired set point (in the appropriate units) by the incremental weight per unit listed in Table 2.

For Example:

\_\_\_” Model 370D CS - if the desired setting is 5 oz/in<sup>2</sup>

Table 2 shows that for a 20” vent, the pallet would weigh 20.13 lb per oz/in<sup>2</sup>

So the pallet assembly for a 5 oz/in<sup>2</sup> setting would weigh: 20.13 lbs/oz/in<sup>2</sup> x 5.0 oz./in<sup>2</sup> - 100.65 lbs

Valve Concepts allows a deviation from this theoretical weight of ± 3.0%.

**To Determine Diaphragm/Seat Leakage:**

After both pallets’ weight has been determined and verified for the required setting, reassemble the vent and mount on a Tank Vent Test Stand and slowly raise the pressure at the flow rate of 1.0 SCFH.

**ACCEPTANCE CRITERIA:**

The pressure gauge shall maintain a pressure equal to or greater than 90% of set pressure for a one minute period while the specified flow rate is maintained. *Note: Valve Concepts acceptance criteria exceed the requirements of API. API 2521 states that if the rate of leakage does not exceed ½ SCFH for 6 inch size and smaller, or 5 SCFH for 8 inch and larger, at 75% of set point, then a vent is considered satisfactory for all practical purposes.*

If the vent fails to meet the 90% criteria, it must be disassembled and the seat, pallet, and or diaphragms repaired or replaced.

A test report should be completed for each vent. The report should indicate the total pallet weight and the pressure achieved at the Test Flow Rate for both pressure and vacuum. Other general information such as serial number, model number, material of construction, set pressure and vacuum, etc. should be included in the report.

The test report should be kept with the Vent Maintenance Records.

**TABLE 2  
Nominal Pallet Assembly Weight Per Unit of Pressure lbs (kg)**

| SET Point<br>Units     | Size        |             |             |              |
|------------------------|-------------|-------------|-------------|--------------|
|                        | 16”         | 18”         | 20”         | 24”          |
|                        | Lb (kg)     | Lb (kg)     | Lb (kg)     | Lb (kg)      |
| 1.0 oz/in <sup>2</sup> | 13.56 (6.5) | 17.04 (7.7) | 20.13 (9.1) | 28.87 (13.1) |
| 1.0 in WC              | 7.85 ((3.6) | 9.85 (4.5)  | 11.63 (5.2) | 16.69 (7.5)  |
| 1.0 mbar               | 3.15 (1.4)  | 3.95 (1.8)  | 4.67 (2.1)  | 6.70 (3.0)   |

## SECTION VII

### VII. ORDERING INFORMATION

#### NEW REPLACEMENT UNIT vs PARTS "KIT" FOR FIELD REPAIR

To obtain a quotation or place an order, please retrieve the Serial Number and Product Code that was stamped on the metal name plate and attached to the unit. This information can also be found on the Bill of Material ("BOM"), a parts list that was provided when unit was originally shipped. (Serial Number typically 6 digits).

#### NEW REPLACEMENT UNIT:

Contact your local Cashco, Inc., Sales Representative with the Serial Number, Product code and the pressure setting. With this information they can provide a quotation for a new unit including a complete description, price and availability.

#### PARTS "KIT" for FIELD REPAIR:

Contact your local Cashco, Inc., Sales Representative with the Serial Number and Product code. Identify the parts and the quantity required to repair the unit from the "BOM" sheet that was provided when unit was originally shipped.

If the "BOM" is not available, refer to the cross-sectional drawings included in this manual for part identification and selection.

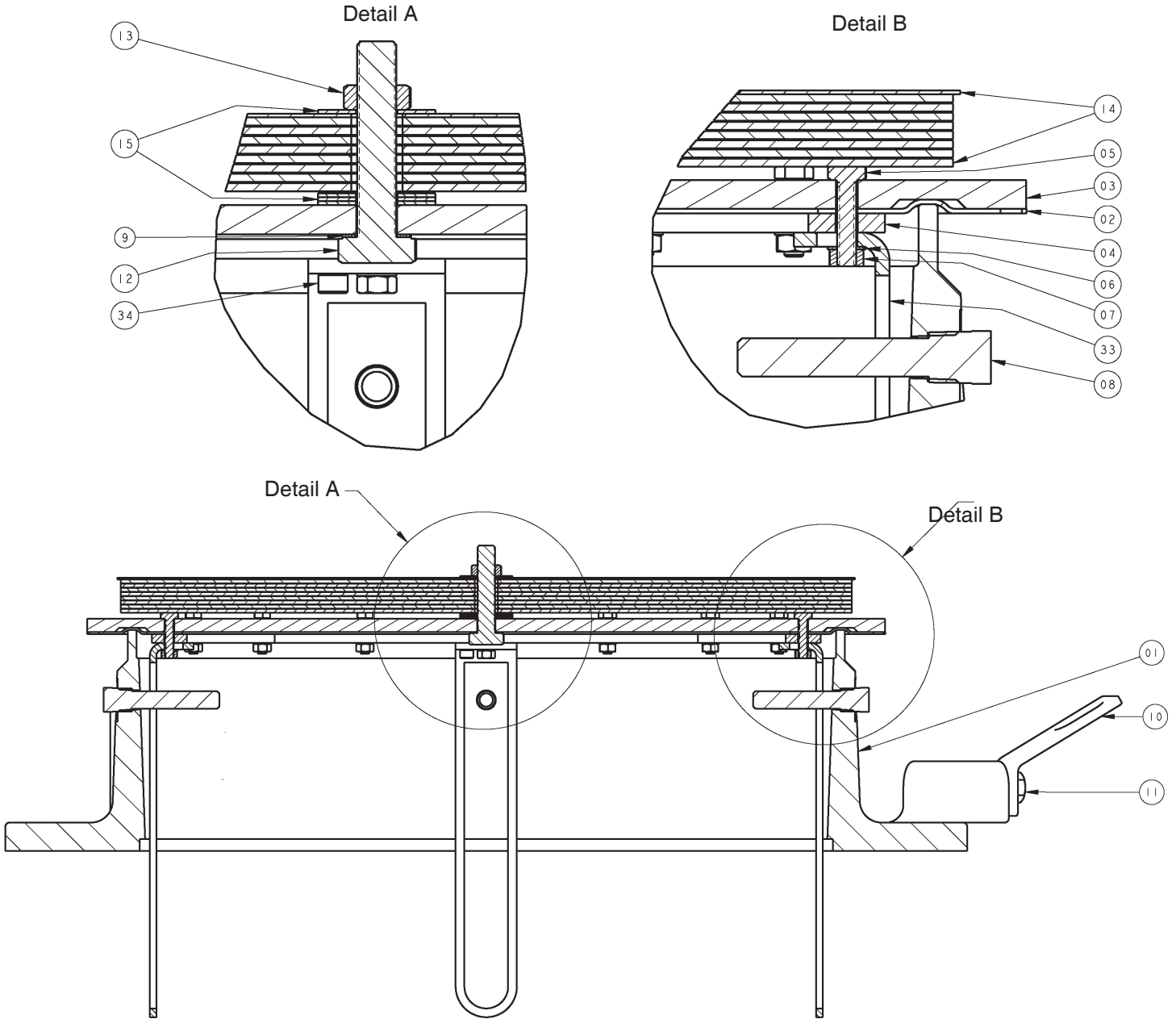
A Local Sales Representative will provide quotation for appropriate Kit Number, Price and Availability.



#### **CAUTION**

**Do not attempt to alter the original construction of any unit without assistance and approval from the factory. All proposed changes will require a new name plate with appropriate ratings and new product code to accommodate the recommended part(s) changes.**

## MODEL 3700 EMERGENCY RELIEF VENT Aluminum Base



**ITEM NO. DESCRIPTION**

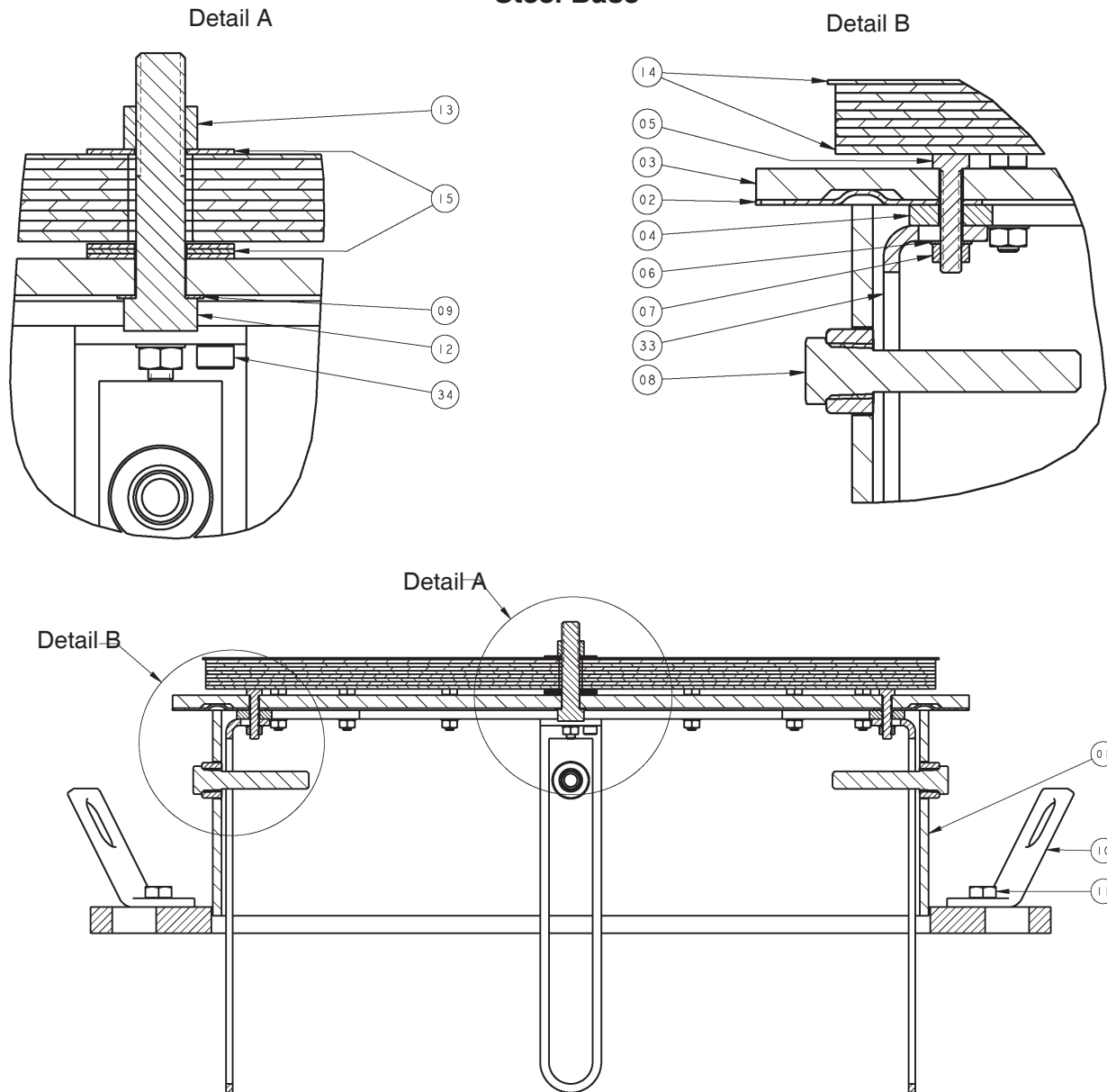
|    |                            |
|----|----------------------------|
| 01 | Flange Seat                |
| 02 | Diaphragm ‡                |
| 03 | Pallet                     |
| 04 | Diaphragm Retainer / Guide |
| 05 | Cap Screw                  |
| 06 | Gasket ‡                   |
| 07 | Nut                        |
| 08 | Cap Screw                  |
| 09 | Gasket ‡                   |
| 10 | Lift Bracket               |

**ITEM NO. DESCRIPTION**

|    |                       |
|----|-----------------------|
| 11 | Cap Screw             |
| 12 | Cap Screw             |
| 13 | Jam Nut               |
| 14 | Pallet Weight         |
| 15 | Washer                |
| 17 | ATEX Cable (Optional) |
| 33 | Pallet Guide          |
| 34 | Cap Screw             |

‡ Typical Parts required for inspection and rebuild.

**MODEL 3700 EMERGENCY RELIEF VENT**  
**Fabricated Steel & Stainless**  
**Steel Base**



**ITEM NO. DESCRIPTION**

|    |                            |
|----|----------------------------|
| 01 | Flange Seat                |
| 02 | Diaphragm ‡                |
| 03 | Pallet                     |
| 04 | Diaphragm Retainer / Guide |
| 05 | Cap Screw                  |
| 06 | Gasket ‡                   |
| 07 | Nut                        |
| 08 | Cap Screw                  |
| 09 | Gasket ‡                   |
| 10 | Lift Bracket               |

**ITEM NO. DESCRIPTION**

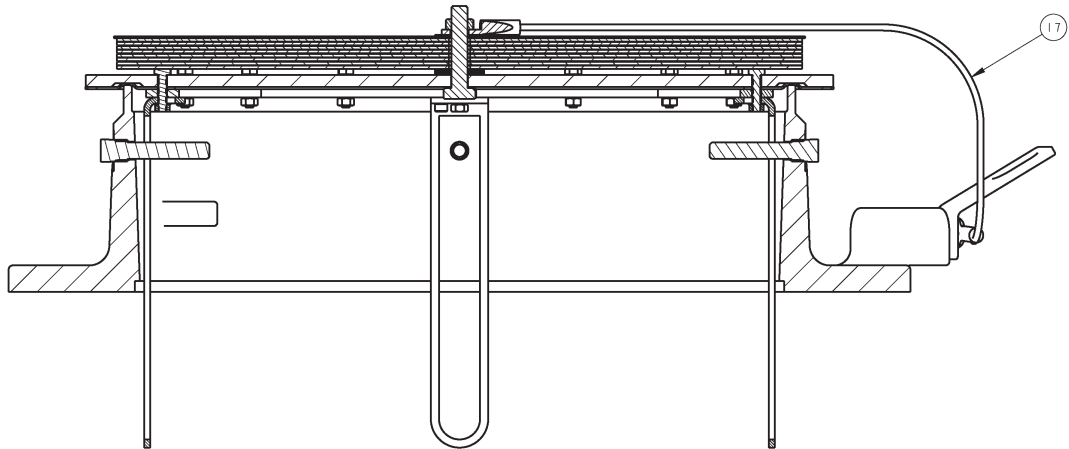
|    |                       |
|----|-----------------------|
| 11 | Cap Screw             |
| 12 | Cap Screw             |
| 13 | Jam Nut               |
| 14 | Pallet Weight         |
| 15 | Washer                |
| 17 | ATEX Cable (Optional) |
| 33 | Pallet Guide          |
| 34 | Cap Screw             |

‡ Typical Parts required for inspection and rebuild.

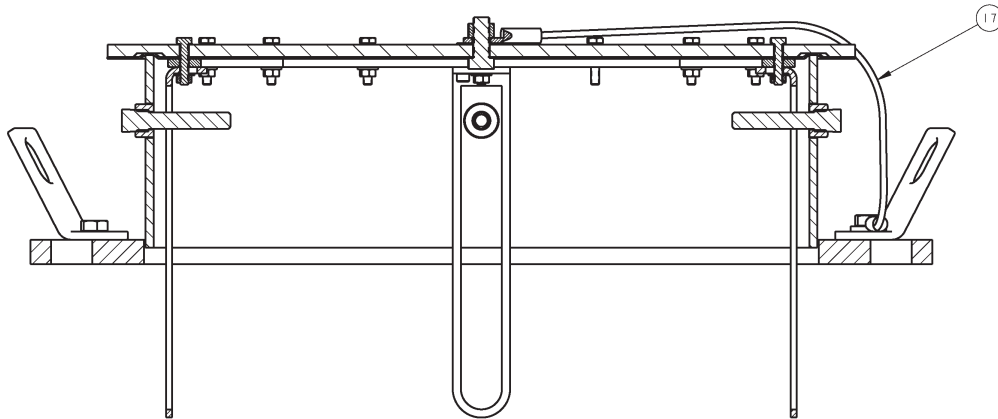


## VENT with ATEX CABLE

### Aluminum Base



### Steel & Stainless Steel Base



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