

**VAREC 221 SERIES**  
 EMERGENCY PRESSURE RELIEF MANWAY COVERS

The 221 Series is designed to provide emergency venting of low pressure storage tanks and vessels.



221P



221PV

**Introduction**

When the tank is exposed to abnormal internal pressure or vacuum beyond the capability of the breather vent, the manway protects the tank against costly rupture or implosion. The 221 Series Manway Covers also provide quick, easy access for tank inspection and maintenance. The most common cause of excessive internal pressure is fire exposure. Emergency venting capacity requirements depend on the wetted surface area of the tank. The venting requirements can be calculated using API Standard 2000. The 221P provides emergency pressure relief only. Vacuum relief must be supplied by a separate breather valve. The 221PV provides both pressure and vacuum relief.

**Features**

The 221 Series Manway Cover is hinged, providing a fixed pivot point for the cover. This feature keeps the cover aligned so it reseats properly after venting. Unlike covers which use less reliable cable restraints, the 221 Series cannot separate from the base. These covers can also be easily lifted open, helping provide a large, unobstructed passage for rapid entry and easy access to the tank.

The 221PV incorporates a spring loaded vacuum relief valve integral to the cover assembly. Additional features include a weather hood and screen provided for protection, and a nonmetallic seat insert on the pallet to minimize leakage.

Both the 221P and 221PV feature a diaphragm type seating surface on the pressure side. The diaphragm is fabric reinforced for durability, and is backed by compressible, cellular non-metallic pads for added cushion and reduced leakage.

BUNA-N diaphragm and Neoprenepads are offered as standard. Teflon® and Viton® diaphragm and Viton® pads are offered as optional.

All covers are heavy cast metal to provide added strength and longer life than fabricated sheet metal covers. Optional materials are available to fit most chemical applications.

**Technical data**

- Hinged cover for proper reseating and added safety.
- Available in emergency pressure only and emergency pressure and vacuum relief models.
- Cast metal cover provides added strength and extended life.
- API 650 or ANSI 150# flange drilling.

## Specifications

### Sizes

18", 20", 24"

### Connections

Drilled to API 650 dimensions, flat face flange standard

Drilled to ANSI 150# dimensions, flat face flange – optional

Special flange drilling requirements to DIN, JPI or JIS standards are available upon request. Consult your local sales representative for further details.

### Setting Ranges

Pressure See table below

Vacuum 1/2 oz/in<sup>2</sup> to 1 oz/in<sup>2</sup>

### Materials of Construction

#### Base

Carbon Steel with Stainless Steel seating surface – standard

Aluminum – optional

316 Stainless Steel – optional

#### Cover

Low copper Aluminum cover with Carbon Steel hinge arm – standard

Carbon Steel cover with Carbon Steel hinge arm – optional

316 Stainless Steel cover with 304 Stainless Steel hinge arm – optional

#### Diaphragm and Pads

BUNA-N diaphragm with Neoprene pads – standard

Teflon® diaphragm with Neoprene pads – optional

Viton® diaphragm with Viton® pads – optional

#### Vacuum Insert (221PV only)

BUNA-N – standard

Teflon® – optional

Viton® – optional

#### Vacuum Pallet Assembly (221PV only)

Aluminum – standard

316 Stainless Steel – optional

#### Hardware

Spring retainer, cotter pin, sleeve, hinge pin, cap screws, nuts and washers – 304 Stainless Steel

### Pressure Setting Codes\*

Size	Cover Material	Below Minimum (Counterweighted) Code 0			Minimum Code 1			Above Minimum Code 2			Extra Heavy Code 3		
		221P	221PV Alum Trim	221PV SS Trim	221P	221PV Alum Trim	221PV SS Trim	221P	221PV Alum Trim	221PV SS Trim	221P	221PV Alum Trim	221PV SS Trim
		oz/in <sup>2</sup>	oz/in <sup>2</sup>	oz/in <sup>2</sup>	oz/in <sup>2</sup>	oz/in <sup>2</sup>	oz/in <sup>2</sup>	oz/in <sup>2</sup>	oz/in <sup>2</sup>	oz/in <sup>2</sup>	oz/in <sup>2</sup>	oz/in <sup>2</sup>	oz/in <sup>2</sup>
18"	Aluminum	0.5 - 1.0	0.5 - 1.1	0.5 - 1.35	1.0	1.1	1.35	1.0 - 3.0	1.1 - 4.5	1.35 - 4.5	3.0 - 6.0	4.5 - 6.0	4.5 - 6.0
18"	Carbon Steel or 316 Stainless Steel	2.5 - 3.5	-	2.75 - 3.75	3.5	-	3.75	3.5 - 6.0	-	3.75 - 6.0	-	-	-
20"	Aluminum	0.5 - 1.0	0.5 - 1.1	0.5 - 1.35	1.0	1.1	1.35	1.0 - 3.0	1.1 - 4.5	1.35 - 4.5	3.0 - 6.0	4.5 - 6.0	4.5 - 6.0
20"	Carbon Steel or 316 Stainless Steel	2.75 - 3.5	-	3.0 - 3.75	3.5	-	3.75	3.5 - 6.0	-	3.75 - 6.0	-	-	-
24"	Aluminum	0.5 - 1.0	0.6 - 1.1	0.85 - 1.35	1.0	1.1	1.35	1.0 - 3.0	1.1 - 4.5	1.35 - 4.5	3.0 - 6.0	4.5 - 6.0	4.5 - 6.0
24"	Carbon Steel or 316 Stainless Steel	3.0 - 3.5	-	3.25 - 3.75	3.5	-	3.75	3.5 - 6.0	-	3.75 - 6.0	-	-	-

\* For higher pressure settings see technical product data sheet for Figure 4210A (VRCMC-0308-US) or contact your sales representative.

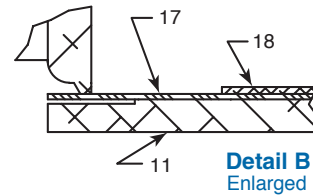
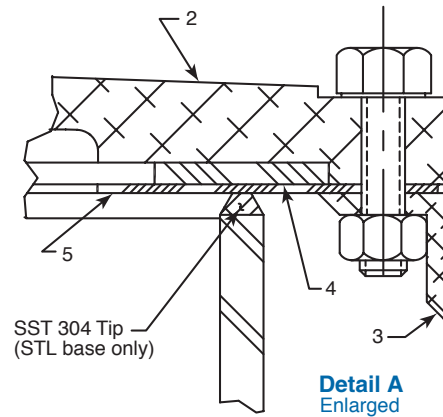
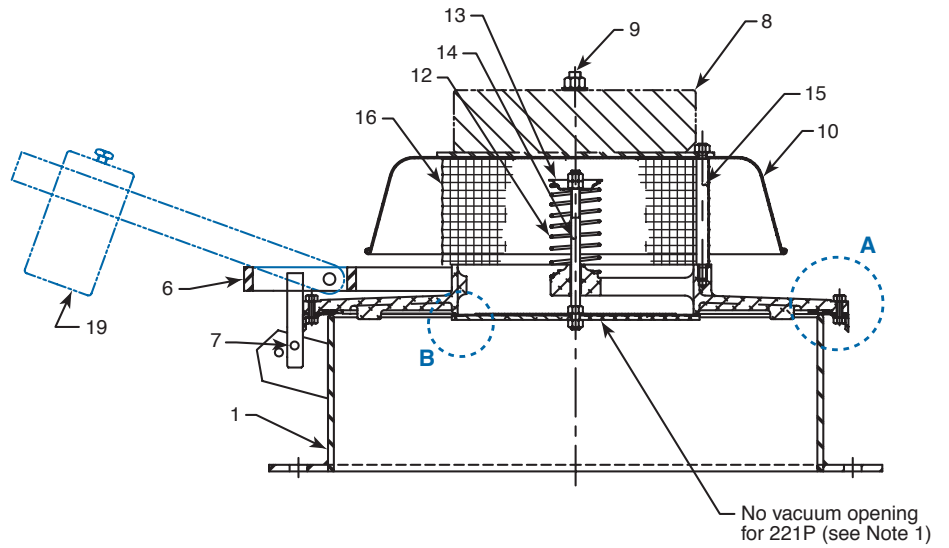
**VAREC 221 SERIES**  
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**Dimensions**

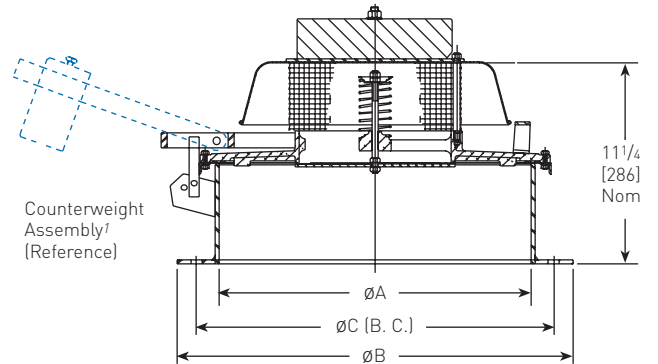
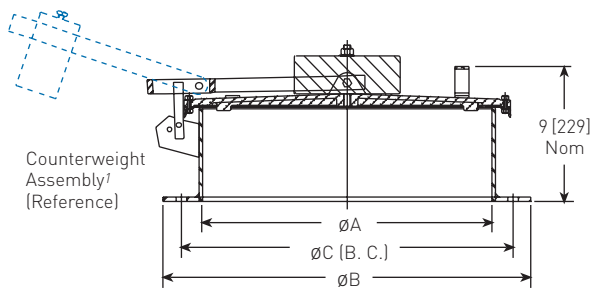
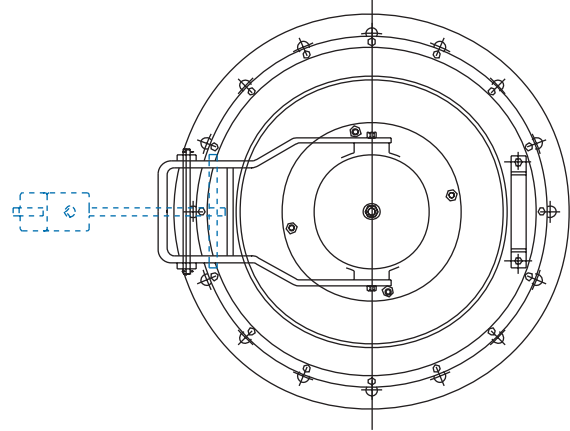
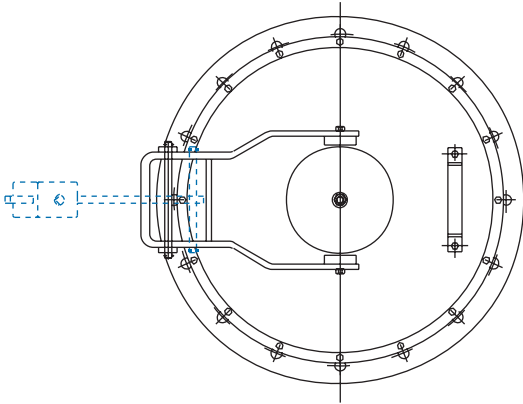
Parts	
Item	Description
1	Base Assembly
2	Cover
3	Cover Ring
4	Cover Pad
5	Diaphragm
6	Hinge Arm Assembly
7	Hinge Pin
8	Loading Weight
9	Weight Mtg Stud/Assembly
10	Vacuum Hood <sup>1</sup>
11	Vacuum Pallet <sup>1</sup>
12	Vacuum Spring <sup>1</sup>
13	Vacuum Spring Retainer <sup>1</sup>
14	Vacuum Stem <sup>1</sup>
15	Vacuum Post <sup>1</sup>
16	Vacuum Screen <sup>1</sup>
17	Vacuum Seat Insert <sup>1</sup>
18	Vacuum Insert Retainer <sup>1</sup>
19	Counter Weight Assembly <sup>2</sup>

**Notes:**

1. Used only for the 221PV vacuum port.
2. Used only for the "Below Minimum" pressure range.



**Specifications, inches [mm]**



**Drilled for API 650 Flange**

Size Code	18	20	24
<b>Nominal Pipe Size</b>	<b>18</b> [450]	<b>20</b> [500]	<b>24</b> [600]
A	18 1/2 [470]	20 1/2 [521]	24 1/2 [622]
B	25 [635]	26 [660]	30 [762]
C	21 1/2 [546]	23 1/2 [597]	27 1/2 [698]
Diameter of Holes	5/8 [16]	3/4 [19]	3/4 [19]
No. of Holes	16	16	20

**Drilled for ANSI 150# Flange (optional)**

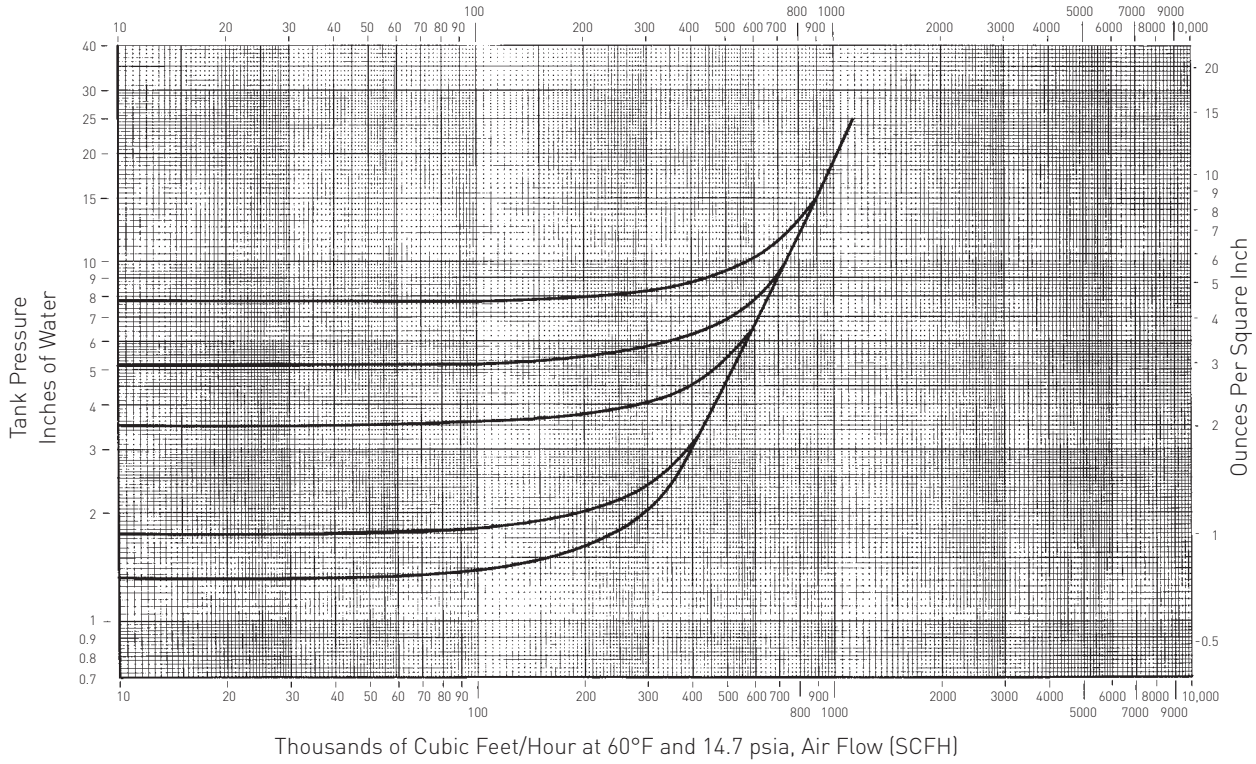
Size Code	18	20	24
<b>Nominal Pipe Size</b>	<b>18</b> [450]	<b>20</b> [500]	<b>24</b> [600]
A	18 1/2 [470]	20 1/2 [521]	24 1/2 [622]
B	25 [635]	27 1/2 [698]	32 [813]
C	22 3/4 [578]	25 [635]	29 1/2 [749]
Diameter of Holes	1 1/4 [32]	1 1/4 [32]	1 3/8 [35]
No. of Holes	16	20	20

**Notes:**

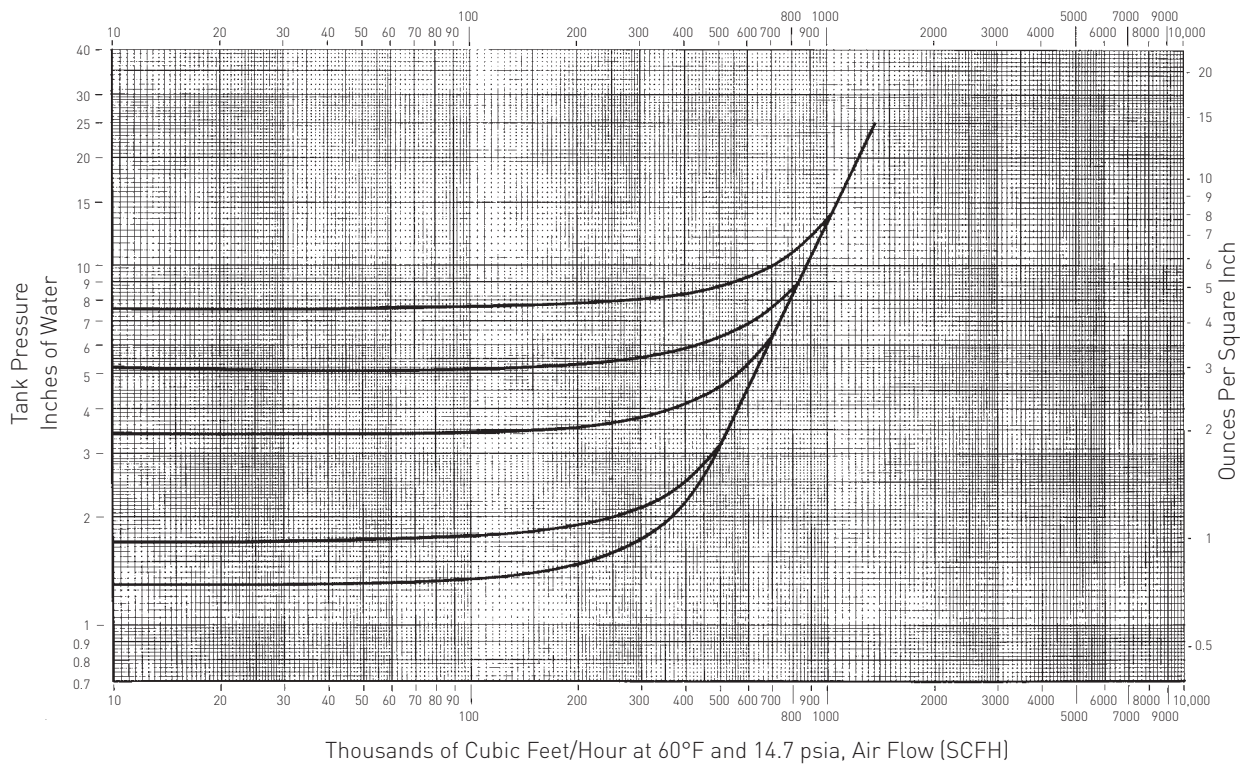
1. For Pressure Setting Code 0 only.
2. Installation, mounting arrangement and dimensions are preliminary general information not to be used for construction. Certified drawings are available upon request.

**Flow Capacity**

**18" 221P/PV Relief Manway Cover Pressure Relief**

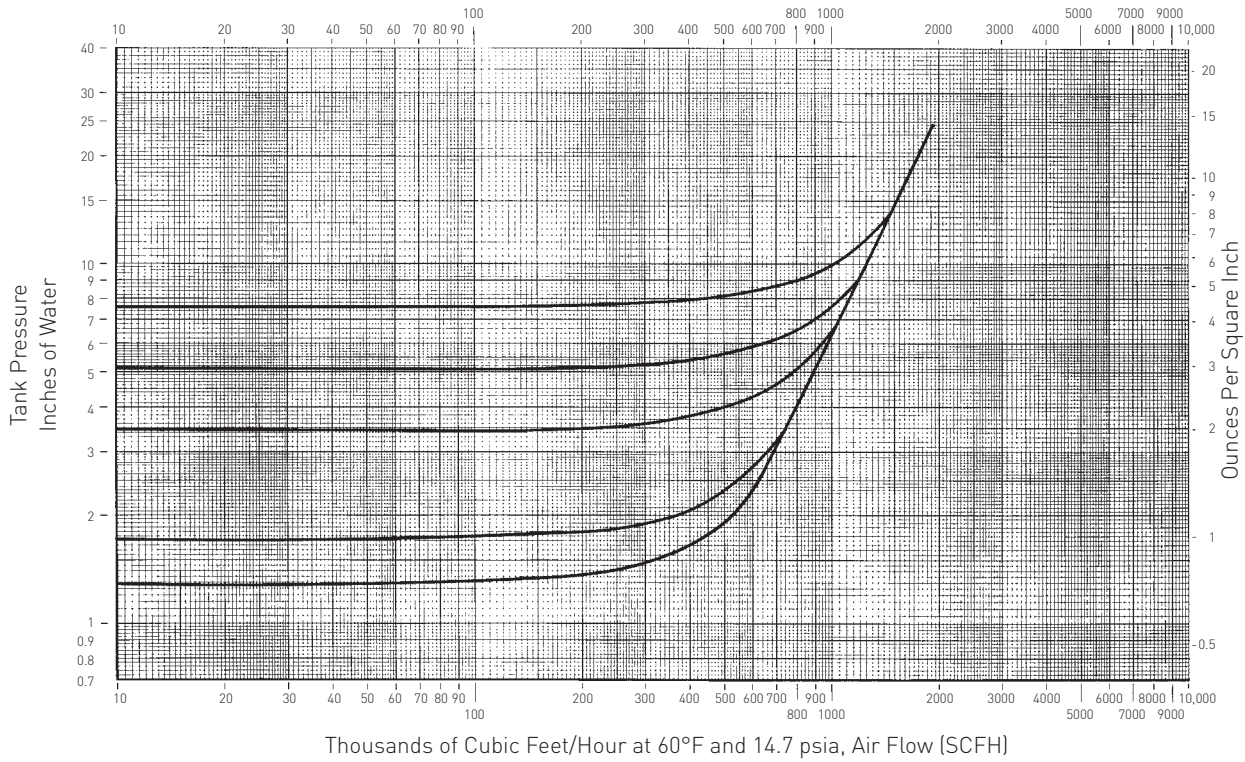


**20" 221P/PV Relief Manway Cover Pressure Relief**

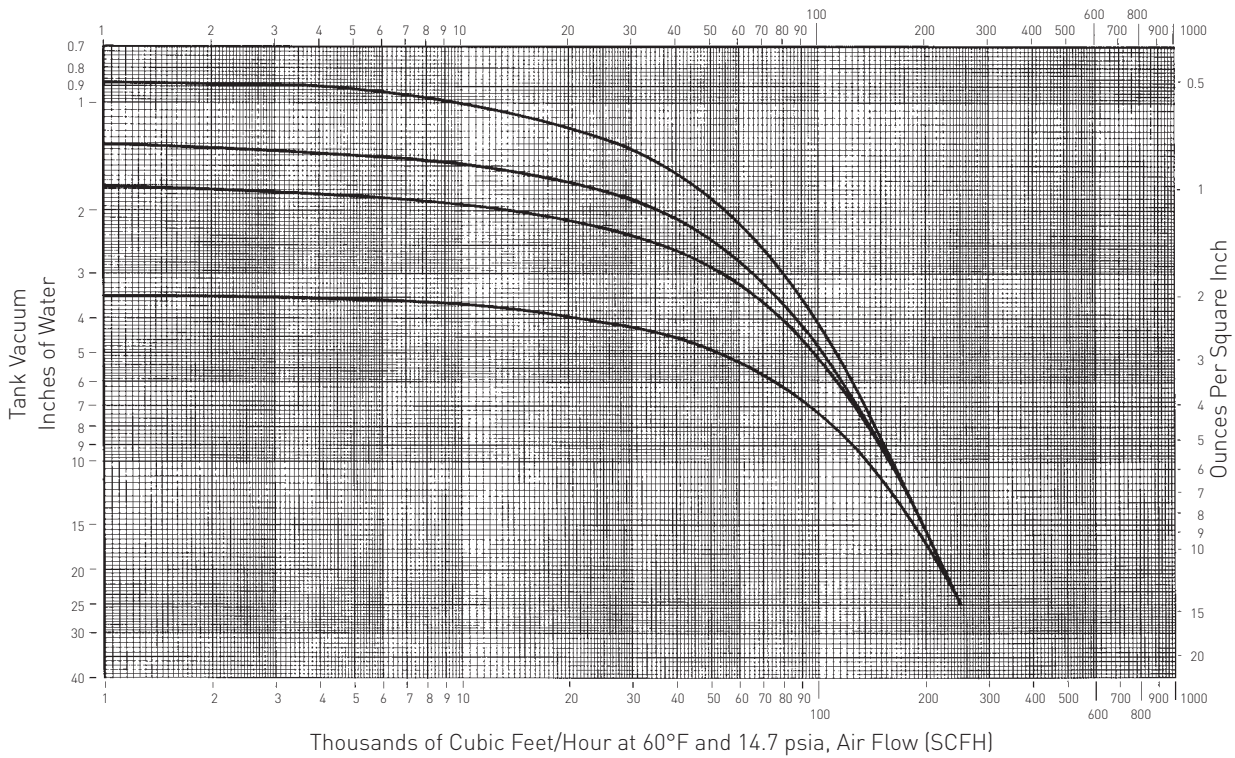


**Flow Capacity**

**24" 221P/PV Relief Manway Cover Pressure Relief**



**18", 20", and 24" 221P/PV Relief Manway Cover Vacuum Relief**



**Ordering Information – Pressure and Vacuum**

<b>Code</b>	<b>Description</b>					
221	Emergency Pressure and Vacuum Relief Manway Cover					
	<b>Code</b>	<b>Size</b>				
	18	18"				
	20	20"				
	24	24"				
	<b>Code</b>	<b>Materials of Construction</b>				
		<b>Base</b>	<b>Cover</b>	<b>Vacuum Trim</b>		
	1PV1	Carbon Steel	Aluminum	Aluminum		
	1PV2	Carbon Steel	Aluminum	316 Stainless Steel		
	2PV1	Aluminum	Aluminum	Aluminum		
	2PV2	Aluminum	Aluminum	316 Stainless Steel		
	3PV2	Carbon Steel	Carbon Steel	316 Stainless Steel		
	4PV2	316 Stainless Steel	316 Stainless Steel	316 Stainless Steel		
	<b>Code</b>	<b>Diaphragm/Cover Pads/Vacuum Insert</b>				
	B	BUNA-N/Neoprene/BUNA-N				
	T	Teflon®/Neoprene/Teflon®				
	V	Viton®/Viton®/Viton®				
	<b>Code</b>	<b>Base Flange Drilling</b>				
	1	API 650				
	2	ANSI 150#				
	<b>Code</b>	<b>Pressure Setting</b>				
	0	Below Minimum (Counterweighted)				
	1	Minimum (Standard)				
	2	Above Minimum				
	3	Extra Heavy				
<b>221</b>	<b>20</b>	<b>1PV1</b>	<b>B</b>	<b>1</b>	<b>1</b>	<b>(Example)</b>

Example: 20" Emergency Pressure and Vacuum Relief Manway Cover with Carbon Steel base, Aluminum cover, Aluminum trim, BUNA-N diaphragm and vacuum insert, API 650 Drilling, minimum setting. Specify pressure and vacuum settings when ordering.

**Ordering Information – Pressure Only**

<b>Code</b>	<b>Description</b>					
221	Emergency Pressure Relief Manway Cover					
	<b>Code</b>	<b>Size</b>				
	18	18"				
	20	20"				
	24	24"				
	<b>Code</b>	<b>Materials of Construction</b>				
	<b>Base</b>	<b>Cover</b>				
	1P0	Carbon SteelAluminum				
	2P0	AluminumAluminum				
	3P0	Carbon SteelCarbon Steel				
	4P0	316 Stainless Steel 316 Stainless Steel				
	<b>Code</b>	<b>Diaphragm/Cover Pads</b>				
	B	BUNA-N/Neoprene				
	T	Teflon®/Neoprene				
	V	Viton®/Viton®				
	<b>Code</b>	<b>Base Flange Drilling</b>				
	1	API 650				
	2	ANSI 150#				
	<b>Code</b>	<b>Pressure Setting</b>				
	0	Below Minimum (Counterweighted)				
	1	Minimum (Standard)				
	2	Above Minimum				
	3	Extra Heavy				
<b>221</b>	<b>20</b>	<b>1P0</b>	<b>B</b>	<b>1</b>	<b>1</b>	<b>(Example)</b>

Example: 20" Emergency Pressure Relief Manway Cover, Carbon Steel base with Aluminum cover and BUNA-N diaphragm, API 650 Drilling, minimum setting. Specify pressure setting when ordering.



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