

BREATHER VALVE , FLAME ARRESTER , N2 BLANKETING SYSTEM.....



HY INTERNATIONAL CO.










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COMPANY PROFILE

We are specialized in the manufacture of pressure and vacuum relief valves and flame arresters, as well as safety protection devices for liquid petroleum and petroleum products storage tanks, treatment, nitrogen blanketing systems for automatic nitrogen sealing devices, explosive venting systems, and other related products.

All HY products are designed, manufactured and tested in accordance with API 2000, API 650, API 2521, API RP 520, EN12874, BS 7244 and other relate recognition code or purchase order specification.

For the customer's safety, convenience and prosperity, we have been studying every aspect of storage tank & protection equipment and developing several methods ranging from field application to new products for higher safety standard since our foundation in 1999. All the staffs of our company are making every effort to make quality products to meet the needs of customers, through continuous technical development.

HY's quality management systems have been assessed and certified by ABS Quality Evaluation Inc. of Houston of USA and our products are manufactured in accordance with the requirement of ISO 9001 quality assurance procedures and assessed under strict quality standards before delivery to our customers.

We promise to do our best to give our customers satisfaction, from the engineering of the high world standard to perfect after-sales service.

As you are well aware, we are in a good position to export our quality products to global markets at reasonable prices with attractive delivery terms.

If you like to know more about our company, please do not hesitate to contact us at your earliest convenience.

Advantages of Pressure/Vacuum Relief Valves

WHY PRESSURE/VACUUM RELIEF VALVES ARE REQUIRED

1. Saves money by saving product.
2. Protects tank from over or under pressure when sized properly.
3. Protection against fire hazard when conforming to API standards.
4. Minimizes evaporation loss.
5. Reduces atmospheric corrosion of tank

PRESSURE/VACUUM VALVES SAVE MONEY

Actually, any properly sized opening in the tank's upper structure protects the tank from damage, but utilizing a pressure and vacuum valve also serves to accomplish other advantages. Two of the more important are: economic savings and fire hazard protection. In 1952, American petroleum Institute developed a formula to determine tank evaporative losses. The API equation was formulated after the results of a total of 256 individual tests were compiled.

Of the 256 tanks tested (½ with open vents and ½ with pressure/vacuum valves), only 178 were considered valid. The remainder was eliminated because of inadequate data, obviously incorrect test methods, poor tank conditions, or leaky fittings. The API has a formula for calculating tank breathing loss. The principle factors are turnovers per year, true vapor pressure of the product, diameter of the tank in feet, the average daily ambient temperature change, and the paint factor. The test was conducted on tanks containing gas-line with pressure and vacuum valves set at oz. pressure and ½ oz. vacuum. API2521 states that ½oz. is the usual setting.

REDUCED CORROSION

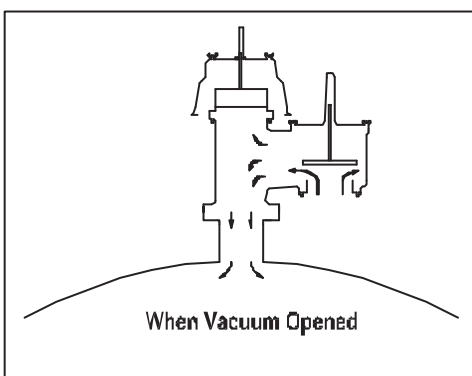
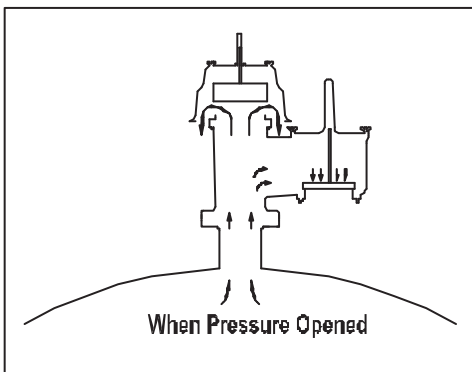
An additional reason for using pressure/vacuum valves, they help reduce overall corrosion in the plant. Plant corrosion is reduced due to less product escaping from the tank and therefore less corrosion is produced by escaping vapors. This means overall plant maintenance is reduced thereby saving labor and dollars.

RECOMMENDED AND REQUIRED

Pressure/vacuum valves are recommended by API 2000 for use atmospheric storage tank in which oil with a flash point below 100°F is stored. OSHA states that tanks storing Class 1 liquids shall be equipped with venting devices which shall be normally closed except under pressure or vacuum condition. Generally speaking, the majority of the regulatory bodies dealing with tank safety, API, OSHA, NFPA, Insurance Companies etc. require installation of these devices on flammable liquid storage tanks.

Pressure/Vacuum Valve Operation

How Pressure/Vacuum relief valves operate



How does a pressure/vacuum valve operate? Most atmospheric tanks require a venting device that will allow large volumes of vapor to escape under relatively low pressures.

Usually the allowable set pressure is in inches of water column pressure, both for positive and vacuum conditions. This is because most large storage tanks have a relatively low maximum allowable working pressure. These tanks are generally large volume welded vessels that are built to API650 standard.

In order to accommodate large volumes at low set pressures, these valves have ports that are greater in area than the inlet or nozzle connection.

The low setting required necessitates weight loading the valve as opposed to spring lading. Because of the above, a pressure/vacuum valve requires approximately 100% over set pressure in order to reach full opening of the valve. However, when deciding on a set pressure the weight-loaded valve operation MAWP should be at least twice the required set pressure to obtain optimum flow.

If the MAWP is less than 100% above the required set, valve could be larger in size than normally required. The possibility of valve chatter and accelerated seat and diaphragm wear will exist if less than 20% over pressure is allowed.

Simply stated, a pressure/vacuum valve is not exactly like a high pressure safety relief valve and should not be sized at 10% or 20% over pressure. When sizing a pressure/vacuum valve, consult the manufacturer flow curves and allow sufficient overset pressure.



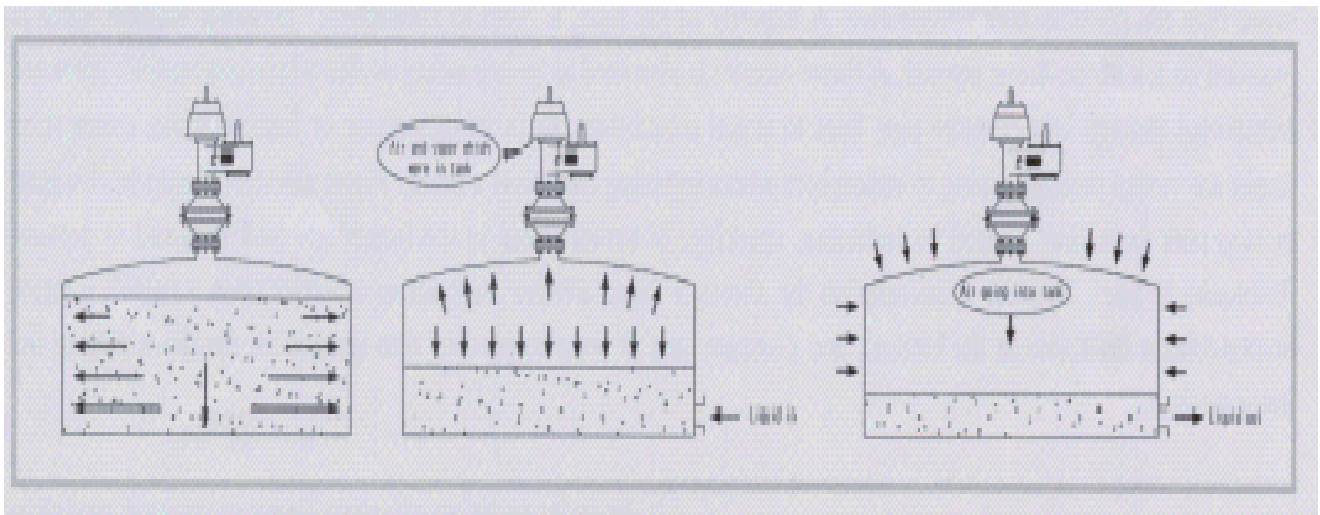
— API Standard 2000 for Venting Atmospheric and Low Pressure storage Tanks

SIZING A PRESSURE/VACUUM RELIEF VALVE

API standards are provided as an engineering aid for specification and selection of “normal” and “emergency” pressure and vacuum relief valves for aboveground liquid petroleum storage tanks. Normal venting capacity is obtained without exceeding pressure or vacuum that would cause physical damage or permanent deformation to the tank. The following will help in sizing a pressure/vacuum valve:

1. NORMAL RELIEF : the sum of vapor replacement resulting from emptying or filling and thermal in-breathing or out-breathing.
2. EMERGENCY RELIEF : thermal out-breathing from fire exposure.
3. ALL TANKS : generally require the sizing of a normal pressure and vacuum relief valve to be sized and an independent emergency relief valve to be sized separately.
4. FLOW CURVES : these curves provide pressure and vacuum capacity which is required for sizing.

STORAGE TANK DESIGN



1. TO HOLD LIQUID

Liquid exerts pressure on the sides and base of the tank. Pressure = Height of Liquid

2. TO BE FILLED

For liquid to get in, air and vapor must get out. If they can't the tank will be pressurized. For air and vapor to be pushed out, the pressure in the tank must be slightly above atmospheric pressure. The tank is designed for an internal pressure of in. water gage(WG).

3. TO BE EMPTIED

For liquid to get out, air must get in. If it can't the tank will be underpressured. For air to be sucked in, the pressure in the tank must be slightly below atmospheric pressure. The tank is designed for an external pressure (or vacuum in the tank) of 2.1/2 in. WG.

PRESSURE/VACUUM RELIEF VALVE SETTING

API 2521

Pressure/vacuum valves on atmospheric pressure fixed roof tanks are usually set at 1/2 oz. per square inch pressure or vacuum. Test data indicate that an increase of 1 oz. per square inch in the pressure set point over the usual 1/2oz. per square inch reduces breathing losses by approximately 7 percent. However, the test data indicate that each additional increase of 1 oz. per square inch in pressure set point reduces the breathing losses in progressively smaller increments.

API 2513

The pressure and vacuum setting of a breather valve are dictated by the structural characteristics of the tank and should be within safe operating limits. A certain amount of pressure and vacuum beyond this setting is necessary to overcome pressure drop in order to obtain required flow. Proper size and setting can best be determined by reference to API STD accordance with this publication. The pressure setting for pressure/vacuum valves to be installed on large tanks constructed in accordance with API 12:Specification for Large Welded Production Tanks(1957)usually is limited to 1/2 oz. because roof plates will start to shift when the pressure rises much above 1 oz.

PRESSURE RELIEF VALVE (MODEL WB10, WB13)

- **Pressure Setting**

: 22mm H₂O to 10,000mm H₂O

- **Size**

: 2" through 12"

- **Available in**

Aluminum, Carbon Steel, Stainless Steel.

- **Other size and material to be consulted by factory.**



MODEL : WB10A

◆ INTRODUCTION

Pressure relief valves are used on liquid storage tanks and other process vessels or systems to prevent structural damage due to excess internal pressure.

Storage tanks are pressurized when liquid is pumped in, compressing the existing vapor or when rising temperatures cause increased evaporation or expansion of existing vapor.

To prevent tank damage, vapor must be allowed into or out of the tank at specified pressure condition. The volume rate of venting depends upon the tank size, volatility of the tank contents, the pumping rates and the temperature.



MODEL : WB13A

◆ **DESIGN AND FUNCTION**

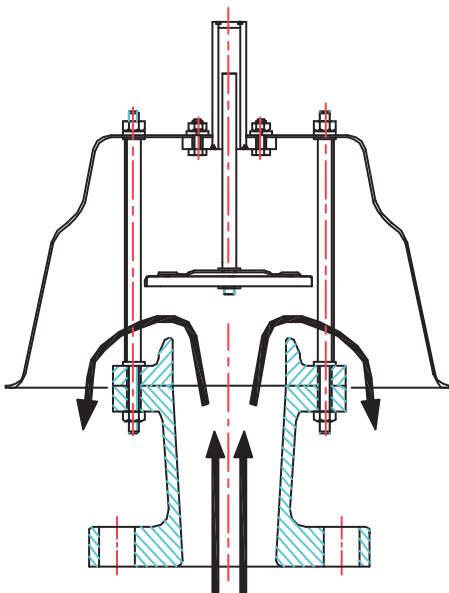
Tank protection equipment typically includes an operating valve which is designed to provide pressure relief under normal pump in thermal breathing conditions.

Model No.	Type	Setting Pressure Range
WB10A	Weight Loaded release to ATM	22 ~ 700 mmH2O
WB10B	Spring Loaded to ATM	Above 700 mmH2O
WB13A	Weight Loaded release Pipe Away	22~ 700 mmH2O
WB13B	Spring Loaded Pipe Away	Above 700 mmH2O

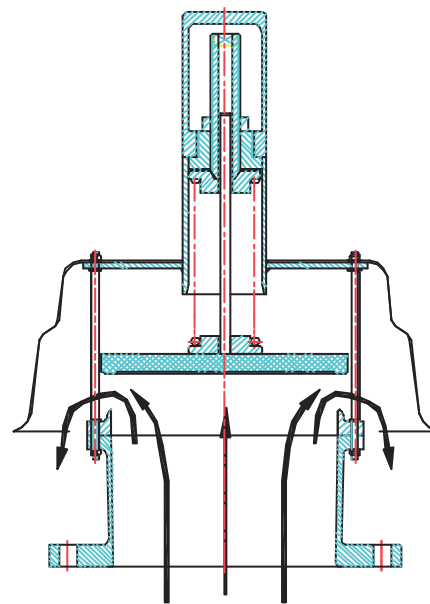
Note) Other specification to be consult by factory.

Pressure Relief

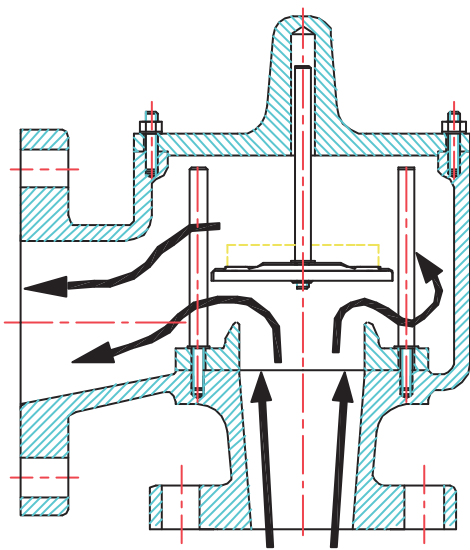
: As the pressure in the storage tank increases. When the set pressure is reached, the pressure pallet lifts and relieves to atmosphere (or to a header if it a pipe away valve).



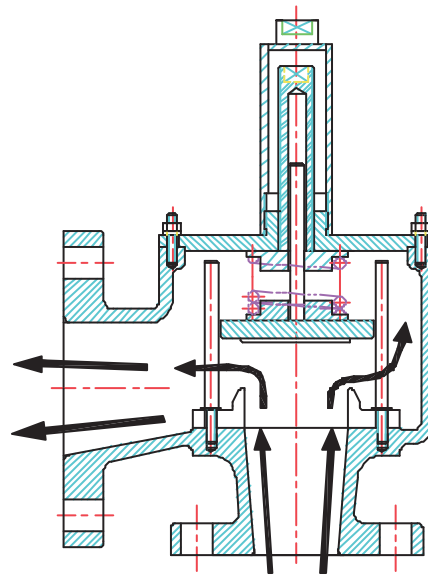
WB10A



WB10B



WB13A



WB13B

Model WB10, WB13 of quick-opening type is designed for emergency relief of pressure above capacity that supplied by a standard operating valve used on tanks, piping and low pressure vessels. It provides relief from excessive internal pressure that may cause tank damage. Model WB10, WB13 has self-draining housing body and drip rings to protect seating surfaces from condensation and freezing.

Model WB13 is for use where pressure relief is required and all relieving vapors must be piped away.

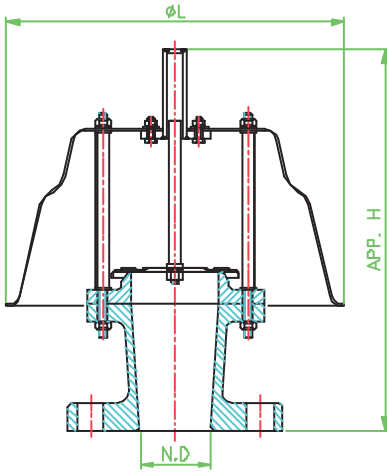
◆ INSPECTION AND STORAGE

The pressure relief valve is carefully packaged to prevent damage or contamination during shipping. Inspect all equipment when it is received: report any damage to the carrier immediately.

The valve should be protected during handling and storage. Keep all the ports plugged to prevent intrusion of foreign materials. Before installation, inspect the unit for indications of physical damage or internal contamination. If these are observed, the valve must be disassembled, cleaned and repaired before installation.

◆ DRAWING AND DIMENSION

MODEL WB10A

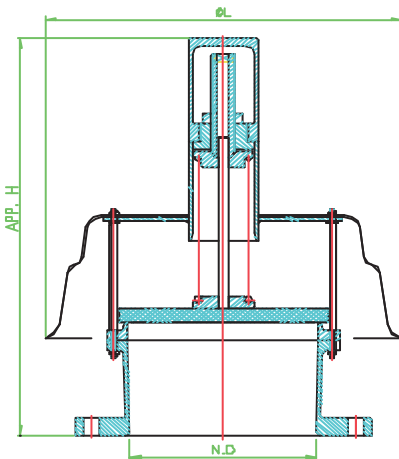


DIMENSION TABLE

UNIT : mm

	2"	3"	4"	6"	8"	10"	12"
N.D	50	80	100	150	200	250	300
H	275	300	342	442	490	540	532
L	240	270	290	400	450	532	582

MODEL WB10B

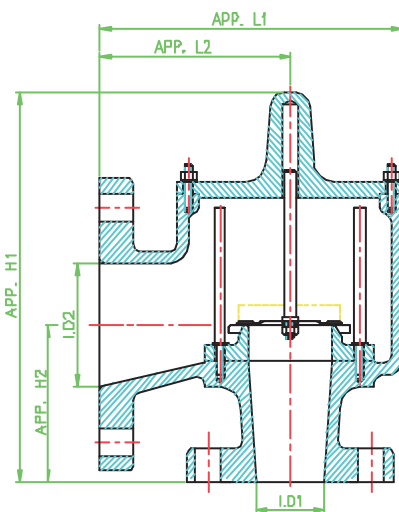


DIMENSION TABLE

UNIT : mm

	2"	3"	4"	6"	8"	10"	12"
N.D	50	80	100	150	200	250	300
H	275	300	342	442	490	540	532
L	240	270	290	400	450	532	582

MODEL WB13A

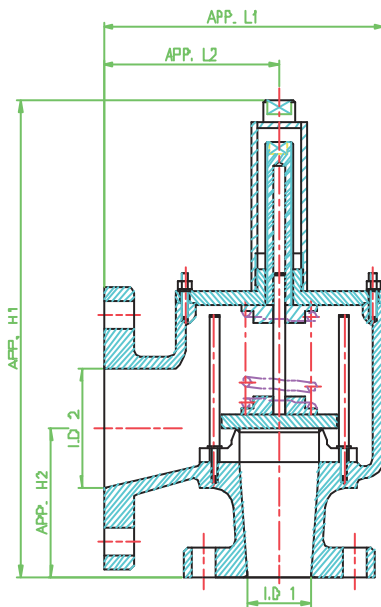


DIMENSION TABLE

UNIT : mm

SIZE	I.D1	I.D2	H1	H2	L1	L2
2" x 3"	50	80	251	100	248	150
3" x 4"	80	100	309	120	258	160
4" x 6"	100	150	379	145	360	220
6" x 8"	150	200	489	180	380	240
8" x 10"	200	250	532	215	420.5	253
10" x 12"	250	300	623	265	491	298
12" x 14"	300	350	686	285	548	330

MODEL WB13B



DIMENSION TABLE

UNIT : mm

SIZE	I.D1	I.D2	H1	H2	L1	L2
2" x 3"	50	80	280	100	248	150
3" x 4"	80	100	340	120	258	160
4" x 6"	100	150	400	145	360	220
6" x 8"	150	200	489	180	380	240
8" x 10"	200	250	550	215	420.5	253
10" x 12"	250	300	623	265	491	298
12" x 14"	300	350	700	285	548	330

VACUUM RELIEF VALVE (MODEL WB11, WB14)

- **Vacuum Setting**

: -22mm H₂O to -8,400mm H₂O

- **Size**

: 2" through 12"

- **Available in**

Aluminum, Carbon Steel, Stainless Steel.

- **Other size and material to be consulted by factory.**



MODEL • WB11A

◆ INTRODUCTION

Vacuum relief valves are used on liquid storage tanks and other process vessels or systems to prevent structural damage due to excess internal vacuum.

Storage tanks are pressurized when liquid is pumped in, compressing the existing vapor or when rising temperatures cause increased evaporation or expansion of existing vapor.

Conversely, a vacuum condition may be created when pumping out or due to falling temperature. To prevent tank damage, vapor must be allowed into or out of the tank at specified vacuum condition. The volume rate of venting depends upon the tank size, volatility of the tank contents, the pumping rates and the temperature.



MODEL : WB14A

◆ DESIGN AND FUNCTION

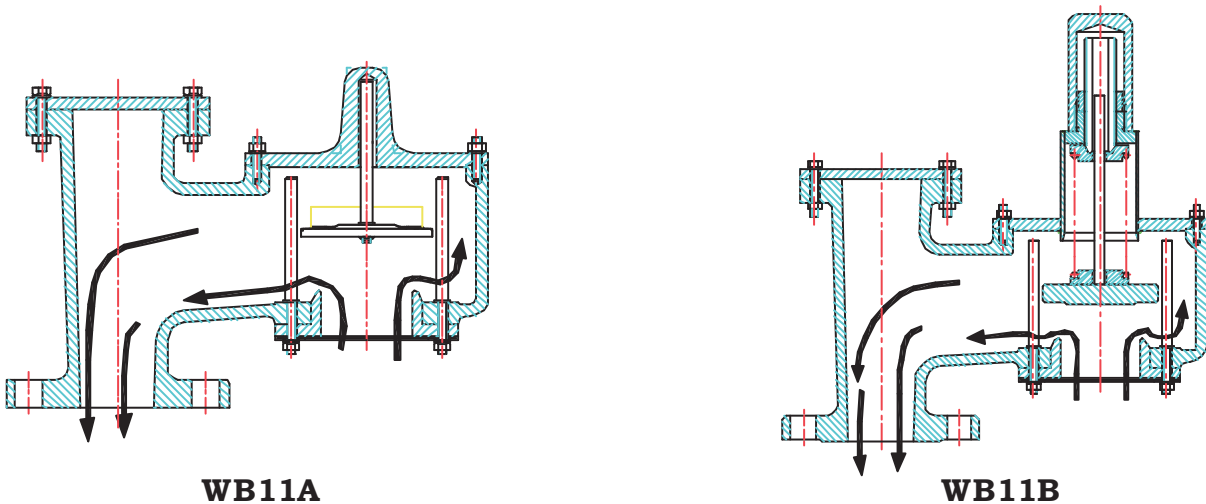
Tank protection equipment typically includes an operating valve, which is designed to provide vacuum relief under normal pump out and thermal breathing conditions.

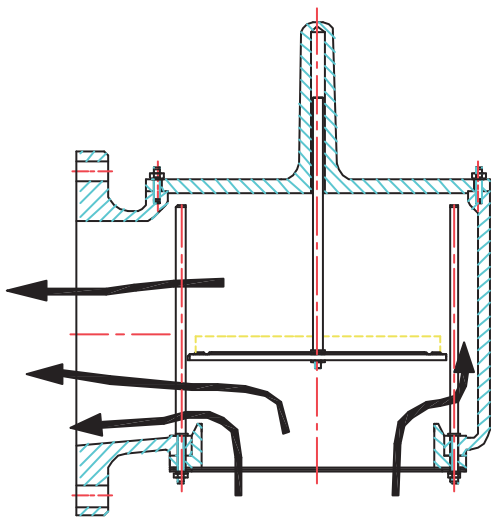
Model No.	Type	Setting Pressure Range
WB11A	Weight Loaded Type	22 ~ 700 mmH ₂ O
WB11B	Spring Loaded Type	Above 700 mmH ₂ O
WB14A	Weight Loaded Type	22 ~ 700 mmH ₂ O
WB14B	Spring Loaded Type	Above 700 mmH ₂ O

Note) Other specification to be consult by factory.

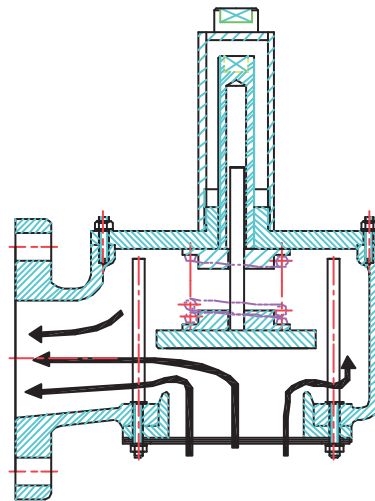
Vacuum Relief

: As a vacuum is drawn in the storage tank (for example, when fluid is being pumped out). When the vacuum setting is reached, the pallet lifts and air is drawn in the storage tank from the atmosphere.





WB14A



WB14B

Model WB11, WB14 is designed for vacuum relief only. It has housing body and drip rings to protect seating surfaces from condensation and freezing. Valve size must be selected to perform required vacuum relief under operating and normal thermal conditions. Model WB14 may be side mounted on the tank body or pipe away.

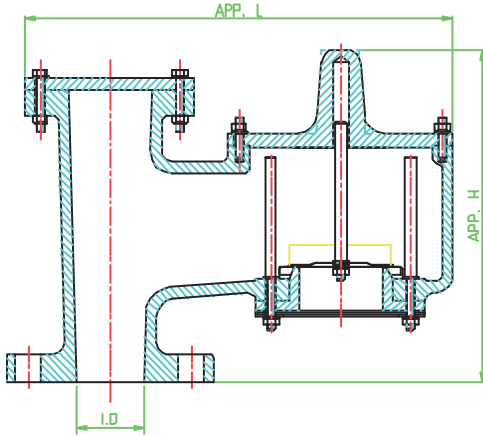
◆ INSPECTION AND STORAGE

The vacuum relief valve is carefully packaged to prevent damage or contamination during shipping. Inspect all equipment when it is received: report any damage to the carrier immediately.

The valve should be protected during handling and storage. Keep all the ports plugged to prevent intrusion of foreign materials. Before installation, inspect the unit for indications of physical damage or internal contamination. If these are observed, the valve must be disassembled, cleaned and repaired before installation.

◆ DRAWING AND DIMENSION

MODEL WB11A

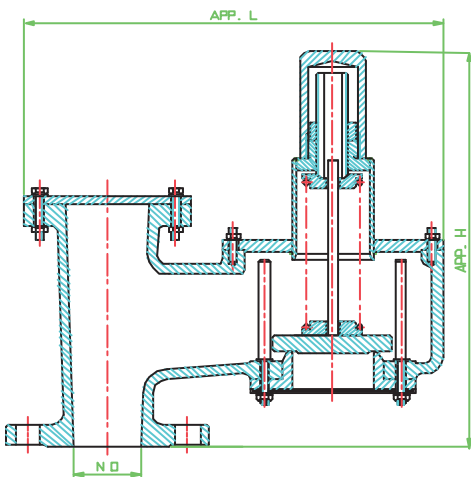


DIMENSION TABLE

UNIT : mm

	2"	3"	4"	6"	8"	10"	12"
I.D	50	80	100	150	200	250	300
H	235	265	335	435	480	525	610
L	315	385	435	555	675	770	885

MODEL WB11B

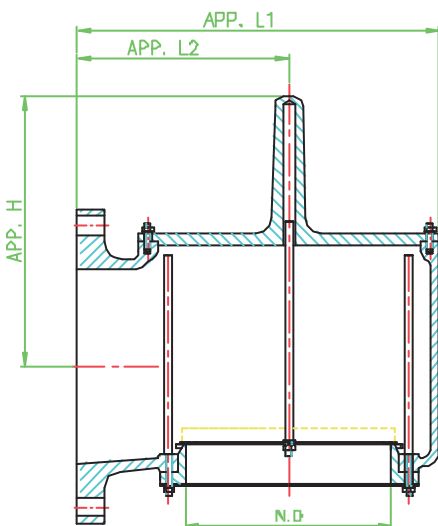


DIMENSION TABLE

UNIT : mm

	2"	3"	4"	6"	8"	10"	12"
N.D	50	80	100	150	200	250	300
H	235	350	420	500	528	660	790
L	315	385	435	555	675	770	885

MODEL WB14A

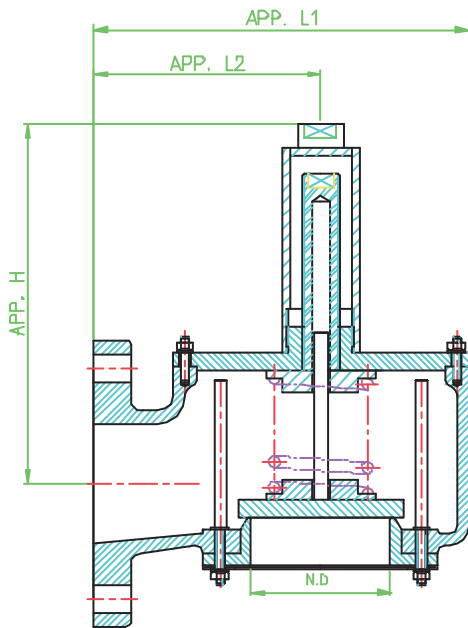


DIMENSION TABLE

UNIT : mm

SIZE	2"	3"	4"	6"	8"	10"	12"
N.D	50	80	100	150	200	250	300
H	149	165.5	200.5	289	310	348	376
L1	231	248	268	360	416	515.5	518
L2	132	150	160	220	250	323	300

MODEL WB14B



DIMENSION TABLE

UNIT : mm

SIZE	2"	3"	4"	6"	8"	10"	12"
N.D	50	80	100	150	200	250	300
H	210	220	256	340	360	400	426
L1	231	248	268	360	416	515	518
L2	132	150	160	220	250	323	300

PRESSURE / VACUUM RELIEF VALVE (MODEL WB12, WB15)

- **Pressure Setting**

: 22mm H₂O to 10,000mm H₂O

- **Size**

: 2" through 12"

- **Available in**

Aluminum, Carbon Steel, Stainless Steel.

- **Other size and material to be consulted by factory**



MODEL : WB12A

◆ INTRODUCTION

Pressure / Vacuum relief valves are used on liquid storage tanks and other process vessels or systems to prevent structural damage due to excess internal vacuum.

Storage tanks are pressurized when liquid is pumped in, compressing the existing vapor or when rising temperatures cause increased evaporation or expansion of existing vapor.



MODEL : WB15A

Conversely, a vacuum condition may be created when pumping out or due to falling temperature. To prevent tank damage, vapor must be allowed into or out of the tank at specified vacuum condition. The volume rate of venting depends upon the tank size, volatility of the tank contents, the pumping rates and the temperature.

◆ DESIGN AND FUNCTION

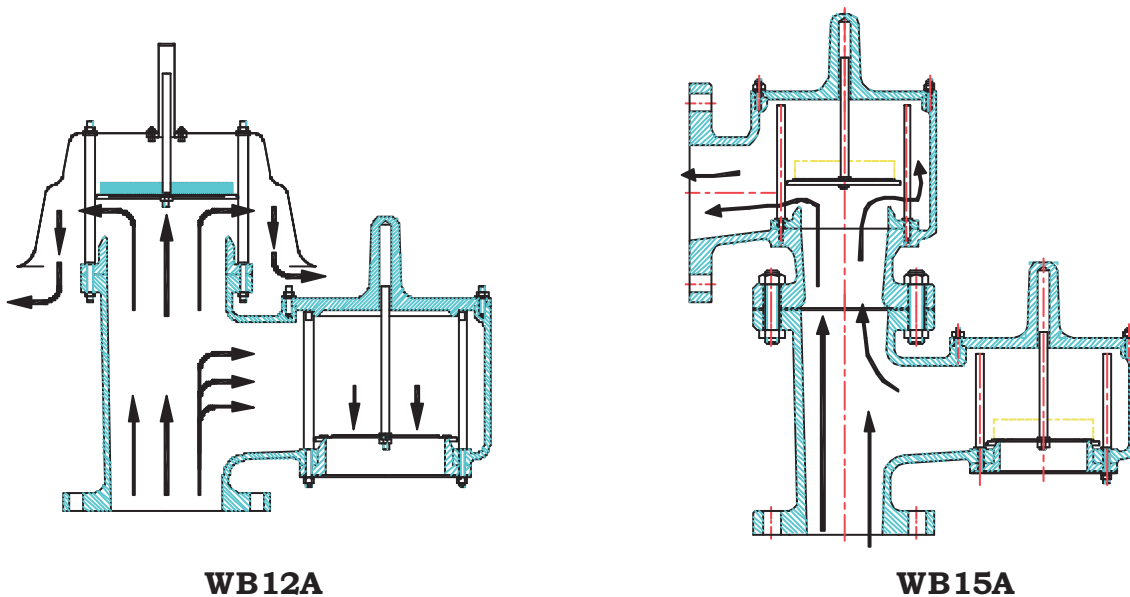
Tank protection equipment typically includes an operating valve, which is designed to provide pressure/vacuum relief under normal pump in/out and thermal breathing conditions.

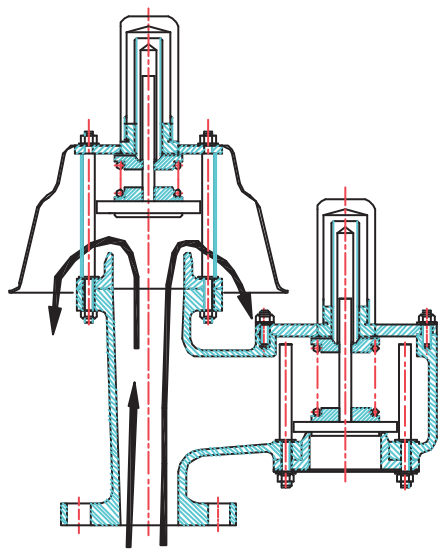
Model No.	Type	Setting Pressure Range
WB12A	Weight Loaded release to ATM	22 ~ 700 mmH ₂ O
WB12B	Spring Loaded to ATM	Above 700 mmH ₂ O
WB15A	Weight Loaded Pipe Away	22 ~ 700 mmH ₂ O
WB15B	Spring Loaded Pipe Away	Above 700 mmH ₂ O

Note) Other specification to be consult by factory.

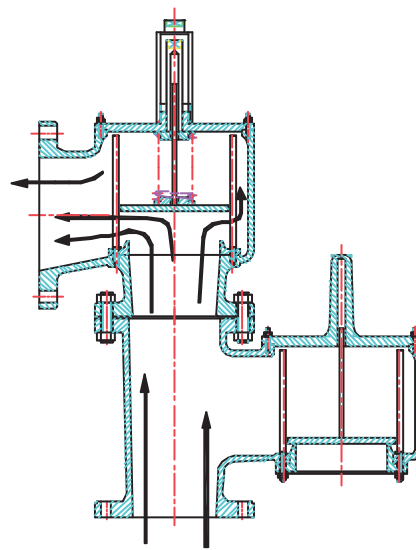
Pressure Relief

: As the pressure in the storage tank increases, the vacuum pallet is held shut. When the set pressure is reached, the pressure pallet lifts and relieves to atmosphere (or to a header if it a pipe away valve).





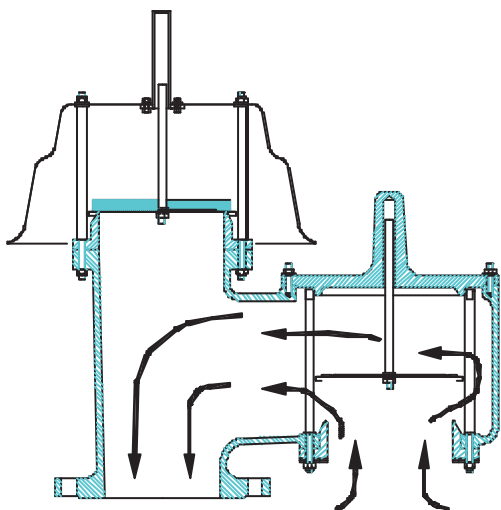
WB12B



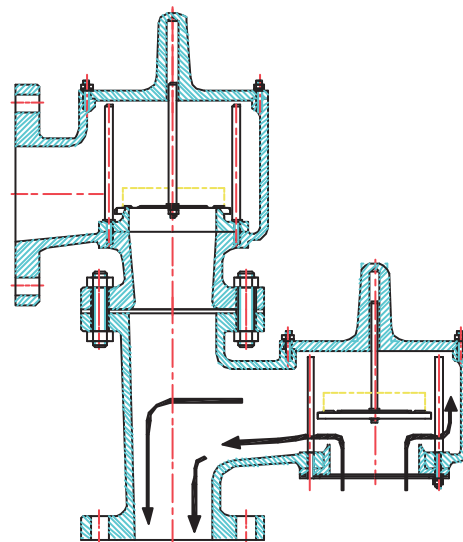
WB15B

Vacuum Relief

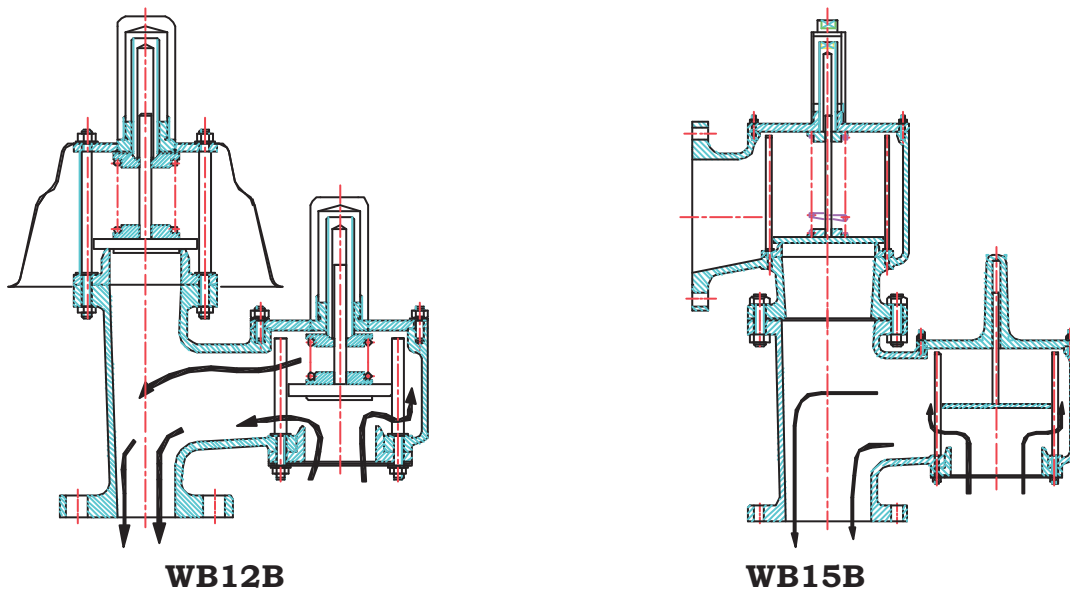
: As a vacuum is drawn in the storage tank (for example, when fluid is being pumped out), the pressure pallet is held shut by atmospheric pressure. When the vacuum setting is reached, the pallet lifts and air is drawn in the storage tank from the atmosphere.



WB12A



WB15A



Model WB12, WB15 is designed to protect the low-pressure tank from damage created by overpressure or excessive vacuum.

Model WB12, WB15 has a self draining house and drip ring to protect the seating surfaces from condensation and freezing. The pressure and vacuum relief valve is installed on the storage tank roof. Also can this valve be mounted in conjunction with a WF21 flame arrester to protect against ignition of flammable vapors from external sources as well as to provide pressure vacuum relief.

Model WB15 is used for pressure and vacuum relief where vapors must be piped away.

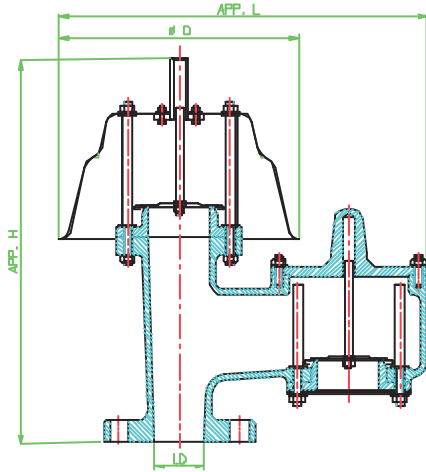
◆ INSPECTION AND STORAGE

The vacuum relief valve is carefully packaged to prevent damage or contamination during shipping. Inspect all equipment when it is received: report any damage to the carrier immediately.

The valve should be protected during handling and storage. Keep all the ports plugged to prevent intrusion of foreign materials. Before installation, inspect the unit for indications of physical damage or internal contamination. If these are observed, the valve must be disassembled, cleaned and repaired before installation.

◆ DRAWING AND DIMENSION

MODEL WB12A

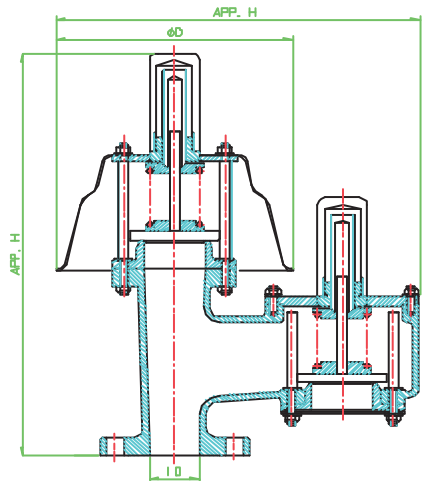


DIMENSION TABLE

UNIT : mm

SIZE	2"	3"	4"	6"	8"	10"	12"
I.D	50	80	100	150	200	250	300
H	385	430	490	665	735	816	883
L	370	445	495	645	758	870	991
D	240	270	290	400	450	532	582

MODEL WB12B

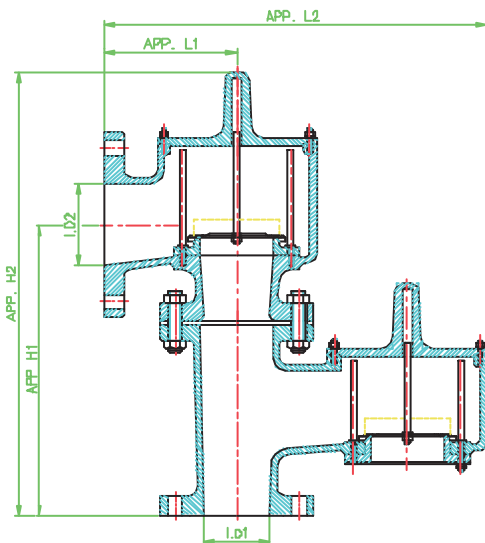


DIMENSION TABLE

UNIT : mm

SIZE	2"	3"	4"	6"	8"	10"	12"
I.D	50	80	100	150	200	250	300
H	385	500	570	750	780	876	930
L	370	445	492	636	758	869	985
D	240	270	290	400	450	532	582

MODEL WB15A



DIMENSION TABLE

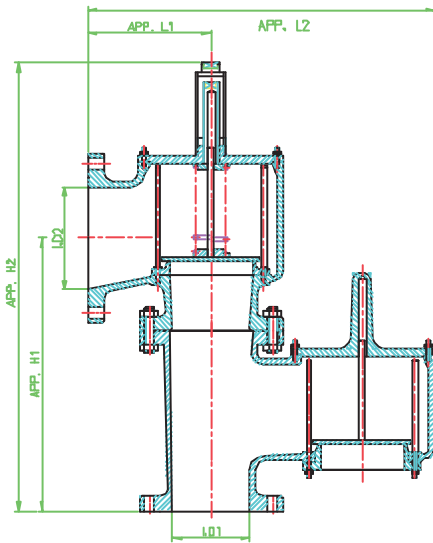
UNIT : mm

SIZE	I.D1	I.D2	H1	H2	L1	L2
2" x 3"	50	80	320	490	150	400
3" x 4"	80	100	360	555	160	472
4" x 6"	100	150	413	700	217	535
6" x 8"	150	200	533	842	238	665
8" x 10"	200	250	602	920	253	785
10" x 12"	250	300	679	1037	298	890
12" x 14"	350	400	758	1159	330	1025

MODEL WB15B

DIMENSION TABLE

UNIT : mm

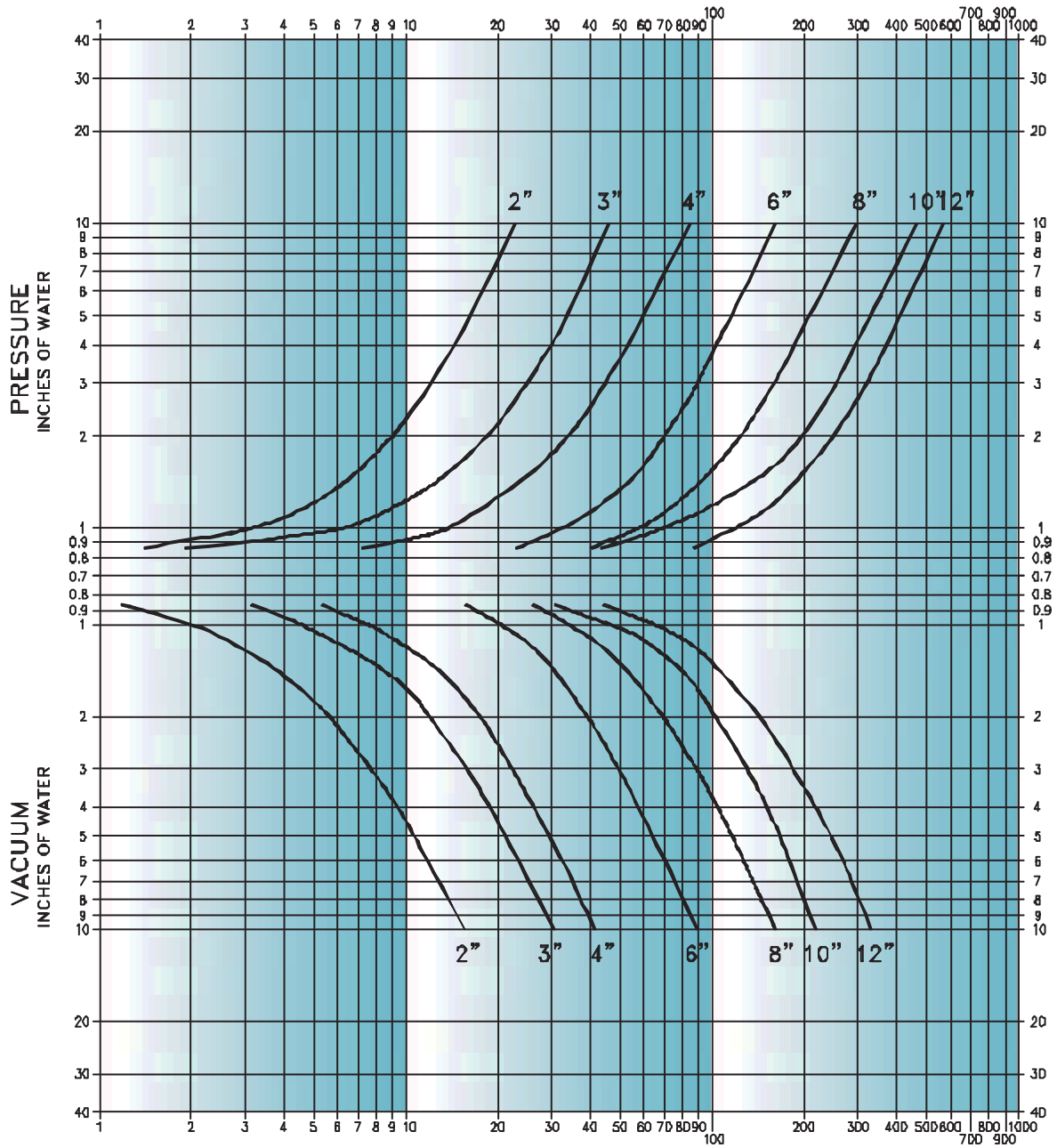


SIZE	I.D1	I.D2	H1	H2	L1	L2
2" x 3"	50	80	320	490	150	400
3" x 4"	80	100	360	555	160	472
4" x 6"	100	150	405	677	220	535
6" x 8"	150	200	533	876	238	665
8" x 10"	200	250	602	950	253	785
10" x 12"	250	300	679	1067	290	890
12" x 14"	300	350	758	1189	330	1025

◆ **FLOW CAPACITY**

WB12A SERIES RELIEF VALVE

SET AT 0.865 INCHES OF WATER

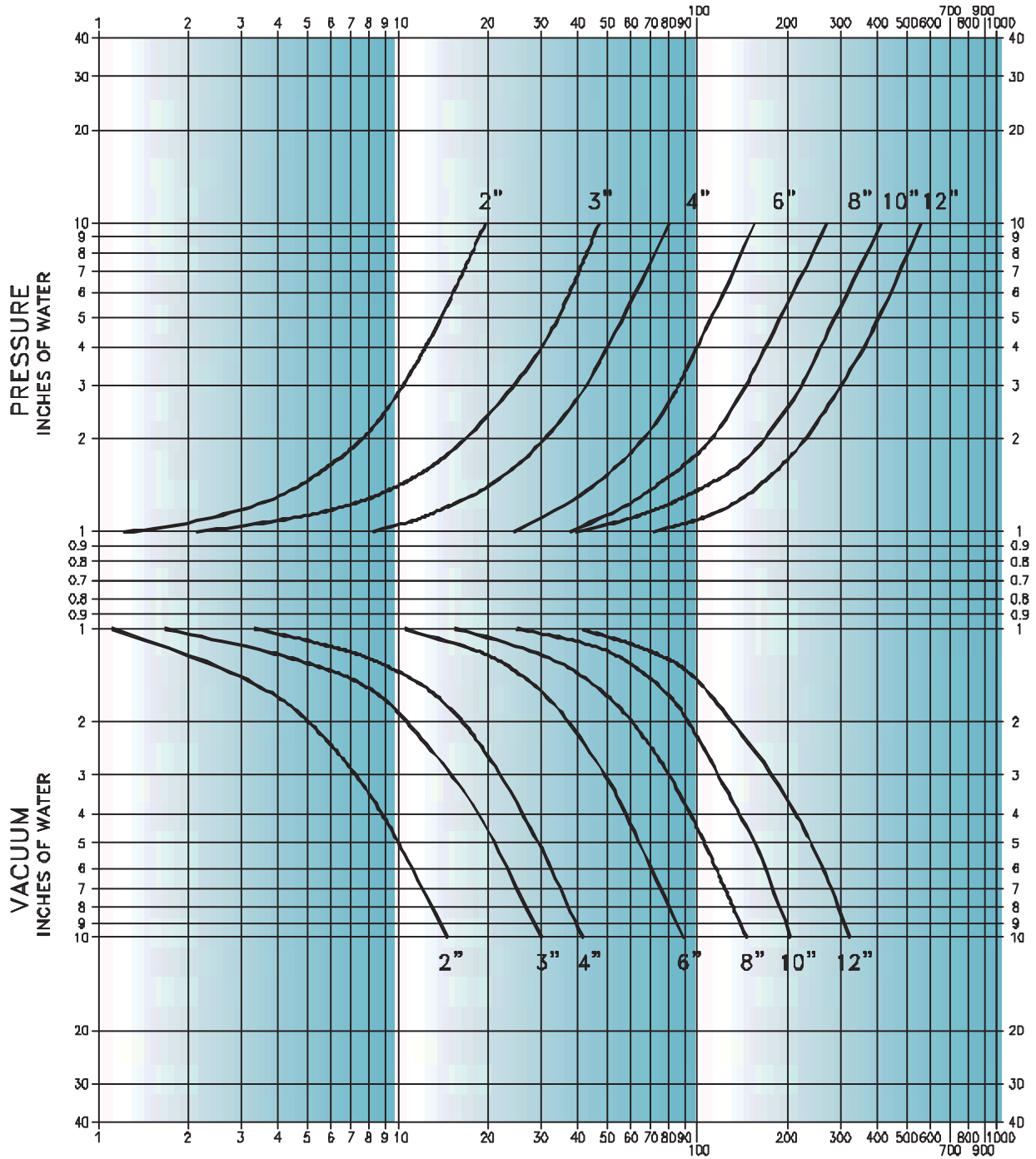


THOUSANDS OF CUBIC FEET/HOUR AT 60°F AND 14.7 P.S.I.A.

AIR FLOW(SCFH) *(SCFHx0.02832=M³/hr)

WB12A SERIES RELIEF VALVE

SET AT 1 INCHES OF WATER

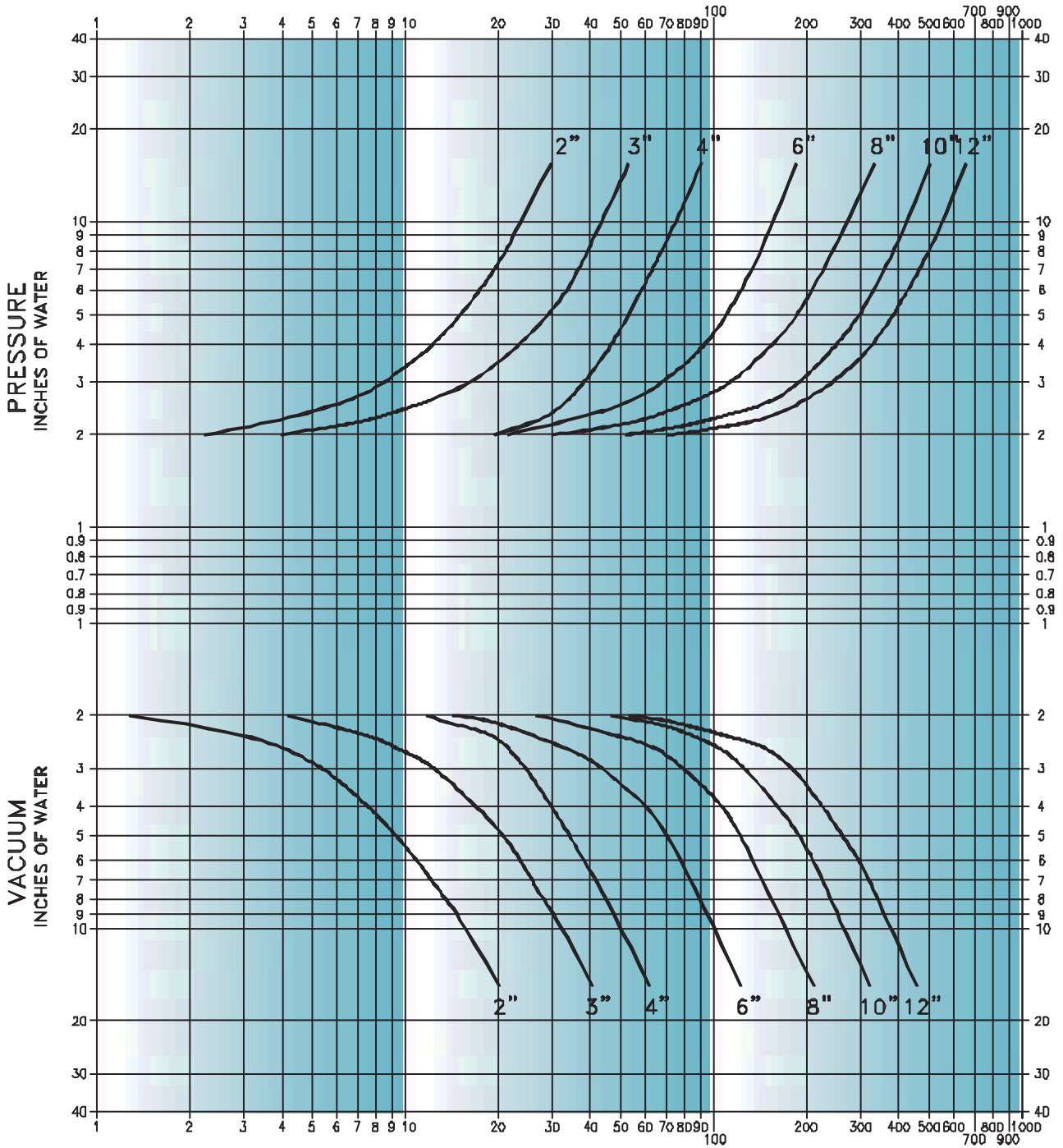


THOUSANDS OF CUBIC FEET/HOUR AT 60°F AND 14.7 P.S.I.A.

AIR FLOW(SCFH) *(SCFHx0.02832=M³/hr)

WB12A SERIES RELIEF VALVE

SET AT 2 INCHES OF WATER

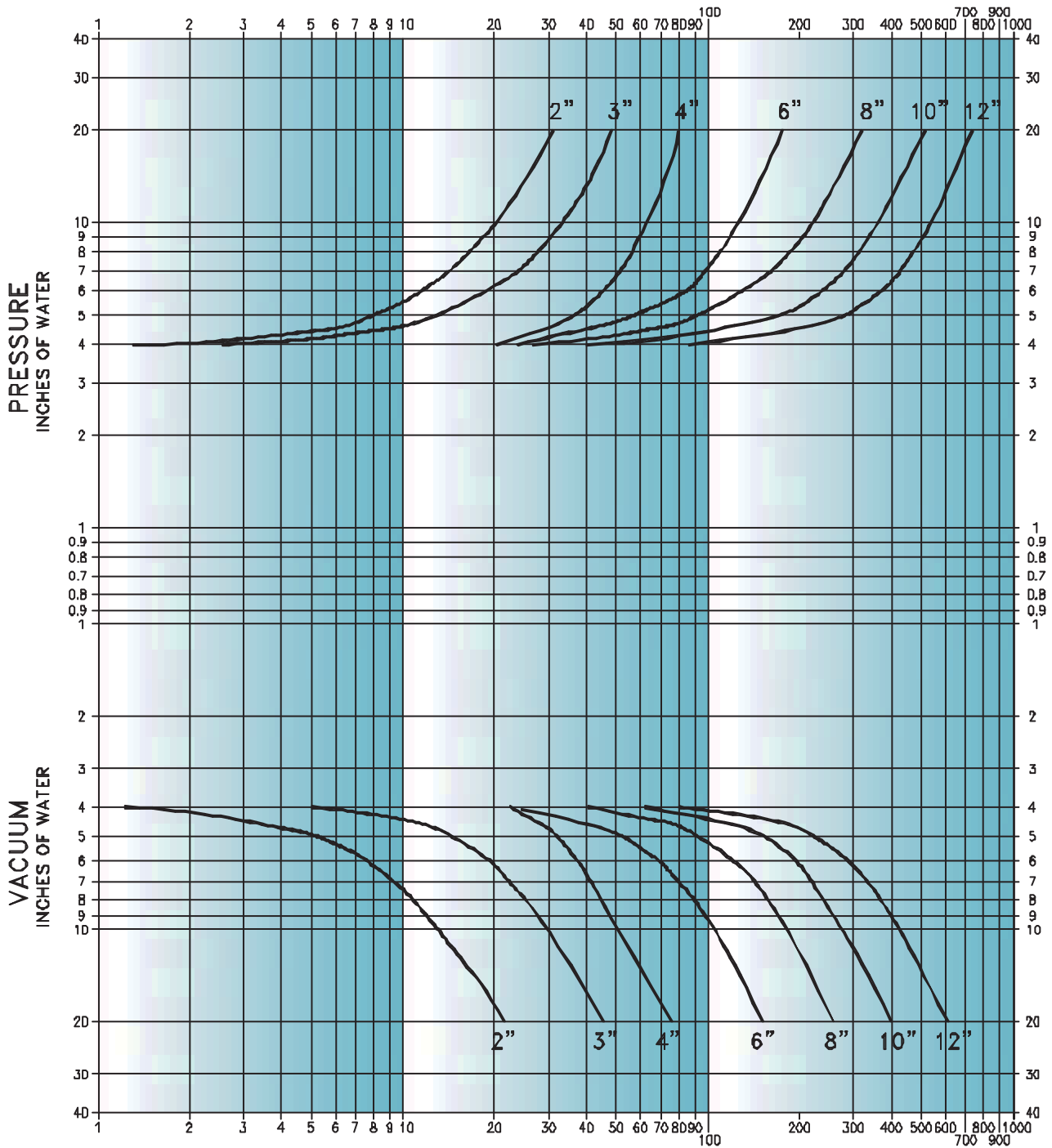


THOUSANDS OF CUBIC FEET/HOUR AT 60°F AND 14.7 P.S.I.A.

AIR FLOW(SCFH) *(SCFHx0.02832=M³/hr)

WB12A SERIES RELIEF VALVE

SET AT 4 INCHES OF WATER

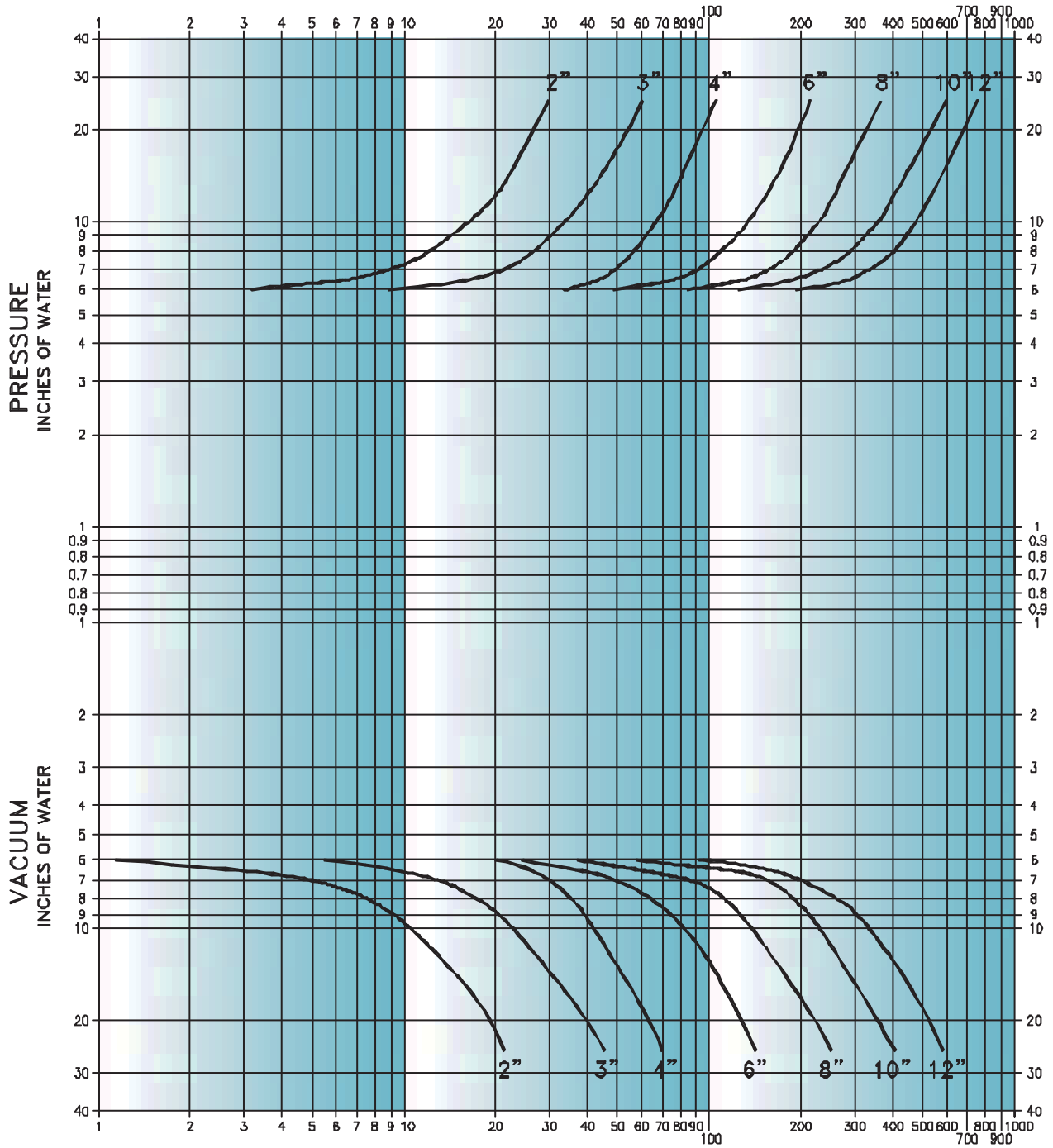


THOUSANDS OF CUBIC FEET/HOUR AT 60°F AND 14.7 P.S.I.A.

AIR FLOW(SCFH) *(SCFH×0.02832=M³/hr)

WB12A SERIES RELIEF VALVE

SET AT 6 INCHES OF WATER

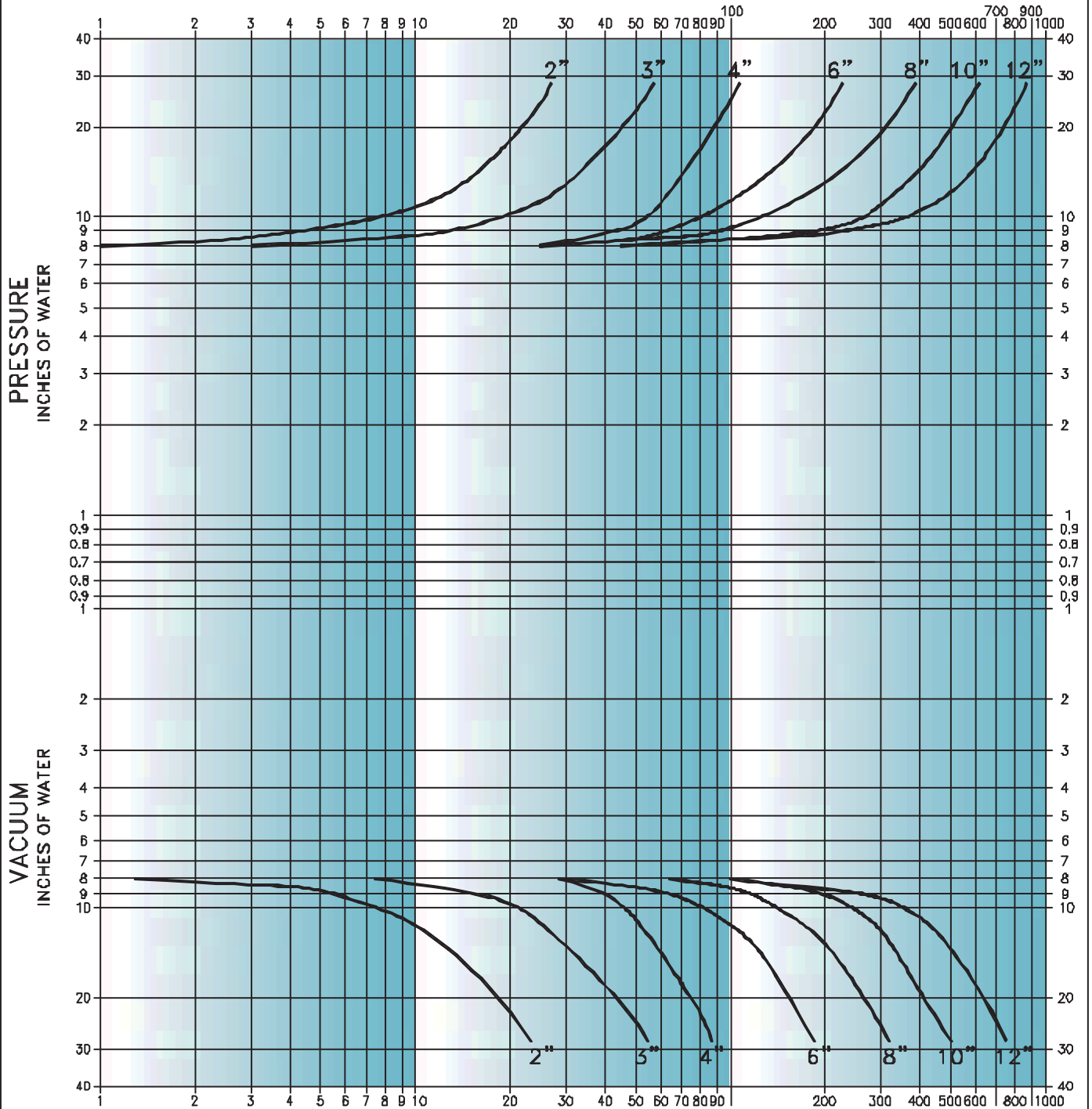


THOUSANDS OF CUBIC FEET/HOUR AT 60°F AND 14.7 P.S.I.A.

AIR FLOW(SCFH) *(SCFHx0.02832=M³/hr)

WB12A SERIES RELIEF VALVE

SET AT 8 INCHES OF WATER

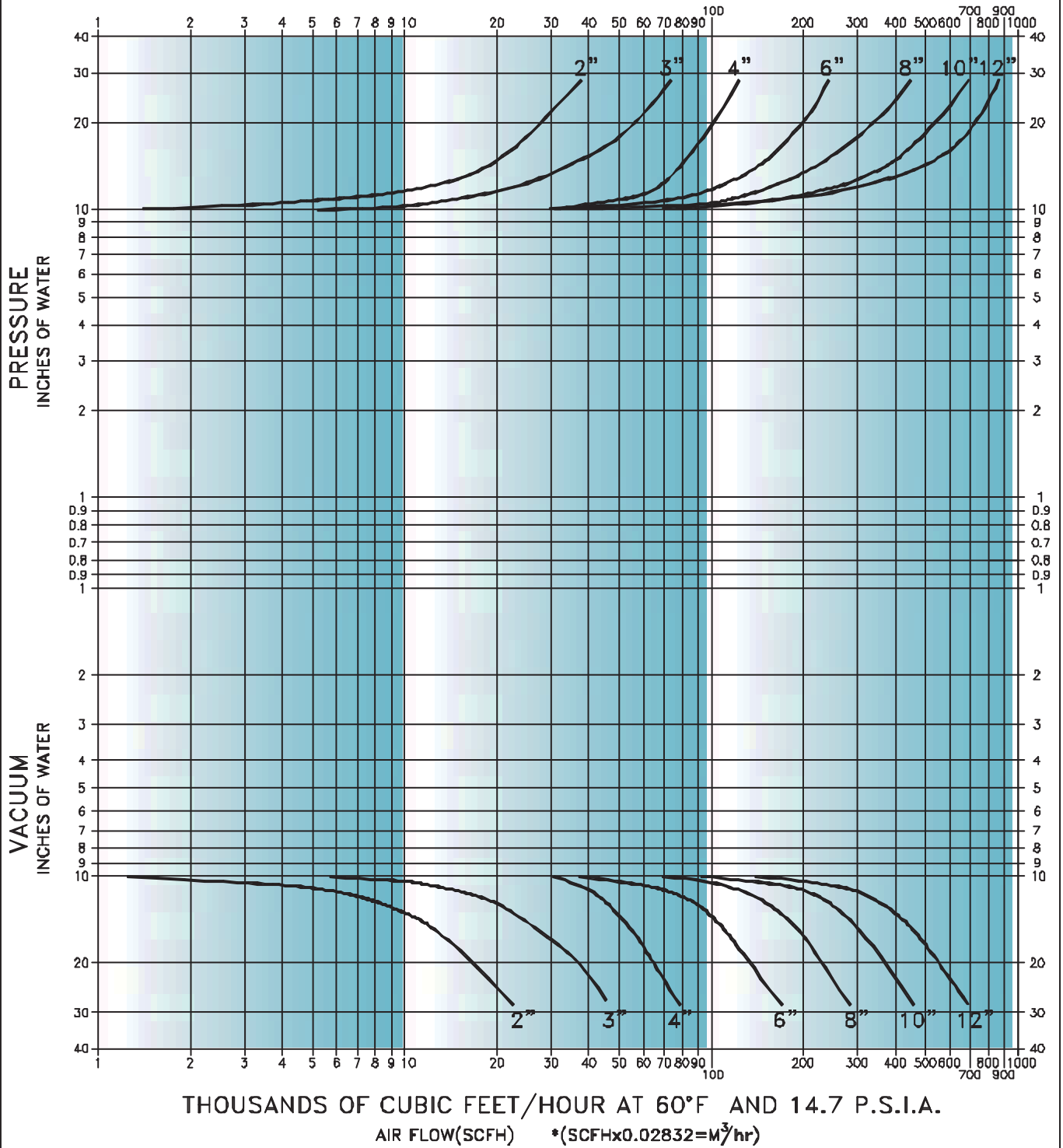


THOUSANDS OF CUBIC FEET/HOUR AT 60°F AND 14.7 P.S.I.A.

AIR FLOW(SCFH) *(SCFH×0.02832=M³/hr)

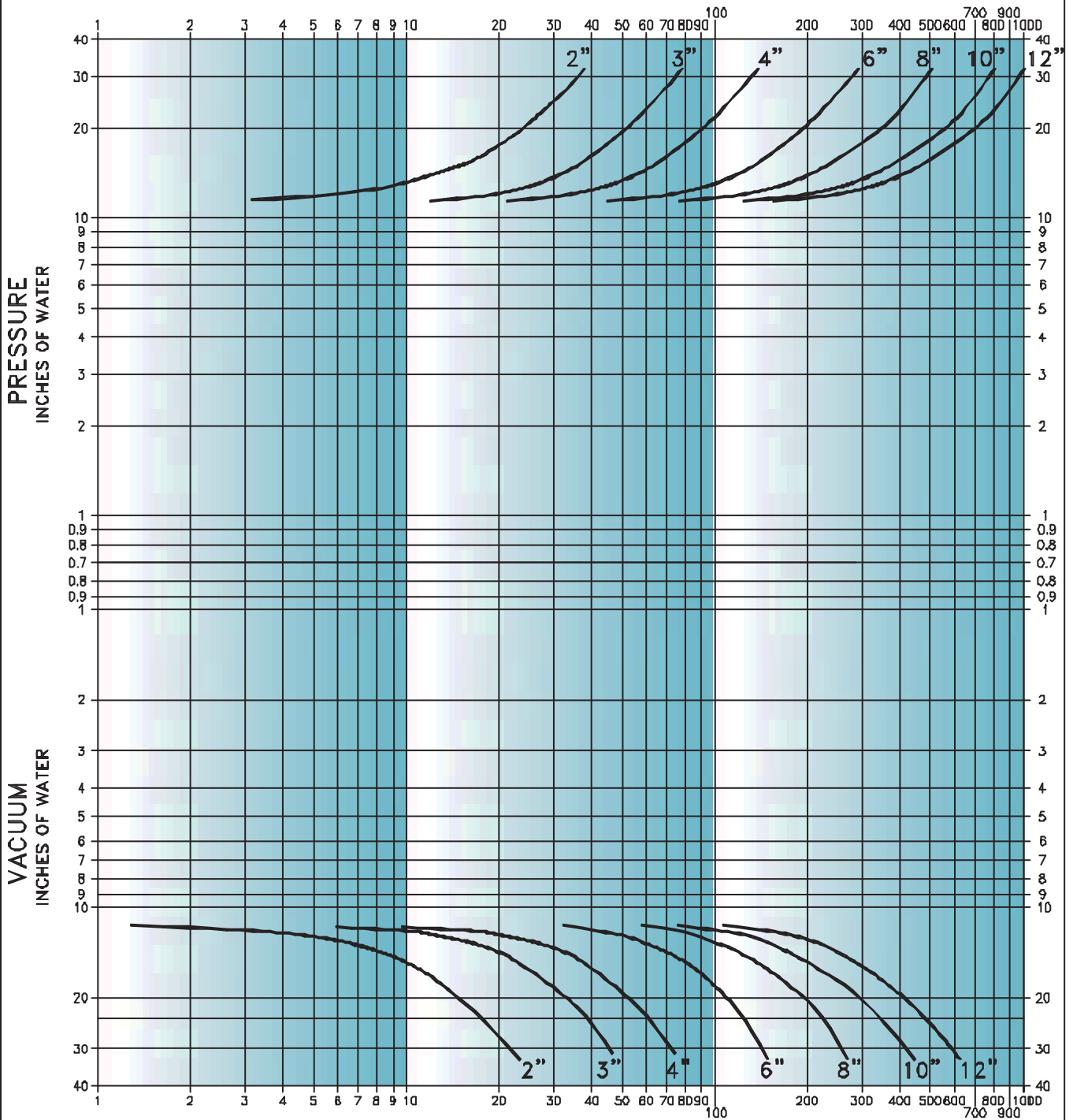
WB12A SERIES RELIEF VALVE

SET AT 10 INCHES OF WATER



WB12A SERIES RELIEF VALVE

SET AT 12 INCHES OF WATER

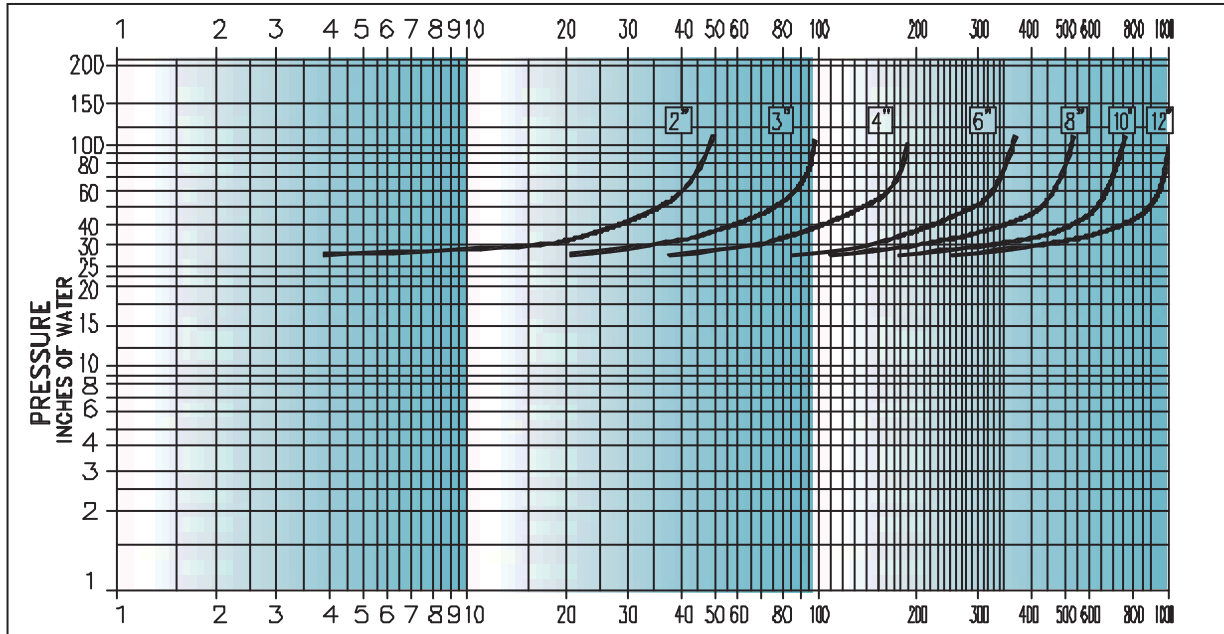


THOUSANDS OF CUBIC FEET/HOUR AT 60°F AND 14.7 P.S.I.A.

AIR FLOW(SCFH) *(SCFHx0.02832=M³/hr)

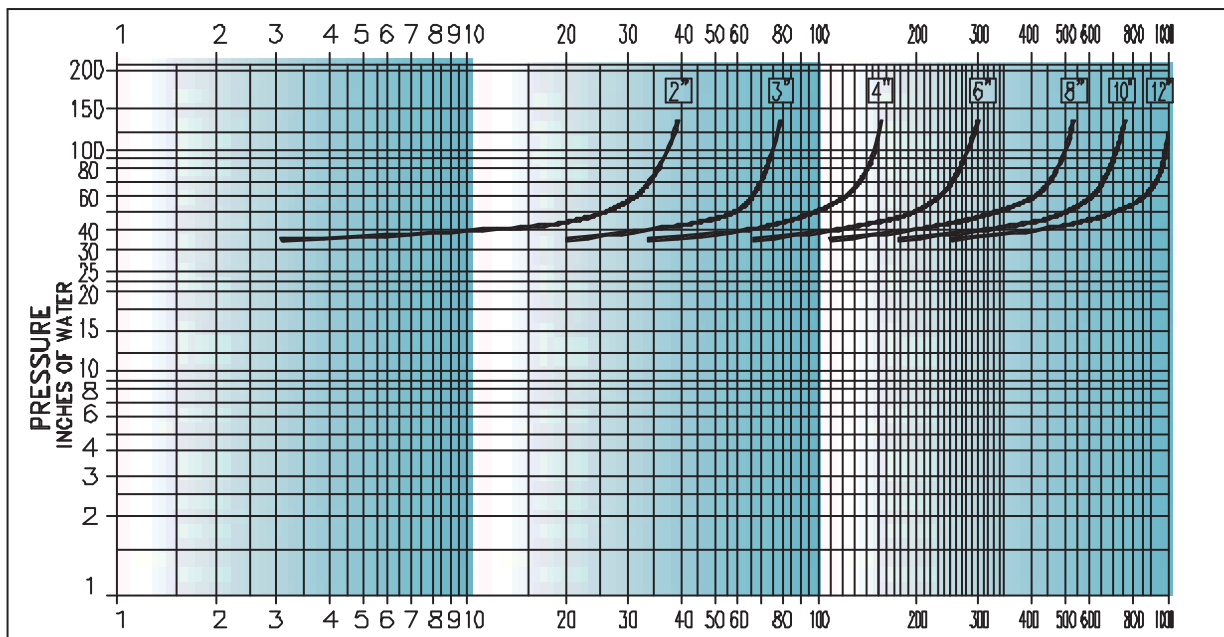
WB1 2B SERIES RELIEF VALVE

SET AT 28 INCHES OF WATER



THOUSANDS OF CUBIC FEET / HOUR AT 60° F AND 14.7 P.S.I.A.
 AIR FLOW (SCFH) *(SCFH=M³/hr x 0.02832)

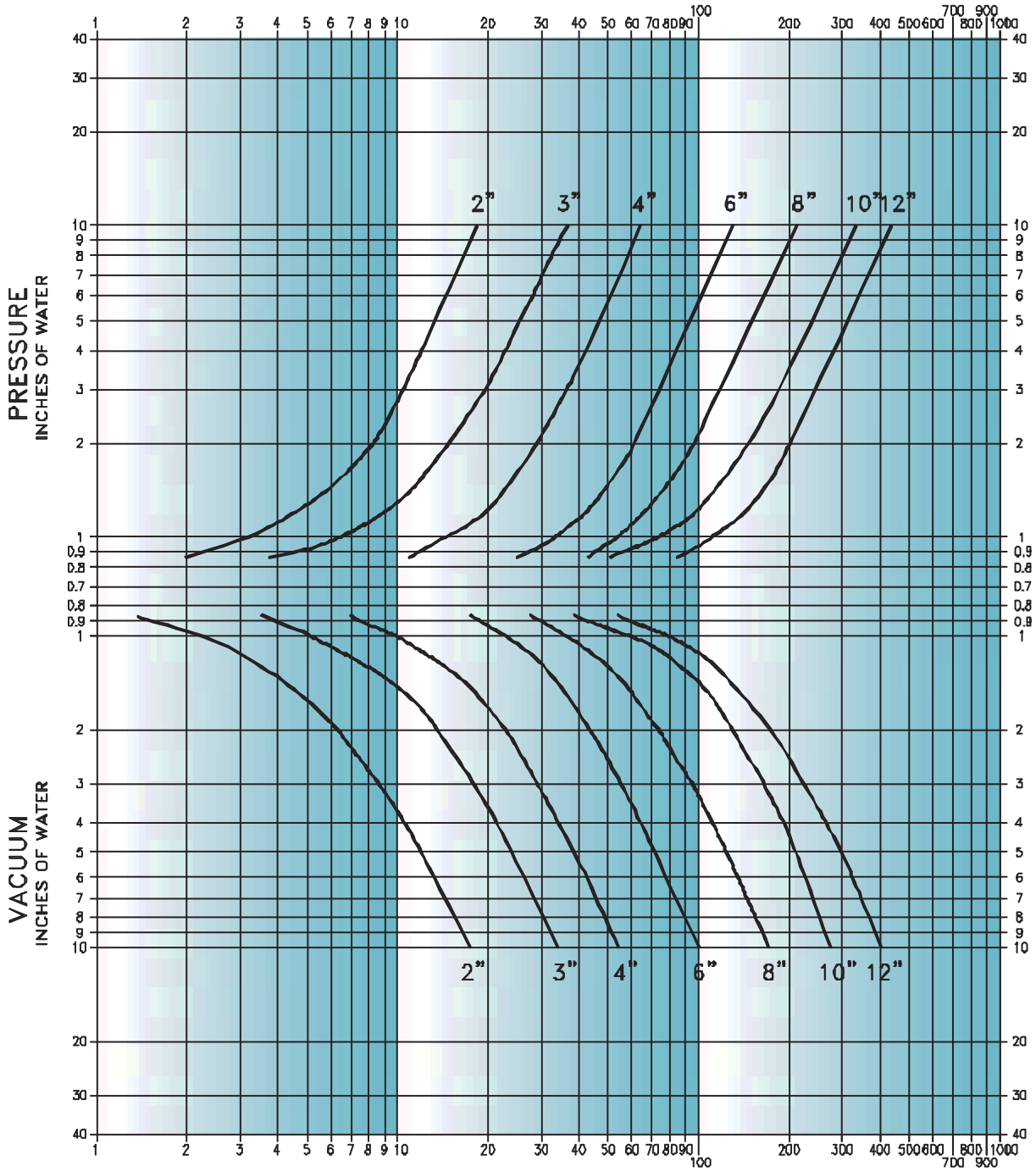
SET AT 32 INCHES OF WATER



THOUSANDS OF CUBIC FEET / HOUR AT 60° F AND 14.7 P.S.I.A.
 AIR FLOW (SCFH) *(SCFH=M³/hr x 0.02832)

WB15A SERIES RELIEF VALVE

SET AT 0.865 INCHES OF WATER

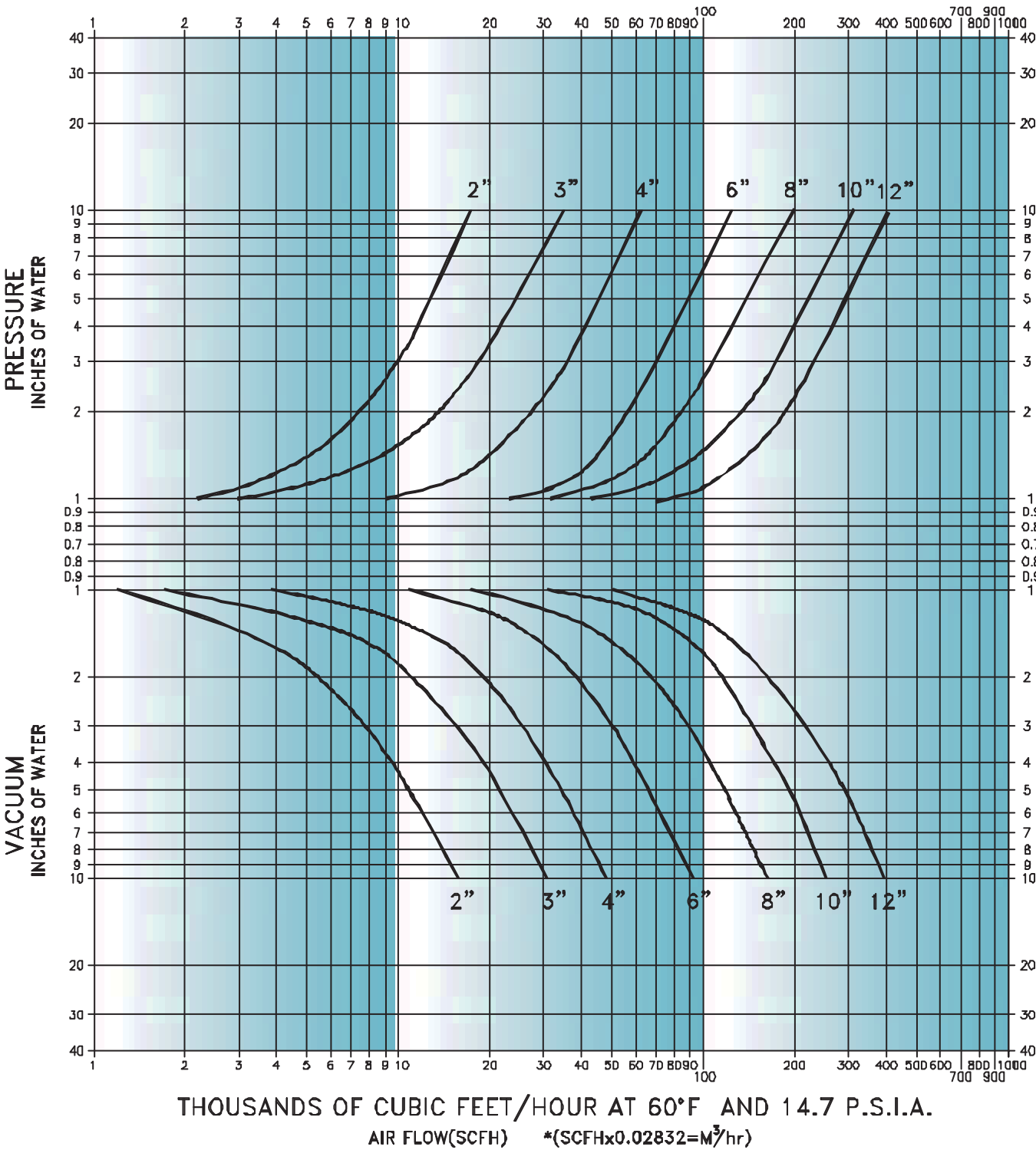


THOUSANDS OF CUBIC FEET/HOUR AT 60°F AND 14.7 P.S.I.A.

AIR FLOW(SCFH) *(SCFHx0.02832=M³/hr)

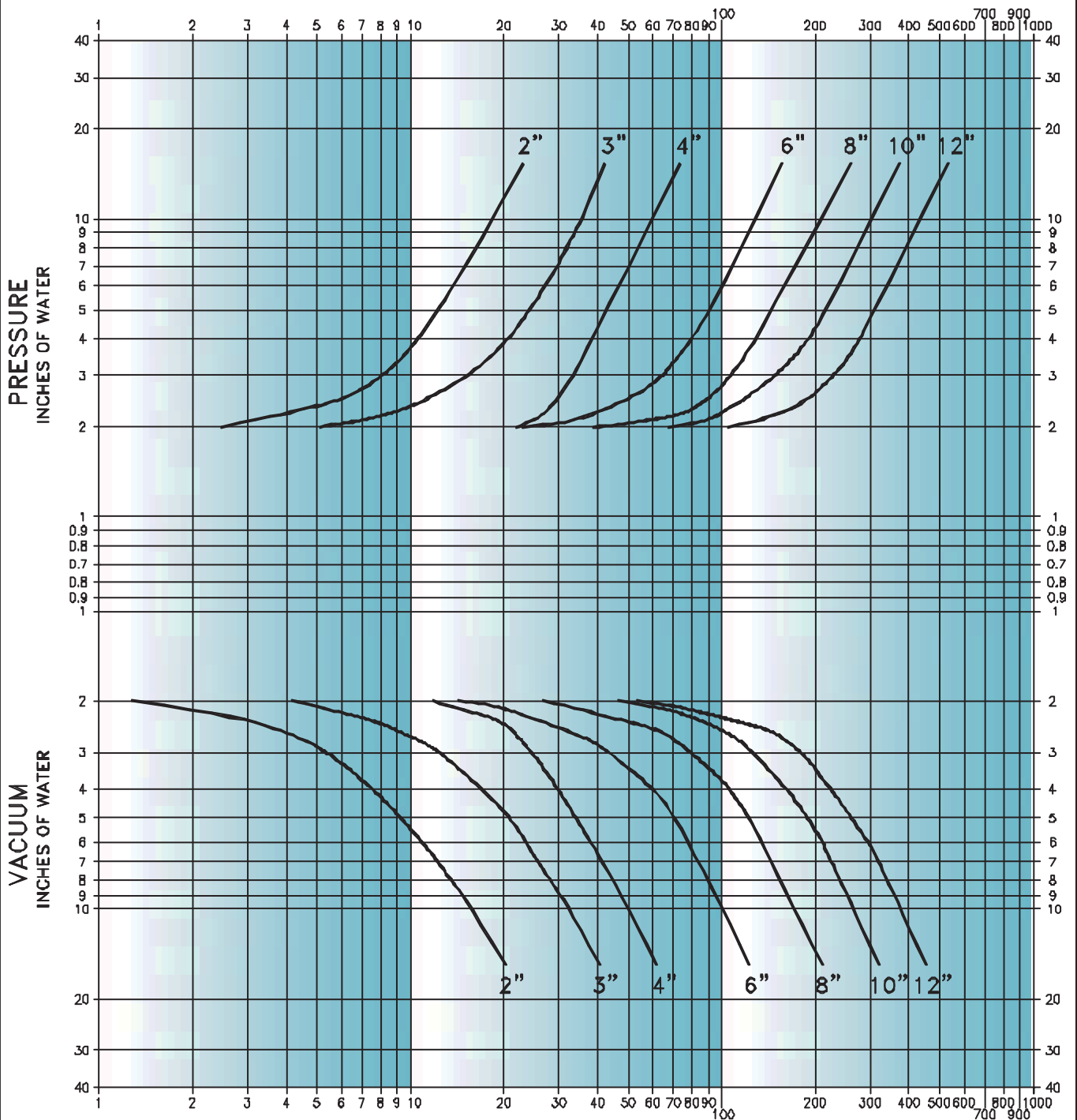
WB15A SERIES RELIEF VALVE

SET AT 1 INCHES OF WATER



WB15A SERIES RELIEF VALVE

SET AT 2 INCHES OF WATER

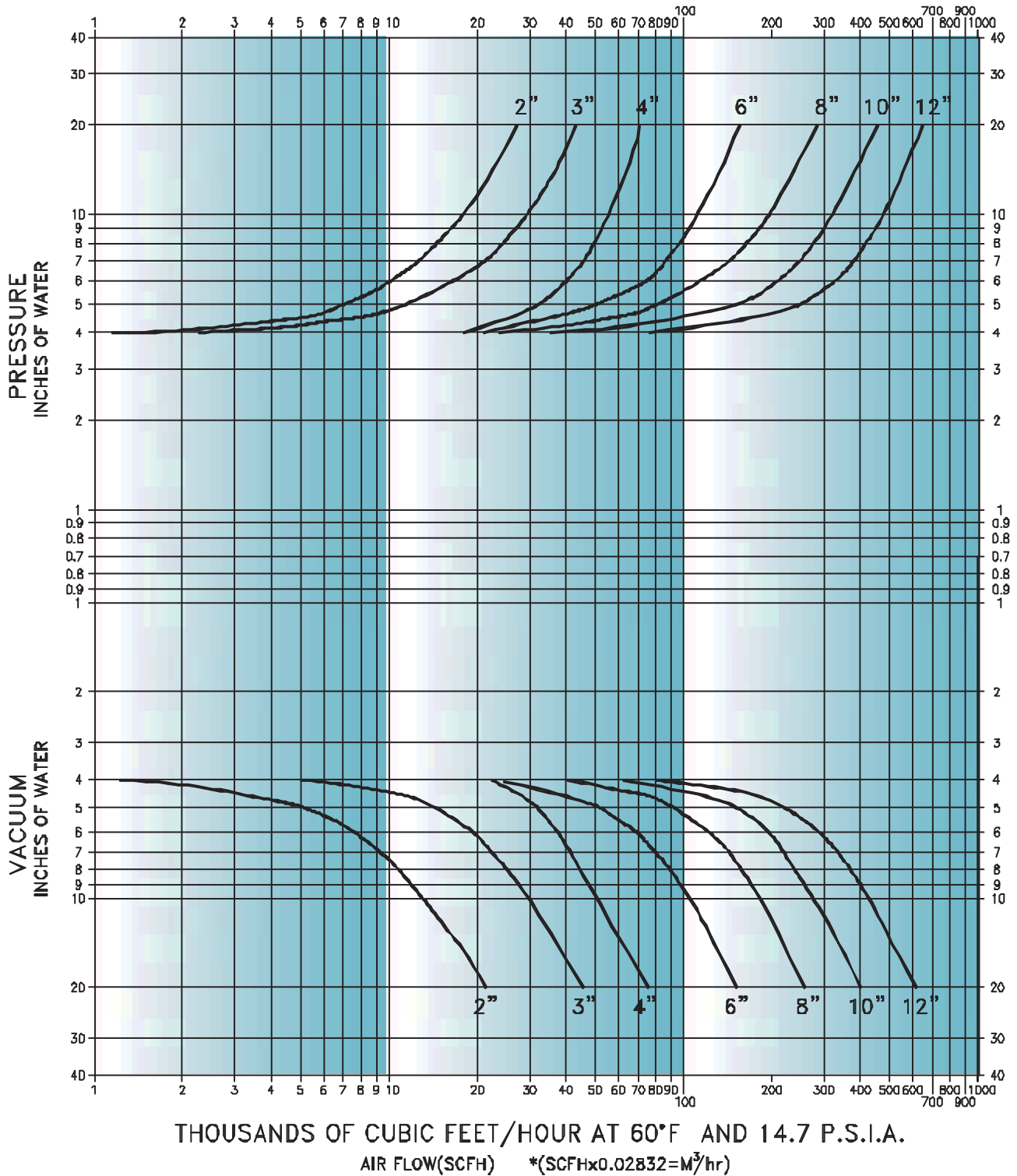


THOUSANDS OF CUBIC FEET/HOUR AT 60°F AND 14.7 P.S.I.A.

AIR FLOW(SCFH) *(SCFHx0.02832=M³/hr)

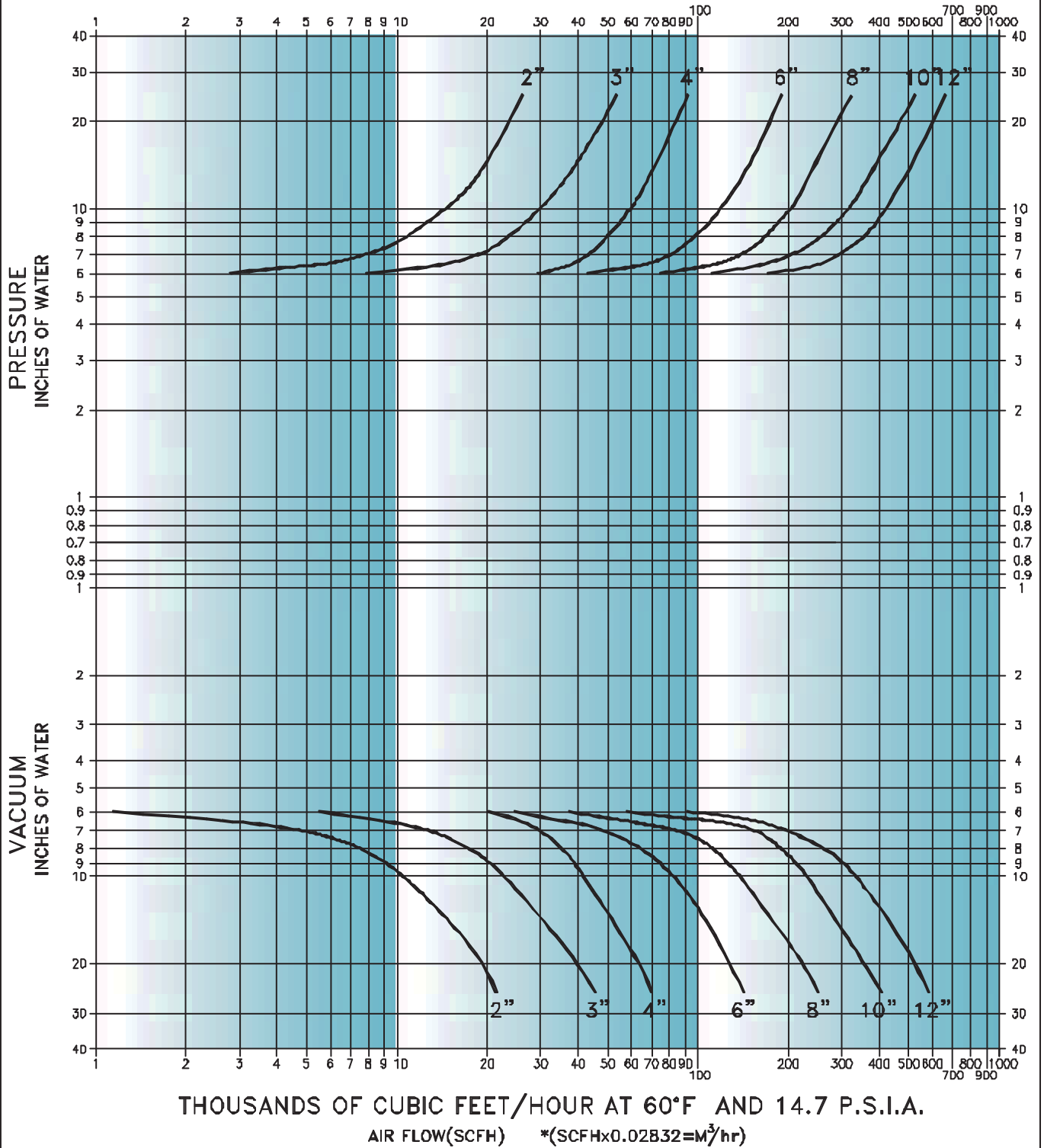
WB15A SERIES RELIEF VALVE

SET AT 4 INCHES OF WATER



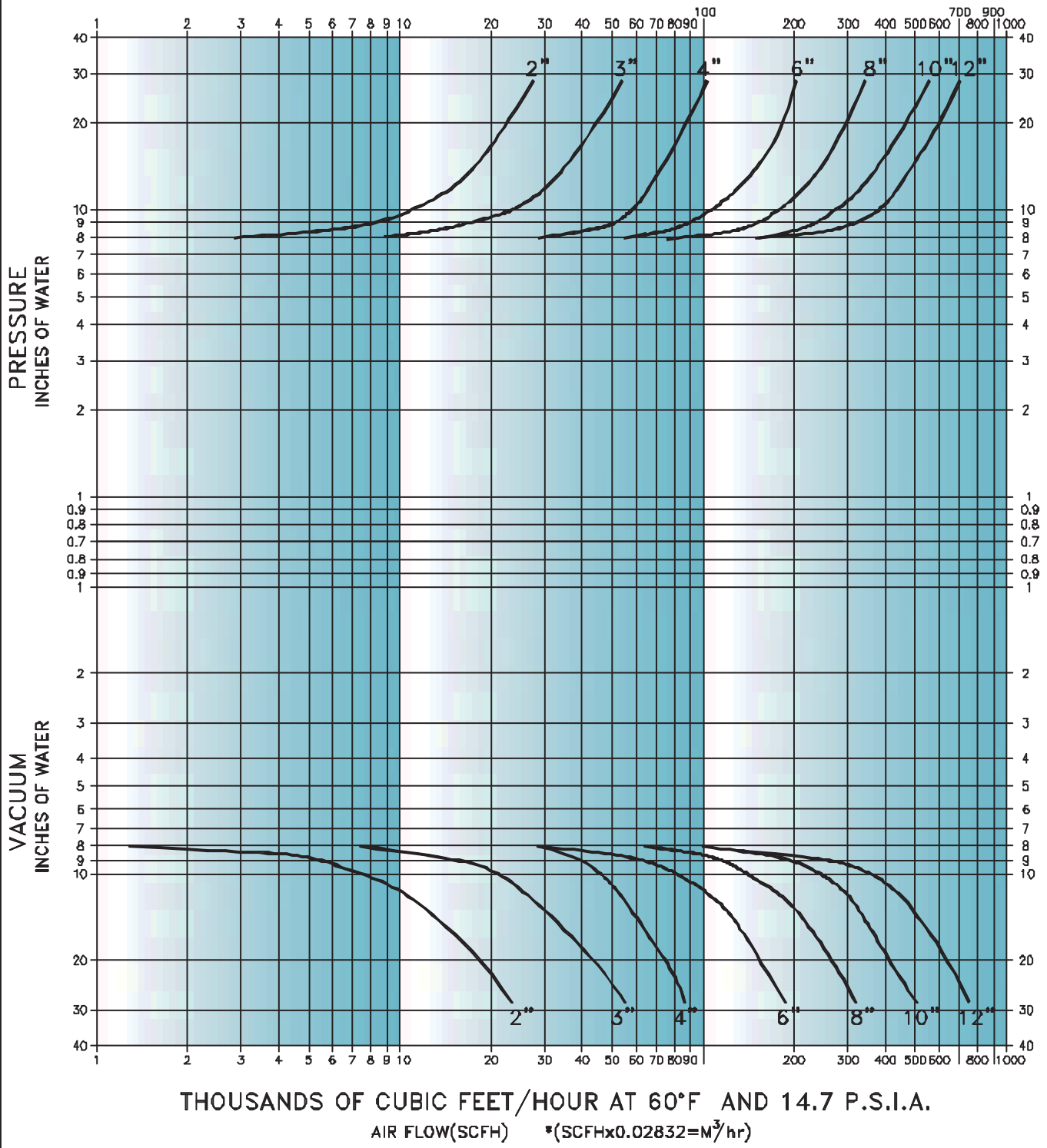
WB15A SERIES RELIEF VALVE

SET AT 6 INCHES OF WATER



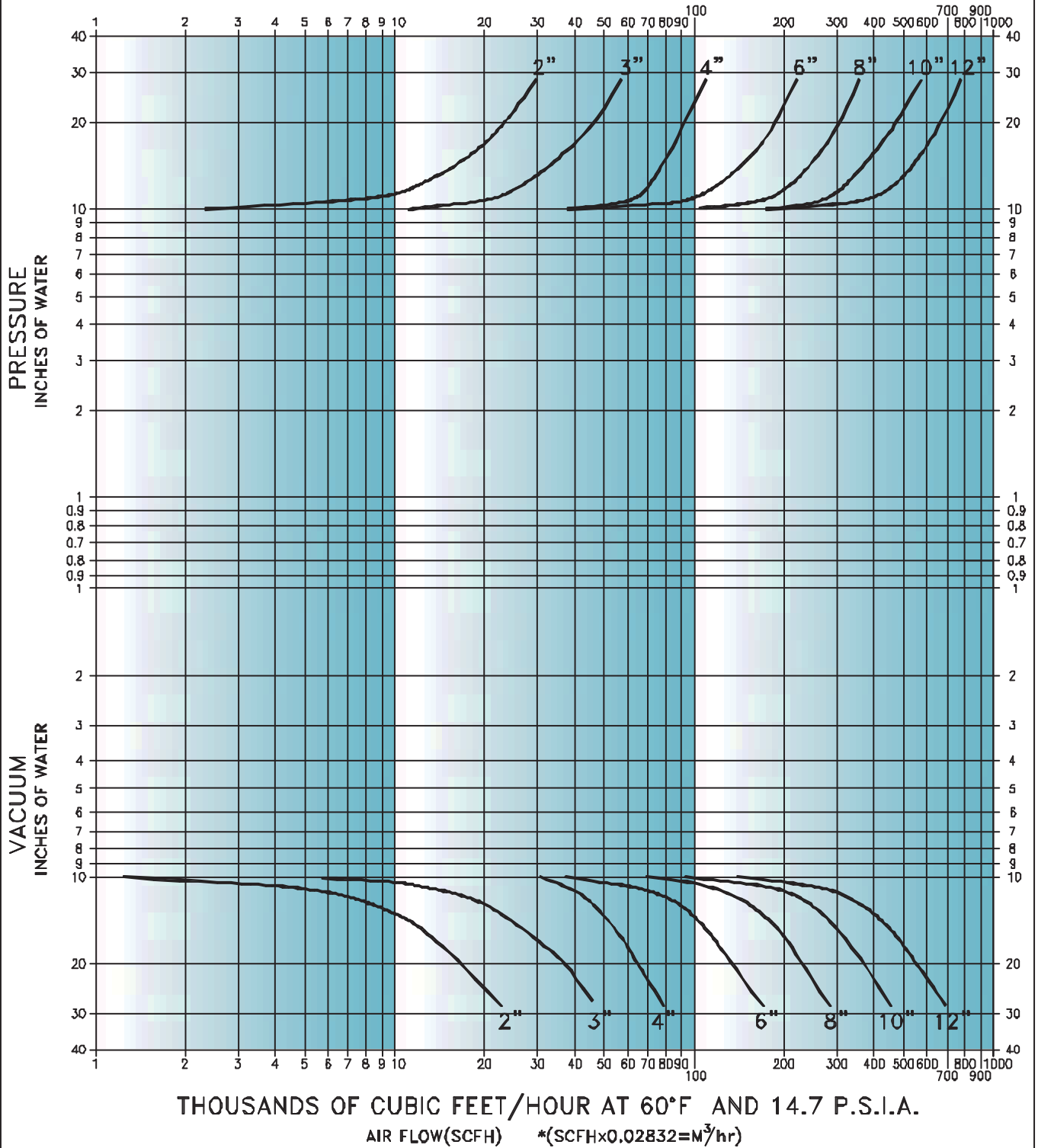
WB15A SERIES RELIEF VALVE

SET AT 8 INCHES OF WATER



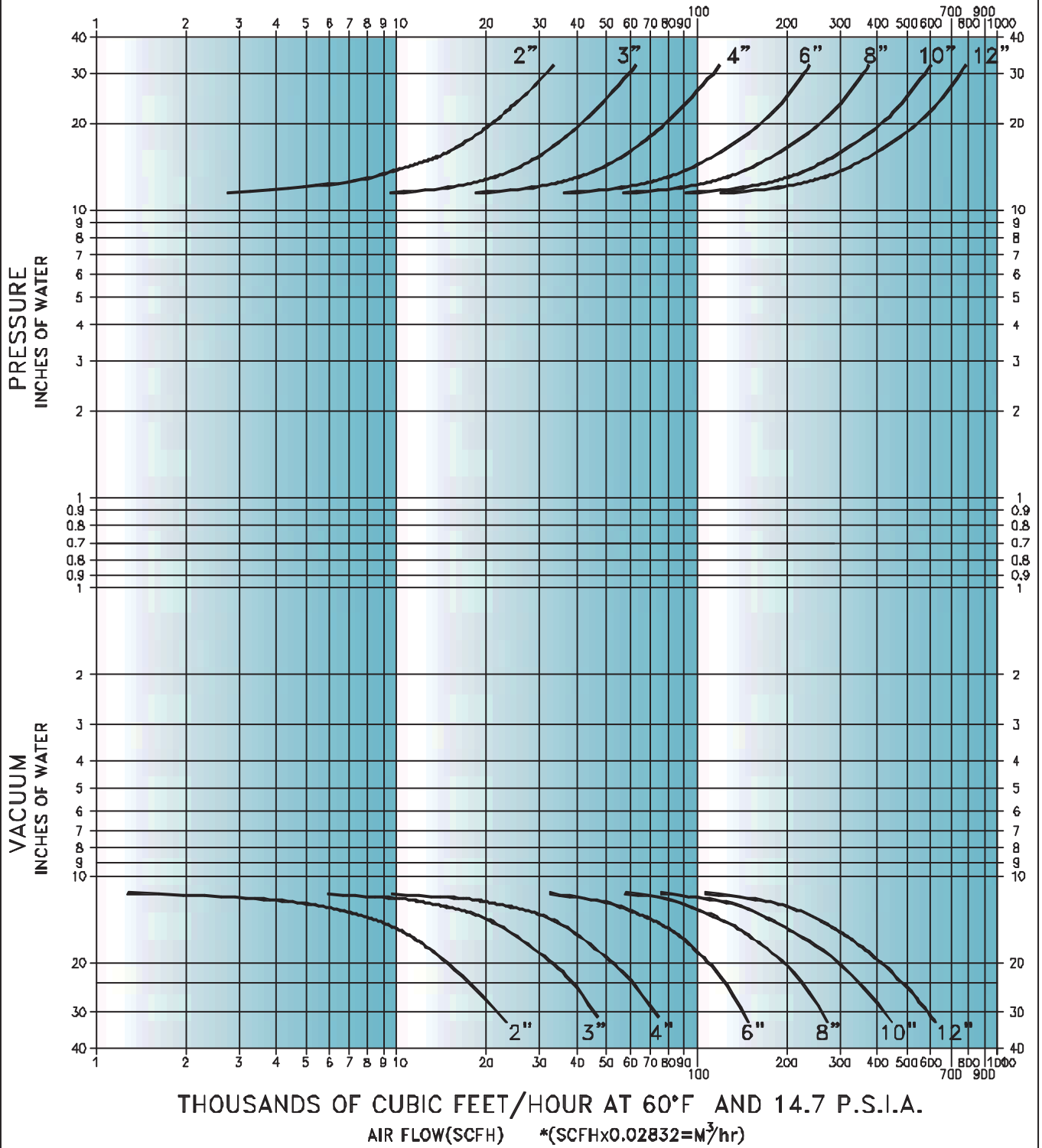
WB15A SERIES RELIEF VALVE

SET AT 10 INCHES OF WATER



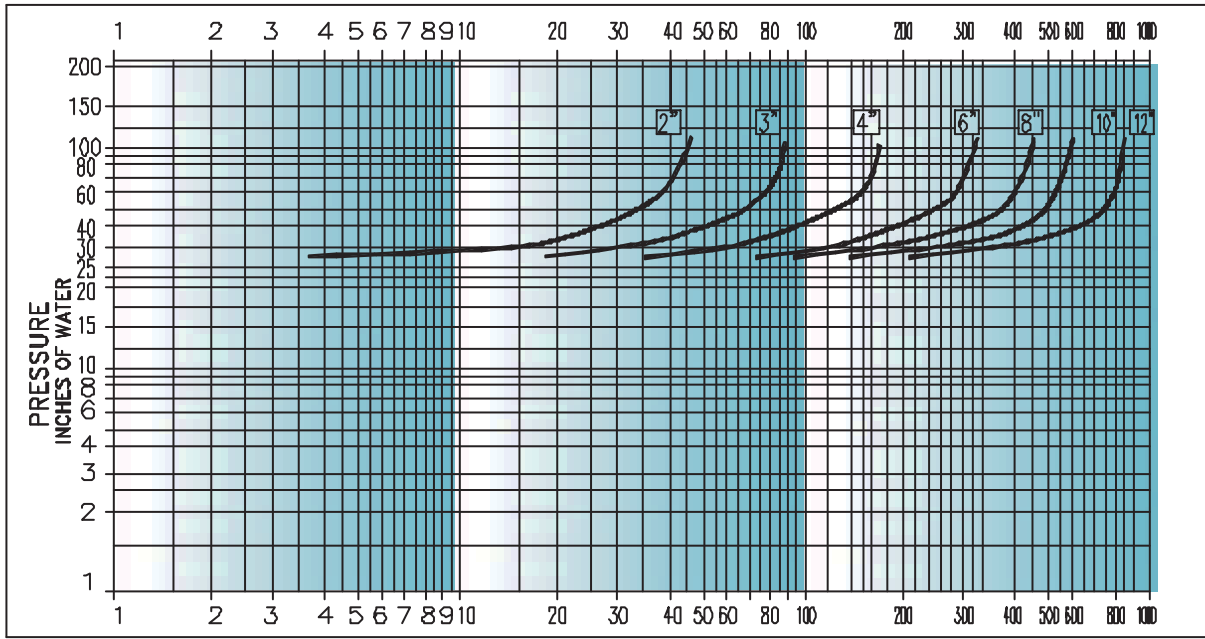
WB15A SERIES RELIEF VALVE

SET AT 12 INCHES OF WATER



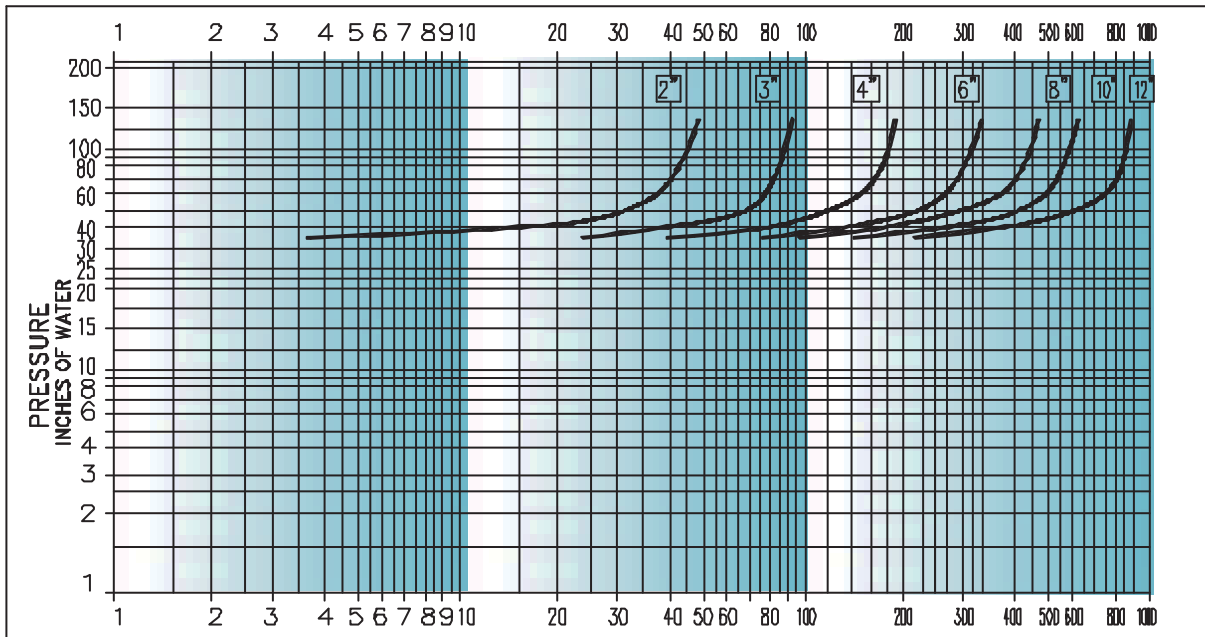
WB15B SERIES RELIEF VALVES

SET AT 28 INCHES OF WATER



THOUSANDS OF CUBIC FEET / HOUR AT 60° F AND 14.7 P.S.I.A.
AIR FLOW (SCFH) *(SCFH=M³/hr x 0.02832)

SET AT 32 INCHES OF WATER



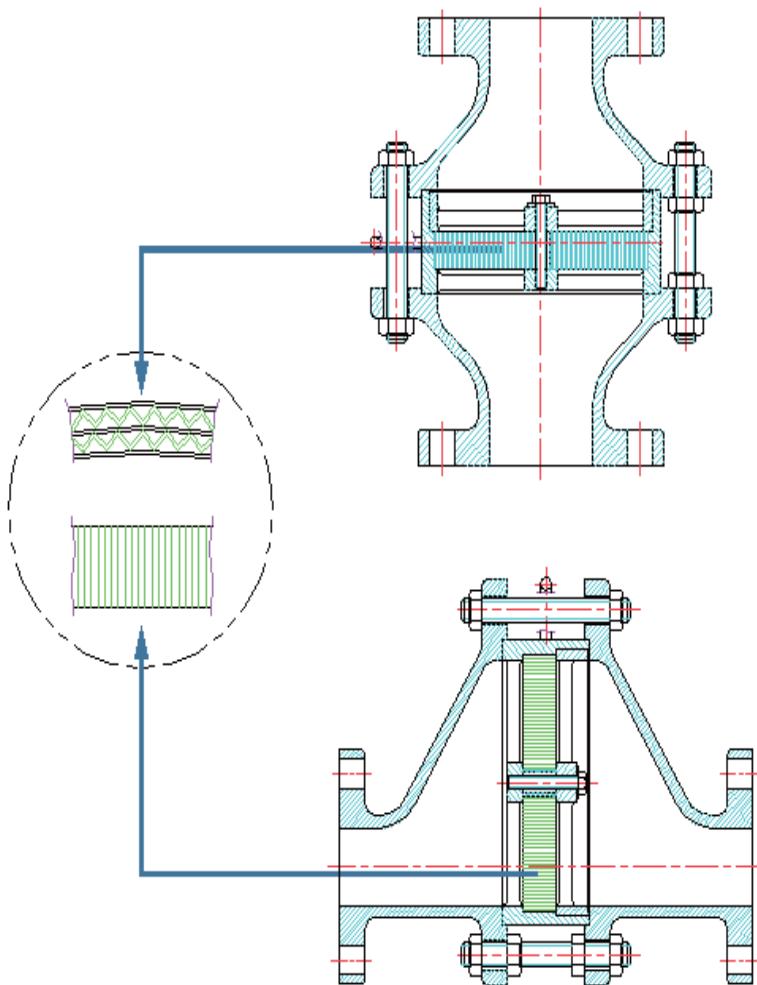
THOUSANDS OF CUBIC FEET / HOUR AT 60° F AND 14.7 P.S.I.A.
AIR FLOW (SCFH) *(SCFH=M³/hr x 0.02832)

FLAME ARRESTER

A flame arrester is a safety device installed on a nozzle on top of a tank when the flash point of the stored product is lower than the possible tank temperature.

A majority of the time, a “vent to atmosphere” pressure / vacuum valve is installed on top of the flame arrester. A flame arrester is also used as in-line safety device where combustible gases are transported through low pressure pipe lines to actual combustion, as in an incinerator or flare or where combustion fumes are vented through piping to atmosphere where lightning can cause a flame.

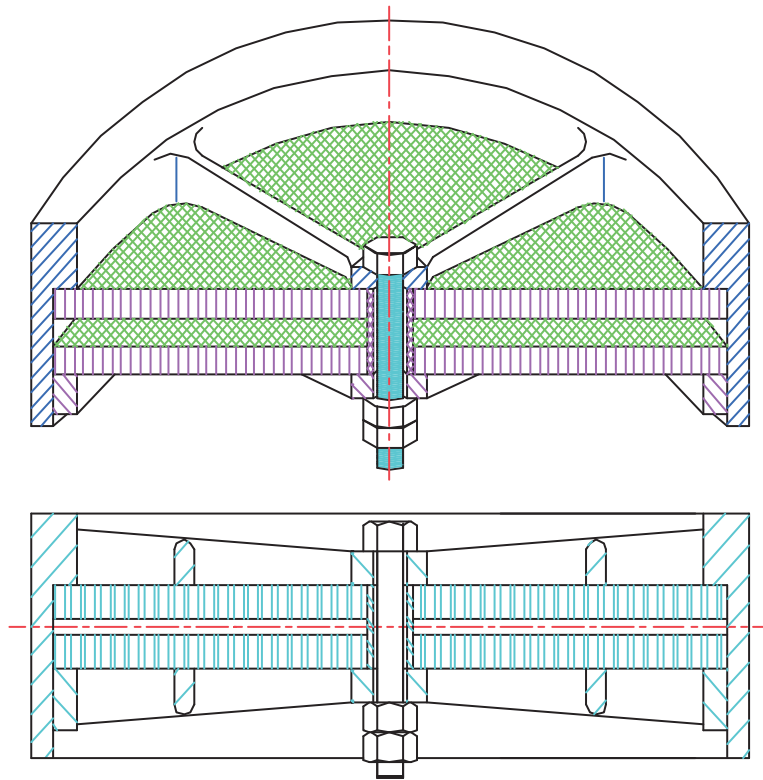
Flame arresters should be designed to stop tank farm fires caused by lightning, sparking, a flame arrester must act as a barrier (stop a flame), a flame holder (contain the flame at the barrier), and dissipate heat in order to prevent auto ignition on the down side of the flame arrester.



Flame Arresters are designed to inhibit flame propagation in gas piping systems and to protect low pressure tanks containing flammable liquids. They protect low flash point liquids from externally caused sources of heat and ignition, providing increased fire protection and safety.

The flame arrester consists of two main components, the arrester bases and the flame element housing. The bases serve as the connecting interface to the piping system. The housing accommodates the flame element and is instrumental in stopping the flame passage. The flame element is comprised of small parallel triangular passageways aligned so that an approaching flame front is slowed down and then quenched before it can propagate to the protected side of the device.

All HY flame elements utilize spiral wound, crimped ribbon constructed of corrosion resistant materials, to insure the best flame quenching performance with minimum pressure drop. A flame arrester should be treated as a safety device and maintained by a knowledgeable repair technician.



STD. CRIMPED BANK ELEMENT STRUCTURE

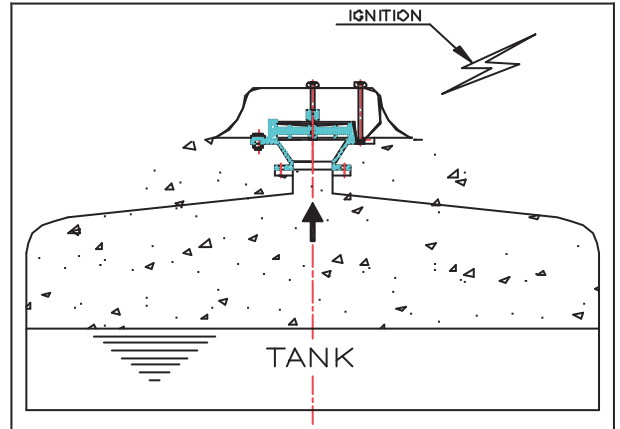
In order to be an effective flame prevention device, a flame arrester must have a quenching or hydraulic diameter small enough to stop the flame created by the combustible gas. Each combustible gas has a different required hydraulic diameter to be able to stop the flame.

In addition to stopping the flame, an arrester must be able to dissipate heat. Flame element mass ensures that hot gases above the auto ignition temperature never reach the downstream side of the flame arrester.

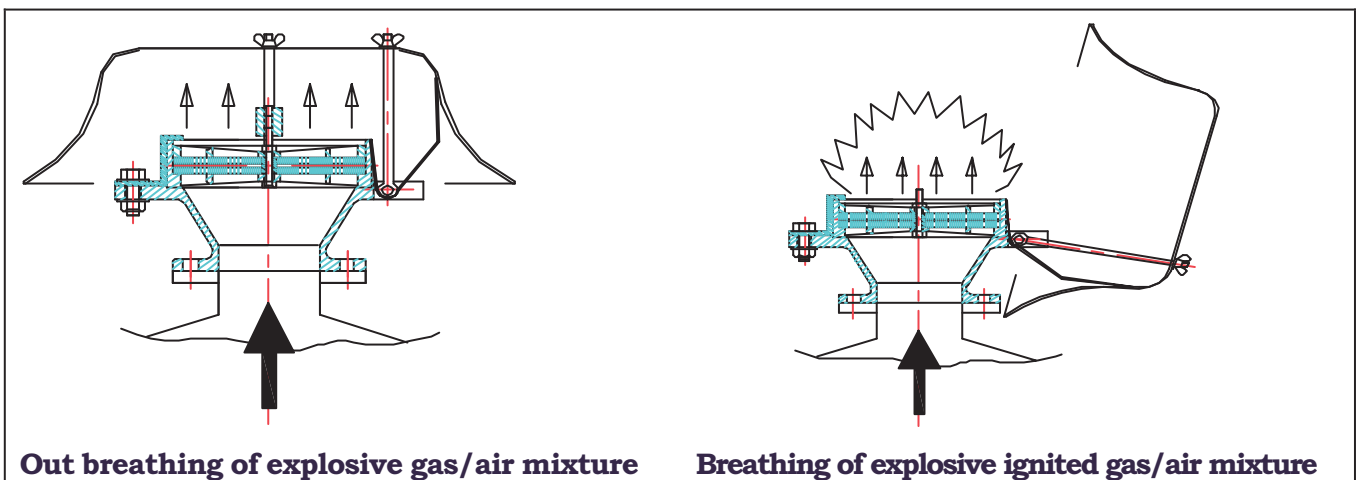
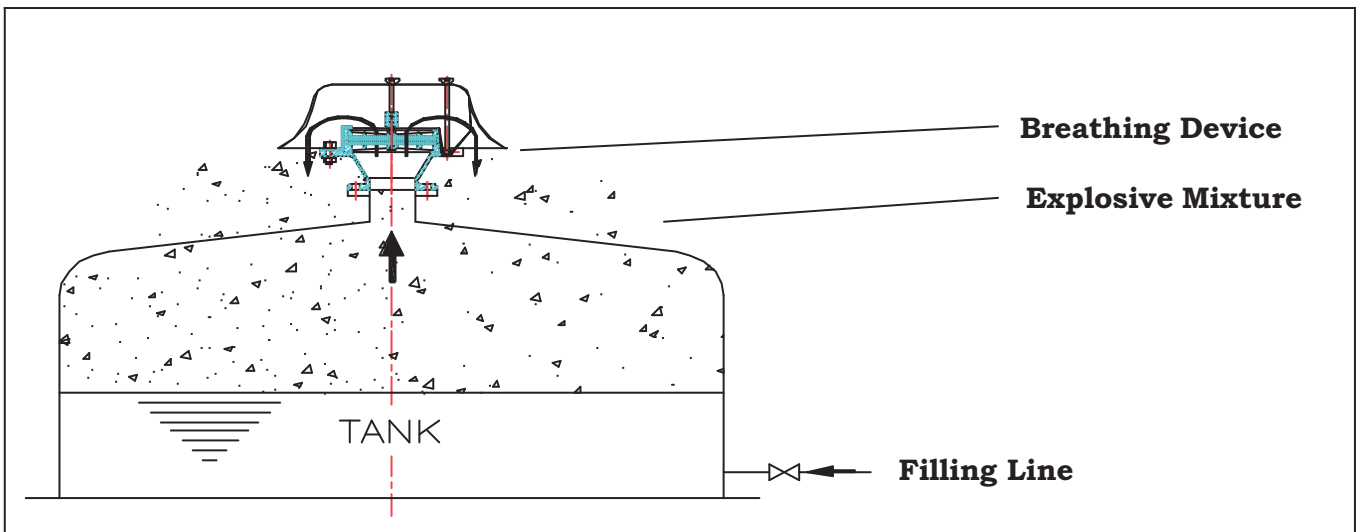
With an in-line installation, structural integrity is important to insure safety if a detonation should occur. Proper gasket to insure an oxygen free environment in the event of a detonation is also important. Unless a flame arrester meets or exceeds the above mentioned design criteria, it is not a true flame arrester.

IGNITION OF GAS/AIR VAPOR-CLOUDS EXTERNAL ATMOSPHERIC EXPLOSION

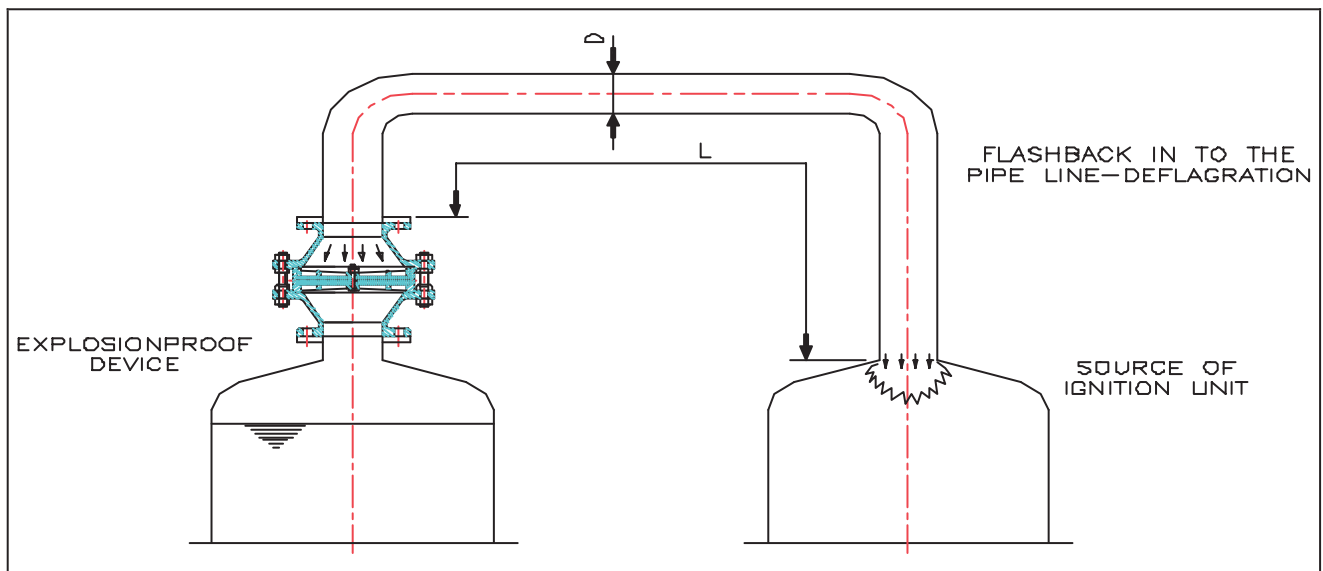
During filling of a storage tank and depending upon weather conditions explosive gas/air vapor clouds can develop in case they ignite due to external to protect the tank gets in touch with both flame and explosion shock wave. The provided device has to prevent a flashback and long burning poof.



BURNING OF EXPLOSIVE GAS/AIR VAPORS LONG BURNING SITUATION



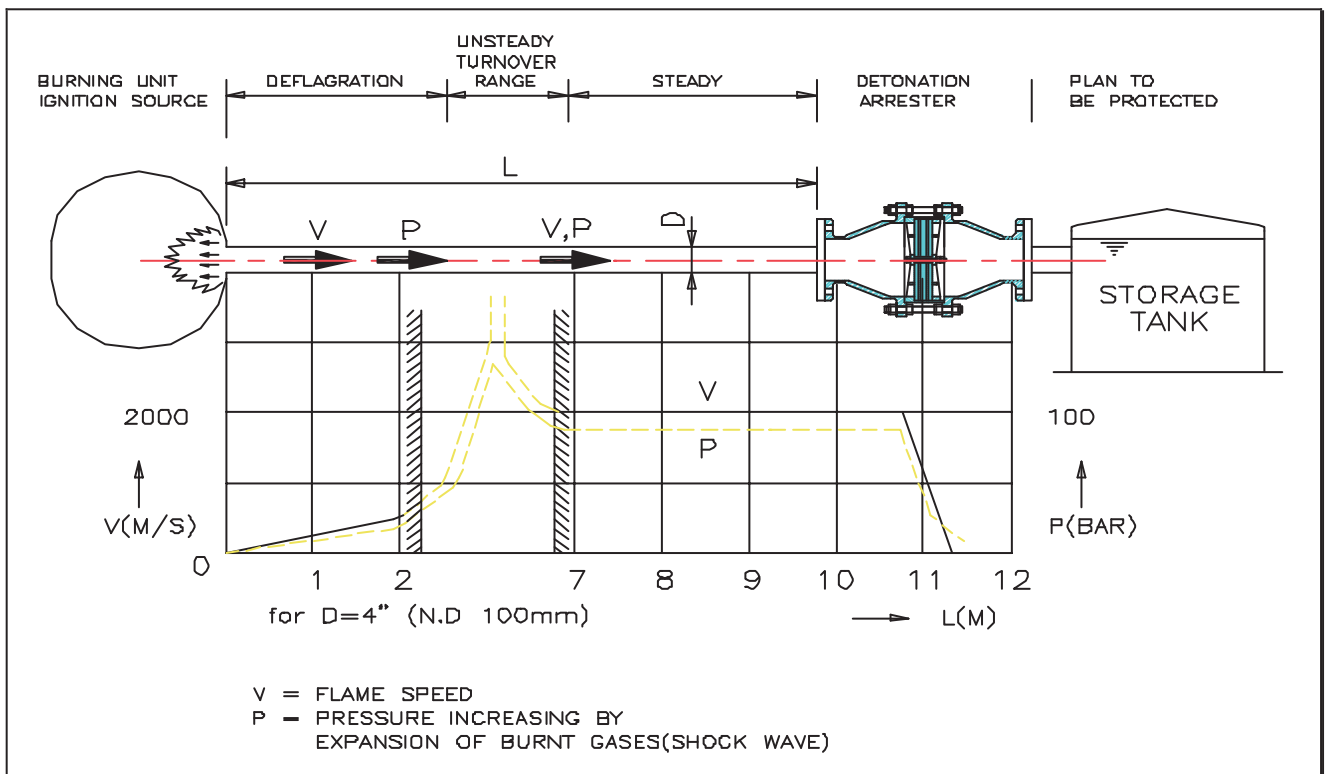
IGNITION OF GAS/AIR MIXTURES IN PIPELES INTERNAL EXPLOSION /DEFLAGRATION



During this combustion influenced by the geometry of pipe flame propagation speeds of several hundred m/s (up to 500 m/s) and explosion pressure between 6 and 10 bar with an initial pressure of 1 bar and ambient temperature appear.

DETONATION FLAME ARRESTER

A detonation flame arrester is another safety device installed in a piping system. A detonation is defined as a flame front propagating through a flammable gas or vapor at a velocity equal to or greater than ten pipe diameters from the installation of the arrester or when there is a possible restriction in the line. HY's Detonation flame arresters Bi-Directional and can be installed in a vertical or horizontal piping installation. The model WF24 has been successfully tested and KIMM approved in accordance with BS7244 (1999) Detonation flame arrester suitable for applications where stationary flames may rest on the element.



In case of an ignition of explosive mixtures within longer pipelines the flame front spreads with increasing speed towards the unburnt explosive mixtures with the effect that the flame connects to a shock wave within this long pipe.

During this propagation speeds are reached, which are higher than 3 times the value of sonic speed in unburnt gas at ambient conditions.

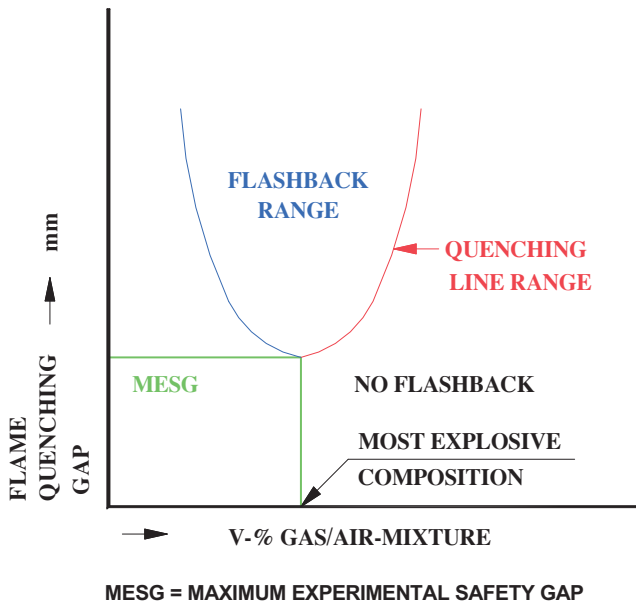
The explosion can very quickly turn into a detonation after a comparatively short starting path during this combustion process. This turnover point is reached, when the existing still unburnt gases are compressed to auto-ignition temperature and burn suddenly due to auto-ignition as a detonation although the proper flame front as element of ignition has not yet reached this area.

The range of the turnover point is called unsteady detonation during this flame propagation speeds of about 2000 m/s occur. There are pressure shocks towards the accelerating detonation wave with short time static stress of more than 80 bar.

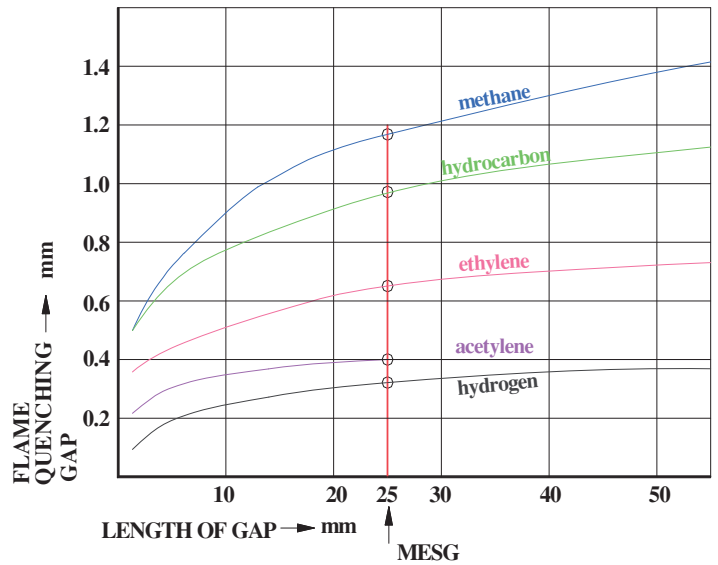
The most important parameter for the development of accelerated flames in pipelines and especially for the change from explosions into detonation is the relation between pipe length and pipe diameter (L/D-ratio).

In order to render the development of detonation possible, pipe bends and piping installations must shorten the necessary pipe length.

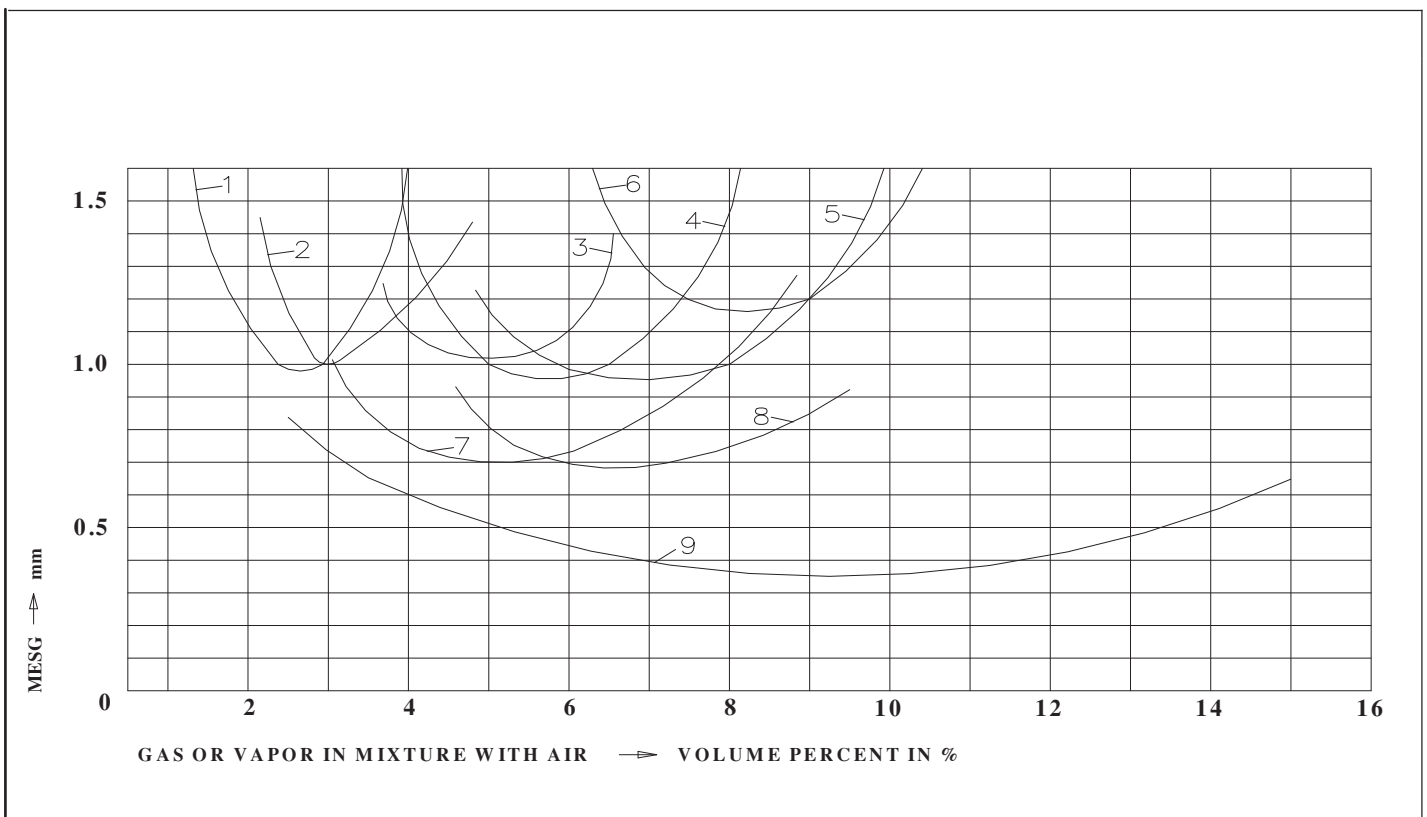
■ **MESG / FLAME QUENCHING GAPS**



■ **LENGTH OF GAP DEPENDING ON FLAME QUENCHING GAP OF DIFFERENT PRODUCTS**

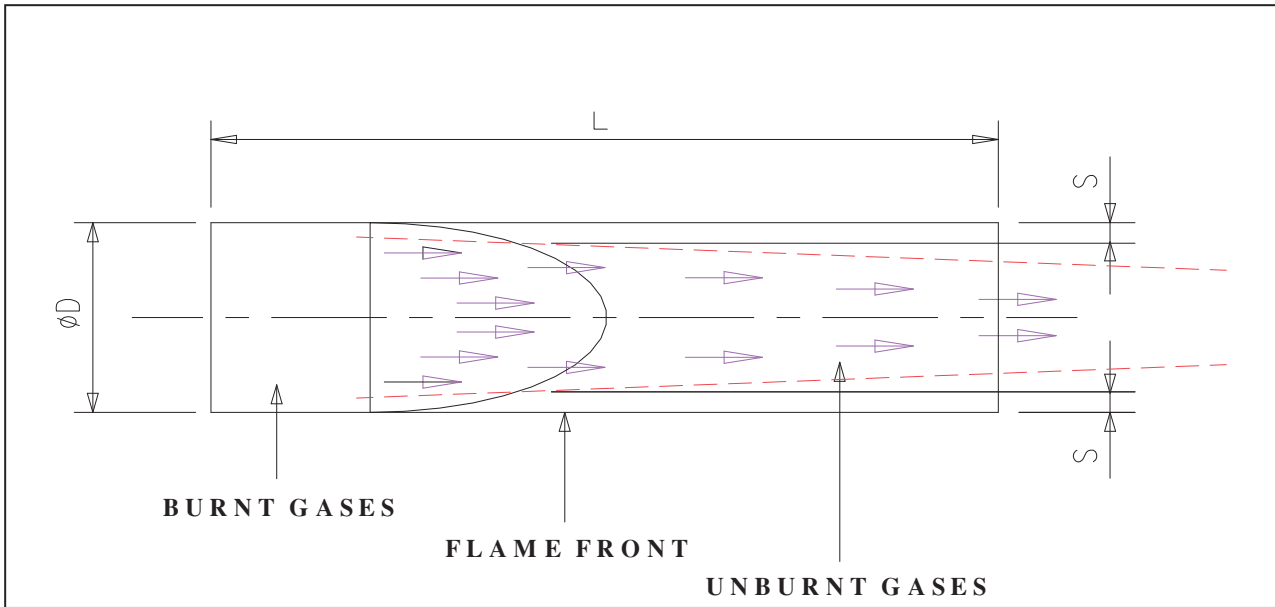


■ **MESG DEEPING UPON MIXTURE COMPOSITION OF DIFFERENT PRODUCTS**



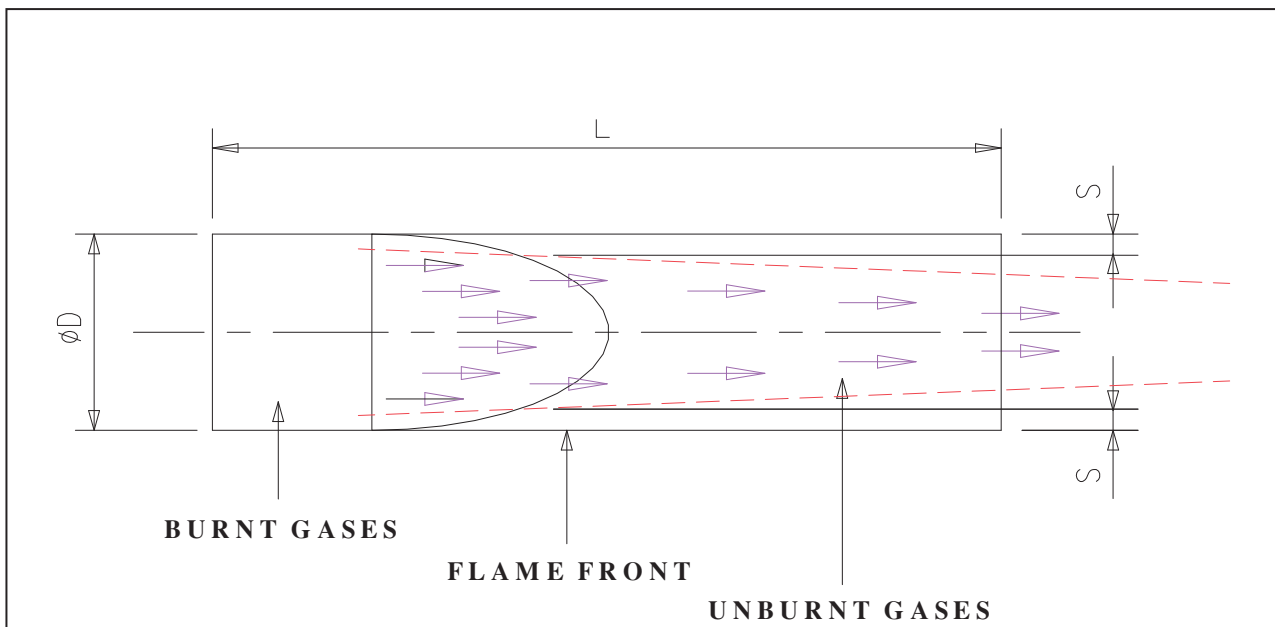
- | | | | |
|--------------------|--------------------------|-----------------|--------------|
| 1. HYDRO CARBON | 2. METHYLISOBUTYLACETONE | 3. ACETIC ETHER | 4. ETHANE |
| 5. ACETIC ALDEHYDE | 6. METHANE | 7. PROPYLENE | 8. ETHYLENE |
| | | | 9. ACETYLENE |

■ PRINCIPLES OF FLASHBACK PREVENTION



$D > 2S$ boundary layer 'S' for dissipation of energy by heat transfer to the wall small in regard to wideness 'D' of flame front. Therefore no flame quenching.

FLASH BACK SITUATION



$D \approx 2S$ boundary layer 'S' for dissipation of energy by heat transfer to the wall small in regard to wideness 'D' of flame front. Therefore flame quenching.

$D = 2 \times S \rightarrow$ flame quenching $D =$ quenching distance

NO FLASH BACK SITUATION

IN LINE FLAME ARRESTER (MODEL WF21, WF23)

- Flame Element

: Proven Spiral wound, crimped ribbon design

- Size

: 2" through 12"

- Available in

Aluminum, Carbon Steel, Stainless Steel.

- Other size and material to be consulted by factory.



MODEL : WF21

◆ DESIGN AND FUNCTION

Model WF21, WF23 is bi-directional type and designed to be installed in “open vent pipes” from storage or processing tanks, bleed lines or other vapor conveying lines.

The flame arrester consists of a spiral wound and crimped bank element, is designed for easy maintenance.

After removing tie rod bolts, it can be expanded by using the remaining jackscrews for element exchange.



MODEL : WF23

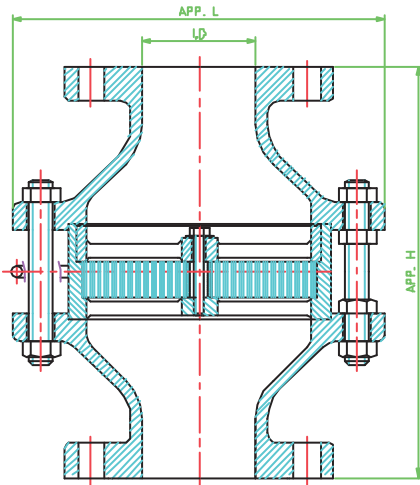
Model WF21, WF23 is used to prevent propagation of an external flame source through the vent opening and into the tank. It should be installed at distances of less than 20 times length of arrester N.D away from the open end of pipe.

◆ INSPECTION AND INSTALLATION

All HY flame arresters are bi-directional and the installation on a tank or piping system depends to a great extent on the design of the system. The Model WF21 is recommended for vertical installation in closed piping systems or venting to atmosphere. (Model WF23: Horizontal Installation) If a Model WF21 is installed in a horizontal line, it should be equipped with drain ports for removal of condensation from the housing.

◆ DRAWING AND DIMENSION

MODEL WF21

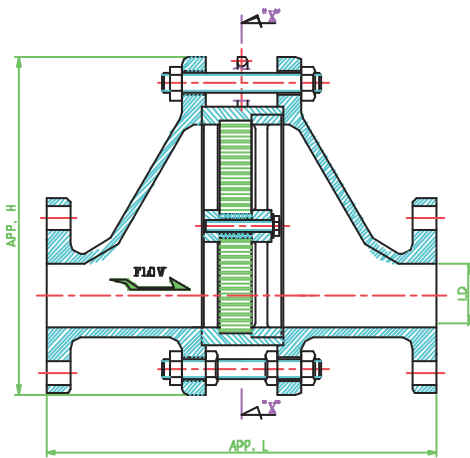


DIMENSION TABLE

UNIT : mm

	2"	3"	4"	6"	8"	10"	12"
I.D	50	80	100	150	200	250	300
H	280	290	355	358	397	463	520
L	225	263	310	400	479	575	663

MODEL WF23

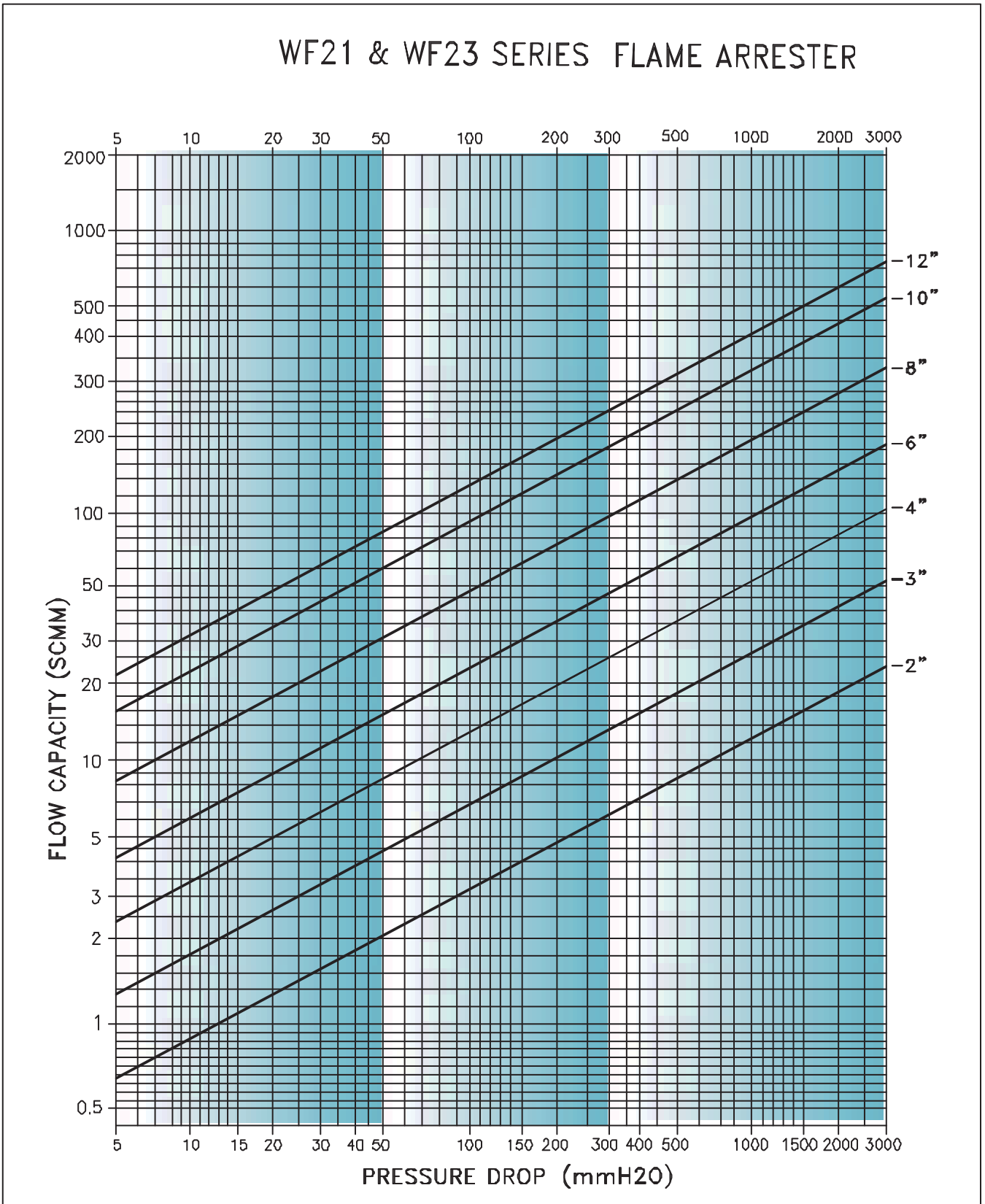


DIMENSION TABLE

UNIT : mm

	2"	3"	4"	6"	8"	10"	12"
I.D	50	80	100	150	200	250	300
H	223	280	310	400	480	587	680
L	320	330	340	385	470	490	560

◆ **FLOW CAPACITY**



END OF LINE FLAME ARRESTER (MODEL WF22)

- **Flame Element**

: Proven Spiral wound, crimped ribbon design

- **Size**

: 2" through 12"

- **Available in**

Aluminum, Carbon Steel, Stainless Steel.

- **Other size and material to be consulted by factory.**



MODEL : WF22

◆ DESIGN AND FUNCTION

Model WF22 type is mounted on the end of a vent pipe from the tank. Vapors are allowed to escape into the atmosphere and air can be drawn into the tank through the flame element. The flame arrester consists of a spiral wound and crimped bank element.

The flame arrester is installed where it is not necessary to conserve vapor losses but low flash point solvent liquid must be protected against fire and explosion from exterior ignition sources.

◆ INSPECTION AND INSTALLATION

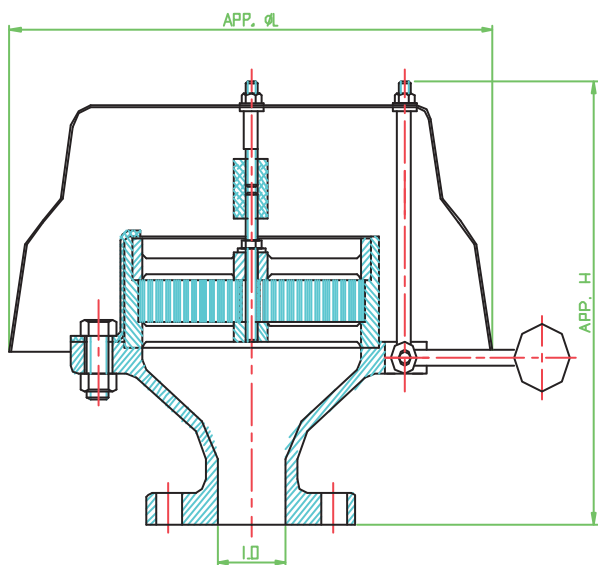
All HY flame arresters are bi-directional and the installation on a tank or piping system depends to a great extent on the design of the system. The Model WF22 is recommended for vertical installation on roof of tank or venting to atmosphere.

◆ **DRAWING AND DIMENSION**

MODEL WF22

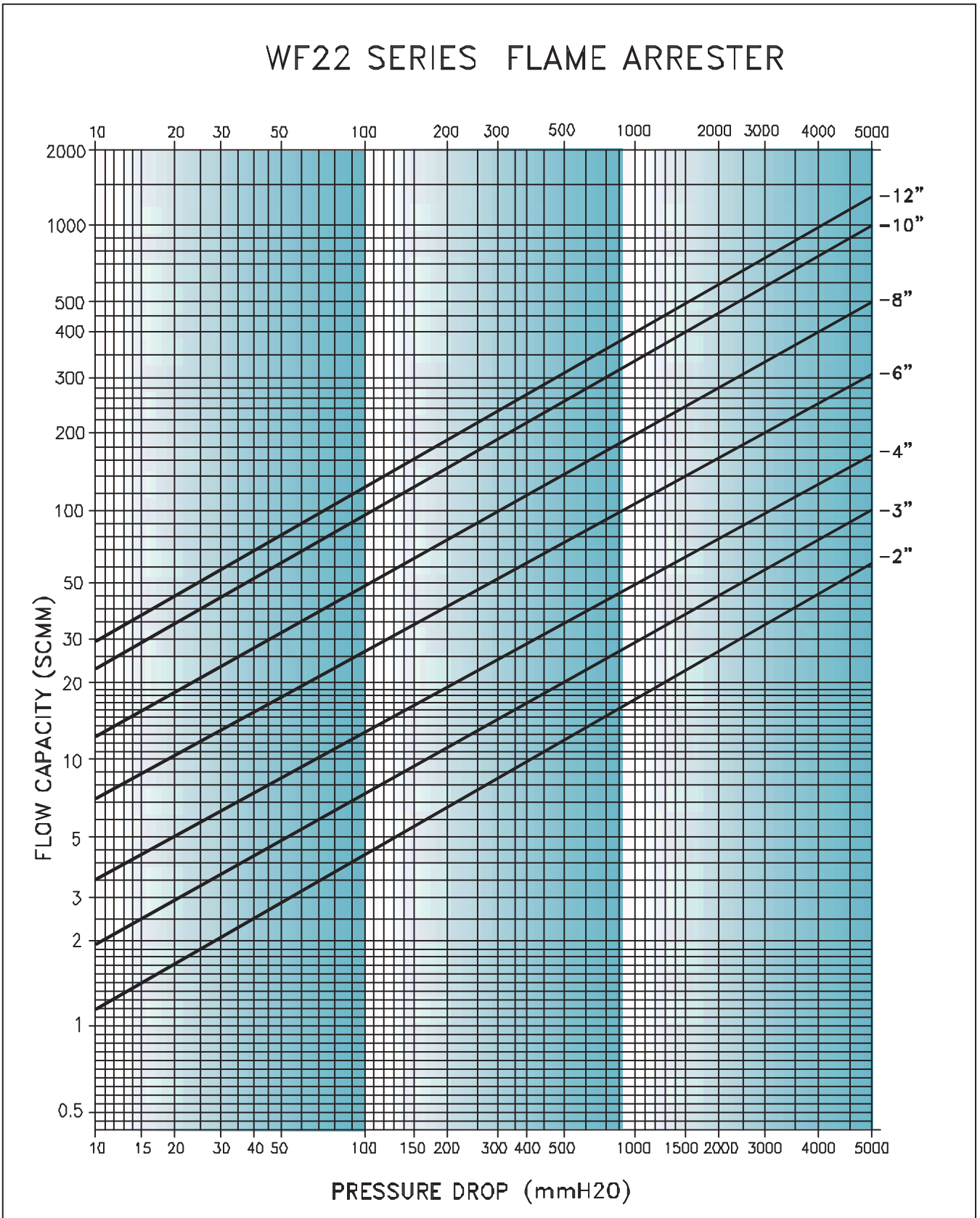
DIMENSION TABLE

UNIT : mm



SIZE	I.D	L	H
2"	50	240	280
3"	80	350	280
4"	100	395	295
6"	150	476	340
8"	200	584	360
10"	250	675	440
12"	300	759	440

◆ **FLOW CAPACITY**



IN LINE TYPE FLAME ARRESTER (MODEL WF25)

- **Flame Element**

: Proven Spiral wound, crimped ribbon design

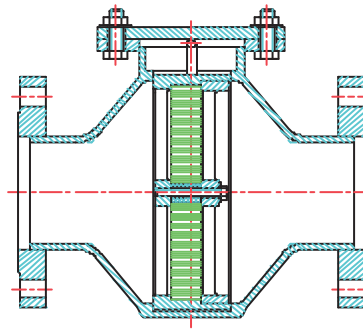
- **Size**

: 2" through 12"

- **Available in**

Aluminum, Carbon Steel, Stainless Steel.

- **Other size and material to be consulted by factory.**



MODEL : WF25

◆ DESIGN AND FUNCTION

Model WF25 is bi-directional type and designed to be installed in “open vent pipes” from storage or processing tanks, bleed lines or other vapor conveying lines.

The flame arrester consists of a spiral wound and crimped bank element, is designed for easy maintenance. After removing tie rod bolts, it can be expanded by using the remaining jackscrews for element exchange.

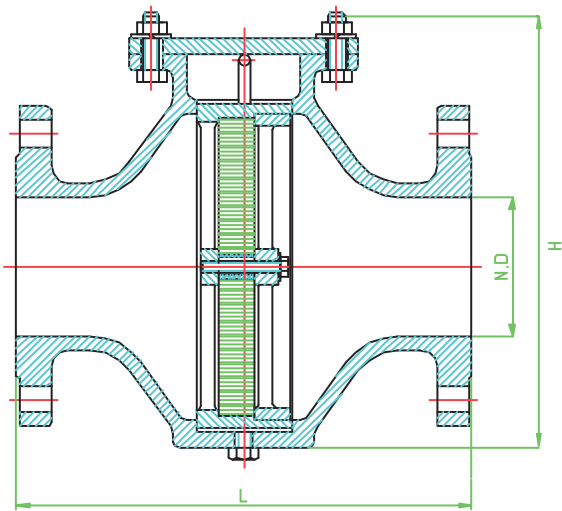
Model WF25 is used to prevent propagation of an external flame source through the vent opening and into the tank. It should be installed at distances of less than 20 times length of arrester N.D away from the open end of pipe.

◆ INSPECTION AND INSTALLATION

All HY flame arresters are bi-directional and the installation on a tank or piping system depends to a great extent on the design of the system. The Model WF25 is recommended for vertical installation in closed piping systems or venting to atmosphere.

◆ **DRAWING AND DIMENSION**

MODEL WF25



DIMENSION TABLE

UNIT : mm

SIZE	N.D	H	L
2"	50	270	250
3"	80	285	285
4"	100	320	320
6"	150	370	370
8"	200	405	405
10"	250	470	470
12"	300	530	530

DETONATION TYPE FLAME ARRESTER (MODEL WF24)

- **Flame Element**

: Proven Spiral wound, crimped ribbon design

- **Size**

: 2" through 12"

- **Available in**

Aluminum, Carbon Steel, Stainless Steel.

- **Other size and material to be consulted by factory.**



MODEL : WF24

◆ DESIGN AND FUNCTION

Model WF24 detonation flame arrester is specifically designed to withstand and arrest the velocity and pressure flame fronts that may be developed in long or complex piping runs that encountered in vapor collection or tank manifold system.

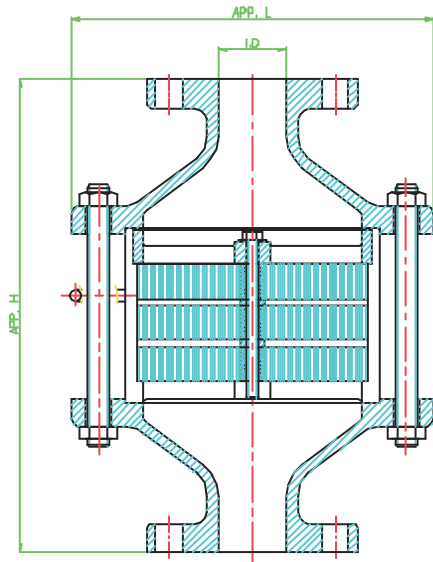
Model WF24 consists of a spiral wound and crimped bank element, and is also designed for easy maintenance. After removing tie rod bolts, it can be expanded by using the remaining jackscrews for element exchange.

◆ INSPECTION AND INSTALLATION

All HY flame arresters are bi-directional and the installation on a tank or piping system depends to a great extent on the design of the system.

◆ **DRAWING AND DIMENSION**

MODEL WF24

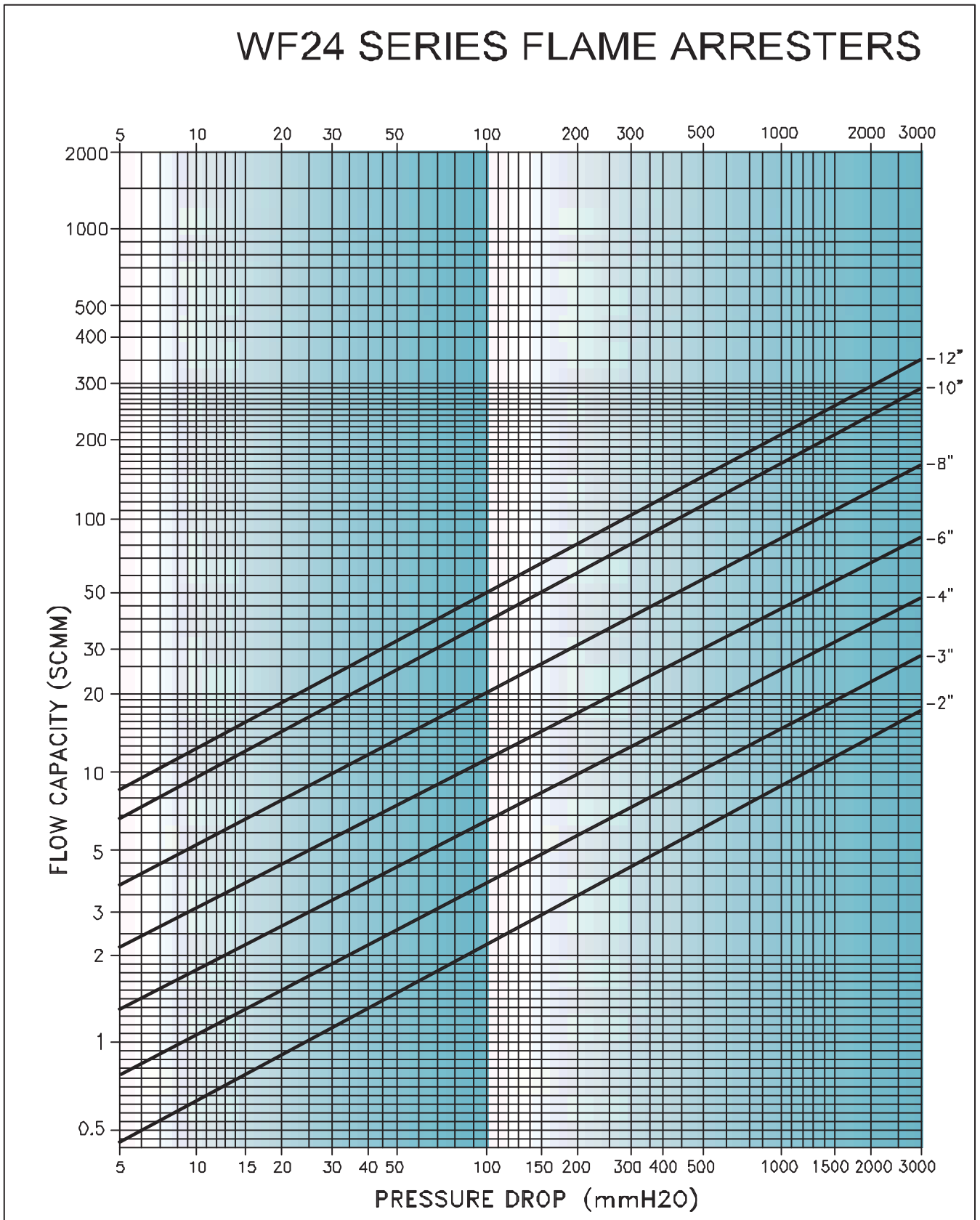


DIMENSION TABLE

UNIT : mm

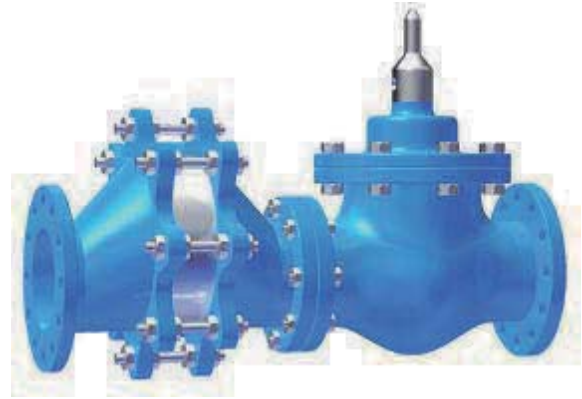
	2"	3"	4"	6"	8"	10"	12"
I.D	50	80	100	150	200	250	300
H	335	350	385	425	465	525	585
L	225	265	310	400	480	575	663

◆ **FLOW CAPACITY**



FLAME TRAP (MODEL WFT239)

- **Spring actuated Quick shut-off thermal valve and fusible element, Sight glass and indicator hood.**
- **Size**
: 2" through 12"
- **Available in**
Aluminum, Carbon Steel, Stainless Steel
- **Other size and material to be consulted by factory.**



MODEL : WFT239

◆ INTRODUCTION

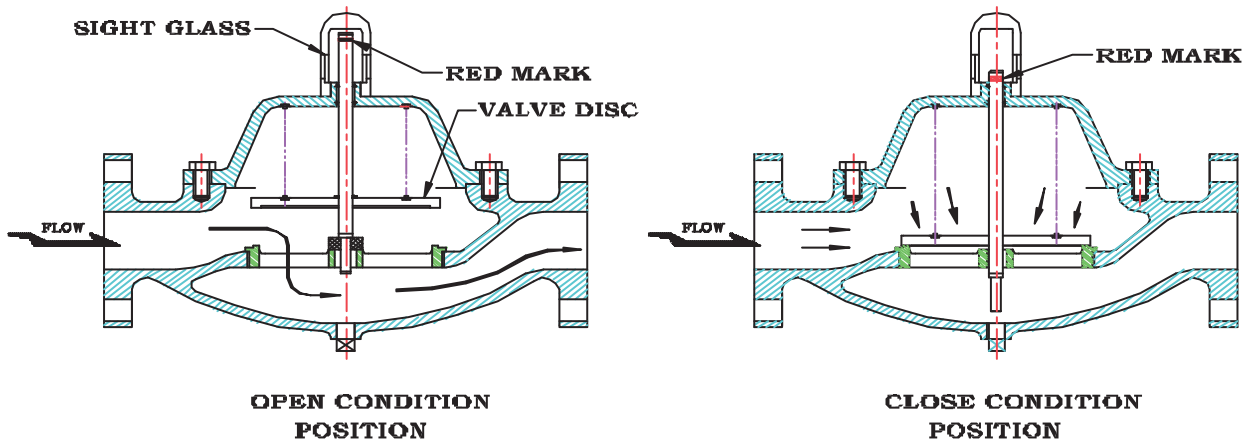
The Model WFT239 is used to protect low pressure waste gas systems if a fire is burning in the piping. The flame trap is a valve intended to prevent backfiring of inflammable mixture of air and vapor and gas etc. automatically. The flame trap assembly serves to extinguish a fire occurring in sewage and other facilities where methane gas is apt to be produced. When the gas catches fire, the valve is closed by the generated heat to stop the gas flow. The Flame Trap is generally installed in gas lines leading from each digester and gas holder. It is also installed in a line to gas utilization equipment, as close as possible to the source of combustion.

◆ DESIGN AND FUNCTION

The Model WFT239 is a combination of the MODEL WF23 flame arrester and the thermal operated shut-off valve. The Model WFT239 flame trap assembly may be installed in the vertical or horizontal position. The thermal operated shut-off valve includes a compression type fusible element rated at 127°C designed to shut-off the gas flow within 15 seconds upon reaching its temperature rating.

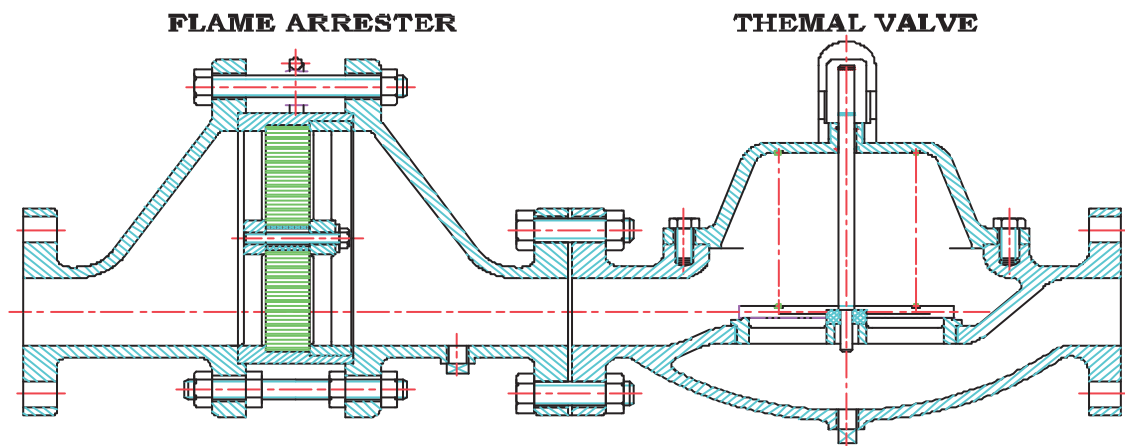
The Model WFT239 series flame trap is designed easily to maintain without valve main body removal from pipe line when replacing the fusible element.

The Model WFT239 series flame trap is designed to check the valve on/off condition through a heat resistant glass at outside of flame trap assembly.

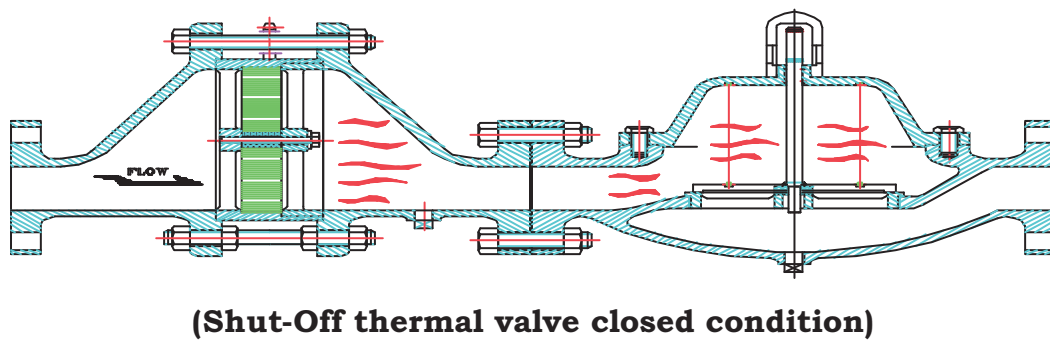
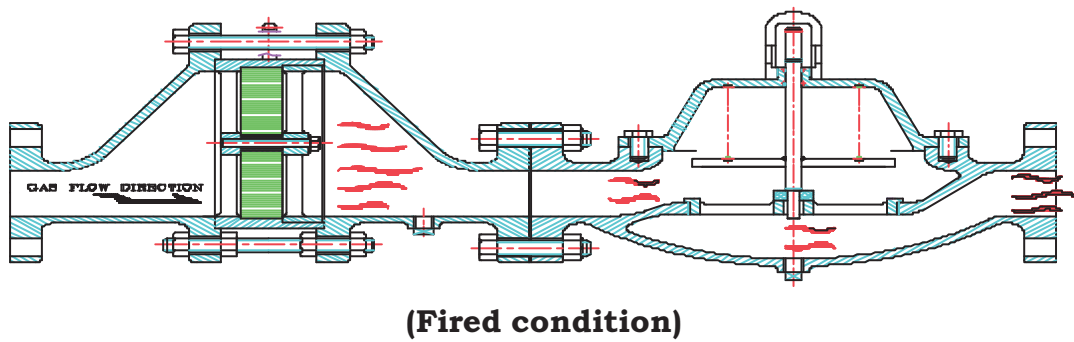
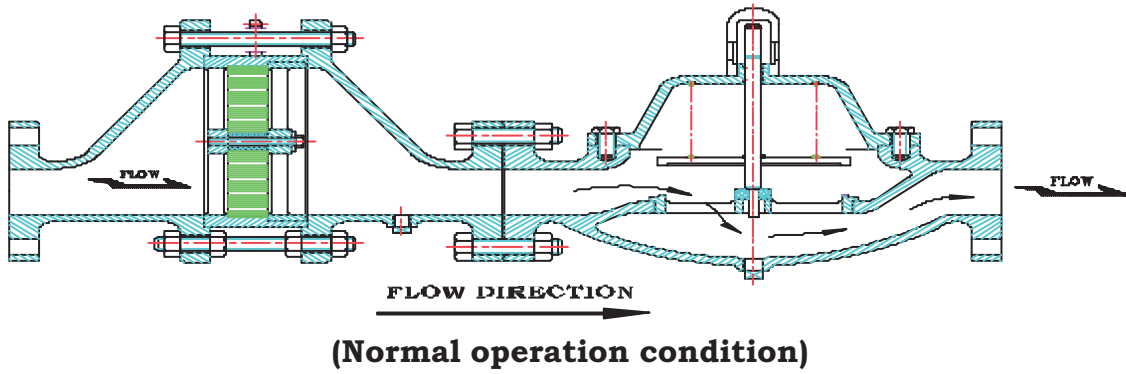


(Open condition position & close condition position)

The Model WFT239 is designed to inspect easily the valve trim parts without the main body valve removal from pipe line.

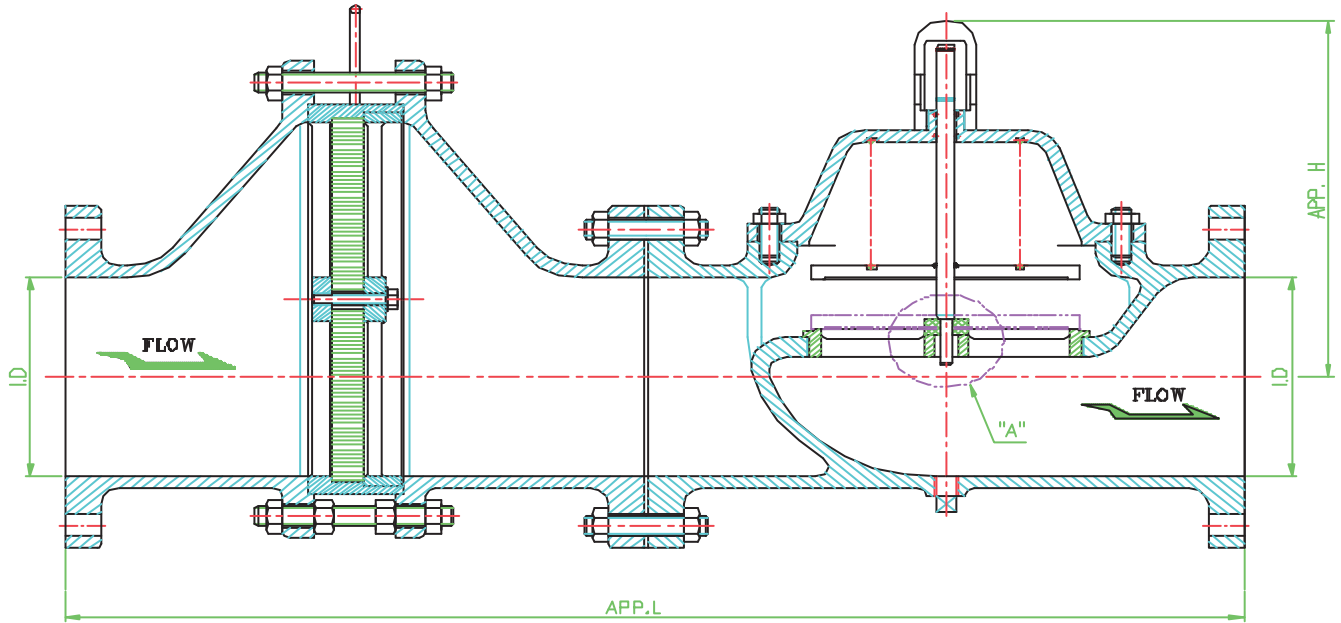


If a fire is burning in the pipe line, the compression type fusible element of shut-off thermal valve is melted with heat within 15 seconds at 127°C the disc of shut-off thermal valve is closed.



◆ DRAWING AND DIMENSION

MODEL WFT239



DIMENSION TABLE

UNIT : mm

SIZE	I.D	L	H
2"	50	520	220
3"	80	575	300
4"	100	690	300
6"	150	815	310
8"	200	940	330
10"	250	1080	450
12"	300	1200	550

PRESSURE VACUUM RELIEF VALVE WITH FLAME ARRESTER (MODL WBF60, WBF70)

- Pressure Setting

: 22mm H₂O to 10,000mm H₂O

- Size

: 2” through 12”

- Flame Element

: Proven Spiral wound, crimped ribbon design

- Available in

Aluminum, Carbon Steel, Stainless Steel.

- Other size and material to be consulted by factory.



MODEL : WBF60A

◆ DESIGN AND FUNCTION

A combination of the model WB12, WB15 pressure vacuum relief valve and model WF21 flame arrester make up the model WBF60, WBF70. The model WBF70 combination units are used for pressure vacuum relief where vapors must be piped away.

The bank assemblies are designed of wafer design for easy removal from the housing to facilitate inspection and cleaning.



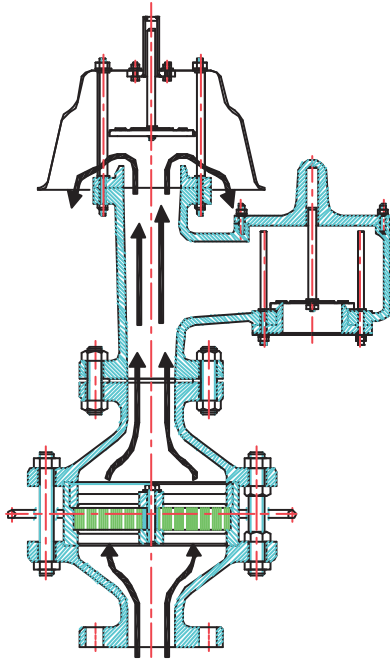
MODEL : WBF70A

Model No.	Type	Setting Pressure Range
WBF60A	Weight Loaded release to ATM	22 ~ 700 mmH ₂ O
WBF60B	Spring Loaded Release to ATM	Above 700 mmH ₂ O
WBF70A	Weight Loaded release to Pipe Away	22 ~ 700 mmH ₂ O
WBF70B	Spring Loaded release to Pipe Away	Above 700 mmH ₂ O

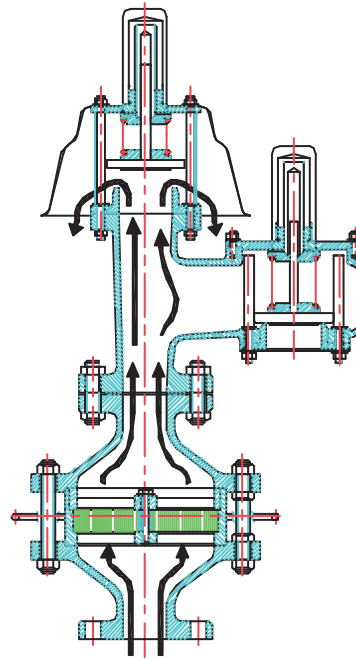
Note) Other specification to be consult by factory.

Pressure Relief

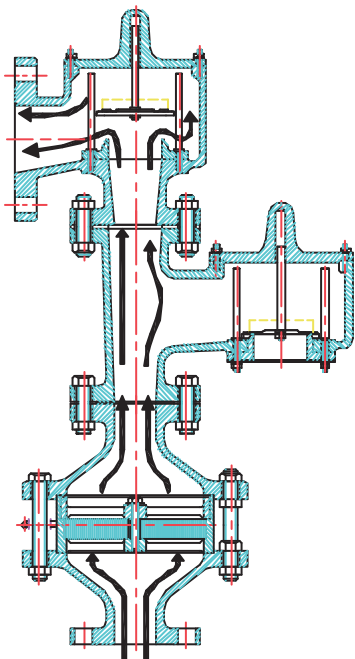
: As the pressure in the storage tank increases, the vacuum pallet is held shut. When the set pressure is reached, the pressure pallet lifts and relieves to atmosphere (or to a header if it a pipe away valve).



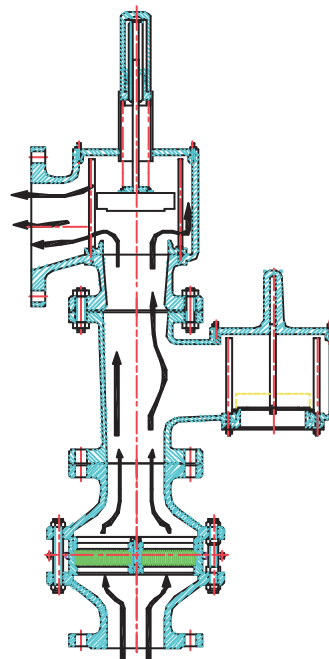
WBF60A



WBF60B



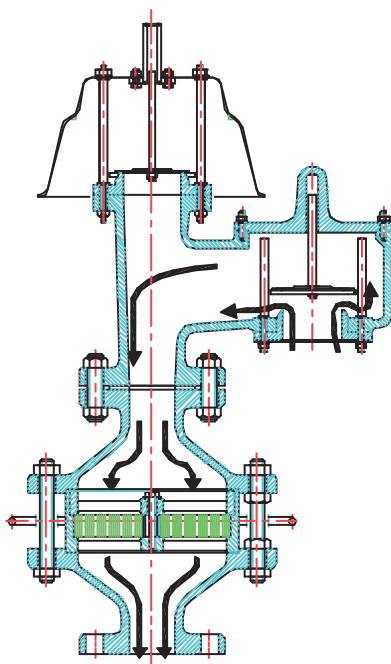
WBF70A



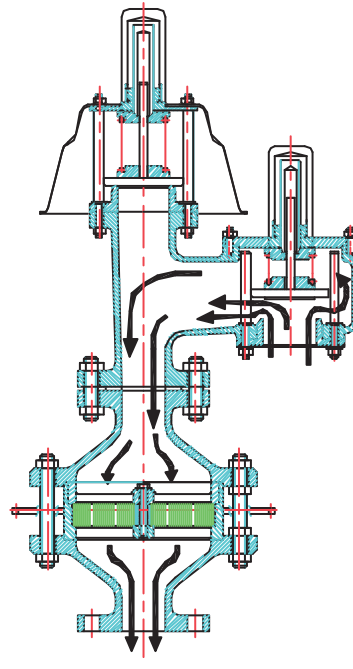
WBF70B

Vacuum Relief

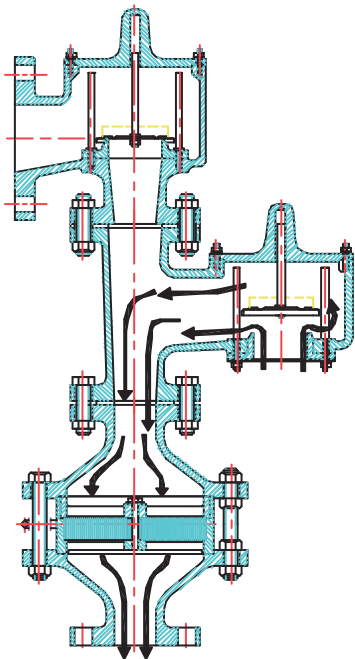
: As a vacuum is drawn in the storage tank (for example, when fluid is being pumped out), the pressure pallet is held shut by atmospheric pressure. When the vacuum setting is reached, the pallet lifts and air is drawn in the storage tank from the atmosphere.



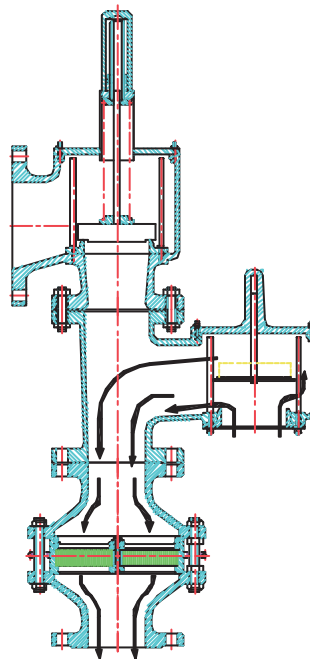
WBF60A



WBF60B



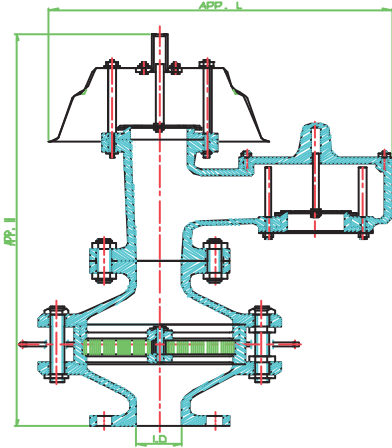
WBF70A



WBF70B

◆ DRAWING AND DIMENSION

MODEL WBF60A

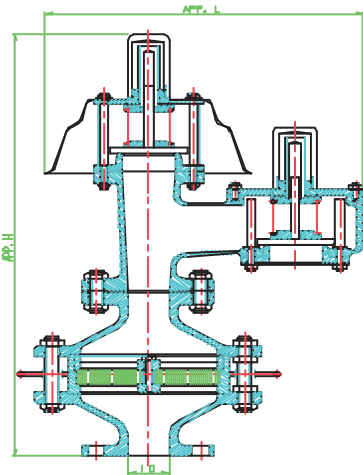


DIMENSION TABLE

UNIT : mm

SIZE	2"	3"	4"	6"	8"	10"	12"
I.D	50	80	100	150	200	250	300
H	700	750	800	1000	1110	1260	1385
L	370	445	492	636	758	869	985

MODEL WBF60B

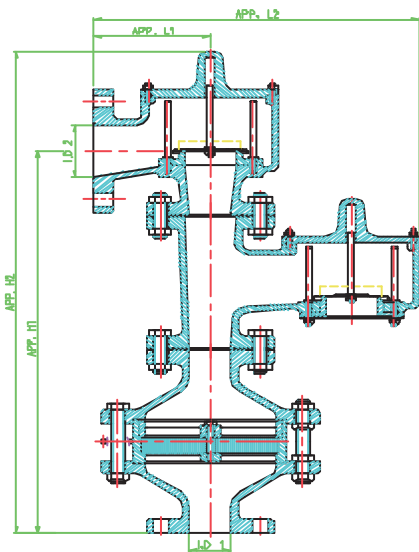


DIMENSION TABLE

UNIT : mm

SIZE	2"	3"	4"	6"	8"	10"	12"
I.D	50	80	100	150	200	250	300
H	670	795	930	1110	1180	1340	1455
L	370	445	490	635	760	870	985

MODEL WBF70A

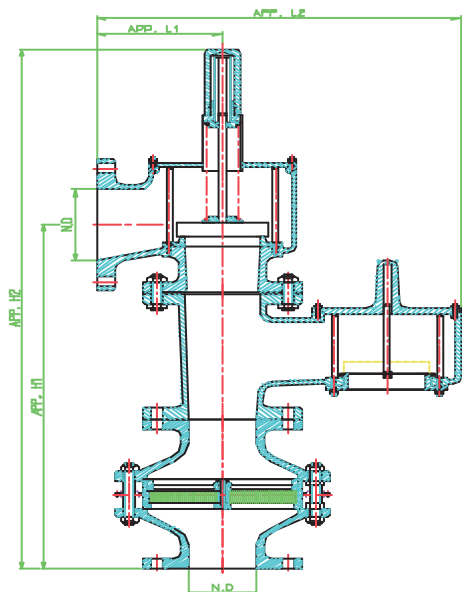


DIMENSION TABLE

UNIT : mm

SIZE	I.D1	I.D2	H1	H2	L1	L2
2" x 3"	50	80	590	740	140	395
3" x 4"	80	100	645	820	165	470
4" x 6"	100	150	735	970	185	535
6" x 8"	150	200	905	1210	220	665
8" x 10"	200	250	1000	1320	253	785
10" x 12"	250	300	1145	1500	290	890
12" x 14"	300	400	1280	1685	330	1025

MODEL WBF70B



DIMENSION TABLE

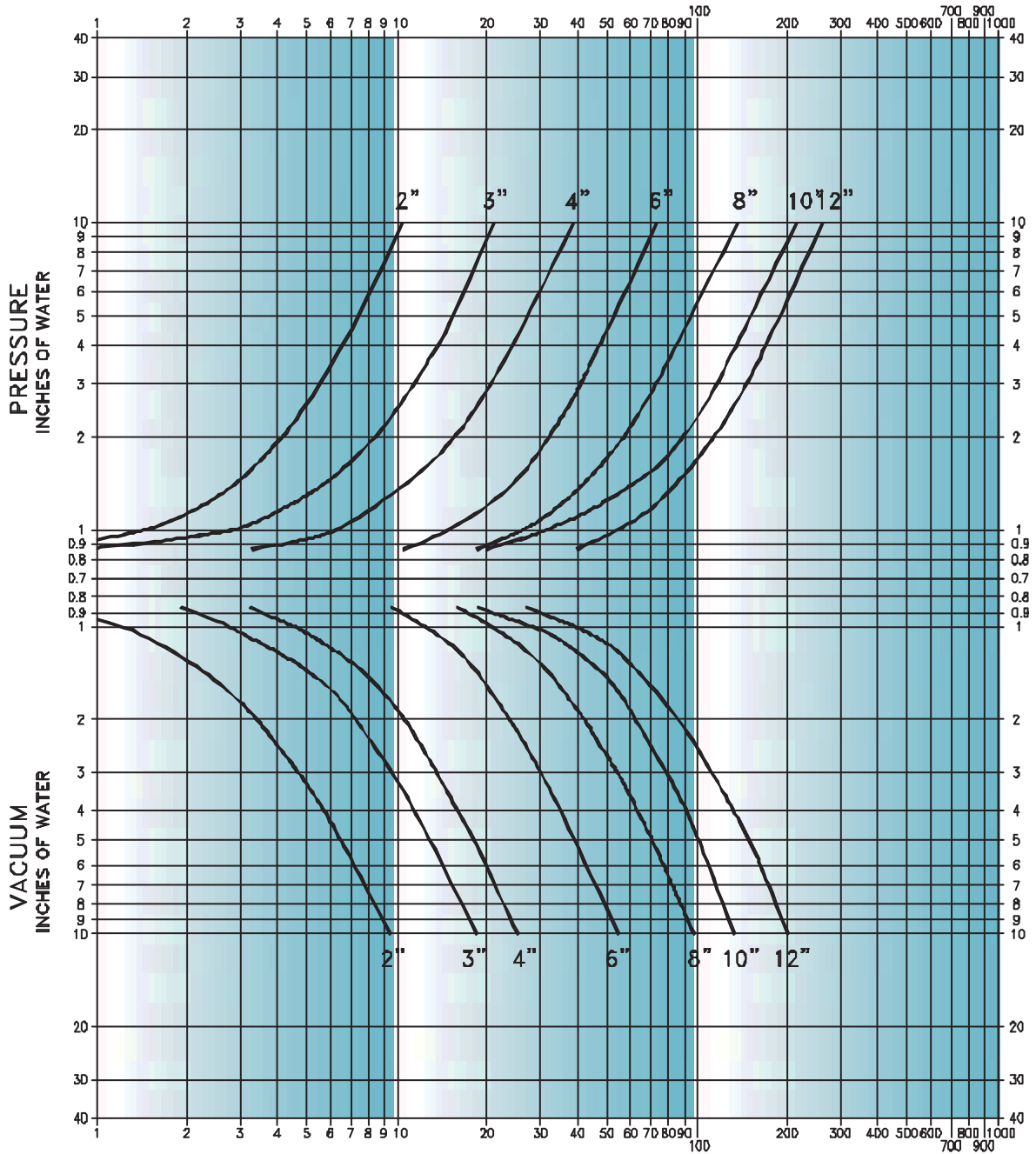
UNIT : mm

SIZE	I.D1	I.D2	H1	H2	L1	L2
2" x 3"	50	80	590	770	150	400
3" x 4"	80	100	645	870	160	472
4" x 6"	100	150	735	1035	220	535
6" x 8"	150	200	905	1280	238	665
8" x 10"	200	250	1000	1350	253	785
10" x 12"	250	300	1145	1530	290	890
12" x 14"	300	350	1280	1710	330	1025

◆ **FLOW CAPACITY**

WB12A SERIES VALVE & WF21 ARRESTER

SET AT 0.865 INCHES OF WATER

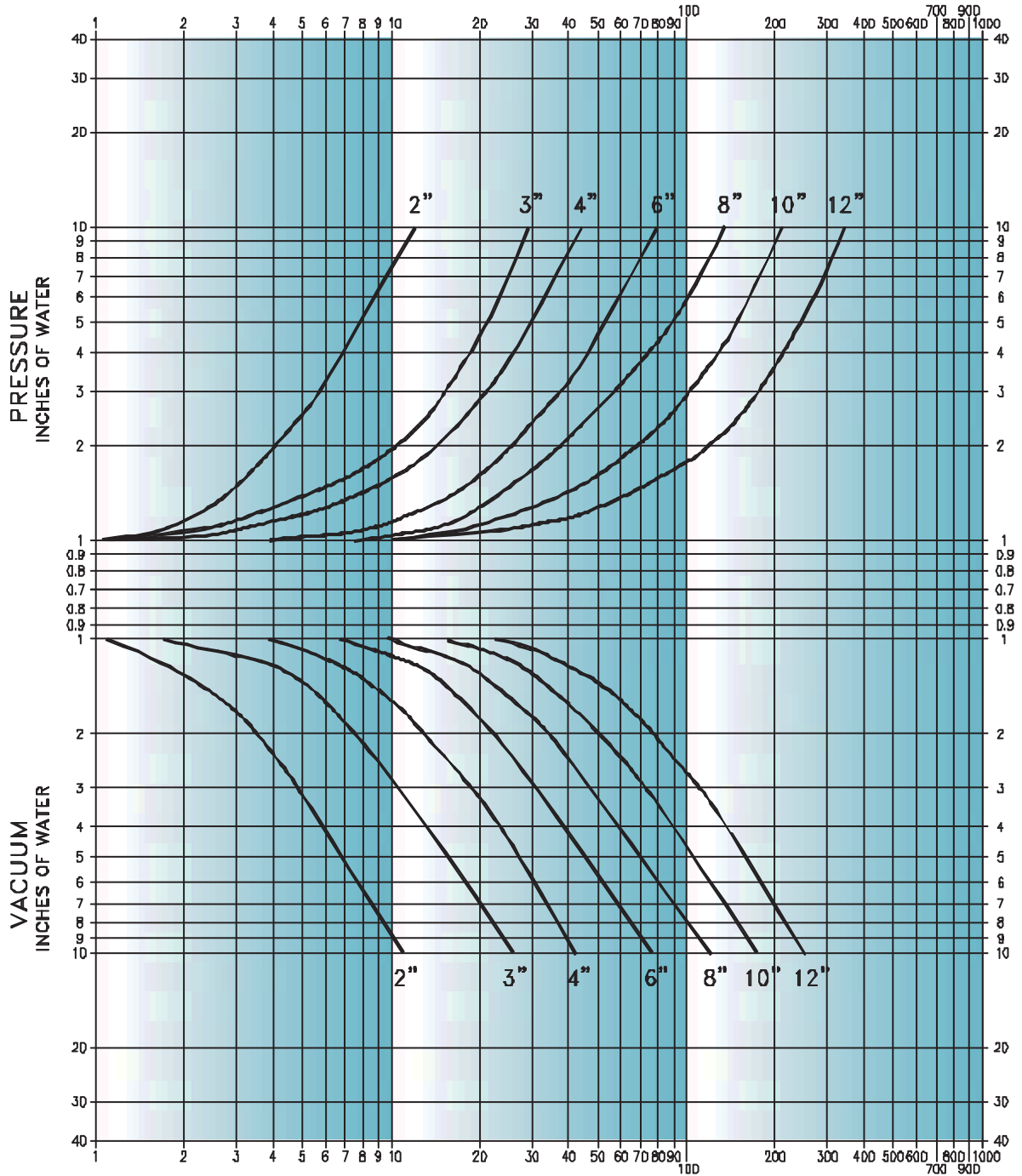


THOUSANDS OF CUBIC FEET/HOUR AT 60°F AND 14.7 P.S.I.A.

AIR FLOW(SCFH) *(SCFHx0.02832=M³/hr)

WB12A SERIES VALVE & WF21 ARRESTER

SET AT 1 INCHES OF WATER

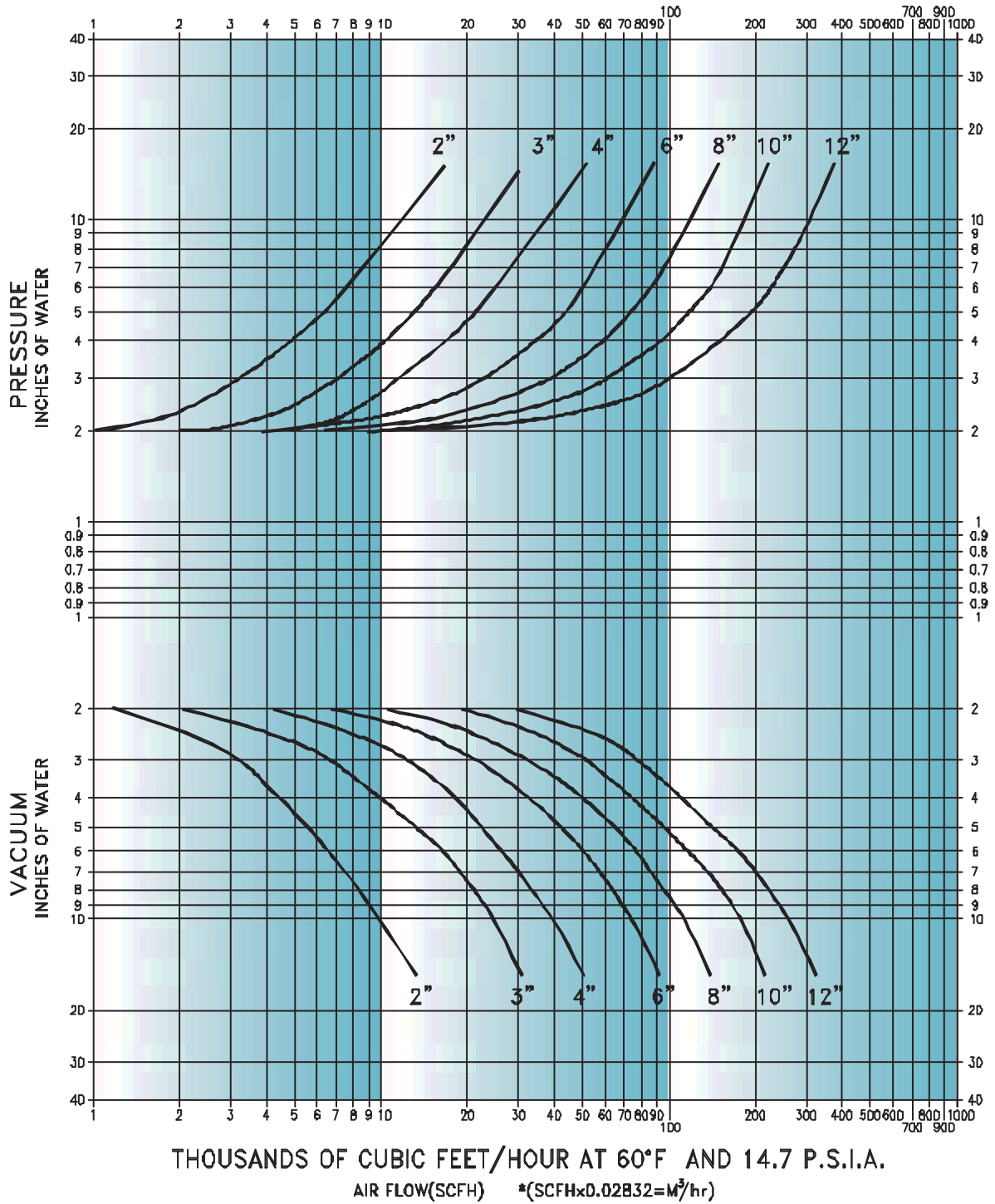


THOUSANDS OF CUBIC FEET/HOUR AT 60°F AND 14.7 P.S.I.A.

AIR FLOW(SCFH) *(SCFHx0.02832=M³/hr)

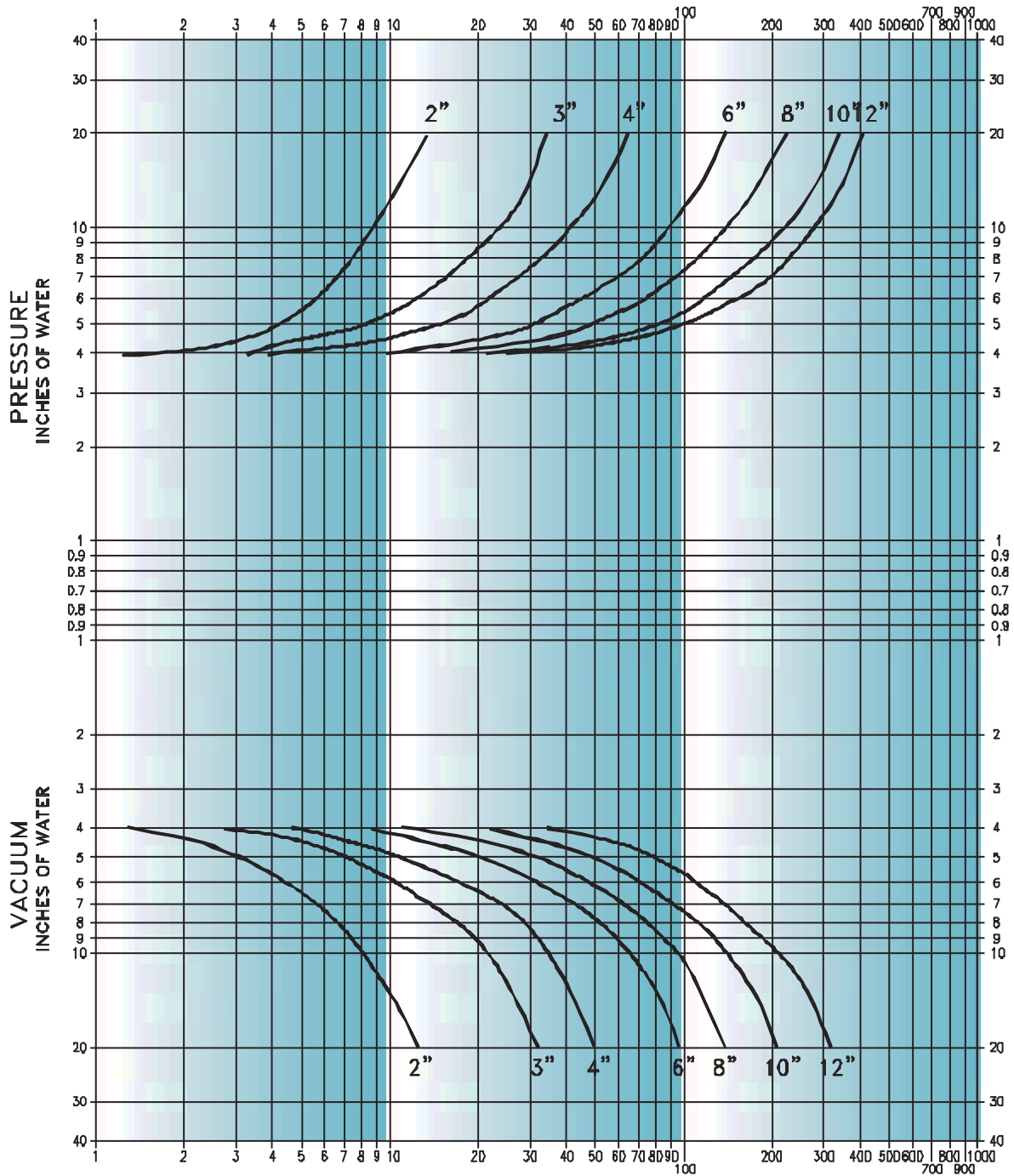
WB12A SERIES VALVE & WF21 ARRESTER

SET AT 2 INCHES OF WATER



WB12A SERIES VALVE & WF21 ARRESTER

SET AT 4 INCHES OF WATER

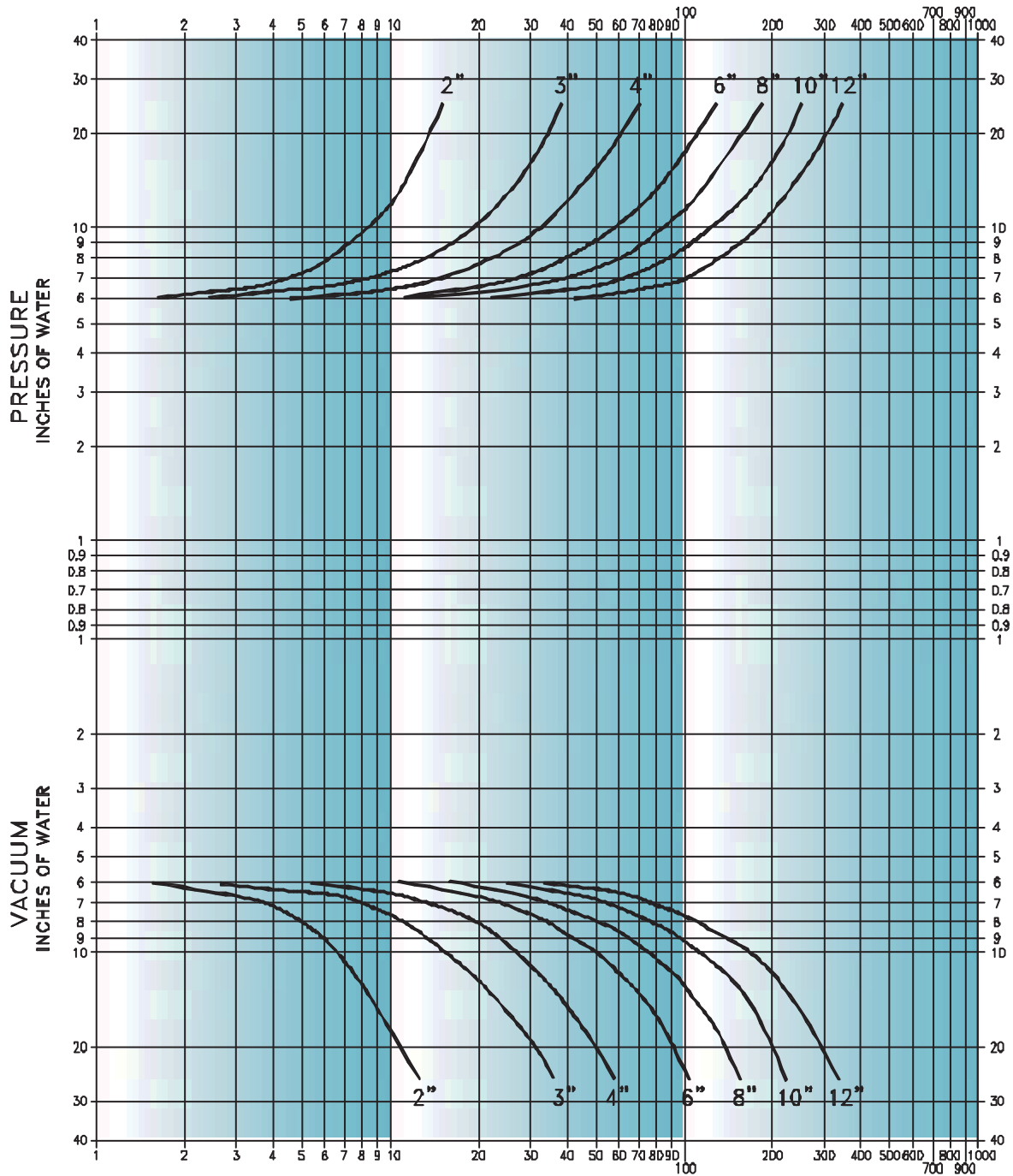


THOUSANDS OF CUBIC FEET/HOUR AT 60°F AND 14.7 P.S.I.A.

AIR FLOW(SCFH) *(SCFHx0.02832=M³/hr)

WB12A SERIES VALVE & WF21 ARRESTER

SET AT 6 INCHES OF WATER

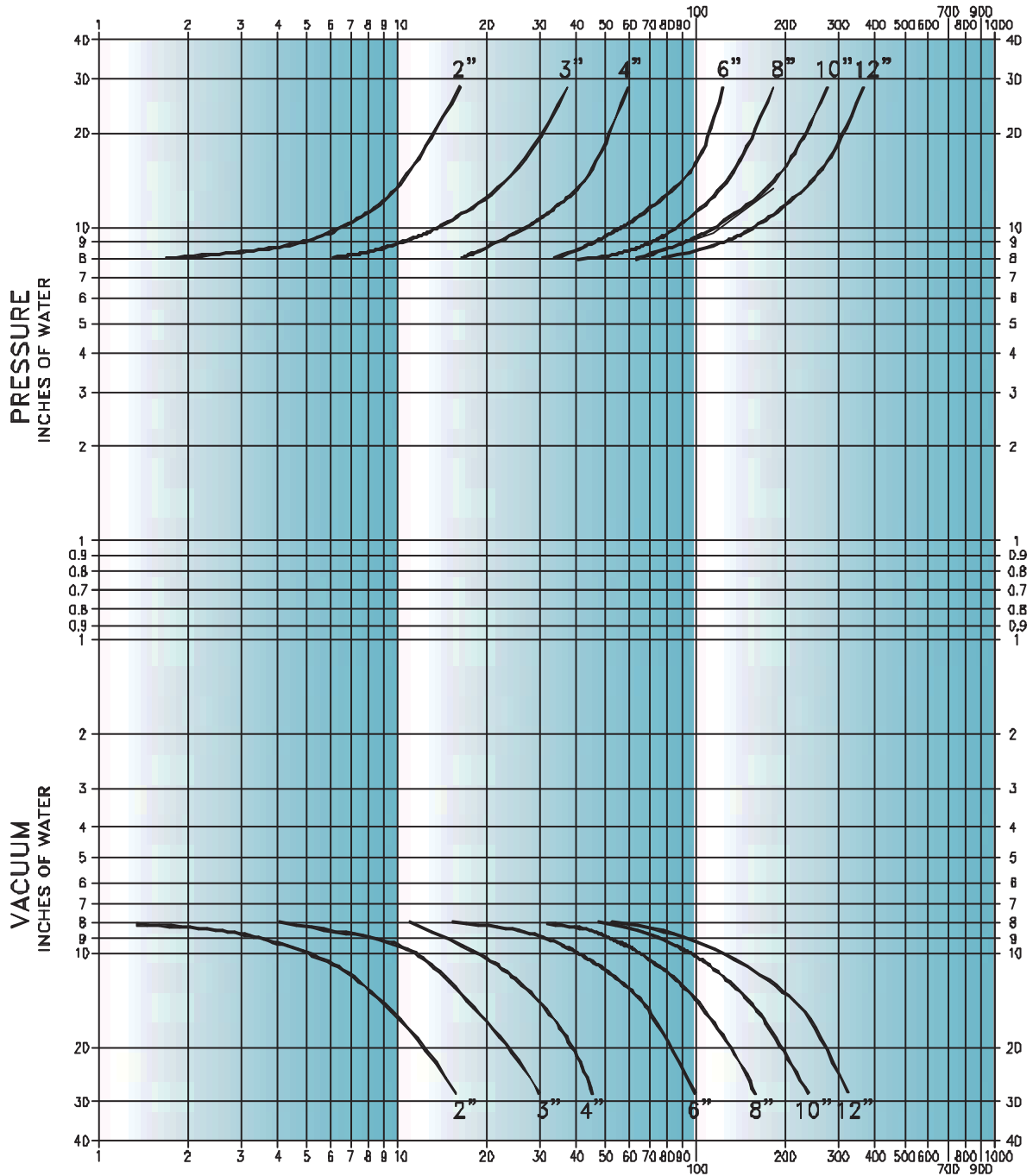


THOUSANDS OF CUBIC FEET/HOUR AT 60°F AND 14.7 P.S.I.A.

AIR FLOW(SCFH) *(SCFH×0.02832=M³/hr)

WB12A SERIES VALVE & WF21 ARRESTER

SET AT 8 INCHES OF WATER

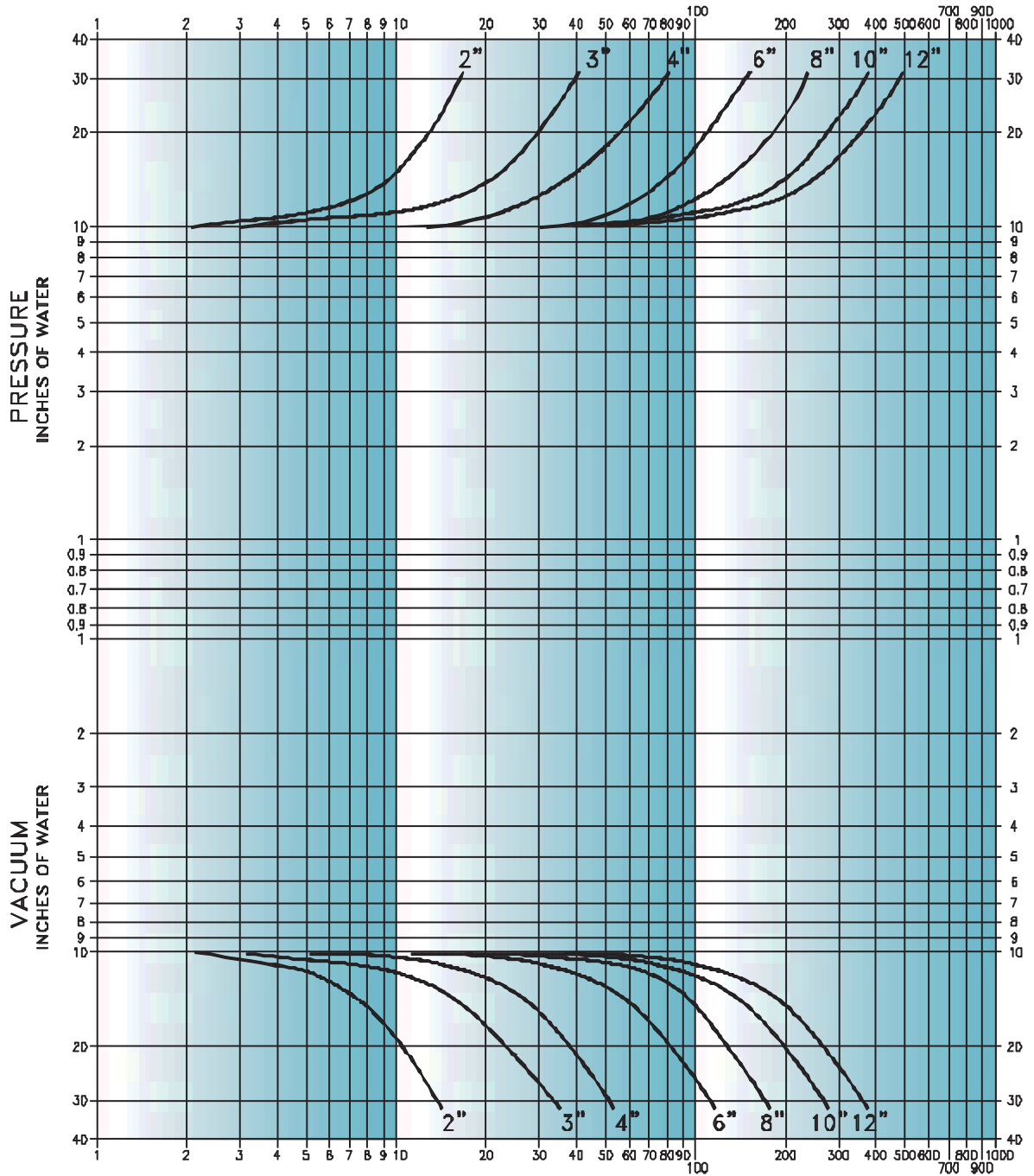


THOUSANDS OF CUBIC FEET/HOUR AT 60°F AND 14.7 P.S.I.A.

AIR FLOW(SCFH) *(SCFHx0.02832=M³/hr)

WB12A SERIES VALVE & WF21 ARRESTER

SET AT 10 INCHES OF WATER

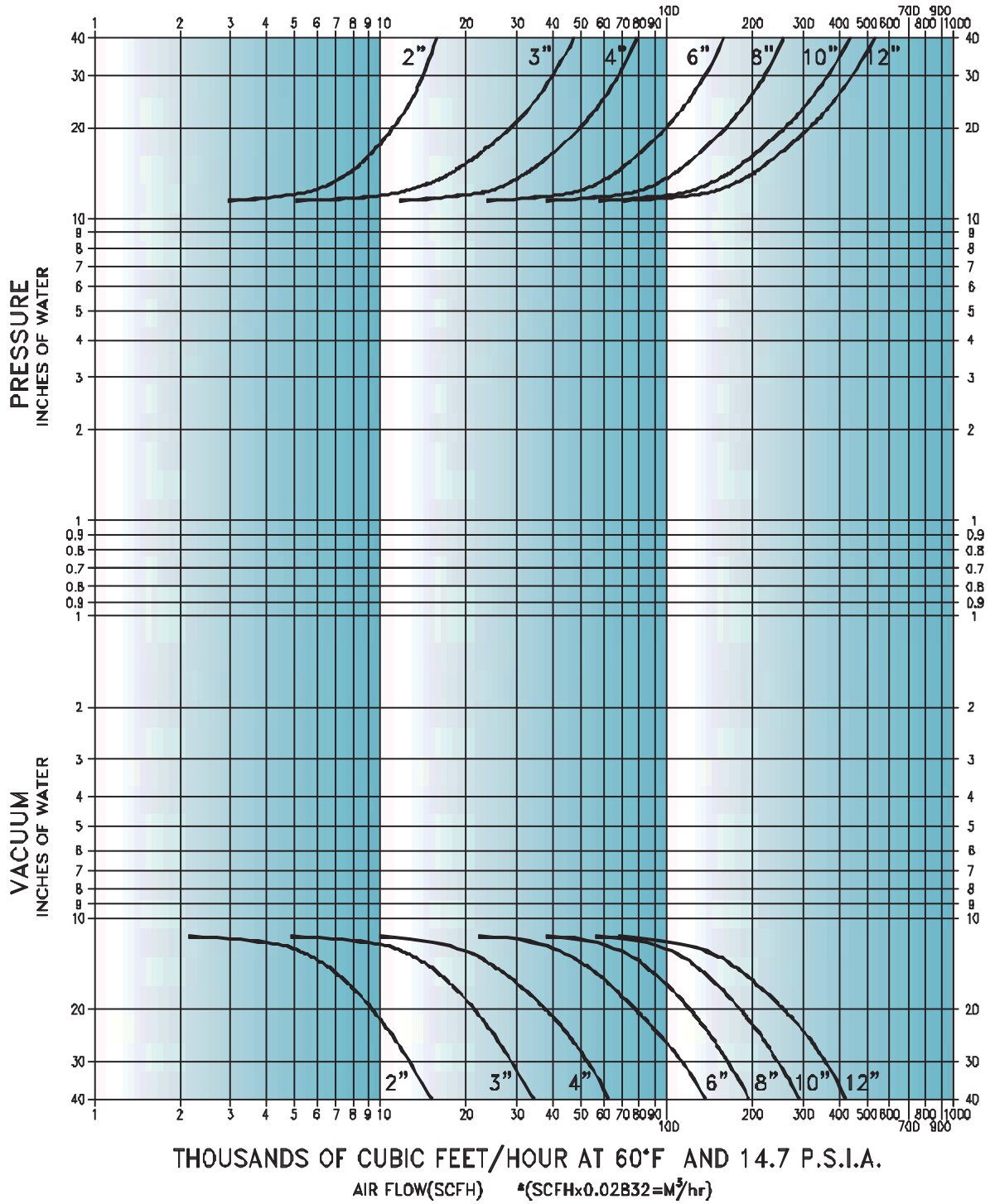


THOUSANDS OF CUBIC FEET/HOUR AT 60°F AND 14.7 P.S.I.A.

AIR FLOW(SCFH) *(SCFHx0.02832=M³/hr)

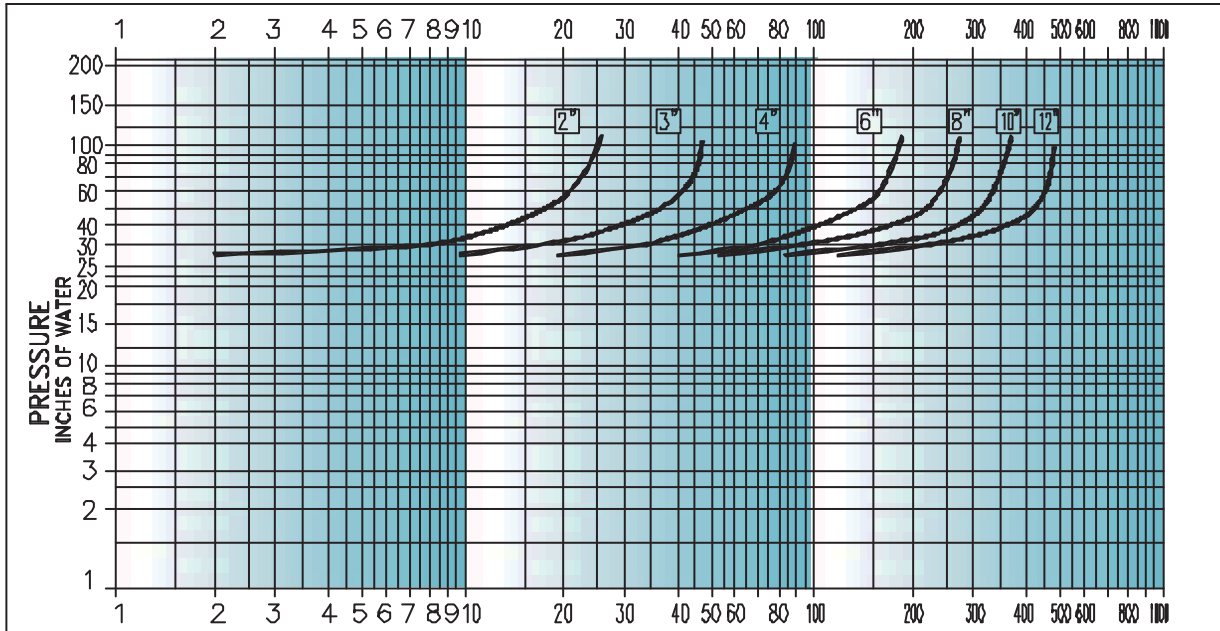
WB12A SERIES VALVE & WF21 ARRESTER

SET AT 12 INCHES OF WATER



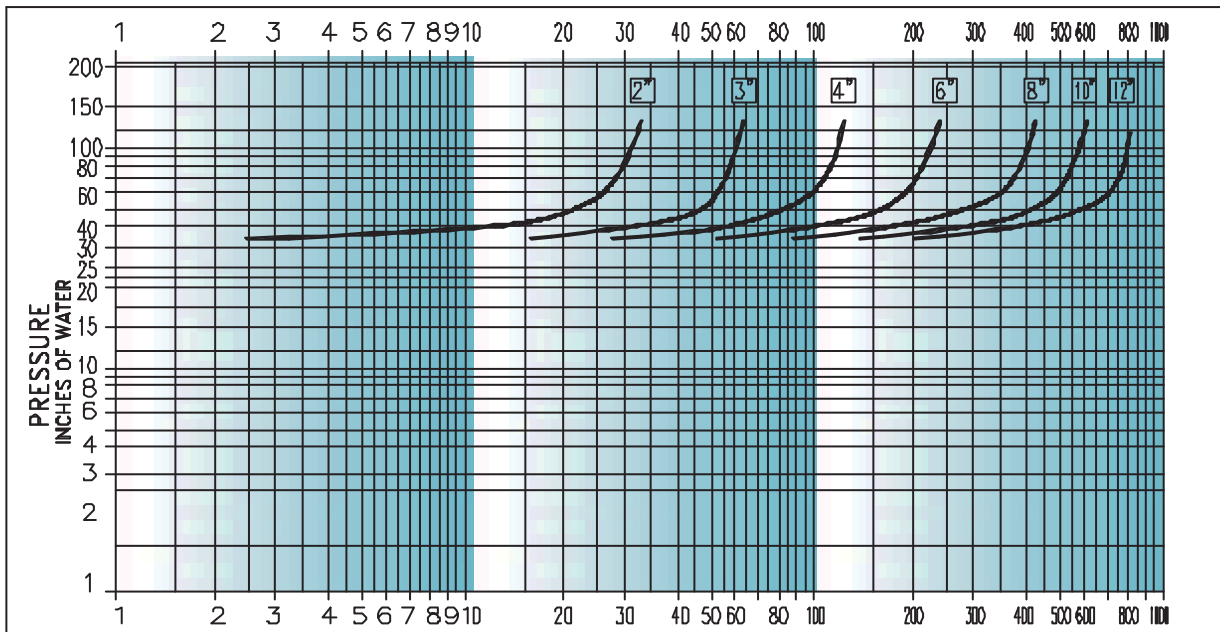
WB12B SERIES VALVE & WF21 ARRESTER

SET AT 28 INCHES OF WATER



THOUSANDS OF CUBIC FEET / HOUR AT 60° F AND 14.7 P.S.I.A.
 AIR FLOW (SCFH) *(SCFHx0.02832=M³/hr)

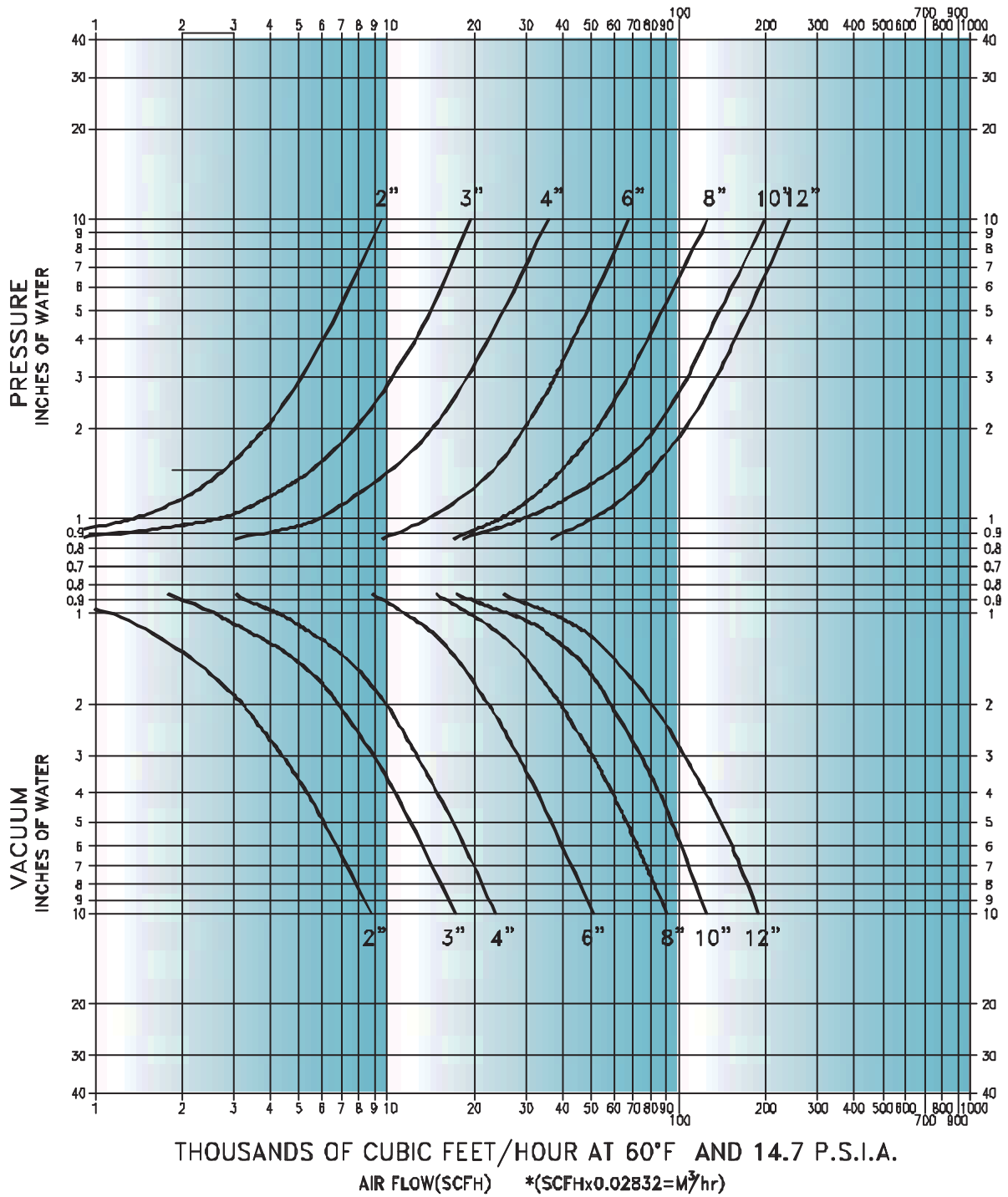
SET AT 32 INCHES OF WATER



THOUSANDS OF CUBIC FEET / HOUR AT 60° F AND 14.7 P.S.I.A.
 AIR FLOW (SCFH) *(SCFHx0.02832=M³/hr)

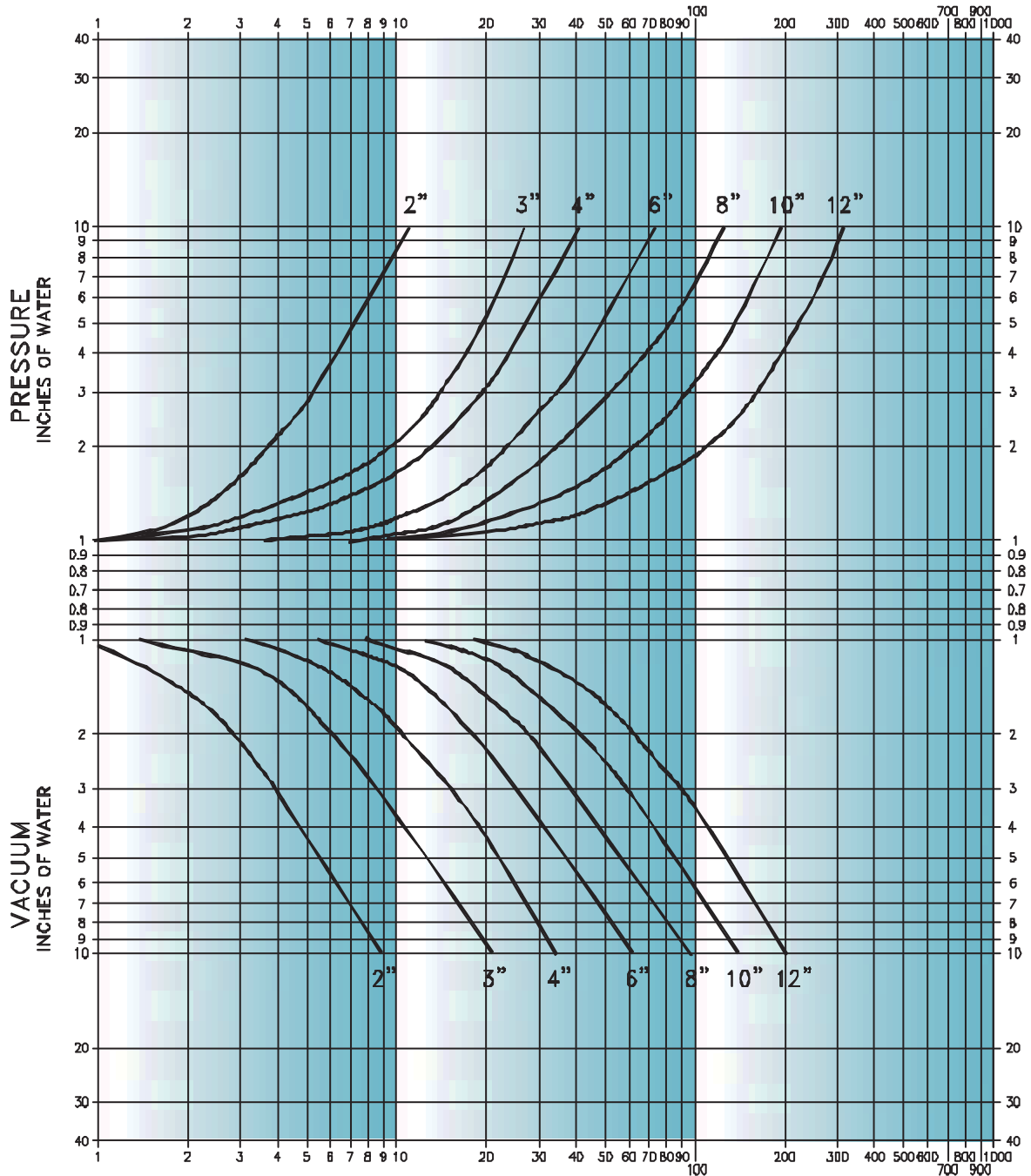
WB15A SERIES VALVE & WF21 ARRESTER

SET AT 0.865 INCHES OF WATER



WB15A SERIES VALVE & WF21 ARRESTER

SET AT 1 INCHES OF WATER

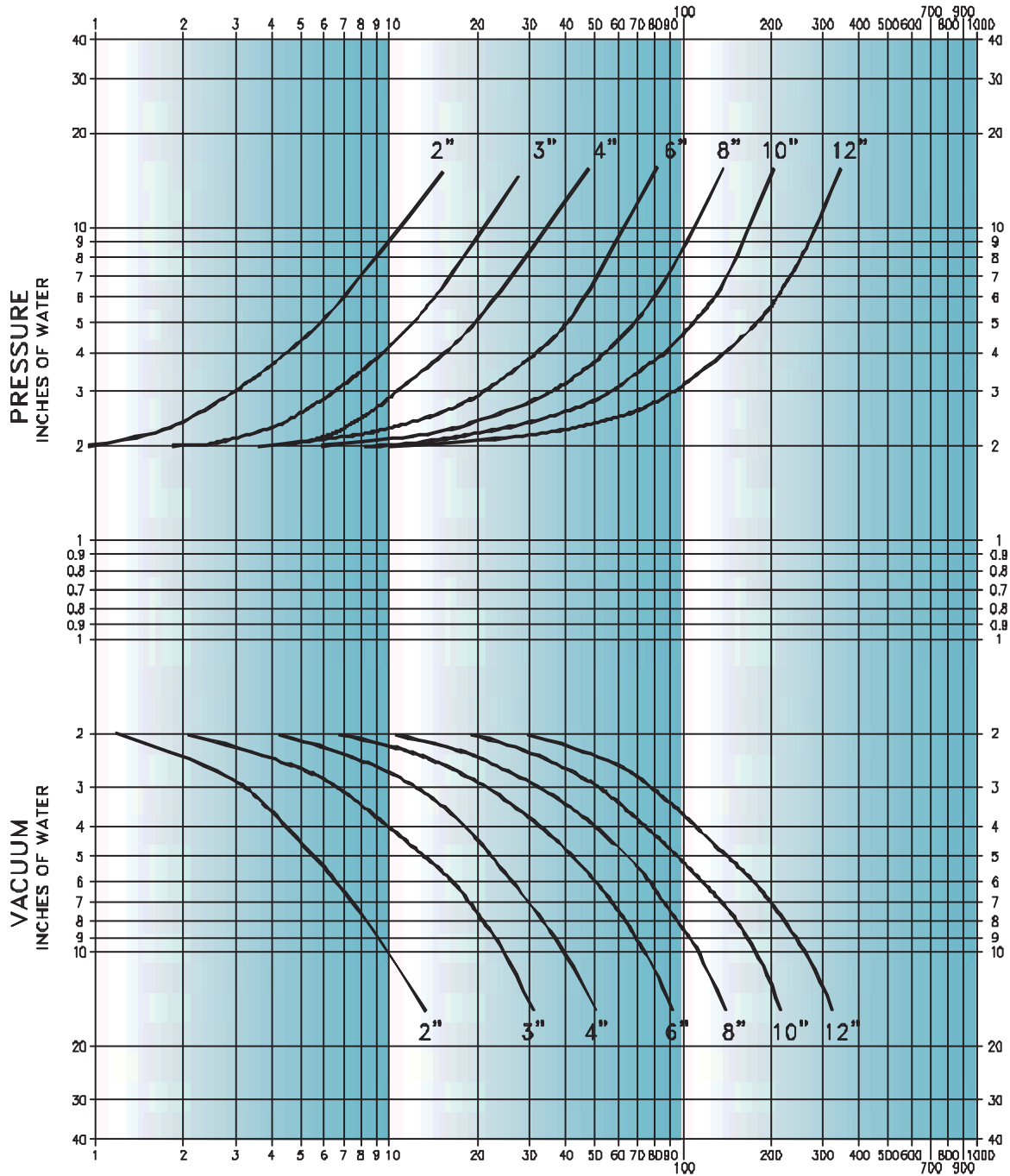


THOUSANDS OF CUBIC FEET/HOUR AT 60°F AND 14.7 P.S.I.A.

AIR FLOW(SCFH) *(SCFHx0.02832=M³/hr)

WB15A SERIES VALVE & WF21 ARRESTER

SET AT 2 INCHES OF WATER

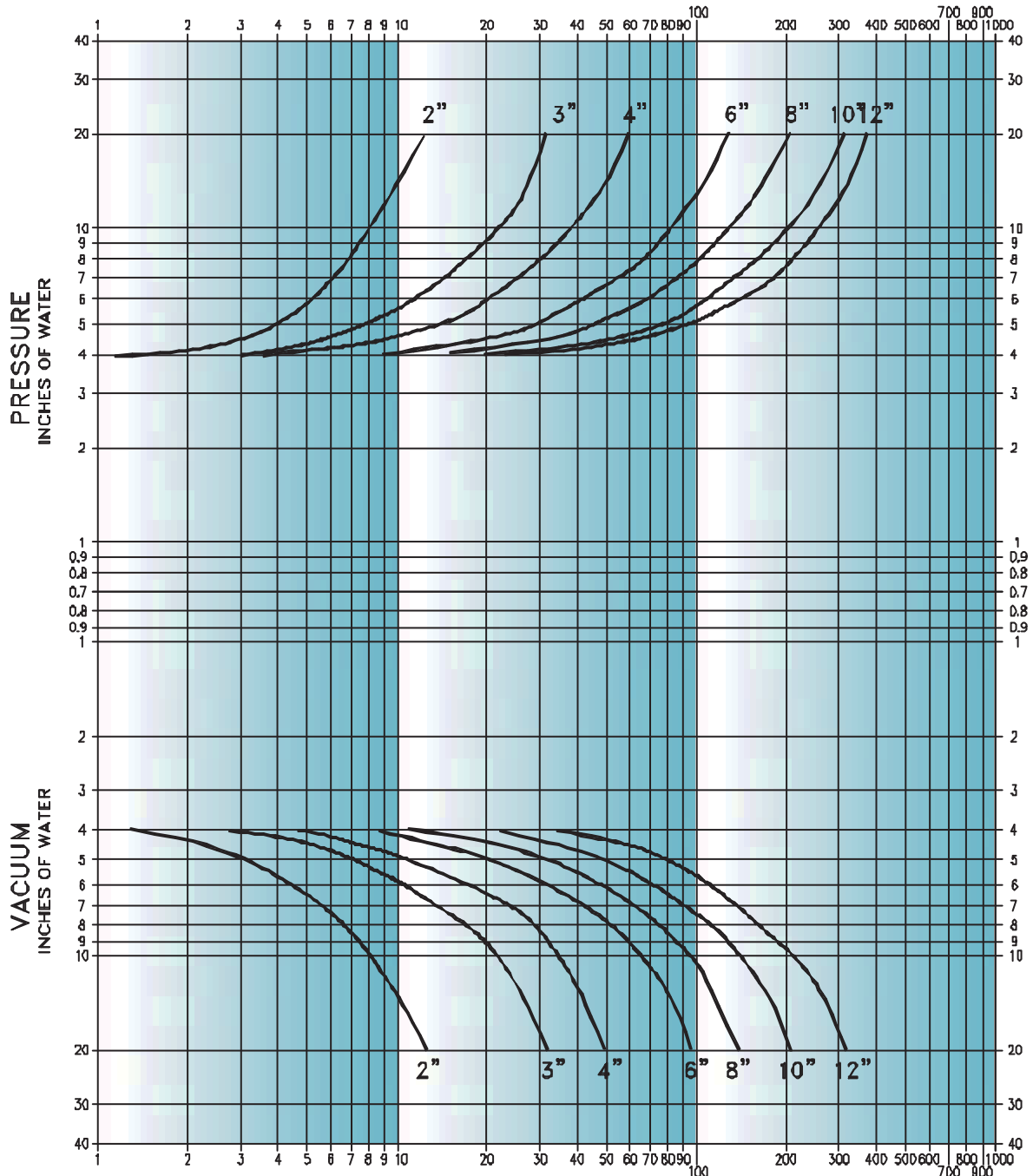


THOUSANDS OF CUBIC FEET/HOUR AT 60°F AND 14.7 P.S.I.A.

AIR FLOW(SCFH) *(SCFHx0.02832=M³/hr)

WB15A SERIES VALVE & WF21 ARRESTER

SET AT 4 INCHES OF WATER

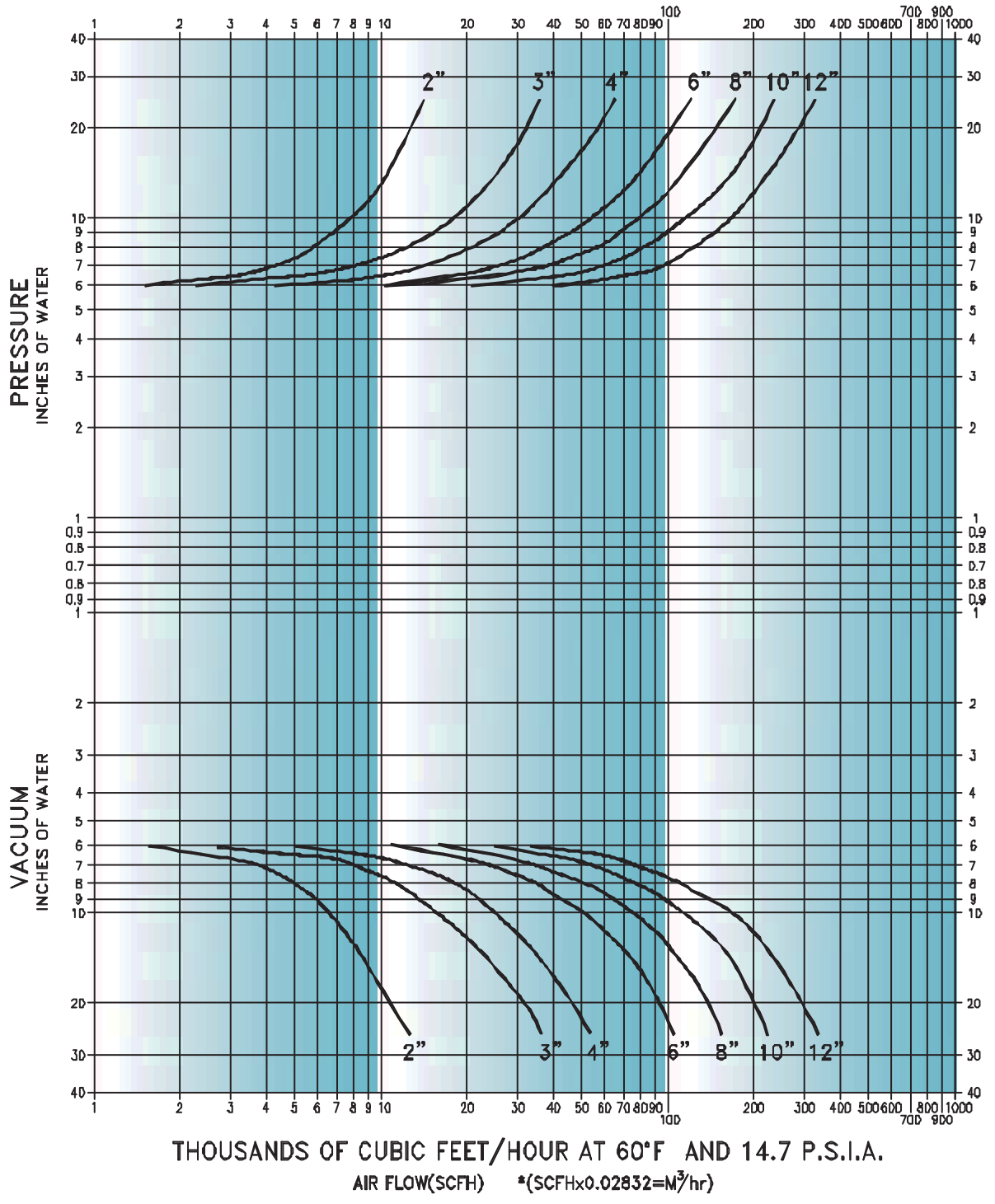


THOUSANDS OF CUBIC FEET/HOUR AT 60°F AND 14.7 P.S.I.A.

AIR FLOW(SCFH) *(SCFHx0.02832=M³/hr)

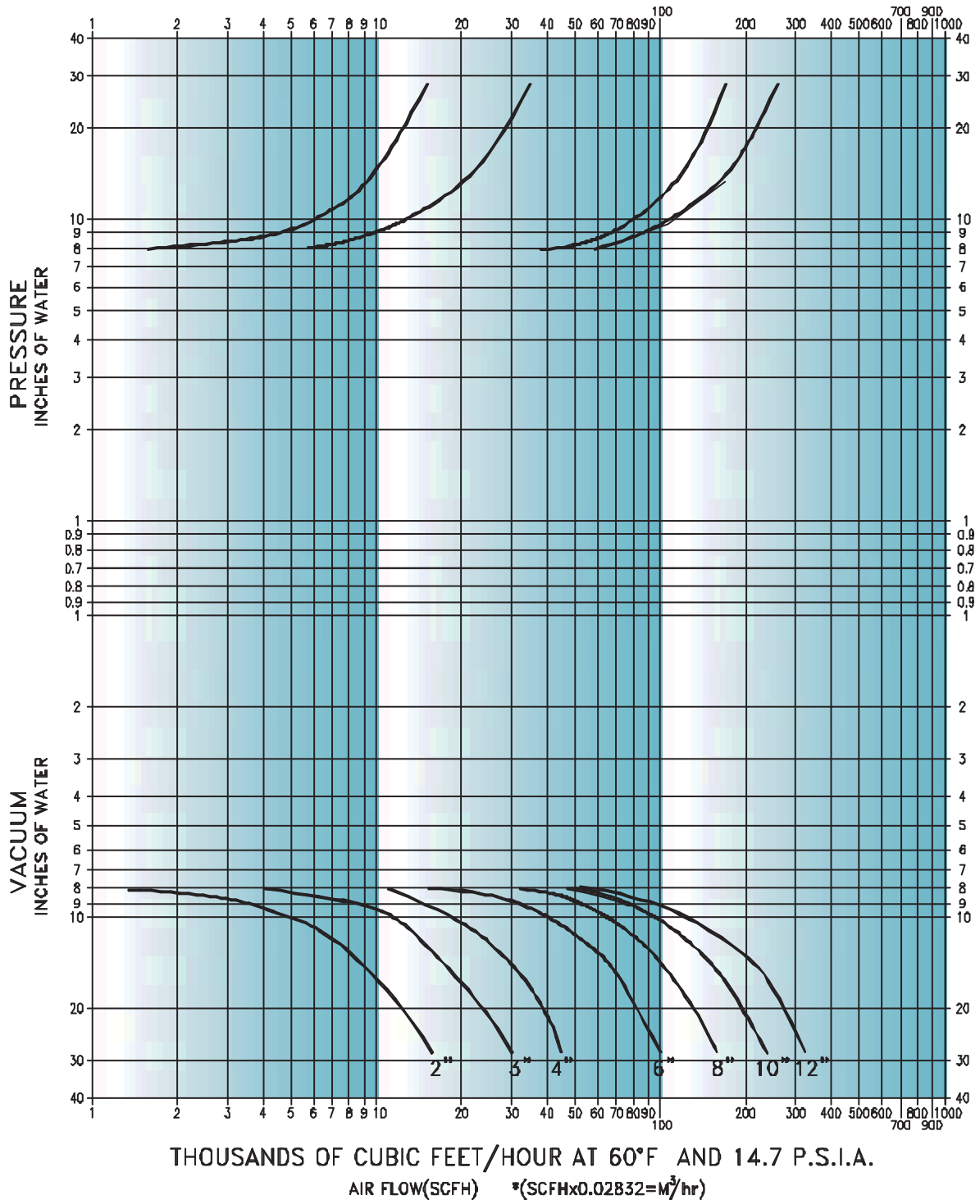
WB15A SERIES VALVE & WF21 ARRESTER

SET AT 6 INCHES OF WATER



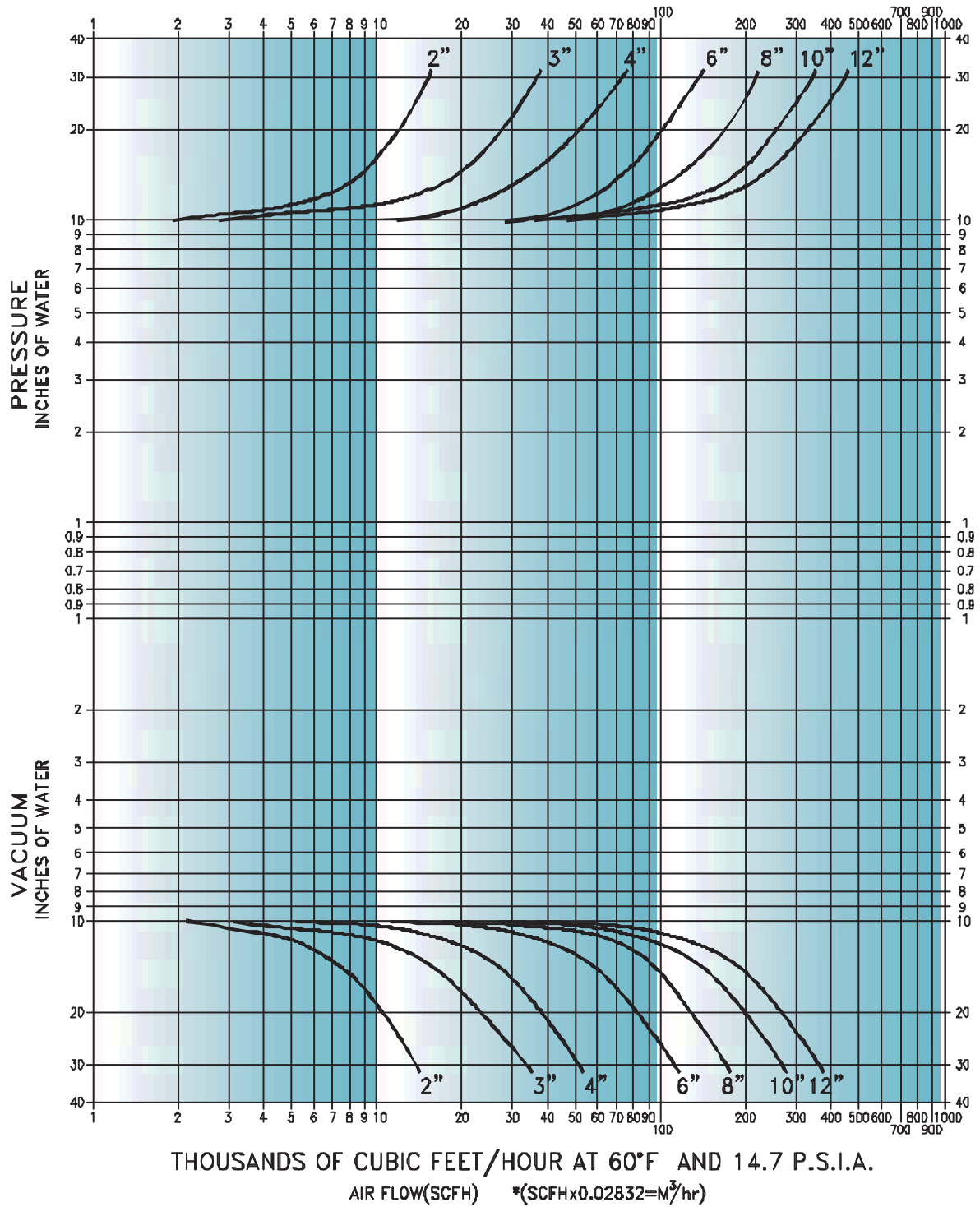
WB15A SERIES VALVE & WF21 ARRESTER

SET AT 8 INCHES OF WATER



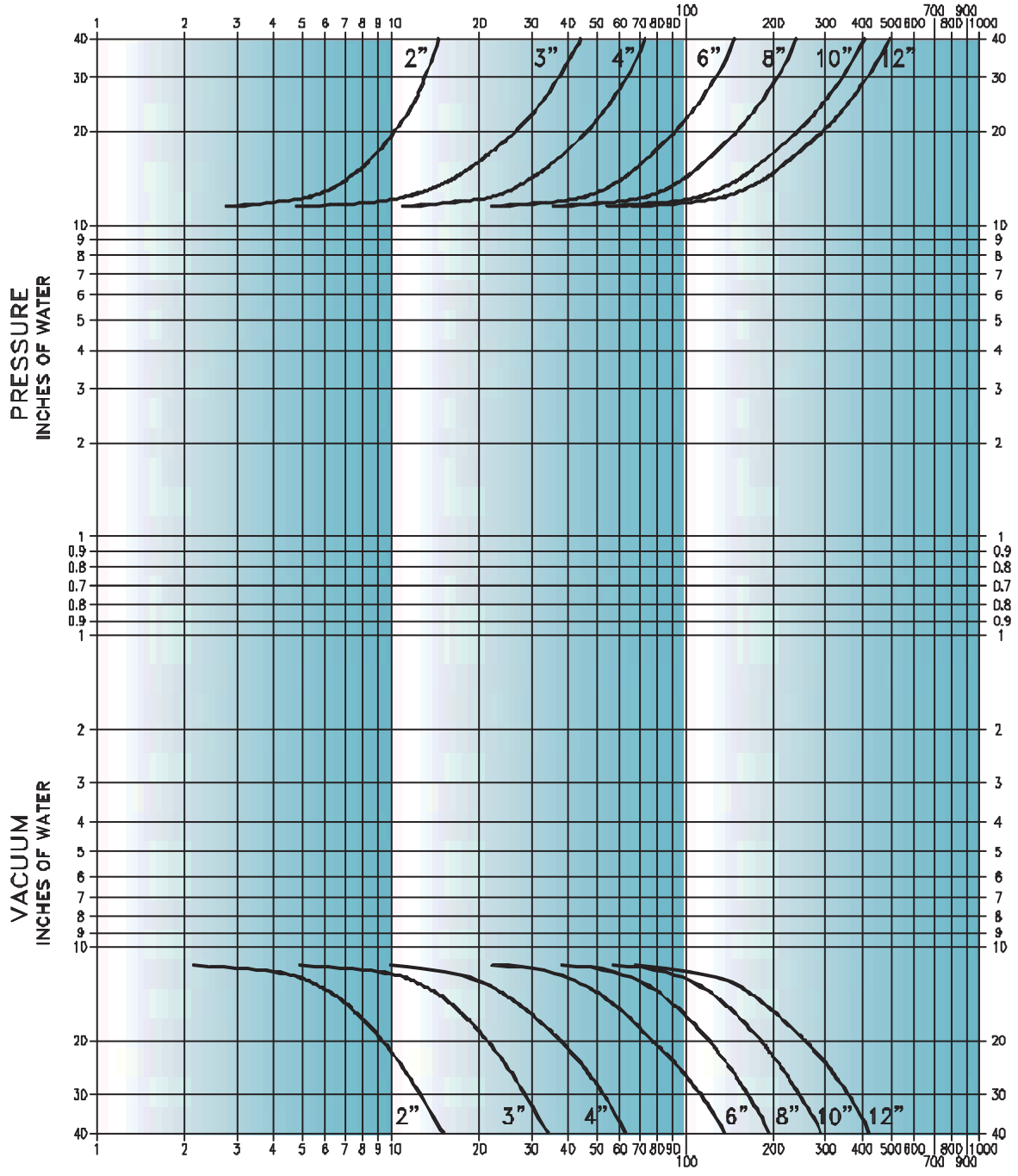
WB15A SERIES VALVE & WF21 ARRESTER

SET AT 10 INCHES OF WATER



WB15A SERIES VALVE & WF21 ARRESTER

SET AT 12 INCHES OF WATER

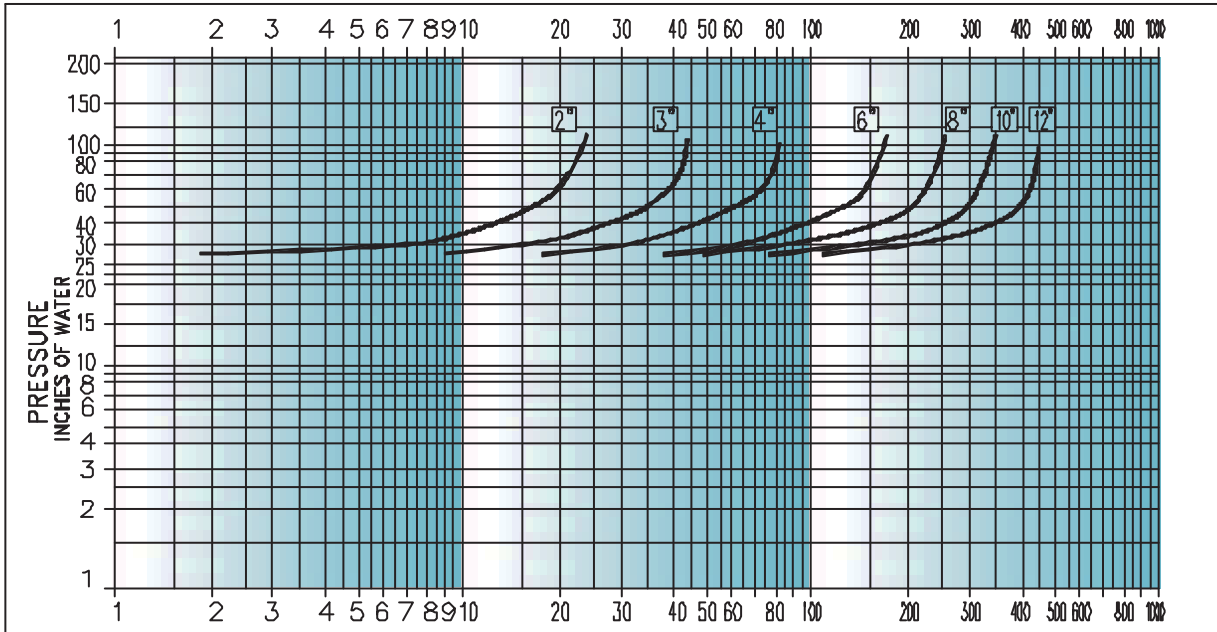


THOUSANDS OF CUBIC FEET/HOUR AT 60°F AND 14.7 P.S.I.A.

AIR FLOW(SCFH) *(SCFHx0.02832=M³/hr)

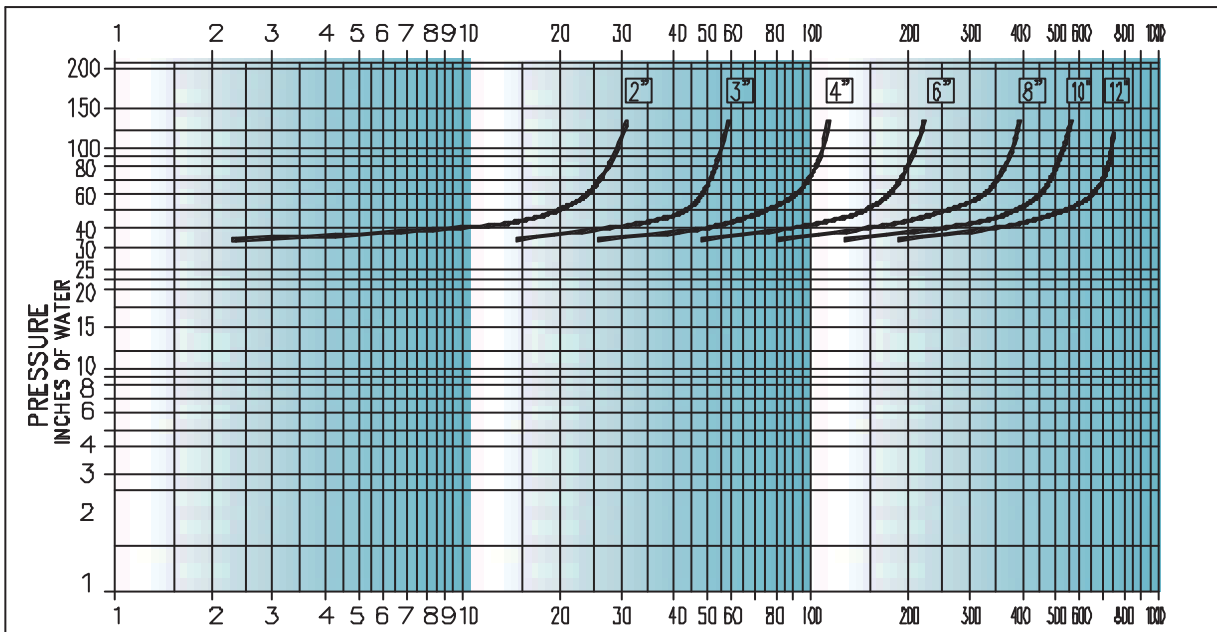
WB15B SERIES VALVE & WF21 ARRESTER

SET AT 28 INCHES OF WATER



THOUSANDS OF CUBIC FEET / HOUR AT 60° F AND 14.7 P.S.I.A.
 AIR FLOW (SCFH) *(SCFH x 0.02832=M³/hr)

SET AT 32 INCHES OF WATER



THOUSANDS OF CUBIC FEET / HOUR AT 60° F AND 14.7 P.S.I.A.
 AIR FLOW (SCFH) *(SCFH x 0.02832=M³/hr)

EMERGENCY PRESSURE/VACUUM VENT COVER

Emergency vent cover is required by API on storage tanks in order to protect the tank against excessive pressure caused by external fire exposure or flashes within the tank. The excessive pressure caused by an external fire is generally because an adjacent tank is on fire or some other structure in close proximity is on fire. Flashes are generally caused by a chemical reaction in the tank.

Regardless of the cause of the excessive pressure, an opening larger than the normal pressure/vacuum valve is necessary in order to carry off the additional volume resulting from the fire exposure the tank is experiencing.

API 2000 states emergency venting may be accomplished by the use of:

1. Larger or additional open vents.
2. Larger or additional pressure/vacuum valves or pressure relief valves.
3. A gage hatch which permits the cover to lift under abnormal internal pressure.
4. A manhole cover which permits the cover to lift under abnormal internal pressure.
5. A connection between the roof and shell which is weaker than the weaker vertical joint in the shell or 1 shell to bottom connection (weak roof to shell weld).

Emergency vent cover is used on liquid storage tanks and other process vessels or systems to prevent structural damage due to excess internal pressure caused by fire or etc. Usually, storage tanks are pressurized when liquid is pumped in, compressing the existing vapor or when rising temperatures cause increased evaporation or expansion of existing vapor.

To prevent tank damage, vapor must be allowed out of the tank at specified pressure conditions. The volume rate of venting depends upon the tank size, volatility of the tank contents, the pumping rates and the temperature.

EMERGENCY PRESSURE/VACUUM VENT COVER OPERATION

When excessive pressure builds within the storage tank the model WE30 Emergency Pressure Relief Vent hinged cover begins to open at the predetermined set pressure, relieving excess pressure. When the overpressure has dissipated the cover reseats onto the base. The hinge mechanism prevents misalignment and provides an accurate reseat.

When excessive vacuum builds within the storage tank the spring loaded pallet lifts, breaking the seal between the seat and pallet, allowing vapors to pass through the valve orifice and relieving the vacuum buildup. The vacuum valve reseals upon relief and remains sealed.

EMERGENCY PRESSURE VENT COVER (MODEL WE30, WE33)

- Pressure Setting

: 50mm H₂O to 10,000mm H₂O

- Size

: 16" through 24"

- Available in

Aluminum, Carbon Steel, Stainless Steel.

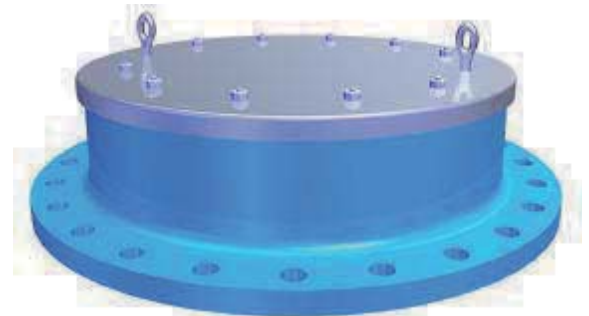
- Other size and material to be consulted by factory.

◆ DESIGN AND FUNCTION

Model WE30, WE33 is designed to protect the tank against rupture or explosion that could result from excessive internal pressures caused by fire etc.

Model WE30, WE33 is designed to provide emergency relief capacity beyond that furnished by the normal operating pressure relief valve on the storage tank.

The feature of Model WE30, WE33 is that the pressure relief cover is designed to lift only far enough to flow its rated capacity should high tank pressure be encountered then reseal automatically when the tank pressure is reduced.



MODEL : WE30A



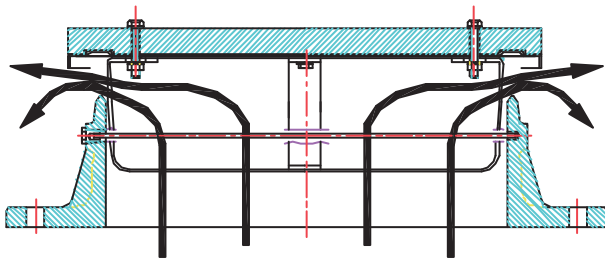
MODEL : WE30B

Model No.	Type	STD. Setting
WE30A	Weight Loaded release to ATM	Bellow 700 mmH2O
WE30B	Spring Loaded to ATM	Above 700 mmH2O
WE33A	Weight Loaded release to ATM	Bellow 700 mmH2O

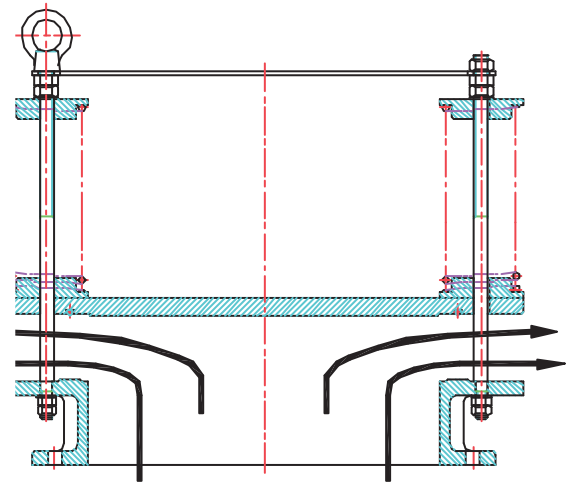
Note) Other specification to be consult by factory.

Pressure Relief

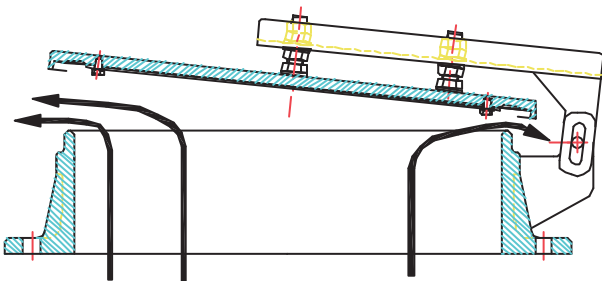
: As the pressure in the storage tank increases, when the set pressure is reached, the pressure pallet lifts and relieves to atmosphere.



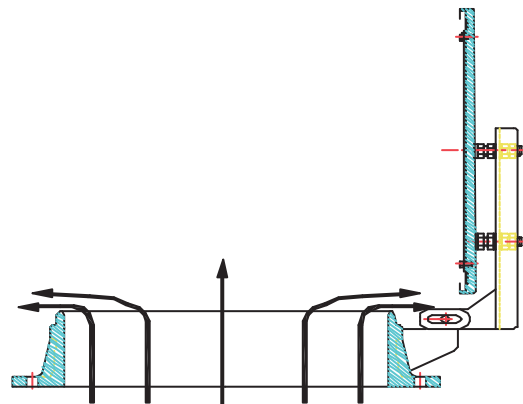
WE30A



WE30B

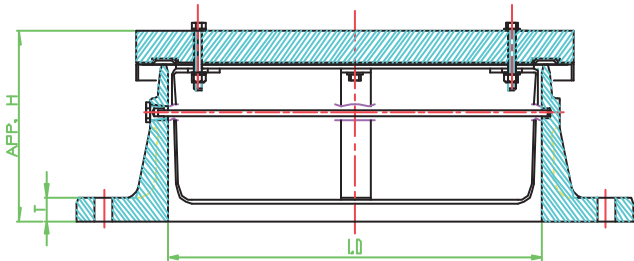


WE33A



◆ DRAWING AND DIMENSION

MODEL WE30A

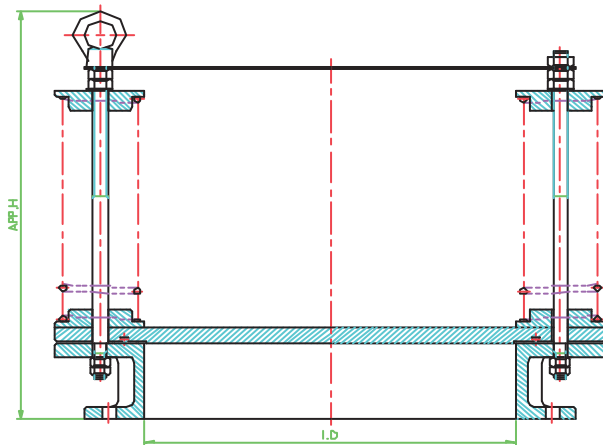


DIMENSION TABLE

UNIT : mm

SIZE	I.D	T	H
16"	400	20	155
20"	500	20	180
24"	600	20	200

MODEL WE30B

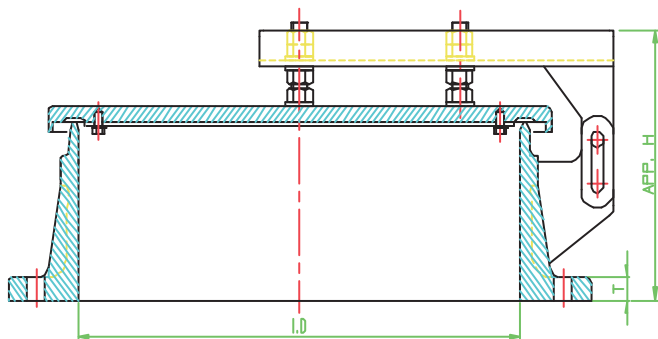


DIMENSION TABLE

UNIT : mm

SIZE	I.D	T	D	H
16"	400	20	640	610
20"	500	20	740	650
24"	600	20	840	650

MODEL WE33A



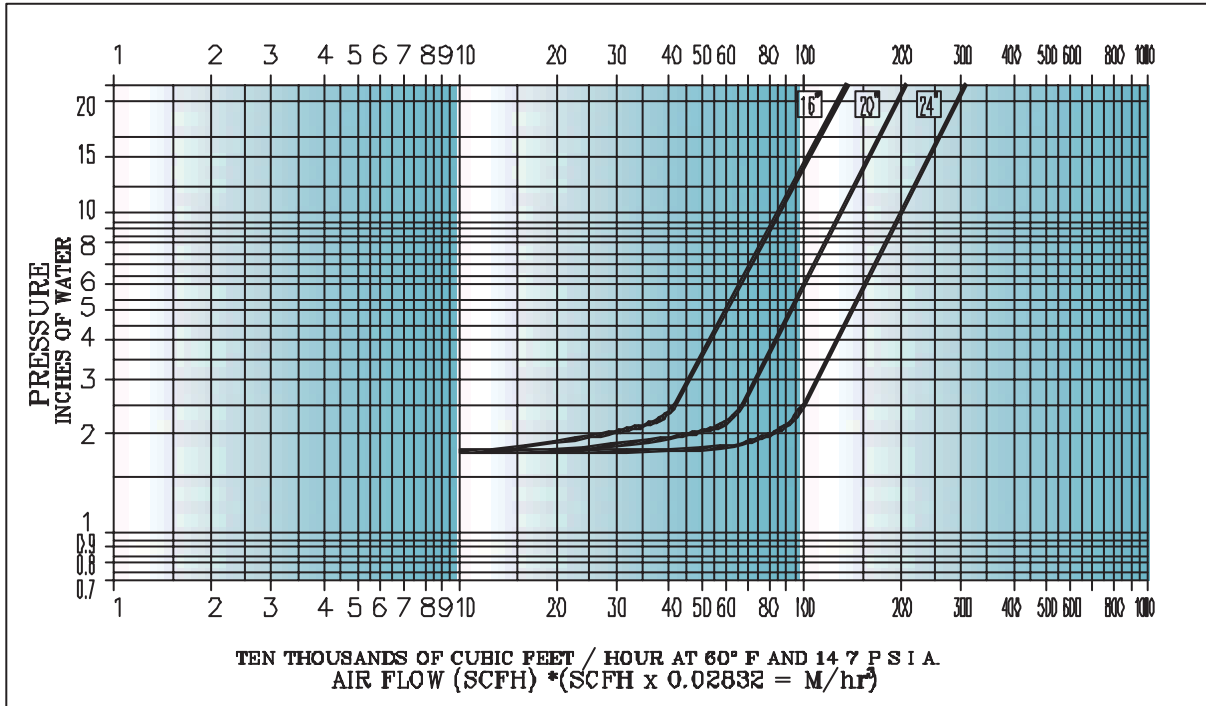
DIMENSION TABLE

UNIT : mm

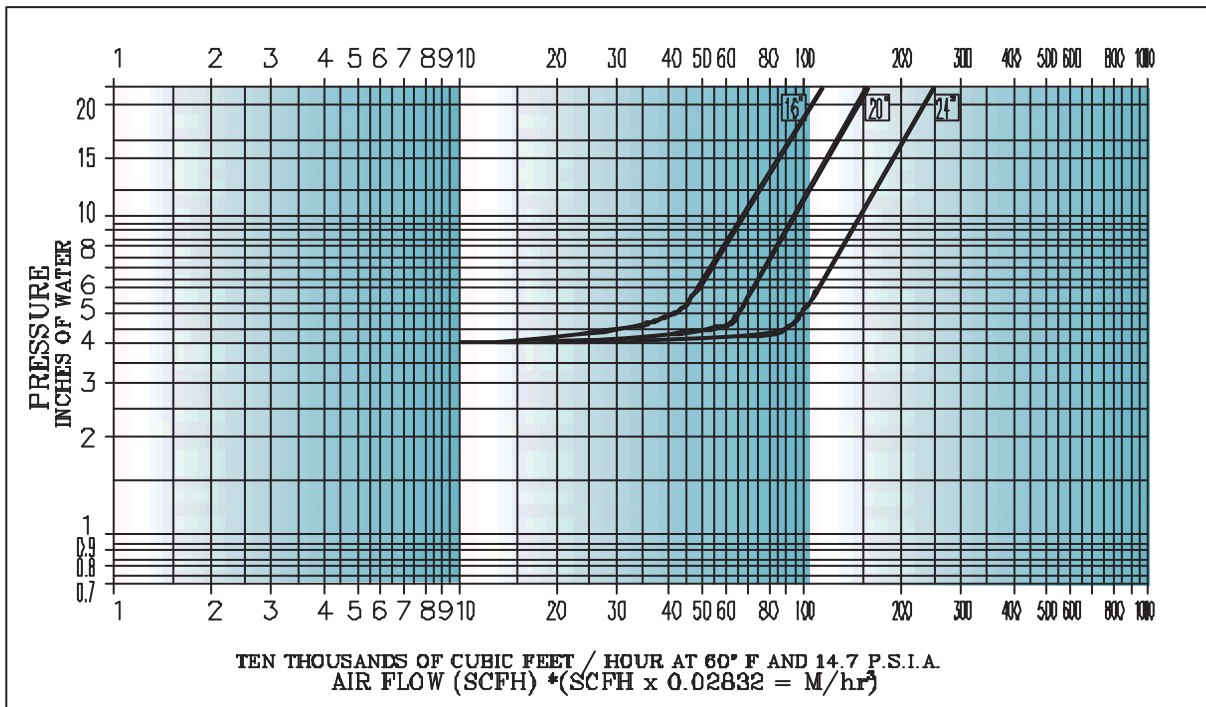
SIZE	I.D	T	H
16"	400	20	200
20"	500	20	250
24"	600	20	270

◆ **FLOW CAPACITY**

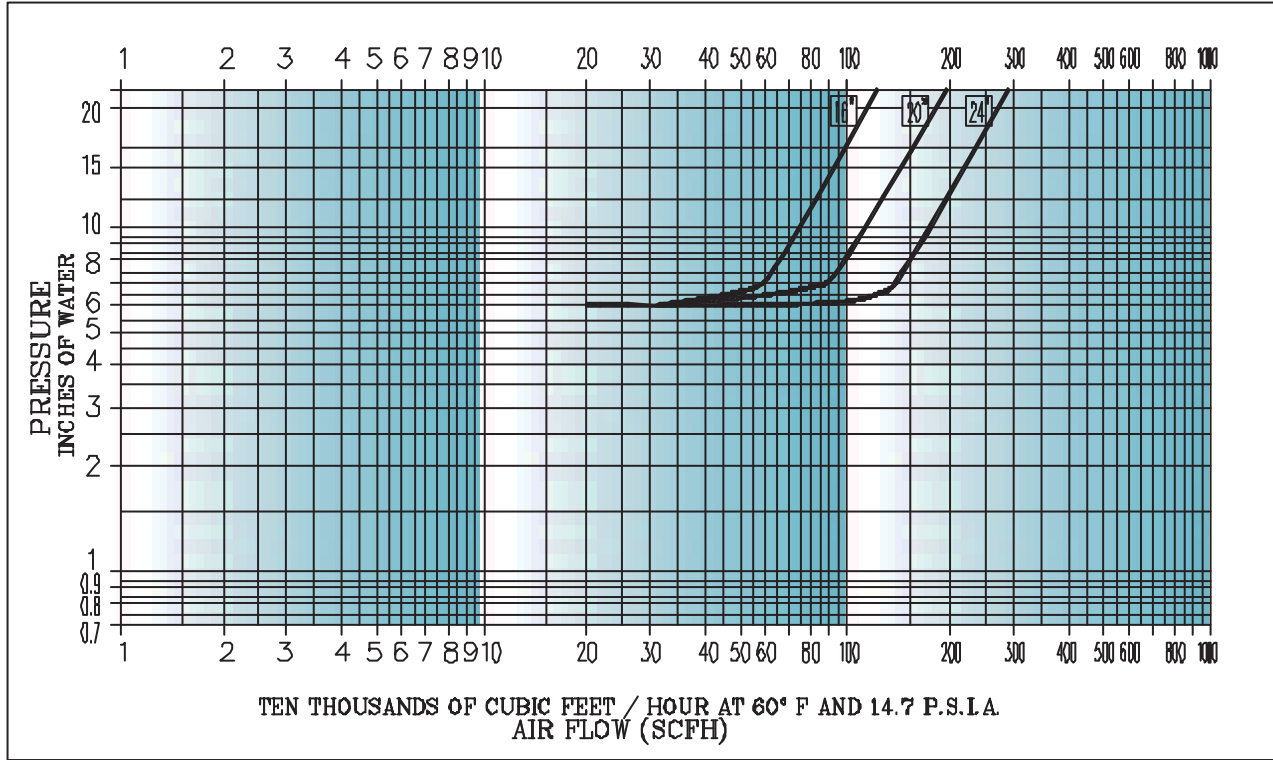
**WE33A SERIES EMERGENCY VENT COVER
SET AT 1.73 INCHES OF WATER**



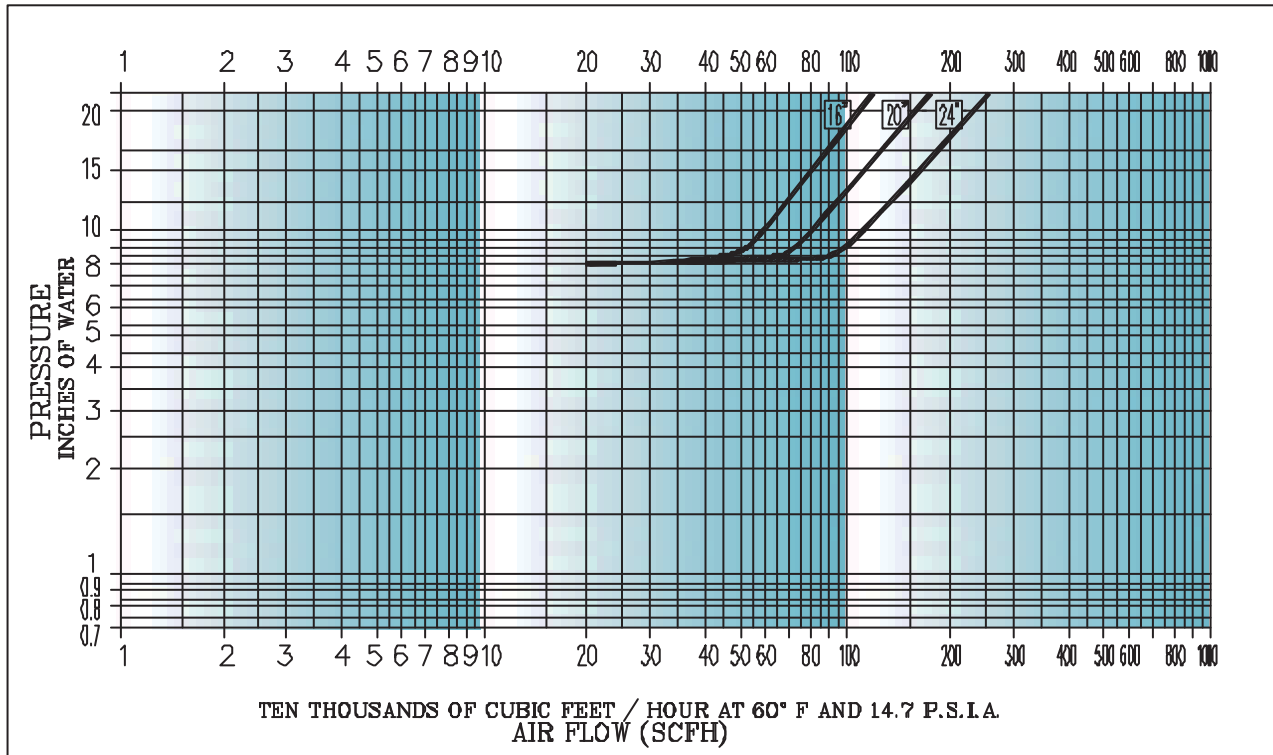
SET AT 4 INCHES OF WATER



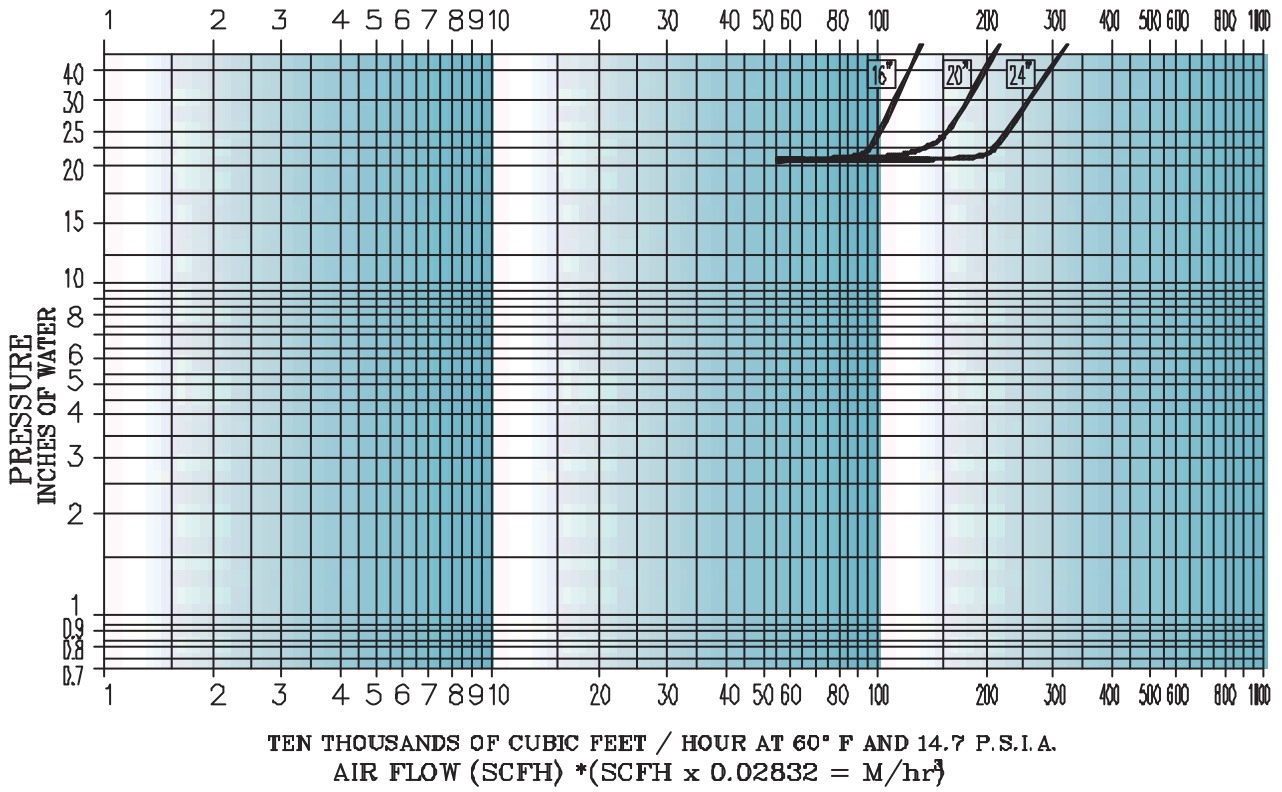
WE33A SERIES EMERGENCY VENT COVER
SET AT 6 INCHES OF WATER



SET AT 8 INCHES OF WATER



**WE33A SERIES EMERGENCY VENT COVER
SET AT 21 INCHES OF WATER**



EMERGENCY PRESSURE VACUUM VENT COVER (MODEL WE31)

- Pressure Setting

: 50mm H₂O to 10,000mm H₂O

- Size

: 16” through 24”

- Available in

Aluminum, Carbon Steel, Stainless Steel.

- Other size and material to be consulted by factory.



MODEL : WE31A

◆ DESIGN AND FUNCTION

Model WE31 is designed to protect the tank against rupture or explosion that could result from excessive internal pressures caused by fire etc.



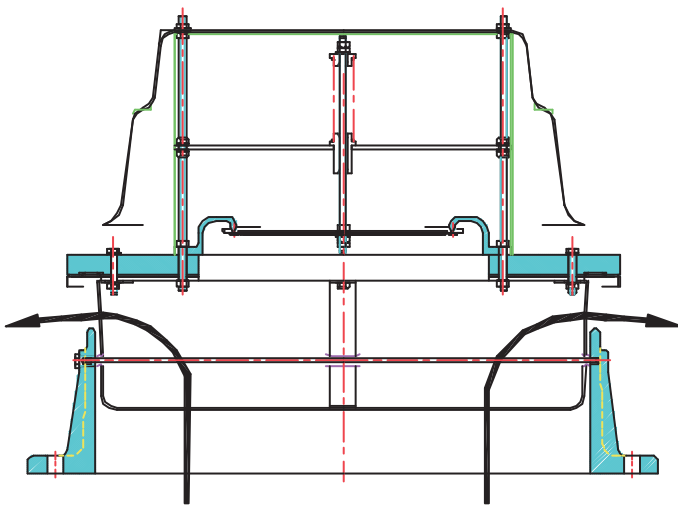
MODEL : WE31B

Model WE31 is designed to provide emergency relief capacity beyond that furnished by the normal operating pressure relief valve on the storage tank.

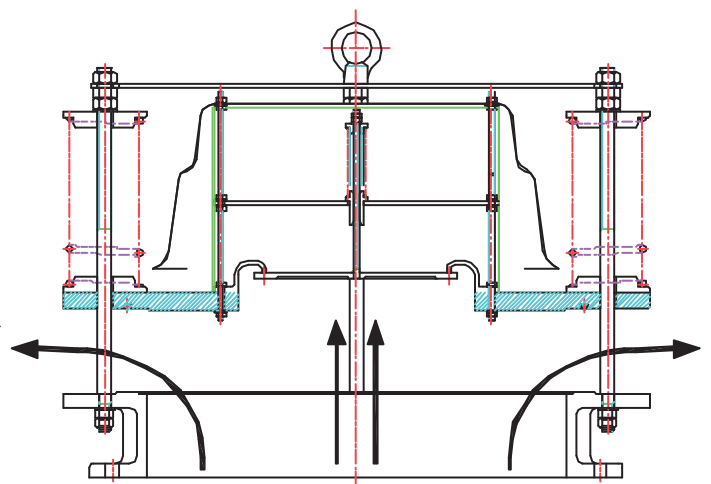
The feature of Model WE31 is that the pressure relief cover is designed to lift only far enough to flow its rated capacity should high tank pressure be encountered then reseal automatically when the tank pressure is reduced.

Model No.	Type	STD. Setting
WE31A	Weight Loaded release to ATM	Bellow 700 mmH ₂ O
WE31B	Spring Loaded to ATM	Above 700 mmH ₂ O

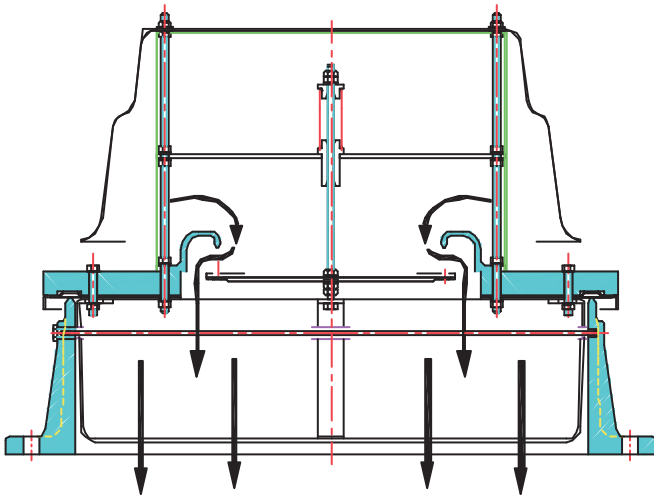
Note) Other specification to be consult by factory.



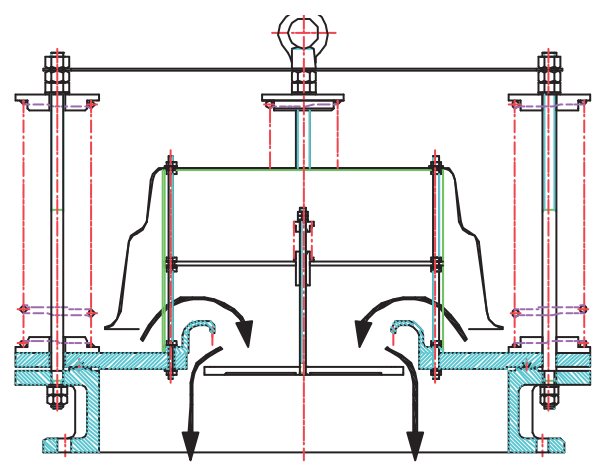
WE31A



WE31B



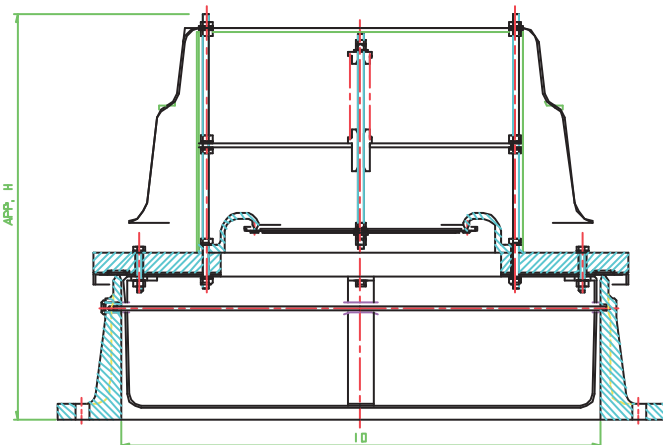
WE31A



WE31B

◆ **DRAWING AND DIMENSION**

MODEL WE31A

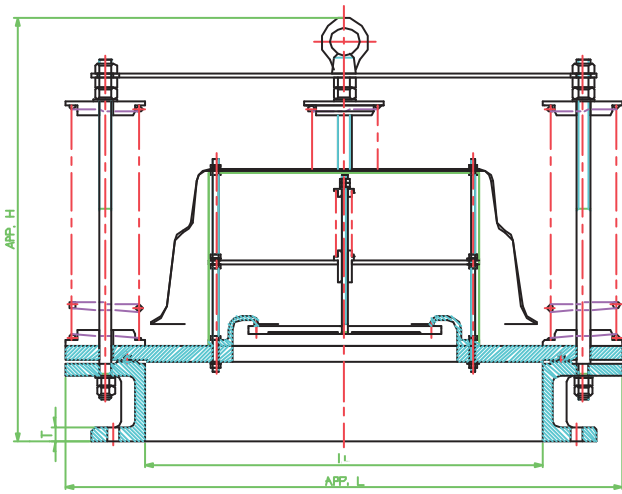


DIMENSION TABLE

UNIT : mm

SIZE	I.D	T	H
16"	400	20	155
20"	500	20	180
24"	600	20	200

MODEL WE31B



DIMENSION TABLE

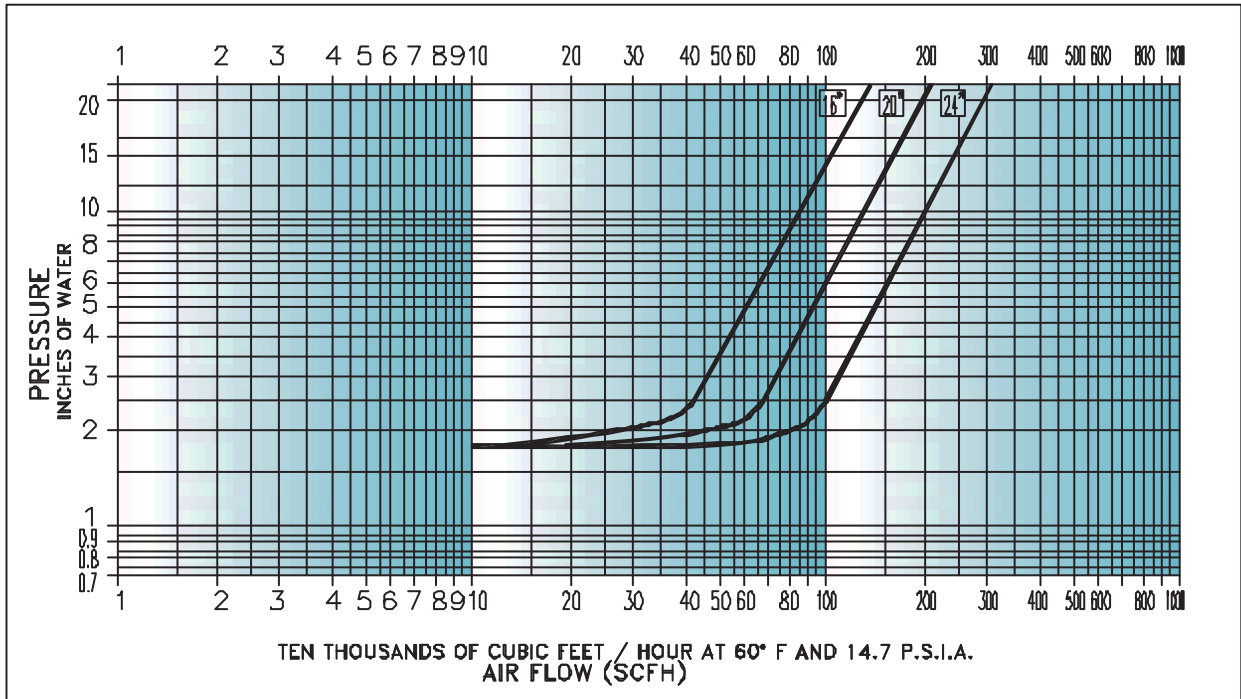
UNIT : mm

SIZE	I.D	T	H	L
16"	400	20	610	640
20"	500	20	650	740
24"	600	20	650	840

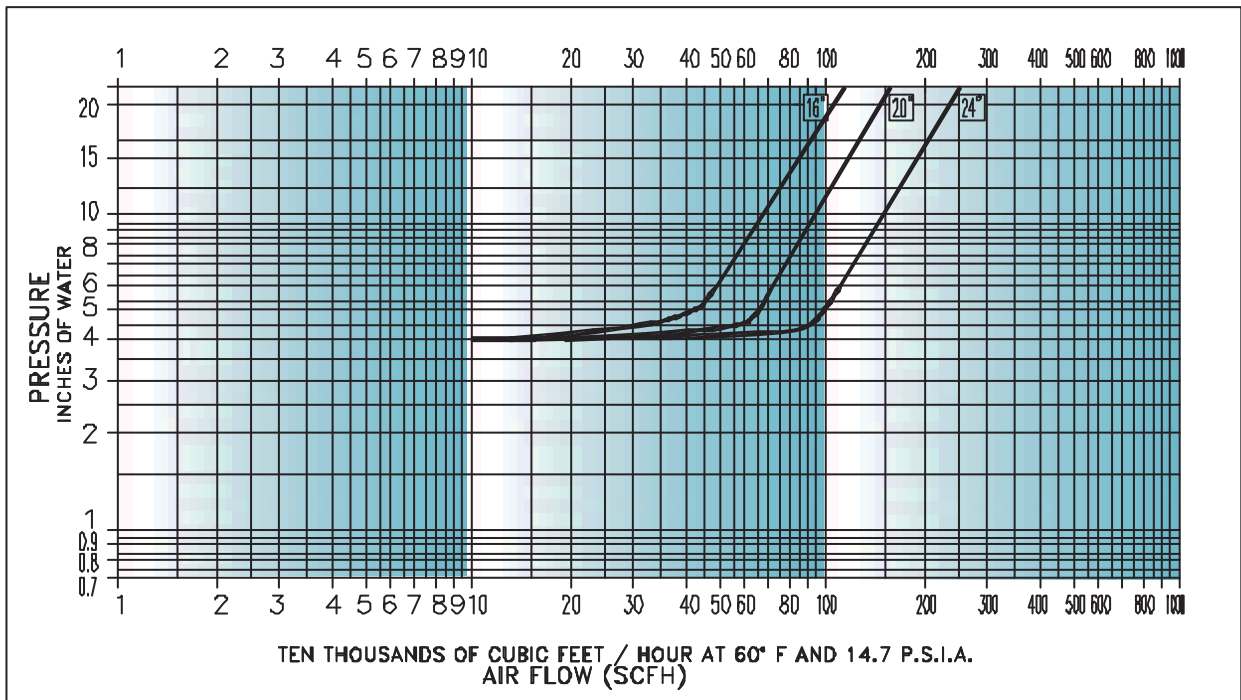
◆ **FLOW CAPACITY**

WE30A/31A SERIES EMERGENCY VENT COVER

SET AT 1.73 INCHES OF WATER

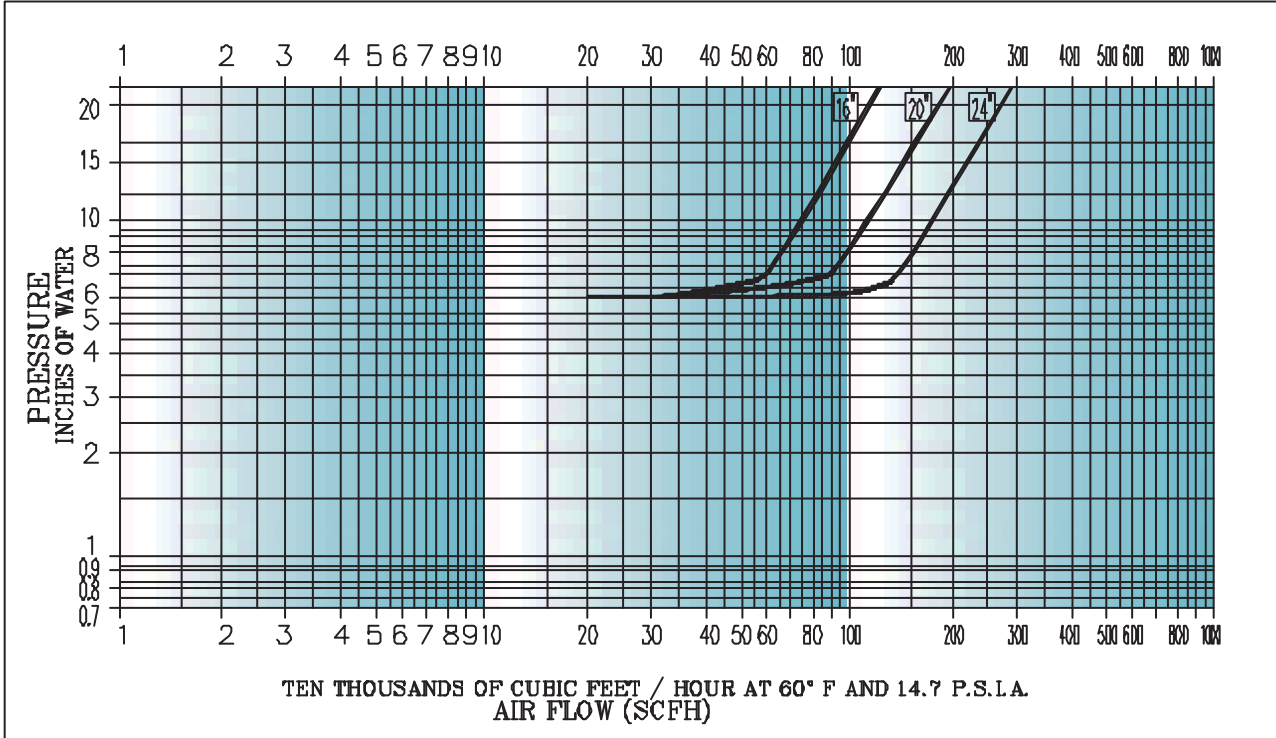


SET AT 4 INCHES OF WATER

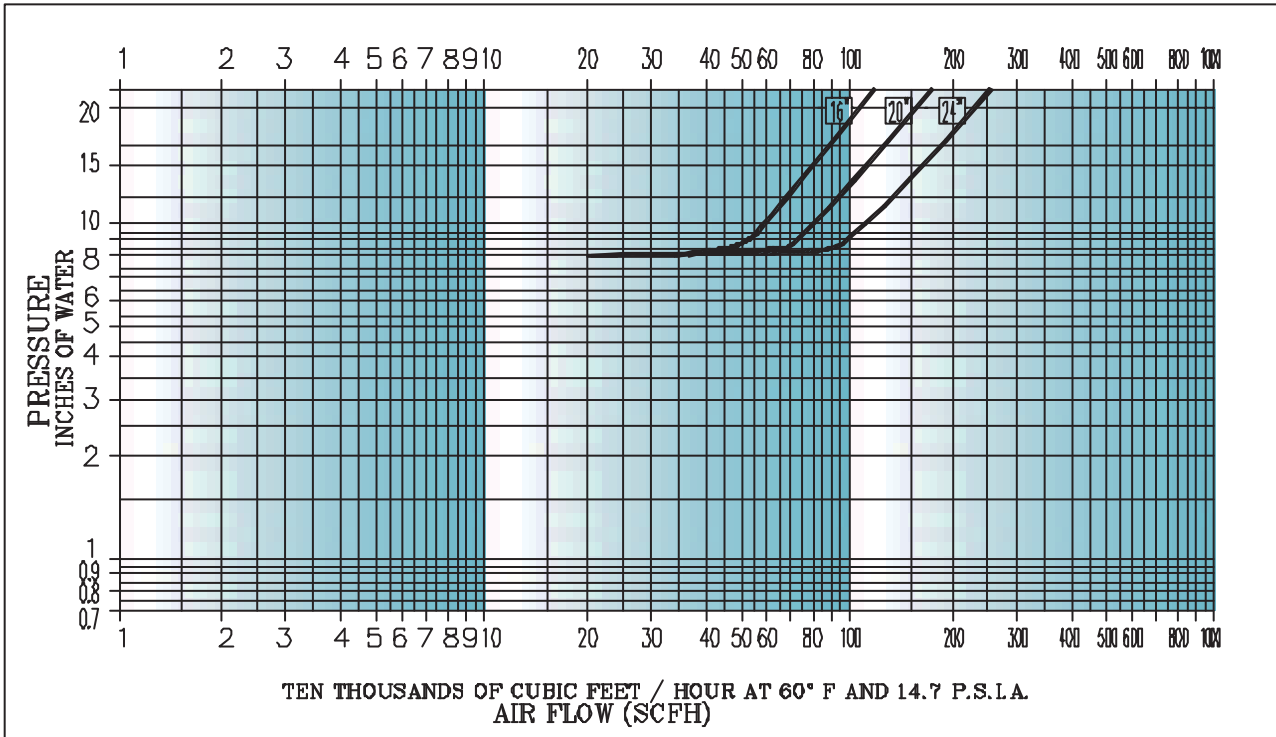


WE30A/31A SERIES EMERGENCY VENT COVER

SET AT 6 INCHES OF WATER

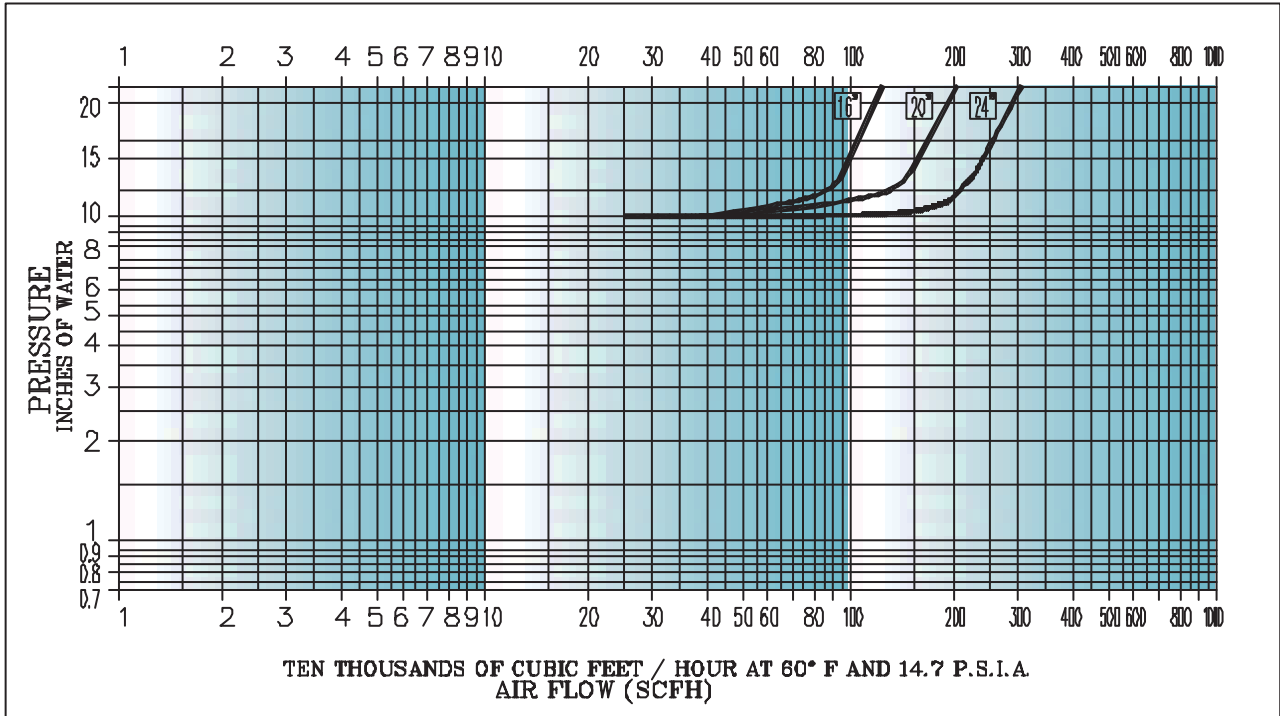


SET AT 8 INCHES OF WATER

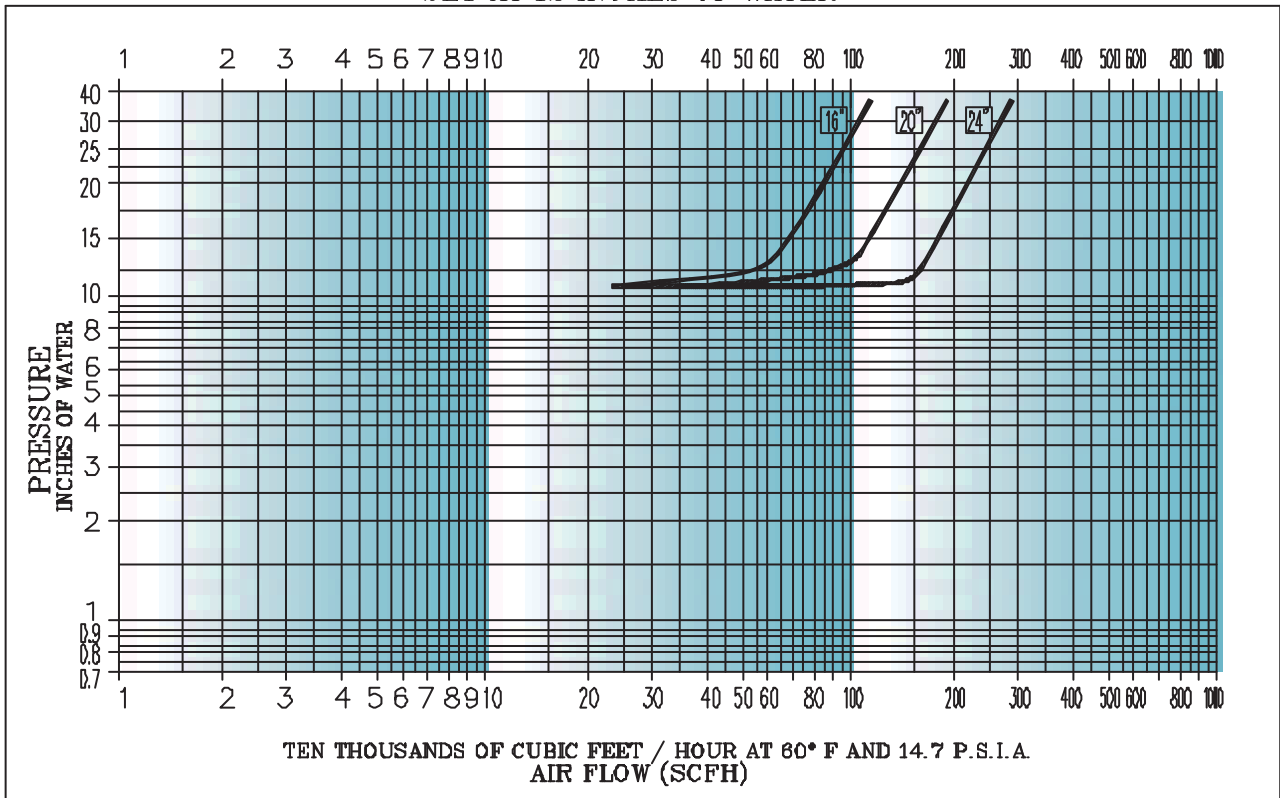


WE30A/31A SERIES EMERGENCY VENT COVER

SET AT 10 INCHES OF WATER

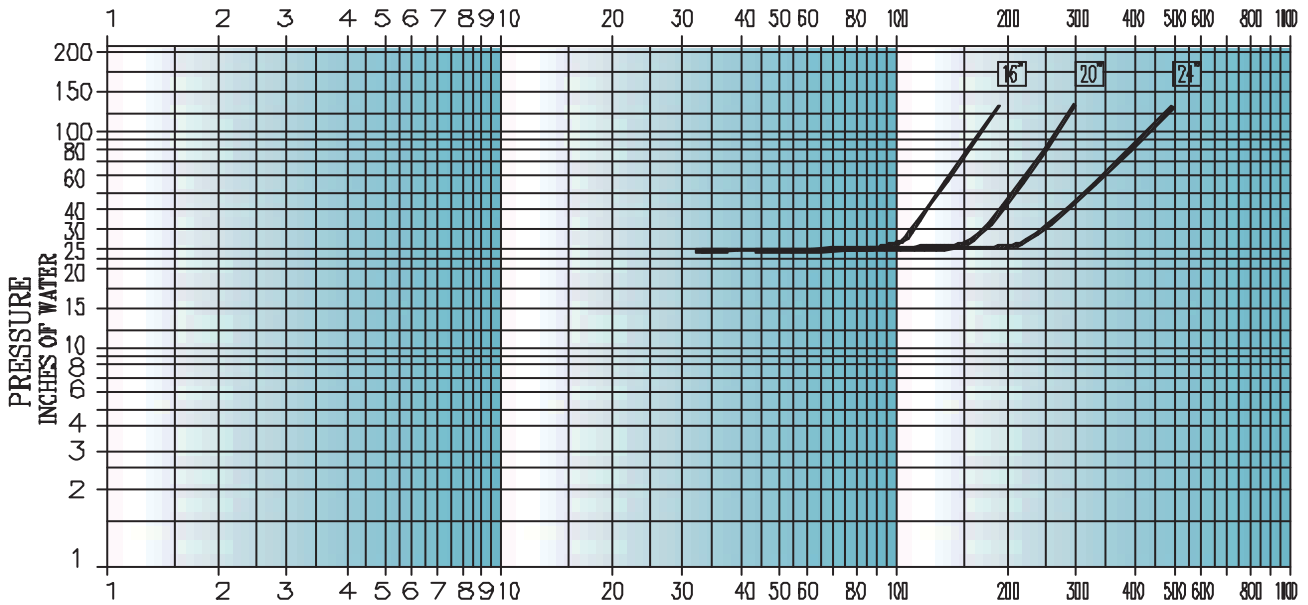


SET AT 12 INCHES OF WATER



WE30A/31A SERIES EMERGENCY VENT COVER

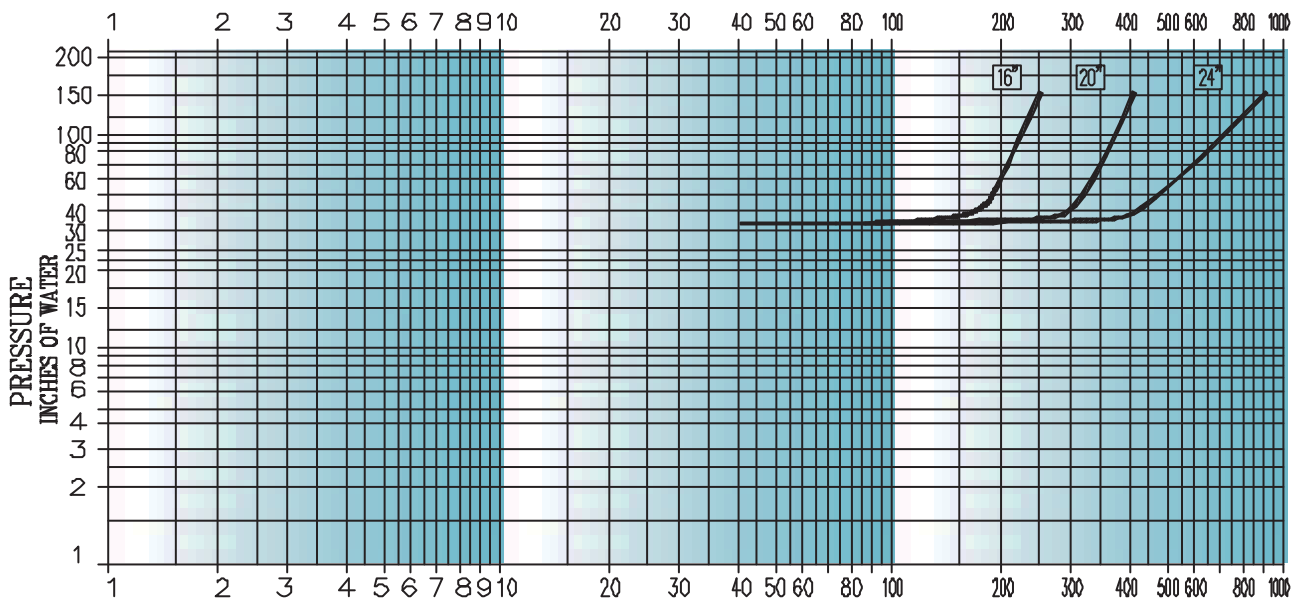
SET AT 24 INCHES OF WATER



TEN THOUSANDS OF CUBIC FEET / HOUR AT 60° F AND 14.7 P.S.I.A.
 AIR FLOW (SCFH) *(SCFH x 0.02832 = M³/hr)

WE30B/31B SERIES EMERGENCY VENT COVER

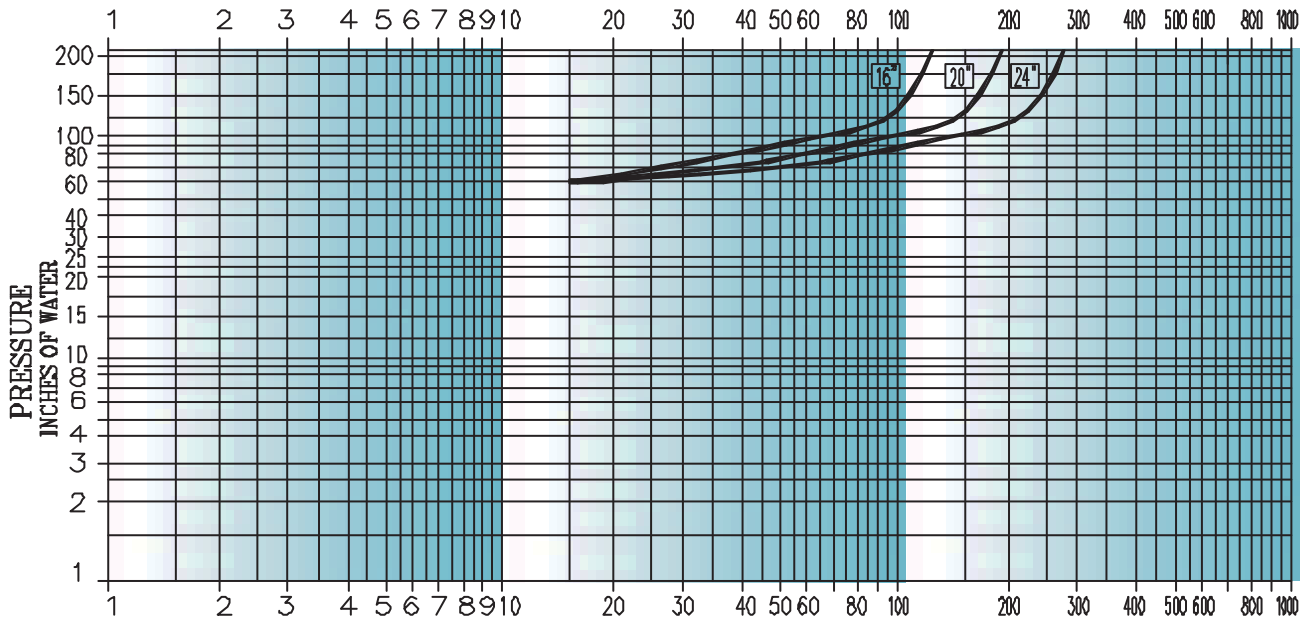
SET AT 33 INCHES OF WATER



TEN THOUSANDS OF CUBIC FEET / HOUR AT 60° F AND 14.7 P.S.I.A.
 AIR FLOW (SCFH) *(SCFH x 0.02832 = M³/hr)

WE30B/31B SERIES EMERGENCY VENT COVER

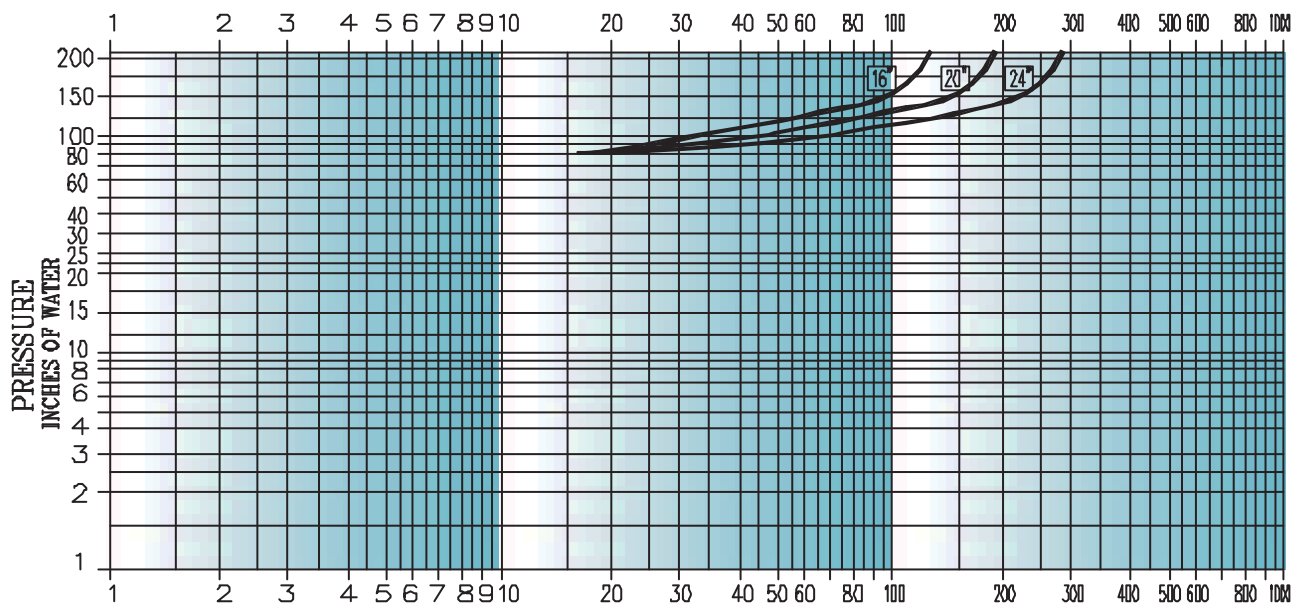
SET AT 60 INCHES OF WATER



TEN THOUSANDS OF CUBIC FEET / HOUR AT 60° F AND 14.7 P.S.I.A.
 AIR FLOW (SCFH) *(SCFH x 0.02832 = M³/hr)

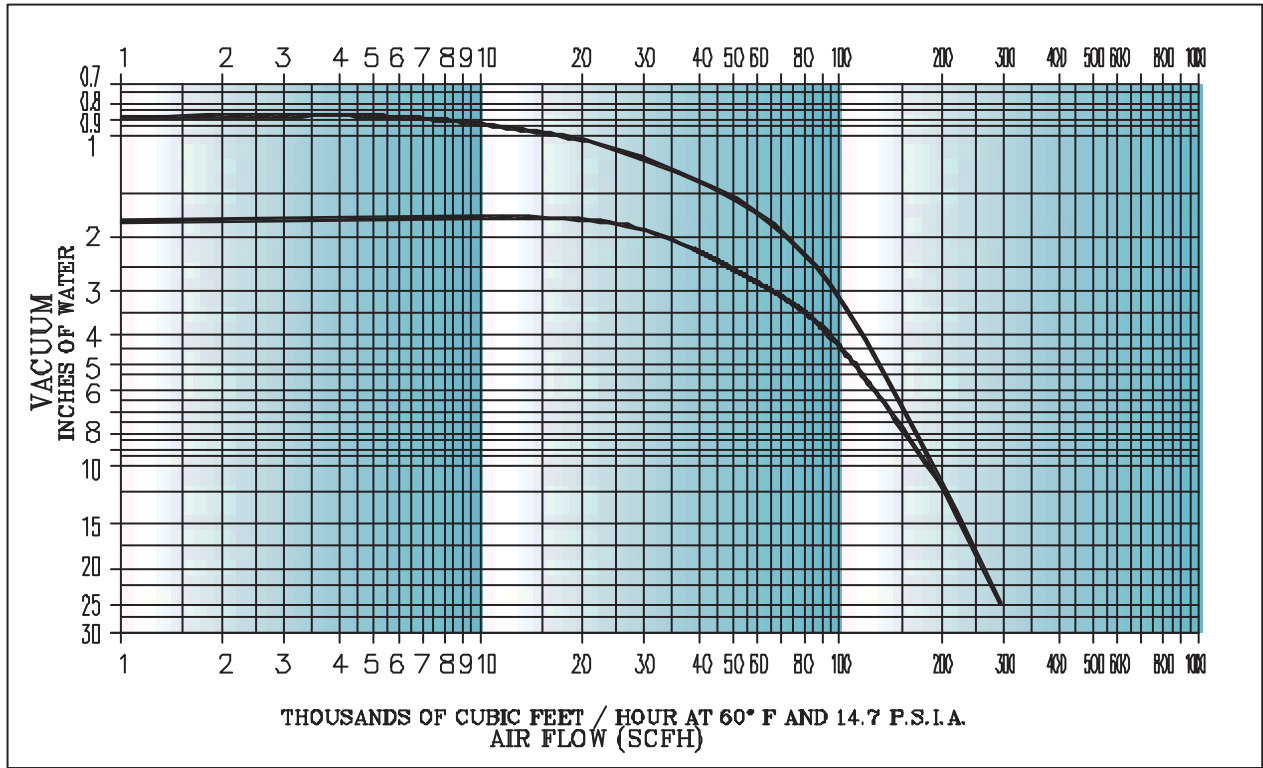
WE30B/31B SERIES EMERGENCY VENT COVER

SET AT 80 INCHES OF WATER

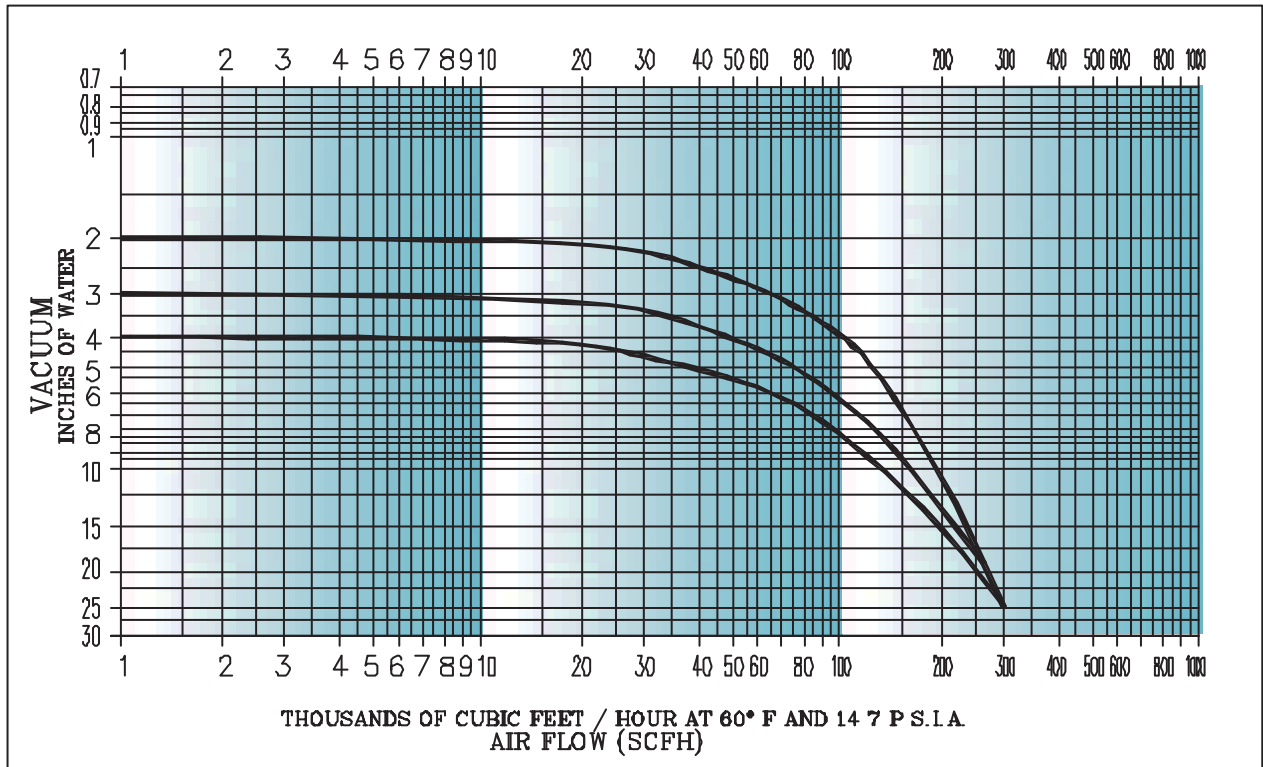


TEN THOUSANDS OF CUBIC FEET / HOUR AT 60° F AND 14.7 P.S.I.A.
 AIR FLOW (SCFH) *(SCFH x 0.02832 = M³/hr)

WE31A SERIES RELIEF VALVES
SET AT 0.87, 1.73 INCHES OF WATER



SET AT 2, 3, 4 INCHES OF WATER



EXPLOSION VENTING SYSTEM (MODEL WE32)

- Venting bursting pressure verified by destructive testing bench 10t manufacture.
- Wide range of vent types are available to meet user specification application.



MODEL : WE32A

◆ INTRODUCTION

Explosion Venting System is used where ever ignitable dust materials are stored (Silos, Bunkers etc.) or dust collectors conveyed.

In case of an Explosion, the pressure or vented and the vessel or the collector housing protected from adverse effects. An explosion can be defined as a seemingly instantaneous release of energy resulting the bursting or rupture of a building, container or process vessel, created by the development of internal pressure.



MODEL : WE32B

Explosion venting provides over pressure protection from industrial explosion hazards by providing a planned pathway for the expanding gases to escape.

Explosion venting is acceptable when the equipment to be protected is located outdoors or near an out side wall.

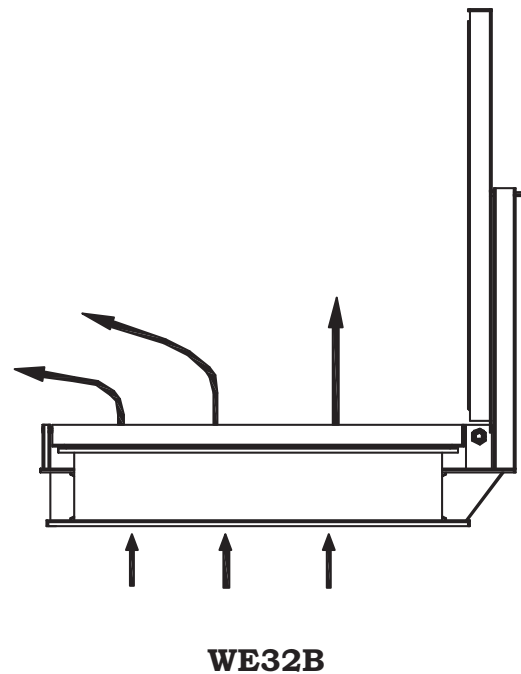
The vent opening must be sited to allow the expanding gases to be vented at a rapid rate so as to limit the internal development of pressure.

◆ **DESIGN AND FUNCTION**

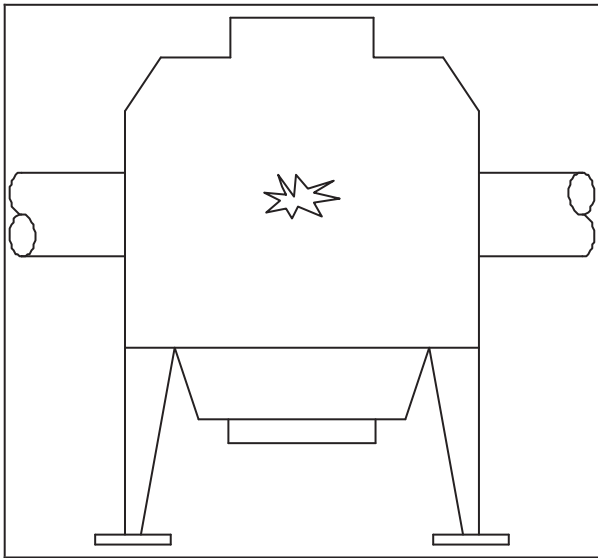
Model No.	Type	STD. Setting
WE32A	Rupture Disc Type	150 ~ 700 mmH ₂ O
WE32B	Door with Share Pin Type	100 ~ 10,000 mmH ₂ O

Note) Other specification to be consult by factory.

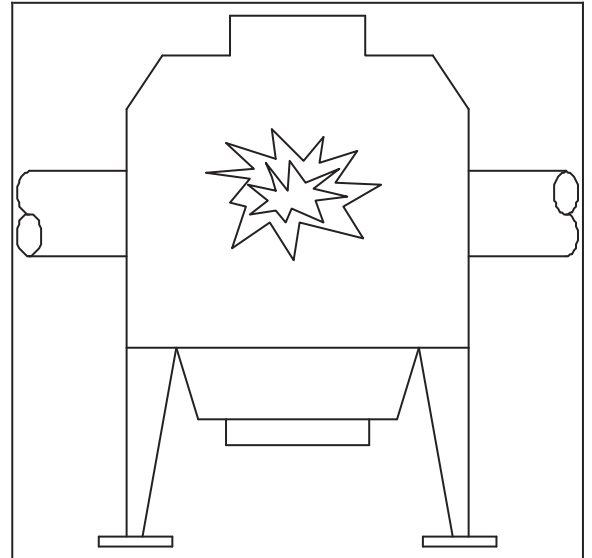
Vent bursting pressure verified by destructive testing of each lot manufactured. Wide range of vent types available to meet user specific application. Explosion venting provides over pressure protection from industrial explosion hazards by providing a planned pathway for the expanding gases to escape. Explosion venting is acceptable when the equipment to be protected is located outdoors or near an outside wall. The vent opening must be sited to allow the expanding gases to be vented at a rapid rate so as to limit the internal development of pressure.



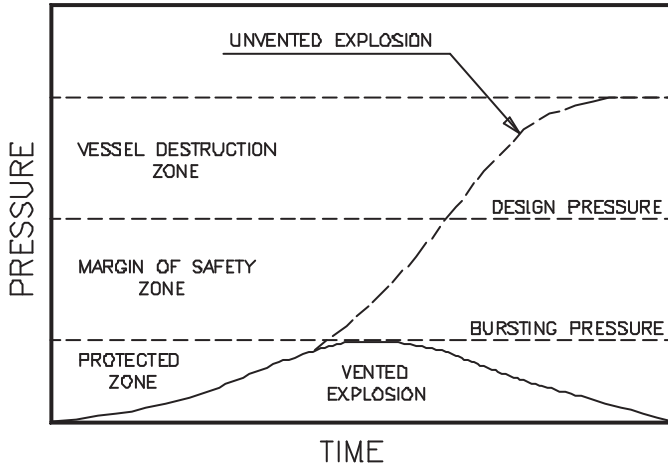
◆ **SCHEMATIC OF EXPLOSION VENTING PROCESS**



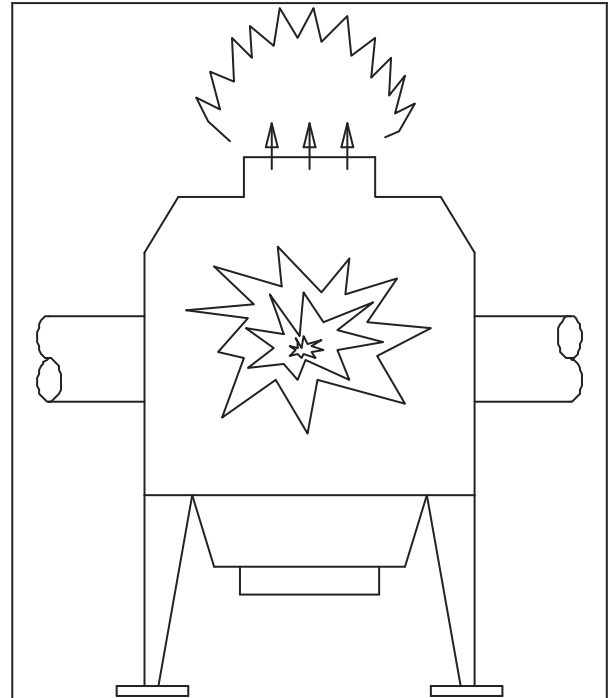
1. Ignition growth of fireball and pressure wave



2. Fireball and pressure wave expand.
(Pressure reaches enclosure walls and initiates opening of vent)



COMPARATIVE GRAPH



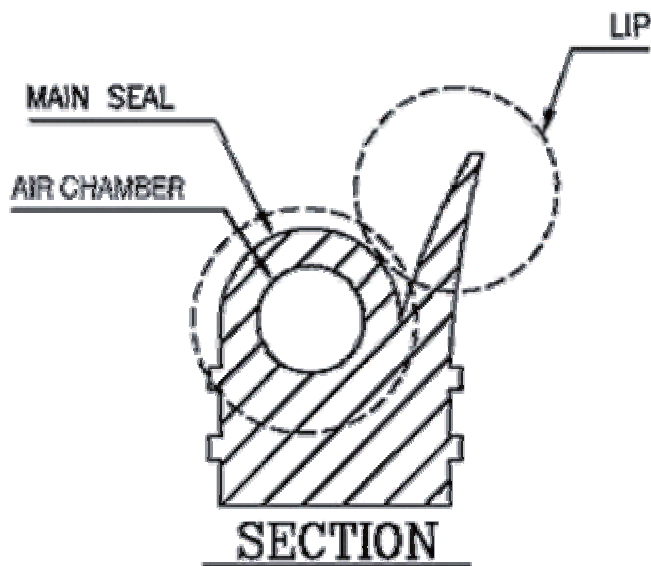
3. Explosion vent reaches full opening.
Flame and overpressure escape through opening.

◆ SEALING GASKET MANUAL FOR EXPLOSION HATCH

1) Seal selection criteria and considering points

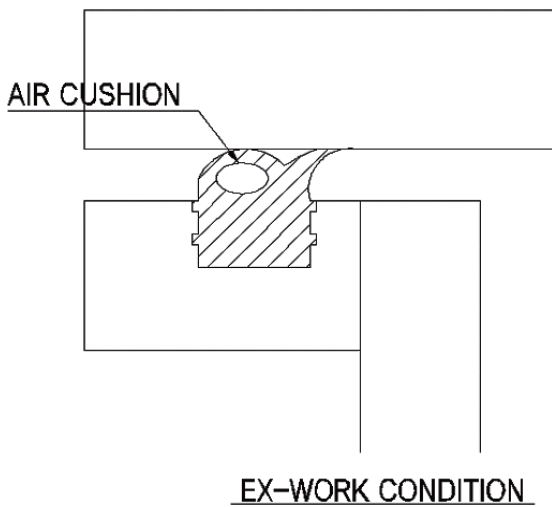
- Resistance to corrosion
- No leakage in the operating pressure
- Stability and elasticity
- The size of explosion hatch is big but the setting pressure is low.
- It is not possible to prevent leak if market product seal O-Ring is used as the set pressure is low compared with the weight of explosive cover.

2) Share and role of seal



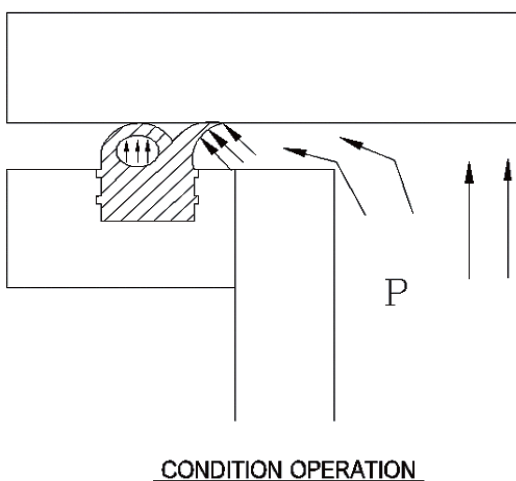
- As shown in the section of the above sketch, seal is composed of main seal, lip and air chamber.
- Lip has good elasticity and excellent to prevent leak at low pressure and main seal has air chamber inside and quickly takes actions against pressure change.
- Like this, seal prevents leak twice at lip and main seal.

3) Change depending on the load and internal pressure of seal.



- The left figure shows the condition at ex-work or when pressure is not applied. By the weight of explosion cover, lip and main seal is closely contacted.

- As the structure of air chamber and lip has very excellent elasticity and stability, they closely contact to the explosion cover even with light weight.



- The main seal and lip which is compressed by the weight of cover returns to its original conditions when the internal pressure increases during operation.

- Main Seal: Air cushion phenomena by air chamber.

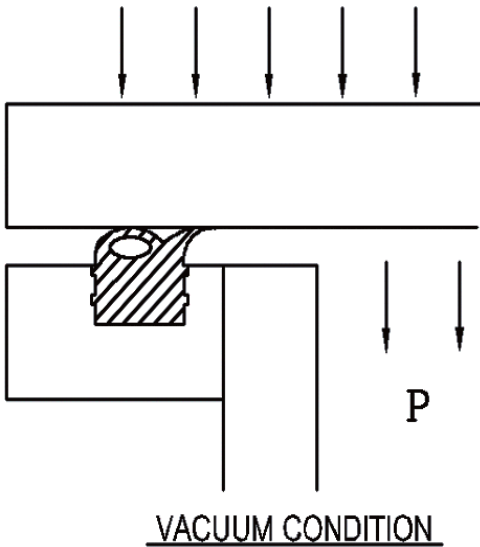
- Lip: Operation of material elasticity and internal pressure.

- It maintains no leak conditions by the elasticity of lip in working pressure.

- It prevents leak at lip and main seal until internal pressure reaches to set pressure.

4) Change by the vacuum of seal

$W(\text{CROSS SECTION AREA} \times P)$

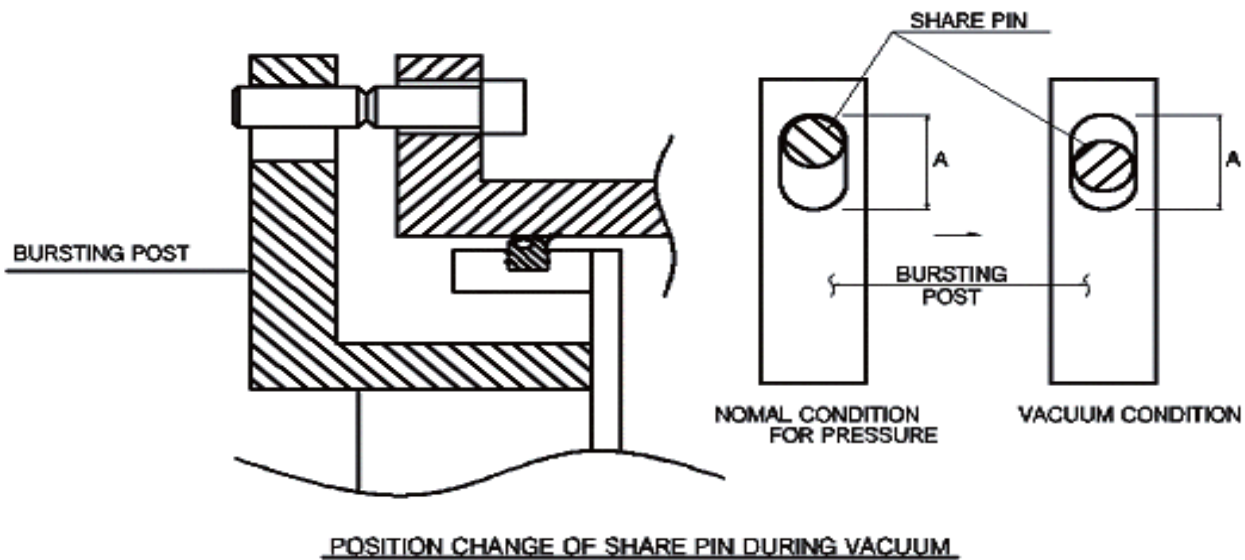


- The left and below figures depict the change of seal and bursting post and share pin during vacuum.

- As it is no leak condition under working pressure, when vacuum phenomena occurs inside of the unit, the vapor gas inside the unit outbreaths and outside air does not flow in. Therefore seal changes as the following phenomena.

- Change of cover weight in vacuum.
 = COVER WEIGHT + VACUUM PRESSURE

The total weight applied to cover when vacuum pressure generates inside the unit.

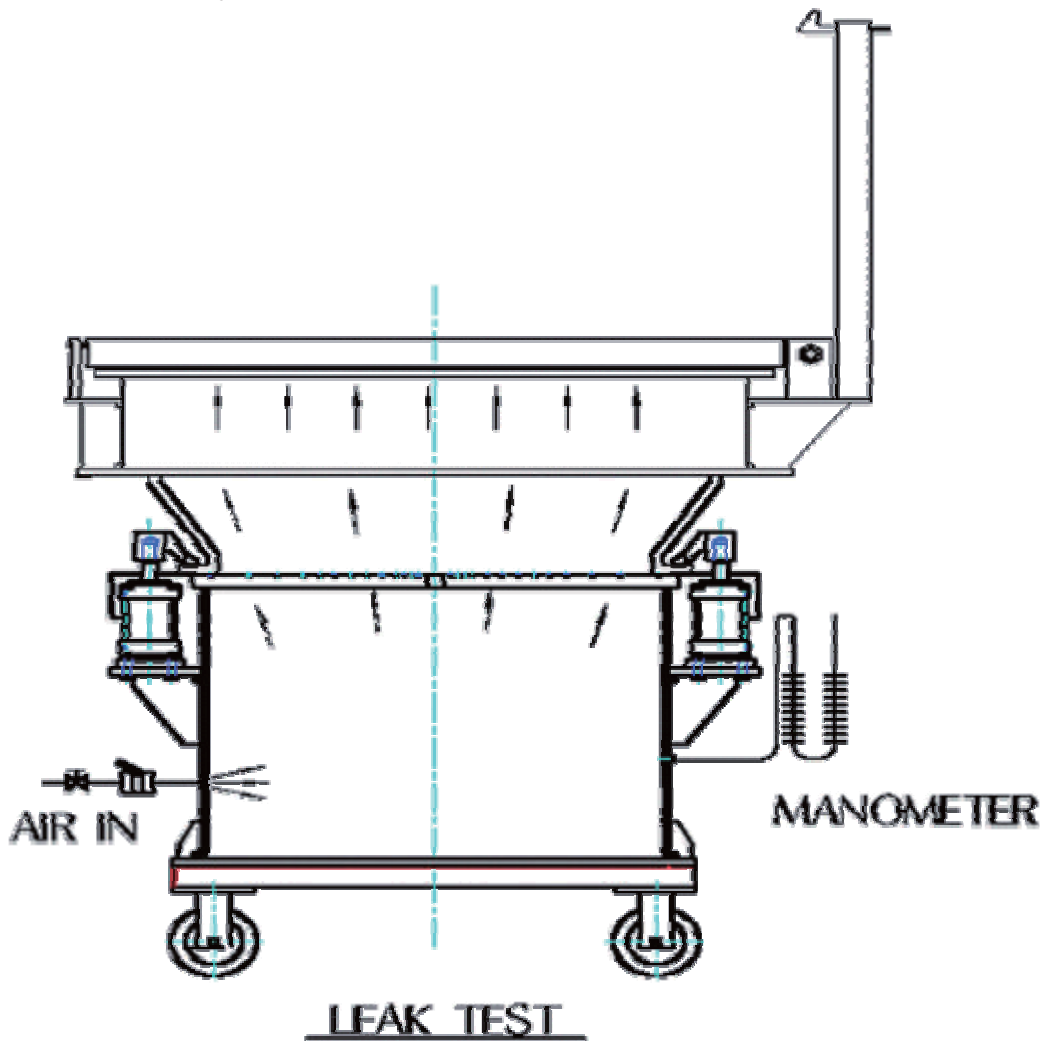


- Share pin moves downward in vacuum condition and there is a slot hole "A" which is bigger than the cover clearance, the share pin does not burst when the unit becomes vacuum.

∴ CONCLUSION

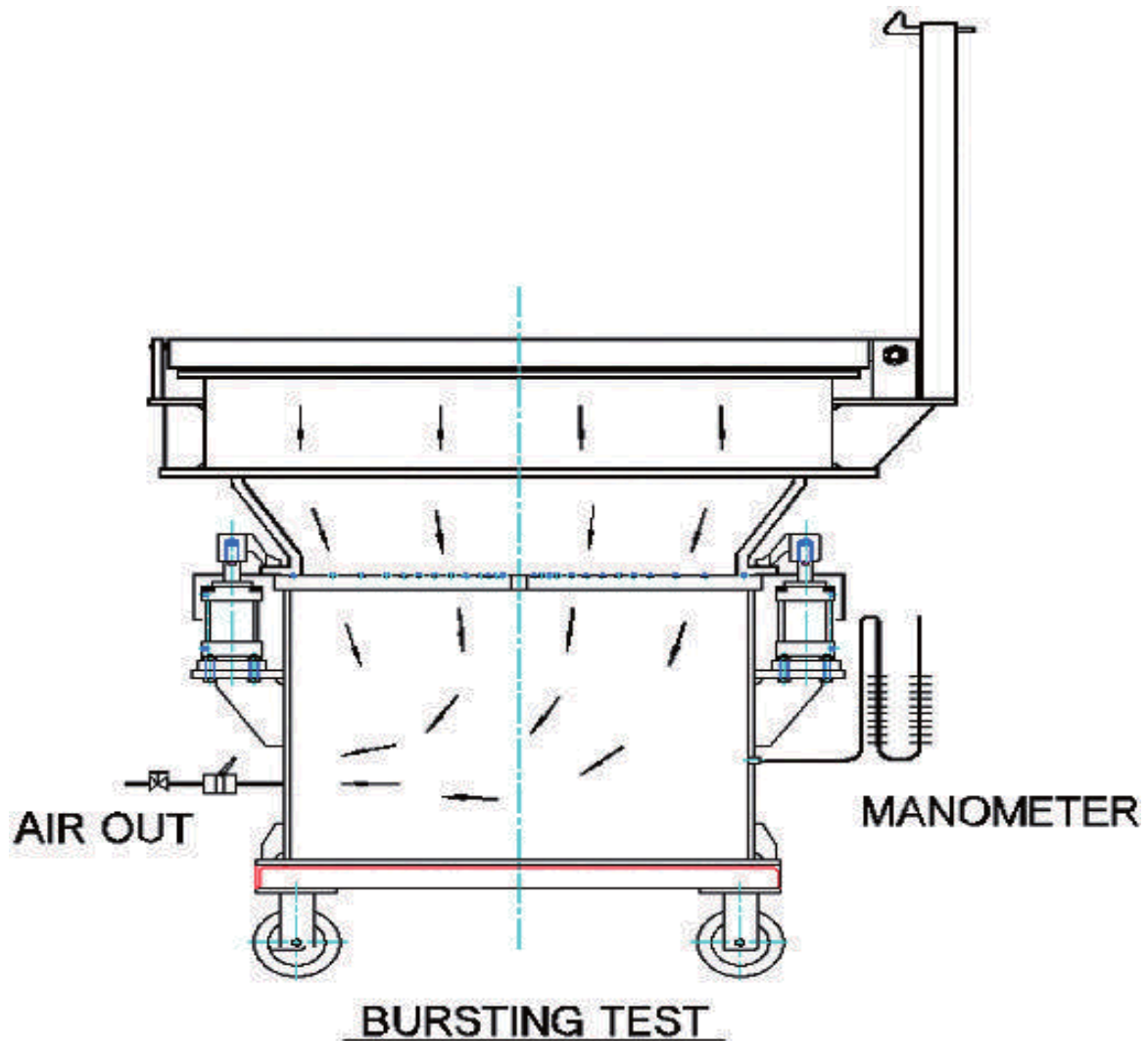
- The seal more closely contacts to cover as the total weight applied to cover in vacuum condition increases and there no intrusion of outside air.
- The slot hole in the bursting post prevents the share pin from bursting in vacuum condition.

5) Sealing inspection by leak test



- Object: Leak check on the explosion hatch seal.
- Leak inspection method: Install product on the test bench and make it horizontal with U-Manometer and gradually increase the pressure on the test bench and maintain the basic pressure of manometer at 90% of the set pressure and hold it for 10minutes and check leakage.

6) No bursting inspection of share pin by vacuum test



- Object: No bursting inspection of share pin in vacuum condition.

- Inspection method

Test Preparation: Outbreath the air by vacuum pump from the test facility which is installed for setting pressure test and maintain the vacuum at $-5\text{mmH}_2\text{O}$ as basic pressure by manometer and hold it for 10 minutes and visually check the bursting of share pin.

◆ INSTALLATION

DO NOT attempt to remove the Explosion Venting System from the tank or process vessel without bleeding all pressure from the system, first.

Alternative means of pressure relief must be provided when the Explosion Venting System is out of order.

1. Inspect the gasket-seating surface of the tank nozzle flange. It must be clean, free of scratches, corrosion, tool marks, and flat
2. Inspect the gasket; make sure that the material is suitable for the application.
3. Lubricate all studs and nuts with an appropriate thread lubricant. If the valve shall see high temperature service or stainless steel fasteners are used, apply an anti-seize compound such as moly-disulfide.
4. Center the gasket within the bolt circle.
5. Set the valve carefully on the nozzle. Install the studs and tighten nuts hand tight.
6. Make sure that the flanges are not distorted and the gasket is evenly compressed.
7. Make up the final tightening and check that no further nut rotation occurs.

◆ INSPECTION

The Explosion Venting System is carefully packaged to prevent damage or contamination during shipping. Inspect all equipment when it is received: report any damage to the carrier immediately. The Explosion Venting System should be protected during handling and storage. Keep all the ports plugged to prevent intrusion of foreign materials. Before installation, inspect the unit for indications of physical damage or internal contamination. If these are observed, the valve must be disassembled, cleaned and repaired before installation.

◆ MAINTENANCE

We recommend that all service performed on the Explosion Venting System be done at the factory. Trained mechanics with specialized test equipment will ensure that the valve is accurately set. It is important to regularly inspect the shear pin and toggle clamp not to be loosened.

When Explosion Venting System is once opened and vents the gases, it should be checked wholly and the used shear pins should be changed for new.

N2 BLANKETING SYSTEM (MODEL WNB WNRS, WNBSL)

- Pressure Settings

:Min 20mm W.C to 7,000mm W.C.(10 Psig)

- Size

: 1/4" through 2"

- Available in

: Stainless Steel, Aluminum, Carbon Steel

- Other size and material to be consulted by factory.

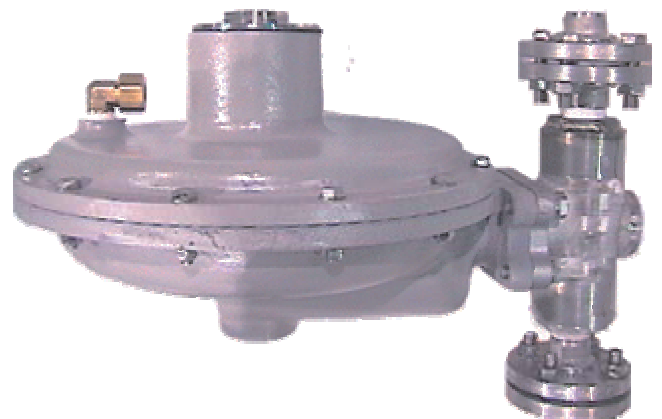


◆ INTRODUCTION

The MODEL WNB series blanket gas valves ensure that a constant gas pressure is maintained in the vapor space of storage tank. When liquid is removed from a tank or the temperature is reduced, a vacuum would be developed.

With the blanket gas regulator, a blanket gas is supplied to prevent any vacuum from developing and to maintain the desired blanket pressure.

MODEL : WNBS



MODEL : WNRS

◆ DESIGN AND FUNCTION

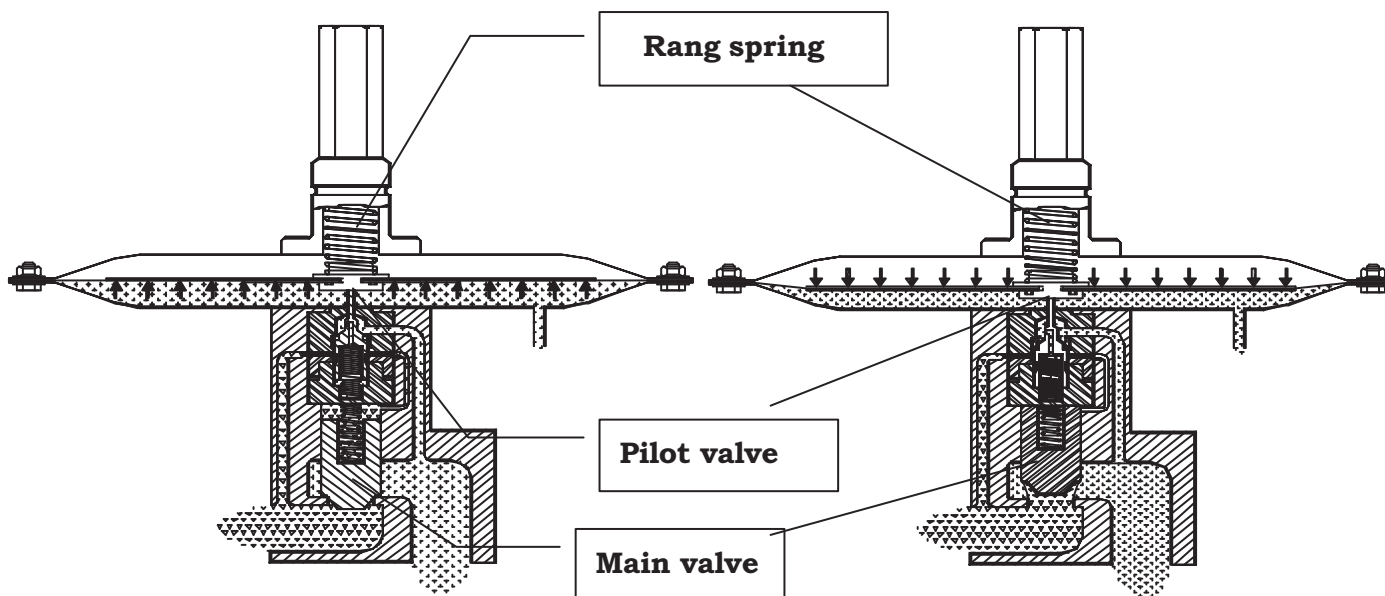
The HY Nitrogen Gas Blanketing Valves ensure that a constant gas pressure is maintained in the vapor space of storage tank. When liquid is removed from a tank or the temperature is reduced, a vacuum would be developed. With the blanket gas regulator, a blanket gas is supplied to prevent any vacuum from developing and to maintain the desired blanket pressure.

The Model WNBSL is a pilot-controlled stainless steel valve using a single oversized diaphragm actuator. The Model WNBS, WNRS is a direct-operated stainless steel valve using a single oversized diaphragm actuator. The oversized actuator offers high sensitivity to change in tank pressure, which increases the accuracy. The valves are fully balanced under all operating conditions, allowing for operation with varying inlet pressures. Blanketing pressure set point is easily controlled by a single adjusting screw.

	WNBSL	WNRS	WNBS
SIZE	1"	1" ~ 2"	1/4" ~ 1/2"
MAX. PRESSURE	10 kgf/cm ²	10 kgf/cm ²	10 kgf/cm ²
SETTING PRESSURE	20 ~ 300 mmH ₂ O	20 ~ 500 mmH ₂ O	20 ~ 300 mmH ₂ O
MAX. FLOW	83,000 SCFH (2,220 m ³ /hr)	26,700 SCFH (720 m ³ /hr)	2,225 SCFH (60 m ³ /hr)

◆ OPERATION

The tank pressure is sensed on the underside of the diaphragm part. The diaphragm directly actuates the pilot valve poppet. Flow through the pilot valve is directed to the tank being blanketed. Gas flowing through the pilot valve causes the pressure to drop in the sealed chamber above the main valve piston. When the pressure has dropped, the main valve opens and allows blanketing gas to flow in to the tank.



◆ INSTALLATION

The HY blanketing valve has been assembled, calibrated and tested. The only adjustable feature is the gas blanketing set point. It has been adjusted to the pressure indicated on the purchase order at the specified supply pressure and set point.

(1) N2 Supply Main line;

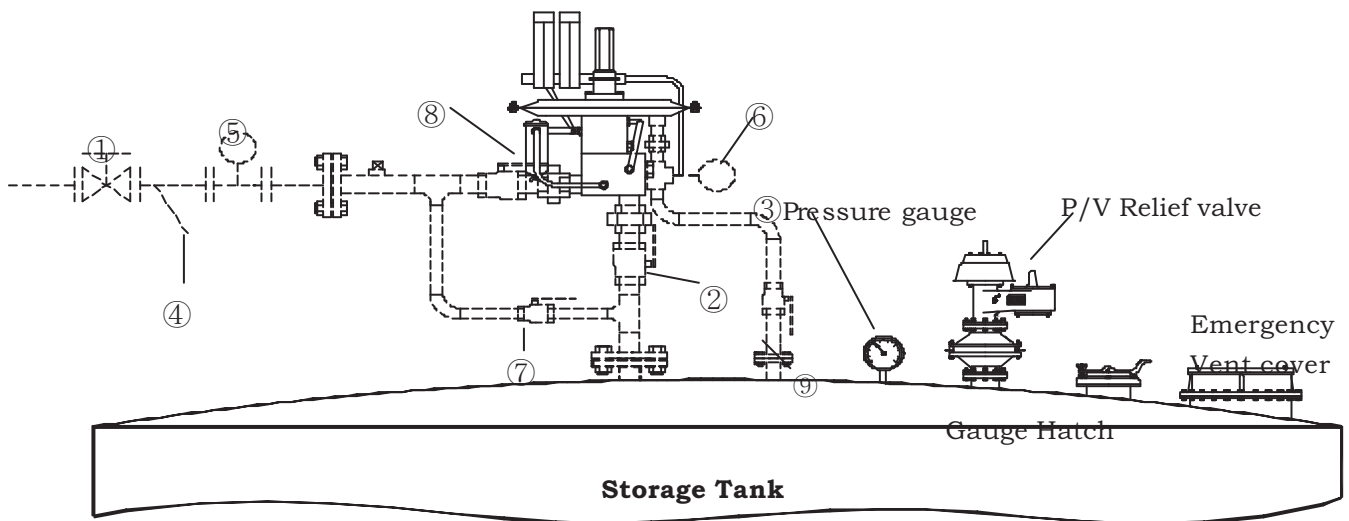
It must be removed dirt and pipe scale.

The Mainline should be installed with a 65-mesh strainer to remove dirt and pipe scale.

(2) Sensing Line;

It must be drained (slope down) and not contain low points or traps that could contain liquid. The sensing line should be 1/2" tubing or pipe.

◆ MAINTENANCE



In Every month;

1. Open the drain port on the main supply line strainer (④) and filter of strainer must be cleaned.
2. Check the unit for problems, loose connection, etc.
3. Check the inlet main pressure (⑤) and to be compared with stamped pressure range on the valve name plate
4. Check the blanketing pressure (⑥)

GAUGE HATCH (MODEL WG40, 41)

- Available in

: Self closing or Lock down cover type

- Size

: 4" through 12"

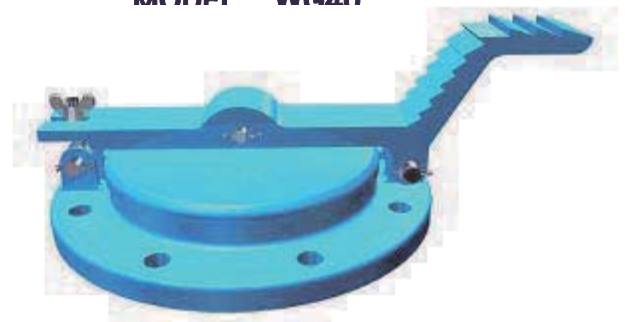
- Available in

Aluminum, Carbon Steel, Stainless Steel.

- Other size and material to be consulted by factory.



MODEL : WG40



MODEL : WG41

◆ INTRODUCTION

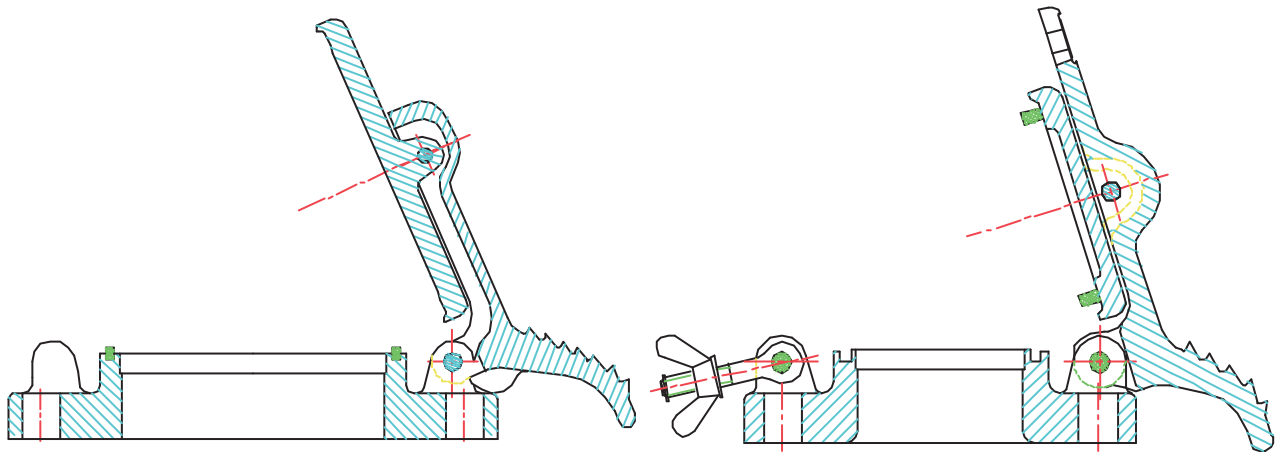
Model WG40, WG41 is designed to provide access for product gauging or sampling from liquid storage tank. Placing the foot on the serrated treadle opens the cover to a full 75° to 80°, permitting inspection and easy entry for gauging or sampling.

◆ DESIGN AND FUNCTION

Model WG41 is designed for working pressure up to 3psig and non-sparking type.

Placing the foot on serrated treadle opens the cover to a full 75° to 80°, input the sampling bottle with a tape measure to in tank.

And check the liquid level on the scale of body inside, take out the sampling bottle from in tank. Removing foot returns cover to a closed position.



WG40

WG41

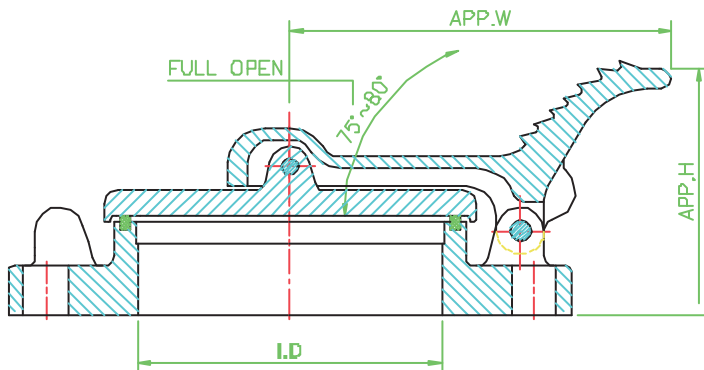
Model WG40, WG41 is designed to provide access for product gauging or sampling from storage tank. And Model WG40 also provides pressure relief as emergency venting. Model WG40, WG41 consists of hinged swiveling and self-closing cap. Removing foot returns cover to a closed position. Model WG41 is designed for working pressure up to 3psig.

◆ **DRAWING AND DIMENSION**

MODEL WG40

DIMENSION TABLE

UNIT : mm

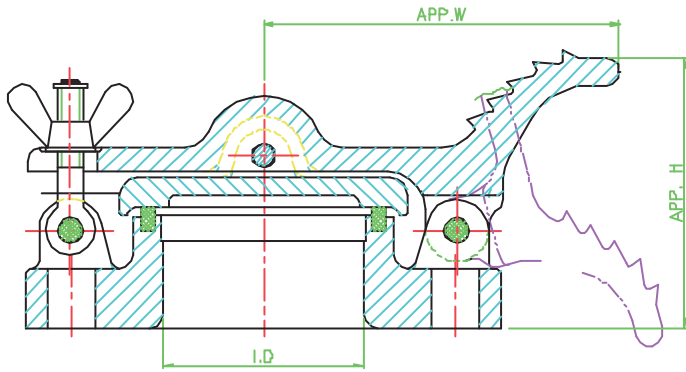


SIZE	I.D	H	W
4"	100	110	150
6"	150	125	190
8"	200	150	240
10"	250	170	270
12"	300	210	315

MODEL WG41

DIMENSION TABLE

UNIT : mm



SIZE	I.D	H	W
4"	100	110	150
6"	150	120	190
8"	200	155	240
10"	250	170	270
12"	300	210	315

SLOT DEEPING & SAMPLING DEVICE (MODEL WDD50)

- Scale Size : 20m, 25m, 30m, 50m, 100m
- Sampling Bottle Size : 300cc, 600cc
- Size : 4" through 8"
- Available in : Aluminum, Carbon Steel, Stainless Steel and
- Other size and material to be consulted by factory.

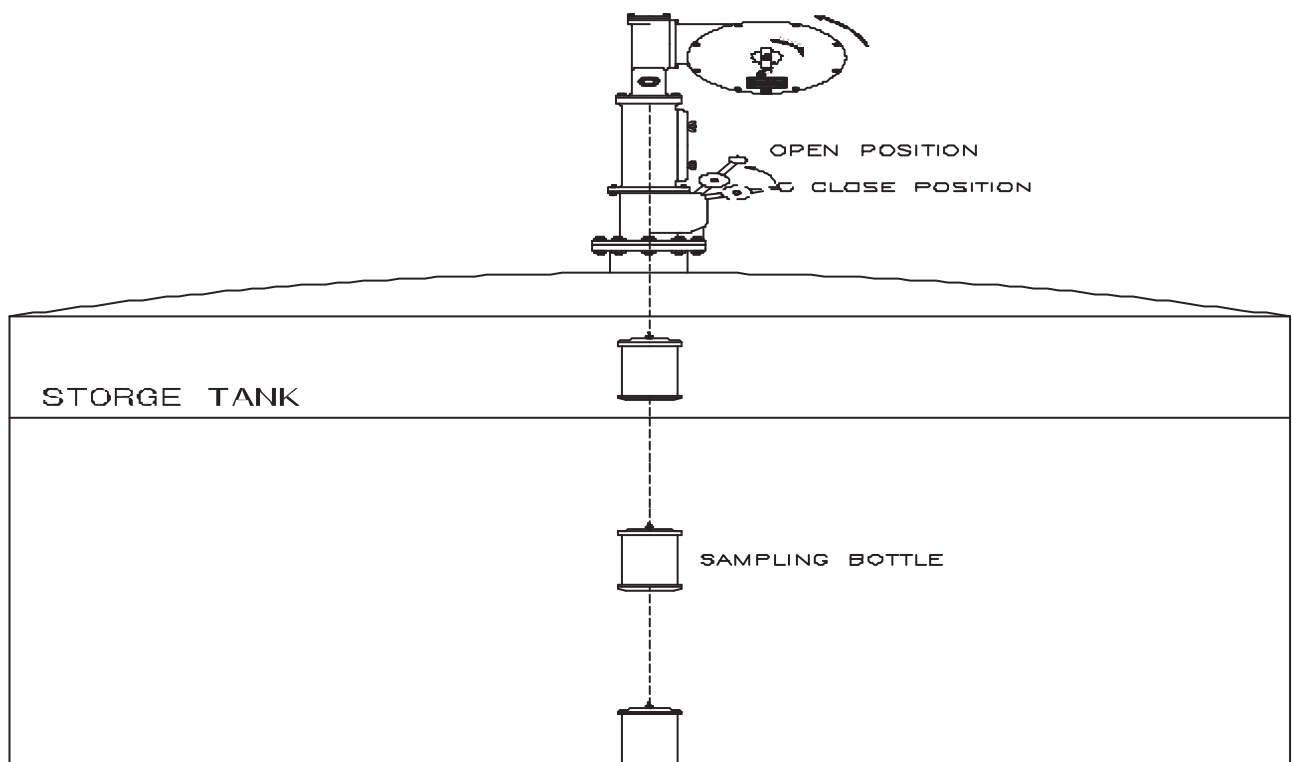


MODEL : WDD50

◆ INTRODUCTION

The Model WDD50 series is used to gage the height of liquid level, taking temperature and taking samples of liquids held in storage tank without relieving pressure within the tank. It avoids the loss of valuable vapors and exposing the people to excessive fumes.

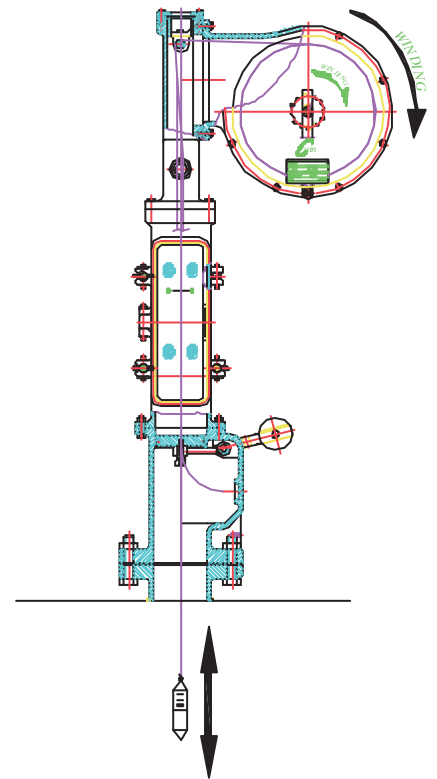
◆ DESIGN AND FUNCTION



The WDD 50 model is designed for closed sampling of liquids, which present a fire, Health or Air pollution hazard. It protects the storage facility from vapor emission and avoids a pressure release in the tank during sampling. The sampling height can be measured graduated tape.

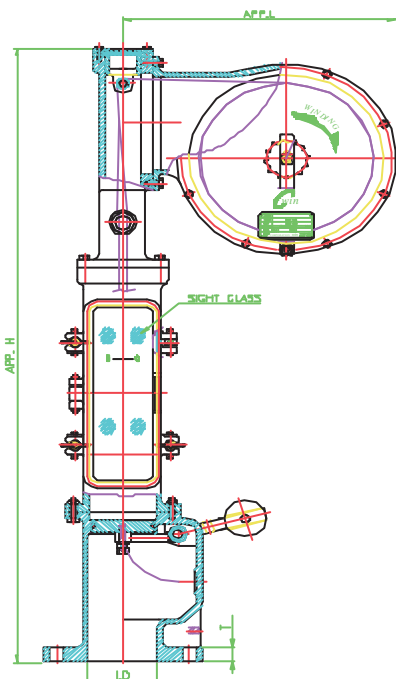
After sampling, the liquid can be transferred into a laboratory. Quick opening valve unit is opened and closed simply by moving a lever through a 90° arc.

A by-pass is provided to equalize in the tank and sampling chamber unit, if this should be necessary for easy opening. The device has an aluminum or stainless steel body and aluminum pallet or stainless steel. The pallet is fitted with an O-Ring that assures tight sealing. The window in the top cover of the gauging unit can be checking the tanking of accurate reading. The WDD50 device can be installed an API 650 and API 620 storage tank with a design pressure of 15 psig(1,05 kg/cm²).



◆ DRAWING AND DIMENSION

MODEL W DD50



DIMENSION TABLE

UNIT : mm

SIZE	I.D	T	H	L
4"	100	23.9	1015	395
6"	100	25.4	1015	395
8"	100	28.6	1015	395

STEAM JACKET TYPE

◆ INTRODUCTION

Steam Jacket pressure & vacuum relief valve and flame arrester used for tanks that store fluids required to be maintained at constant temperature and the steam jacket devices may be necessary where vapor gas tend to crystallize at ambient temperature or operating condition.

The inside of the valve body can be kept at a constant temperature by a steam pipe installed around the body.

All HY products are possible to design as steam jacket type.

1. PRESSURE VACUUM RELIEF VALVE (MODEL WB12AJ)

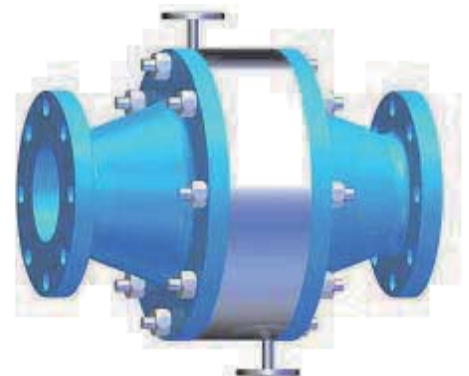
- **Pressure Setting**
: 22mm H₂O to 10,000mm H₂O
- **Size**
: 2" through 12"
- **Available in**
Carbon Steel, Stainless Steel.
- **Other size and material to be consulted by factory.**



MODEL : WB12AJ

2. FLAME ARRESTER (MODEL WF21J)

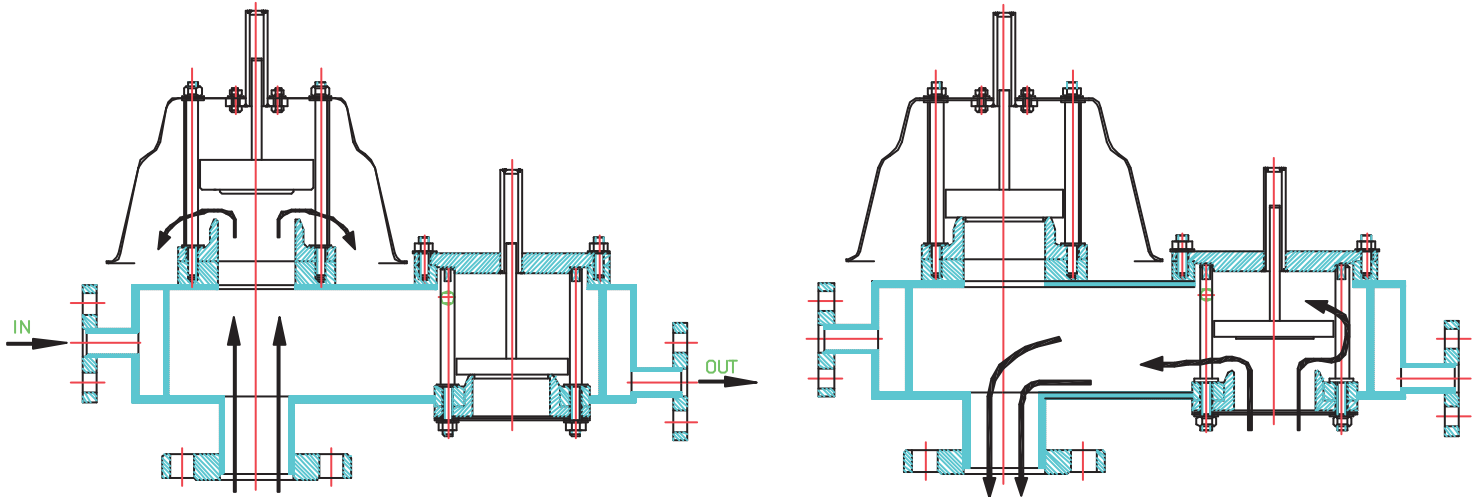
- **Flame Element**
: Proven Spiral wound, crimped ribbon design
- **Size**
: 2through 12"
- **Available in**
Carbon Steel, Stainless Steel
- **Other size and material to be consulted by factory.**



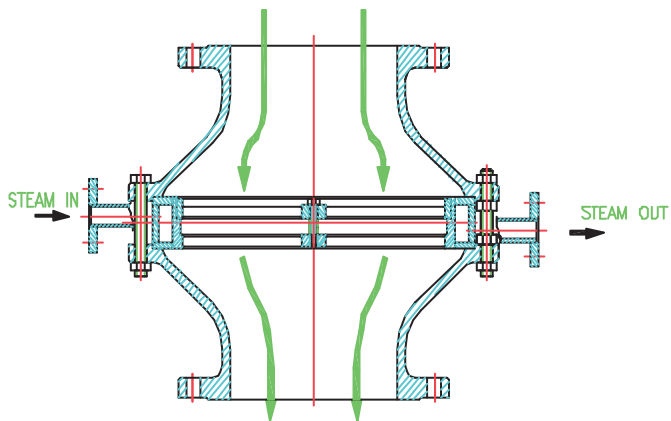
MODEL : WF21J

◆ DESIGN AND FUNCTION

1. WB12J

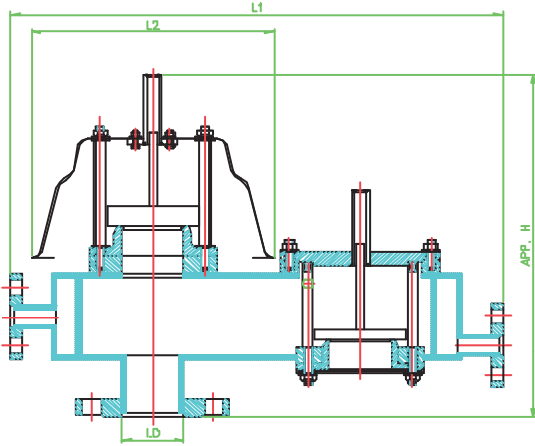


2. WF21J



◆ DRAWING AND DIMENSION

MODEL WB12J

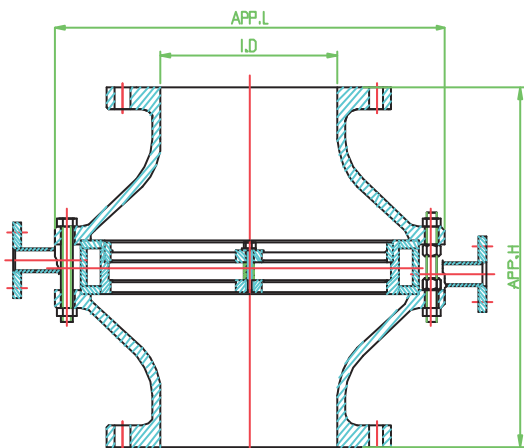


DIMENSION TABLE

UNIT : mm

SIZE	2"	3"	4"	6"	8"	10"	12"
I.D	50	80	100	150	200	250	300
H	385	430	490	665	735	816	883
L	550	650	700	850	950	1100	1200
D	240	270	290	400	450	532	582

MODEL WF21J



DIMENSION TABLE

UNIT : mm

	2"	3"	4"	6"	8"	10"	12"
I.D	50	80	100	150	200	250	300
H	280	290	355	358	397	463	520
L	225	263	310	400	479	575	663

LIQUID SEAL TYPE EMERGENCY VENT COVER (MODEL WE35A)

- Size

: 16" through 24"

- Available in

Aluminum, Carbon Steel, Stainless Steel.

- Other size and material to be consulted by factory.

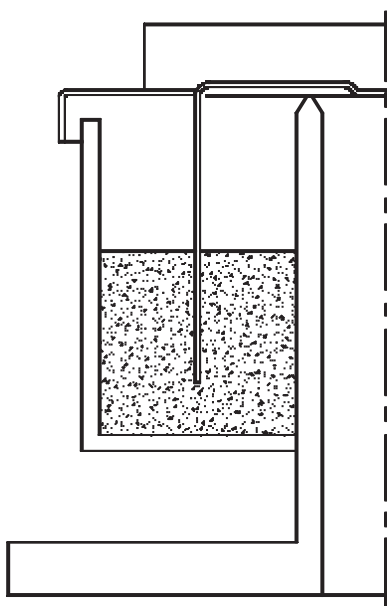


MODEL : WE35A

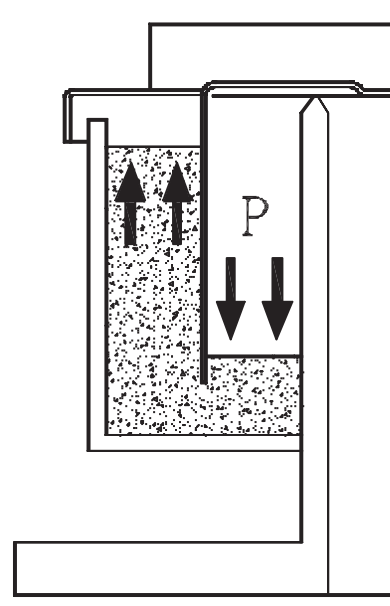
◆ DESIGN AND FUNCTION

Liquid-seal type emergency vent cover prevents the discharge of Vapor gas with liquid film. Vapor gas can not be discharged into the Atmosphere with liquid film. The liquid Which Win uses is a special Liquid and its characteristic is as follows.

- * It does not freeze in winter.
- * It minimizes the vaporization of liquid during summer.
- * The liquid does not change even it contacts with vapor gas.
- * It is odorless liquid.
- * It does not deteriorate even in long time use.



*** No pressure condition**



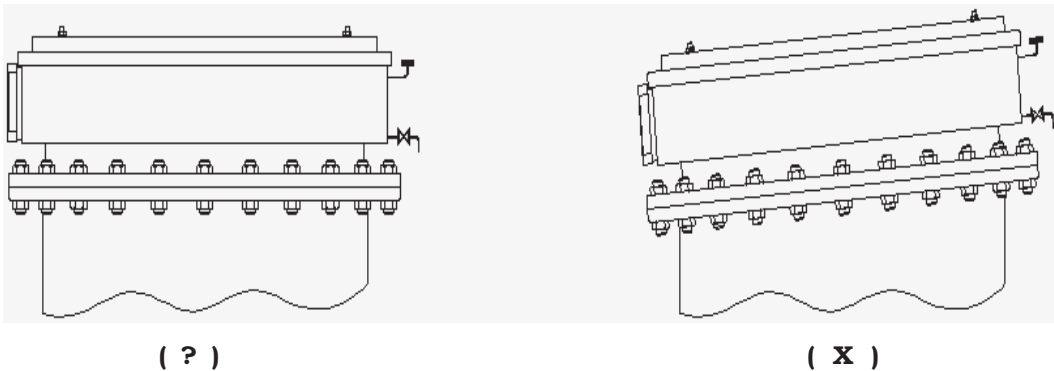
*** Normal operating condition**

◆ **COMPARISON TABLE OLD & NEW PRODUCT**

	Old products	New products
Model	WE30, WE31	WE35
Leak condition	5.0 SCFH Leak at 90% of setting pressure	No-Leak at normal operating pressure
Pallet type	Diaphragm pallet	Liquid-seal pallet

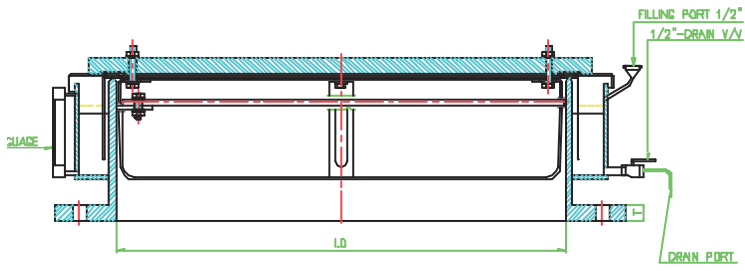
◆ **INSTALLATION, OPERATION, MAINTENANCE & REPAIR**

- ① The perforated nozzle installed on the tank roof should be kept horizontal as liquid is filled in the liquid chamber.
- ② Fill the liquid until it reaches the maximum scale of the level gauge.
- ③ When the liquid reaches the maximum scale of the level gauge after long use, refill the liquid.
- ④ When emergency vent cover was once worked in emergency, check major parts and replace them with new ones if they are damaged.
- ⑤ The setting pressure of emergency vent cover shall be more than the full opening pressure of breather valve of normal venting device.



◆ DRAWING AND DIMENSION

MODEL WE35A



DIMENSION TABLE

UNIT : mm

SIZE	I.D	T	H
16"	400	20	220
20"	500	20	240
24"	600	20	250

LIQUID SEAL TYPE PRESSURE VACUUM RELIEF VALVE (MODEL WBD70)

- Size

: 2" through 12

- Available in

: Aluminum, Carbon Steel, Stainless Steel.

- Other size and material to be consulted by factory.



◆ INTRODUCTION

MODEL : WBD70

Liquid-seal type pressure & vacuum relief valve (WBD70) prevents the discharge of Vapor gas with liquid film. Vapor gas cannot be discharged into the Atmosphere with liquid film.

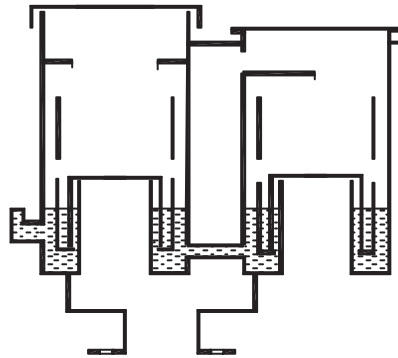
Liquid-seal type pressure & vacuum relief valve (WBD70) is designed according to API STD. 2000 in liquid seal valves, a liquid provides the closure against flow through the vent until over pressure or over vacuum occurs.

The physical properties of the sealing liquid usually are such that it has a very low freezing point as well as a high boiling point.

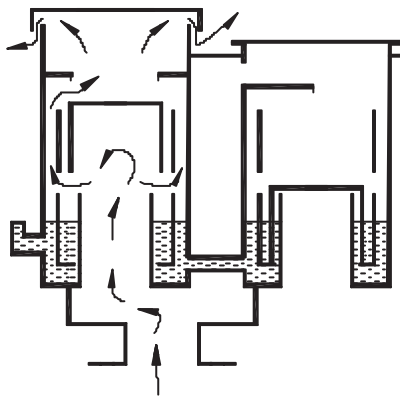
In addition, the sealing liquid should not contaminate the storage tank contents nor, in turn, be contaminated by the tank contents.

◆ DESIGN AND FUNCTION

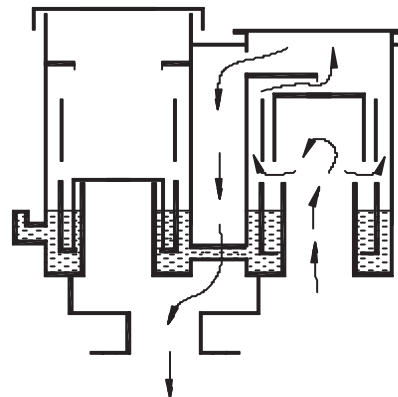
WBD70 liquid seal P/V vent employs two weighted bells, the mouths of which are normally submerged in the sealing liquid. Pressure or vacuum relief is affected when the excess pressure or vacuum raises the respective bell out of the liquid and breaks the seal. The sealing liquid remains in one area.



*** No pressure condition**



*** Normal venting condition**



*** Normal inbreathing condition**

Type WBD70 vent can probably achieve maximum capacity with less overpressure or over vacuum. Changes to set points can be accomplished by changing the weighting of the bells. Preferably changes should be performed by the vent valve manufacturer. Slight adjustments in set points may be effected by changing the level of liquid in the sump.

◆ **COMPARISON TABLE OLD & NEW PRODUCT**

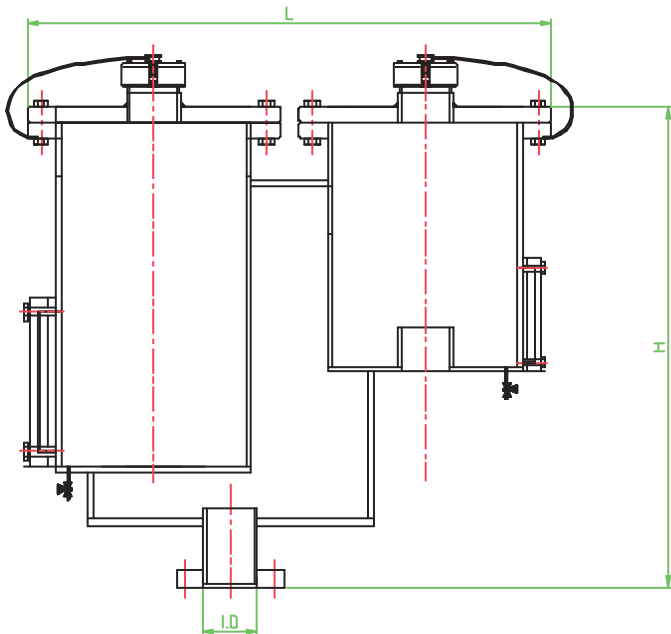
	Old products	New products
Model	WB12A	WBD70
Leak condition	2"~6" : 0.5 SCFH Leak at 90% of set. pressure 8"~24" : 5 SCFH Leak at 90% of set. pressure	No-Leak at normal operating pressure bellow
Pallet type	Diaphragm pallet	Liquid-seal pallet

◆ **INSTALLATION**

- ① The perforated nozzle installed on the tank roof should be kept plain as liquid is filled in the liquid chamber.
- ② Fill the liquid until it reaches the maximum scale of the level gauge.
- ③ When the liquid reaches the minimum scale of the level gauge after long use, refill the liquid.

◆ **DRAWING AND DIMENSION**

MODEL WBD70



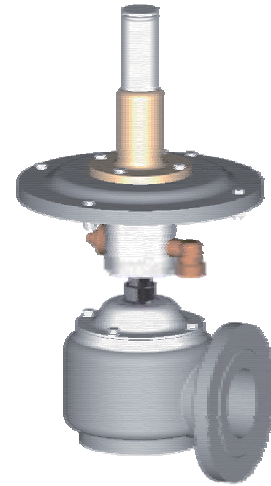
DIMENSION TABLE

UNIT : mm

SIZE	I.D	L	H
2"	50	585	480
3"	80	620	520
4"	100	660	550
6"	150	720	600
8"	200	780	660
10"	250	870	740
12"	300	960	820

PILOT OPERATED VALVE (WP)

- **Pressure Setting**
: 22m H₂O to 10,000mm H₂O
- **Size**
: 2" through 12"
- **Available in**
Carbon Steel, Stainless Steel
- **Other size and material to be consulted by factory.**



MODEL : WP

◆ INTRODUCTION

The model WP Series, Pilot operated valve, is designed to prevent leaking from seat and disc. And the valve is designed to provide safe dependable and accurate operating pressure and vacuum protection.

Principal Advantages

- NO LEAK and No smell from valve trim parts.
- Pilot Operated Valve is full open at near operating pressure of valve.
(Less than 10% over pressure based on setting pressure)
- Tank Operating pressure permit to nearer maximum allowable working pressure.
(High operating pressure can be reduce the venting volume and evaporation)

◆ DESIGN AND FUNCTION

Model	Classification	Relief Service	
		Pressure	Vacuum
WP04	Pipe Away	Pilot Operated	Weight Loaded
WP06	Pipe Away	Pilot Operated	Direct Operated

1. MODEL: WP06

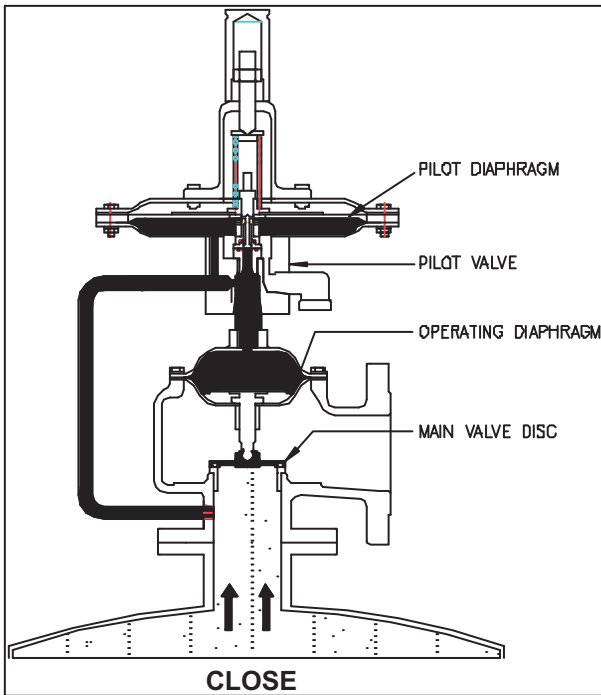


Fig. 1-1 WP06- CLOSE STATE

Gas flowing out to the atmosphere through the pilot valve causes the pressure to drop in the sealed chamber above the operating diaphragm.

When the pressure in the sealed chamber has dropped, the upward force on the main valve disc is greater than the downward force of the sealed chamber; the main valve disc will open.

After the excess pressure has been relieved and the system pressure is again below the set point of the pilot, the main valve disc will close.

(See the Fig 1-2)

When the system pressure rises to the pilot set point due to an over pressure condition, the system pressure is sensed on the pilot diaphragm and pilot diaphragm will lift the pilot valve stem.

As the pilot valve stem lifts, it opens the pilot valve disc to allow flow through the pilot and flow out to the atmosphere. (See the Fig 1-1)

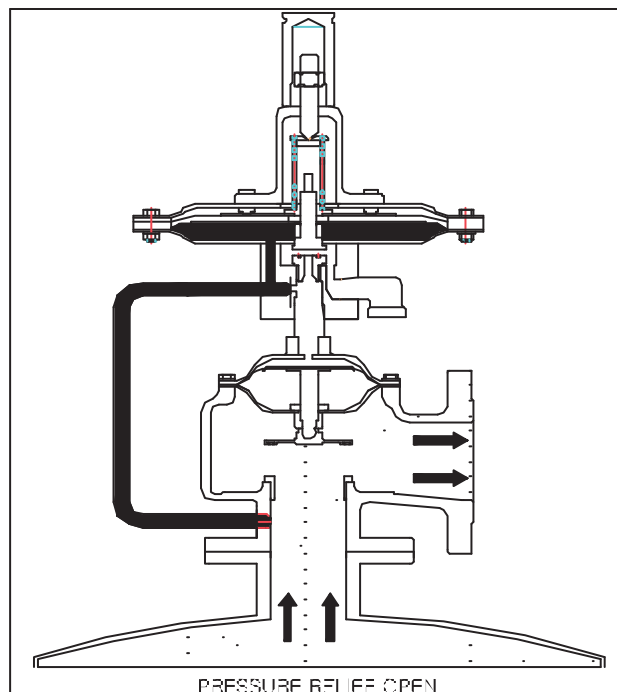


Fig. 1-2 WP06 – PRESS. OPEN

The main valve disc opens when the system vacuum acting in the sealed chamber of operating diaphragm.

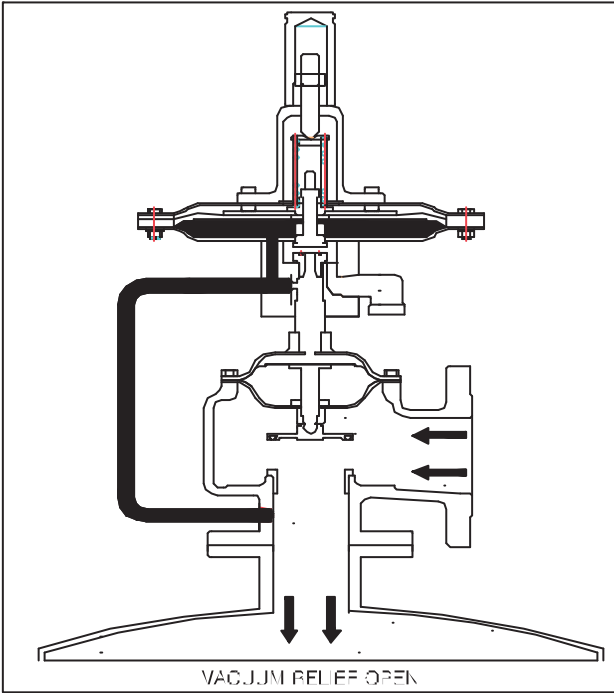


Fig. 1-3 WP06 – VAC.RELIEF OPEN

2. MODEL: WP04

When the system pressure reach to the vacuum valve disc point due to has dropped pressure condition in the system, vacuum valve disc is open and the air is drawn in the system from the atmosphere. (See the Fig 2-1)

The function principles of pressure are same with the WP06.

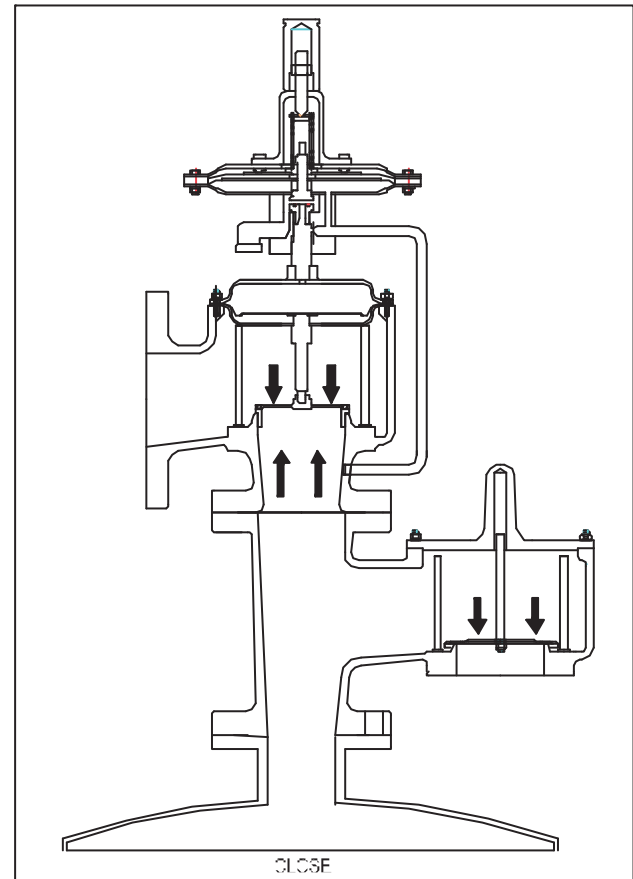


Fig. 2-1 WP04 – CLOSE STATE

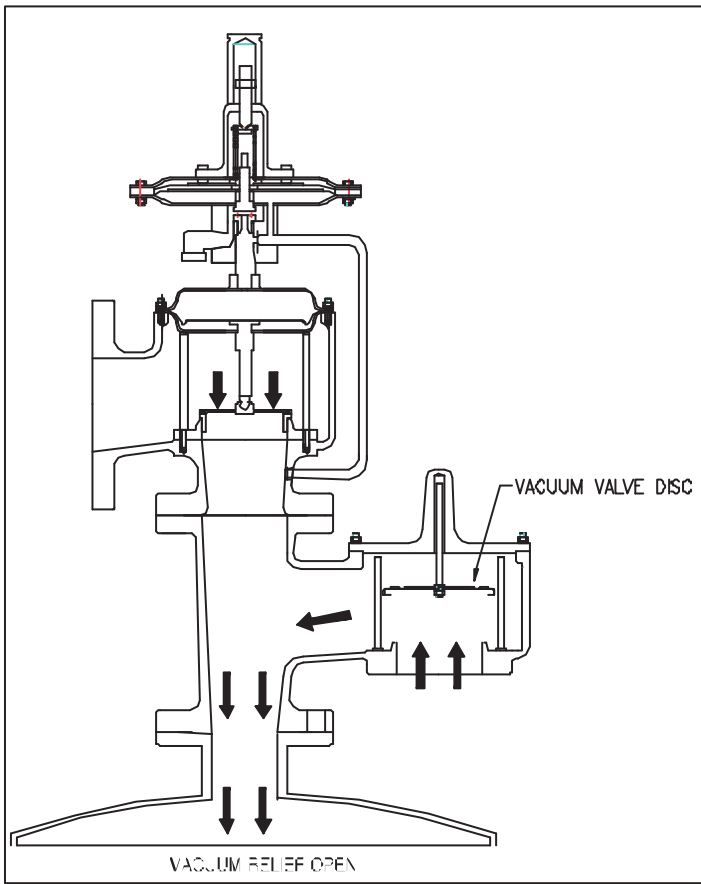


Fig. 2-2 WP04 – VAC. RELIEF OPEN

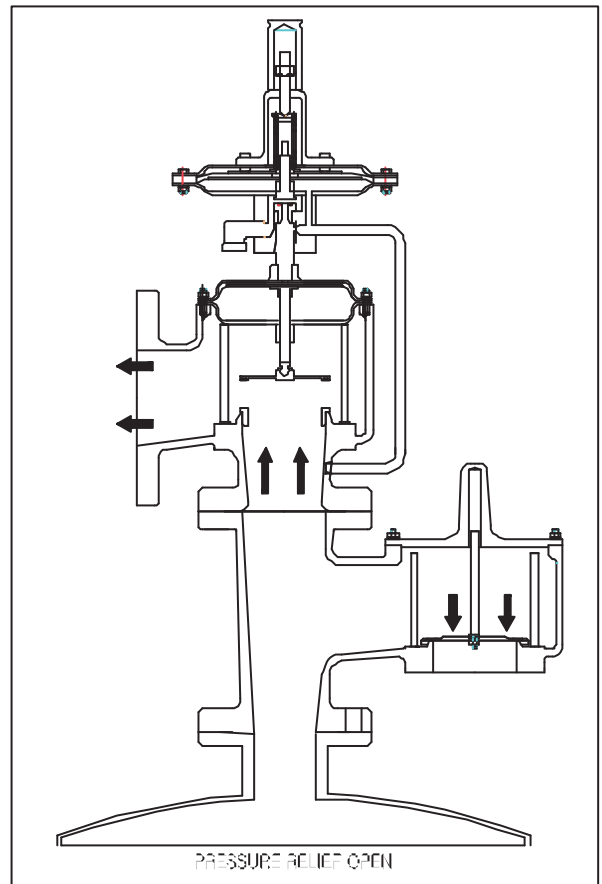


Fig. 2-3 WP04 – PRESS. OPEN

◆ MAINTENANCE

The WP SERIES pilot does not require routine lubrication or adjustments. It should be checked periodically, at least once a year, to confirm the valve is functioning properly and that the set point is correct. The pilot valve is a fail safe device because failure of any seals or diaphragms will cause pressure to be vented to atmosphere, thereby allowing the pressure relief valve to open under pressure.

◆ TROUBLE SHOOTING

PROBLEM	INSPECTION	SUGGESTED CORRECTIVE ACTION
Vapor flowing at tank pressure below specified set point.	Visual, audible or vapor detector	Check actual set pressure on tank if field test connection is installed. Otherwise remove unit and test for: Incorrect pressure and blow down setting using setting and testing procedure in this manual. Damaged seals, seat or diaphragms. Damaged spring or other components. Foreign material or corrosion in pilot.
Vapor not flowing at tank pressure above specified set point.	Visual, audible or vapor detector	Check actual set pressure on tank if field test connection is installed. Otherwise remove unit and test for: Incorrect pressure and blow down setting using setting and testing procedure in this manual. Plugged sense line or internal orifices. Foreign material or corrosion in pilot.
Vapor leaking from spring bonnet vent	Visual, audible or vapor detector	Ruptured diaphragms; remove and replace.
Vapor leaking from body vent	Visual, audible or vapor detector	Damaged seal, seat or body diaphragm, or stem o-ring. Remove and replace.
Incorrect blowdown pressure	Visual, audible or vapor detector	Remove and set according to setting and testing procedure in this manual.

CAUTION

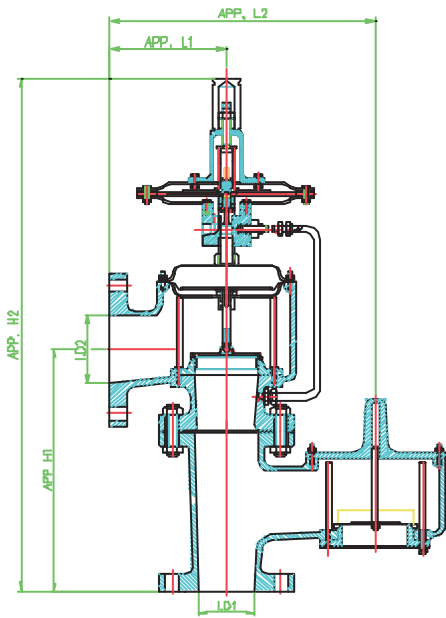
If the valve must be disassembled for any reason, first make sure all pressure to the valve is blocked and pressure trapped in the valve vented safely. Refer to your company procedures when handling toxic or other hazardous materials.

WARNING

The tank pressure required to discharge the normal or emergency venting requirements of the tank will be increased by the amount of back pressure in the discharge header. Maximum possible discharge header pressure must be considered when sizing the pressure relief valve.

◆ **DRAWING AND DIMENSION**

MODEL WP04

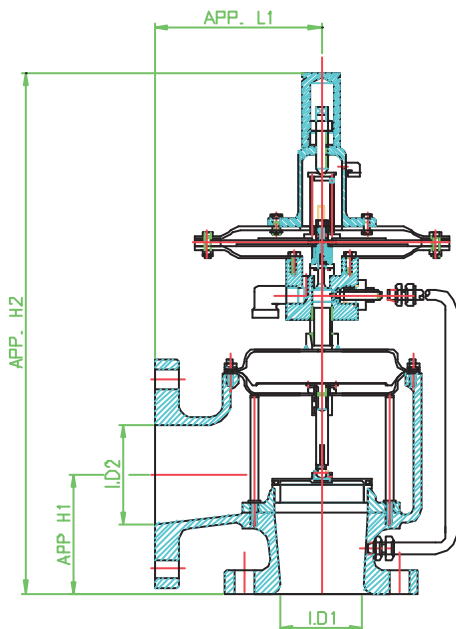


DIMENSION TABLE

UNIT : mm

SIZE	I.D1	I.D2	H1	H2	L1	L2
2" x 3"	50	80	320	847	150	400
3" x 4"	80	100	360	899	160	472
4" x 6"	100	150	413	1027	217	535
6" x 8"	150	200	533	1136	238	665
8" x 10"	200	250	602	1189	253	785
10" x 12"	250	300	679	1281	298	890
12" x 14"	350	400	758	1383	330	1025

MODEL WP06



DIMENSION TABLE

UNIT : mm

SIZE	I.D1	I.D2	H1	H2	L1
2" x 3"	50	80	100	407	150
3" x 4"	80	100	120	660	160
4" x 6"	100	150	145	762	217
6" x 8"	150	200	180	783	238
8" x 10"	200	250	215	802	253
10" x 12"	250	300	265	867	298
12" x 14"	350	400	285	890	330
12" x 16"	350	400	330	920	260

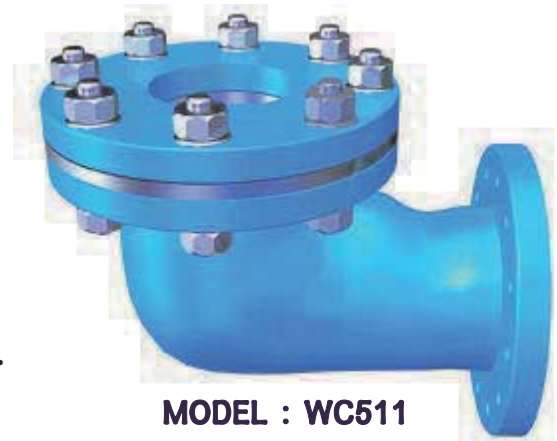
FLOATING SUCTION AND FLOATING ROOF DRAIN SYSTEM

1. FLOAT CHECK VALVE FOR FLOATING ROOF DRAIN (MODEL WC511, WC512)

- **Side Mounting Type, Bottom Mounting Type**
- **Size**
: 3" through 8"
- **Available in**
: Carbon Steel, Stainless Steel.
- **Other size and material to be consulted by factory.**

◆ DESIGN AND FUNCTION

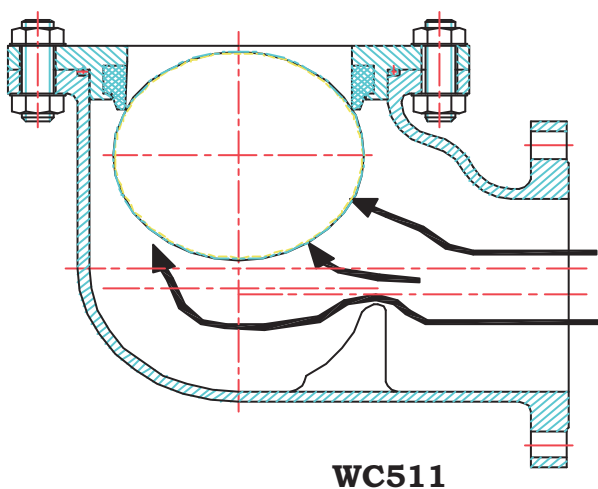
Model WC511 float check valve is side-mounted type to install in water sump of floating roof deck and Model WC512 is bottom mounted type to install under water sump of floating roof deck.



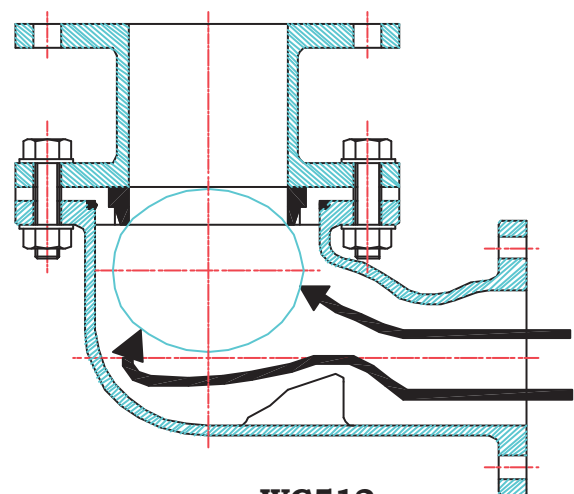
MODEL : WC511



MODEL : WC512



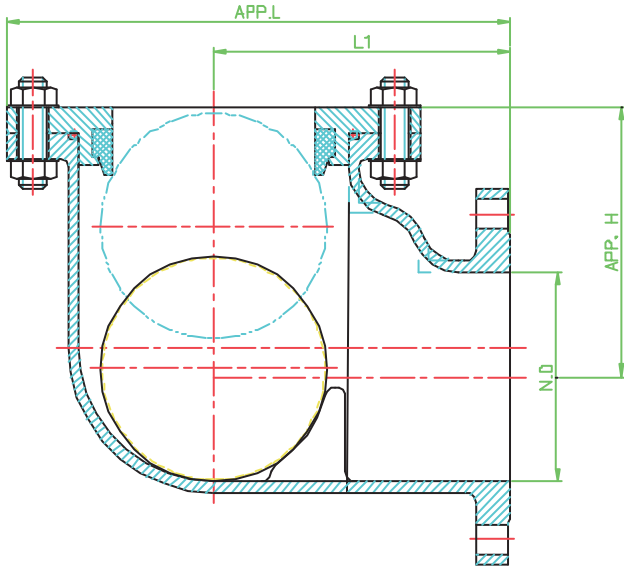
WC511



WC512

◆ **DRAWING AND DIMENSION**

MODEL WC511

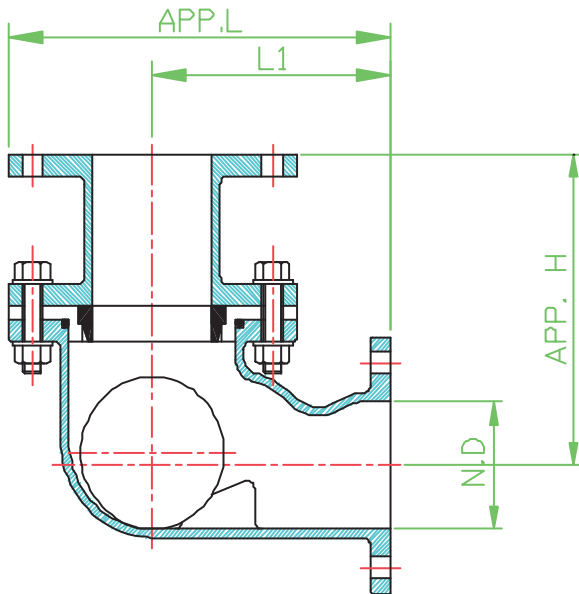


DIMENSION TABLE

UNIT : mm

SIZE	N.D	L	L1	H	D
3"	80	240	140	130	200
4"	100	255	150	140	210
6"	150	374	220	200	308
8"	200	555	350	290	410

MODEL WC512



DIMENSION TABLE

UNIT : mm

SIZE	N.D	L	L1	H	D
3"	80	240	140	130	200
4"	100	255	150	140	210
6"	150	374	220	200	308
8"	200	555	350	290	410

2. FLOATING SUCTION SYSTEM (MODEL WS50)

- **Consisting of an elbow-tube system with a suction opening which is held close to the liquid level by a float.**
- **Size**
: 3" through 24"
(Various designs, depending on the tank dimensions and types)
- **Available in**
Carbon Steel, Stainless Steel.
- **Other size and material to be consulted by factory.**

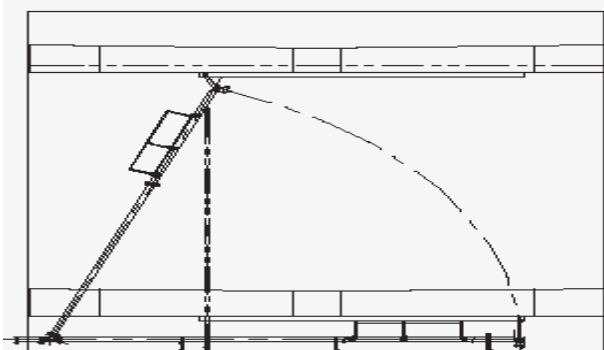
◆ INTRODUCTION

The HY Floating Suction system has found uses in a wide variety of petroleum, petrochemical, and chemical applications. The Floating suction system is designed for use with aboveground storage tanks whenever withdrawal of the cleanest possible product or a heart cut of the product stored is desirable. A properly designed floating suction system will enable the operating company to minimize the length of time required to allow water, sediment, or any other contaminants to settle after periods of tank activity. Therefore, the floating suction is fitted with a low level stop to prevent disturbance of any water or sediment in the tank bottom.

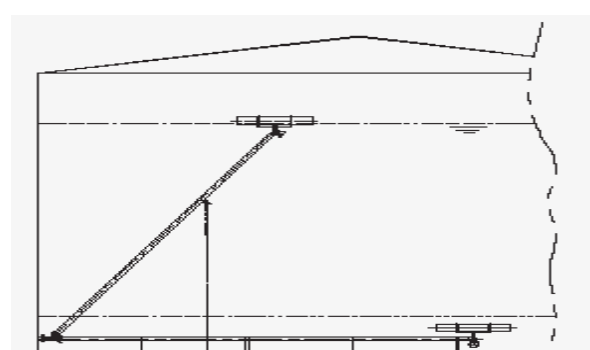
◆ DESIGN

The float of this floating suction is positioned to always turn upward vertically.

WS50A is twin elbow type and WS50B is single elbow type.



Model : WS50A



Model : WS50B

3. ROOF DRAIN SYSTEM (MODEL WD51)

- Size

: 3" through 24"

(Various designs, depending on the tank dimensions and types)

- Available in

Carbon Steel, Stainless Steel.

- Other size and material to be consulted by factory.

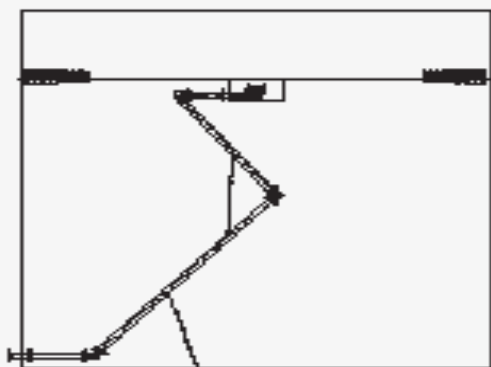
◆ INTRODUCTION

The roof drain system can be completely impervious to the effects of aromatic products and acidic contamination from the atmosphere. This means that from the fluoroelastomer cover and smooth inner water-way, all components, including and fittings, can be resistant to 100% aromatics and the effects of acid rain.

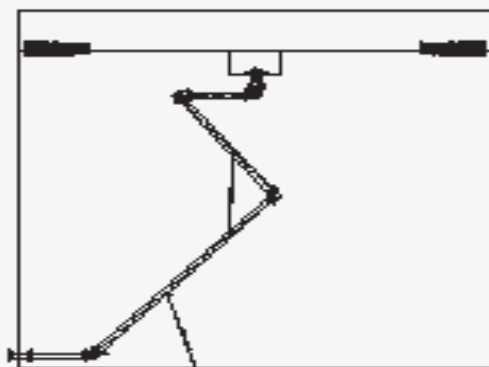
The change in the chemical make up of petroleum products stored (with the possibility that these products can spill on to the roof and wash down the drain) precipitated the development of flexible drains that would meet most requirements and still be economically feasible. Also there is more evidence that atmosphere contamination is resulting in acid rain and even more severe acid fog which can deteriorate any drain water-way that is composed of stainless, mild or carbon steel.

◆ DESIGN

WD51A is schematic side mounted type and WS50B is schematic bottom type .



Model : WD51A



Model : WD51B

4. CENTRAL TYPE SWING JOINT (MODEL WSJ)

- The heavy, cast iron "V" shaped yoke bolts to the tank nozzle to form a rigid, compact and tight connection at the tank shell.
- Size : 4" through 24"
- Design pressure : 6kg/cm²
- Available in Carbon Steel, Stainless Steel.
- Other size and material to be consulted by factory.

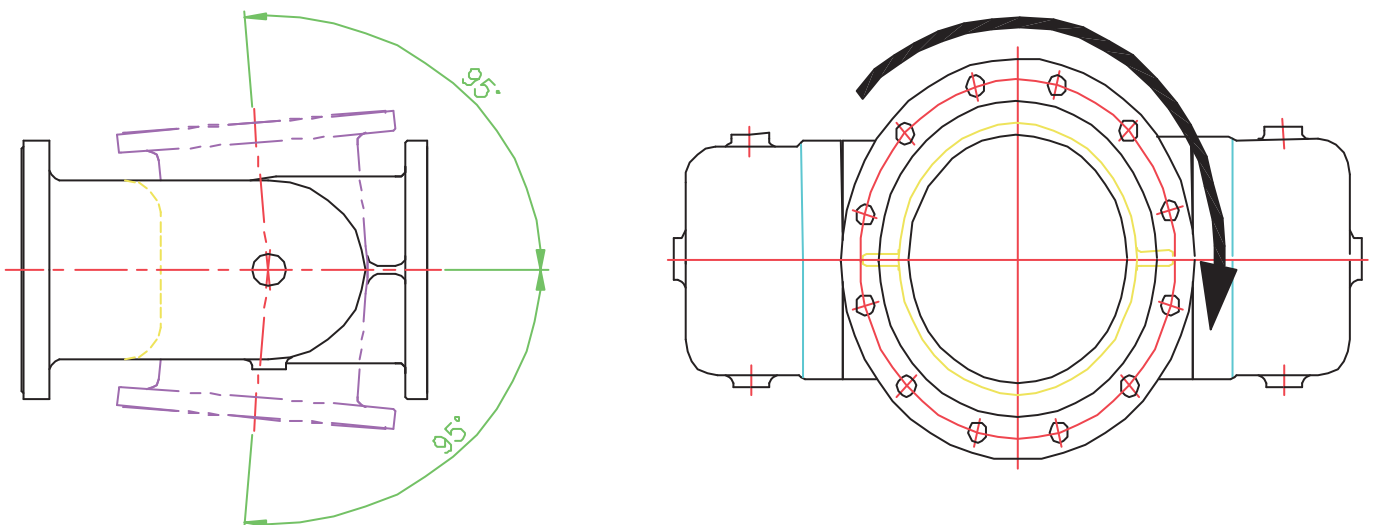


MODEL : WSJ

◆ DESIGN AND FUNCTION

MODEL WSJ series constructed of only four major parts, a cast iron "V" shaped yoke, a specially manufactured tee and two bronze bushings with o-ring seals-the Huber steatite swing joint is balanced, leak tight and has no tendency to tilt or pull apart.

MODEL WSJ SWING JOINT is hydrostatically tested to 6 kg/Cm² G to insure sound and leak tight assemblies and the flanged tee is precision aligned and rotates on large stationary, bronze bushings which are hydraulically pressure into the yoke.

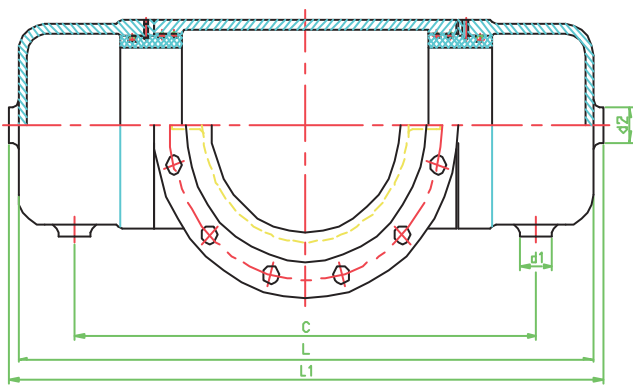


The fluid passage through the joint is unobstructed and generously over sized to facilitate a smooth flow. The fluid thrust present in a Huber swing joint is balanced, Preventing lock-up and potential bending of the tank nozzle.

The passage through the joint is larger than a standard pipe, and there are no interior obstructions to block the flow of liquid.

◆ DRAWING AND DIMENSION

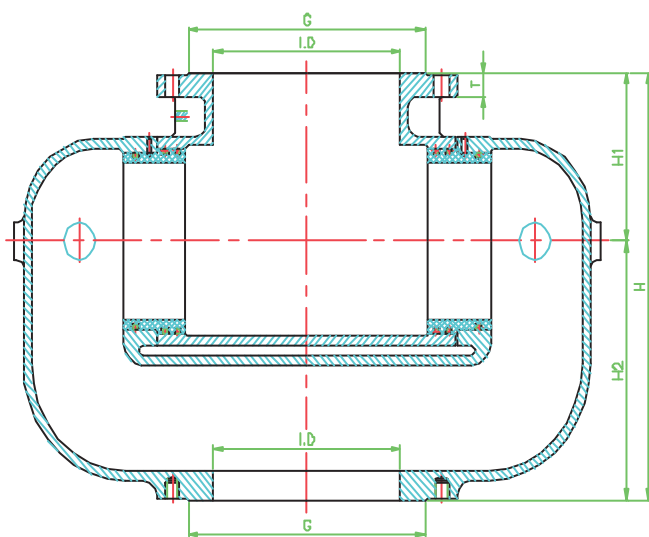
MODEL WSJ



DIMENSION TABLE

UNIT : mm

SIZE	C	L	L1	D1	D2
4"	305	375	400	22	22
6"	410	510	540	36	36
8"	546	650	680	50	50
10"	648	805	835	50	50
12"	775	920	950	50	50
20"	1035	1355	1385	100	100
24"	1270	1565	1600	100	100



DIMENSION TABLE

UNIT : mm

SIZE	I.D	G	T	H	H1	H2
4"	100	157.2	23.9	290	110	180
6"	150	215.9	25.4	350	140	210
8"	200	269.7	28.6	430	170	260
10"	250	323.9	30.2	525	205	320
12"	300	381	31.8	595	230	365
20"	500	584.2	42.9	920	370	550
24"	600	692.2	47.7	1085	430	655

5. SWIVEL JOINT (MODEL WS501, WS502)

- Size

: 3" through 16"

- Swivel Type

: 90°, 180°

- Available in

Carbon Steel, Stainless Steel.

-Other size and material to be consulted by factory



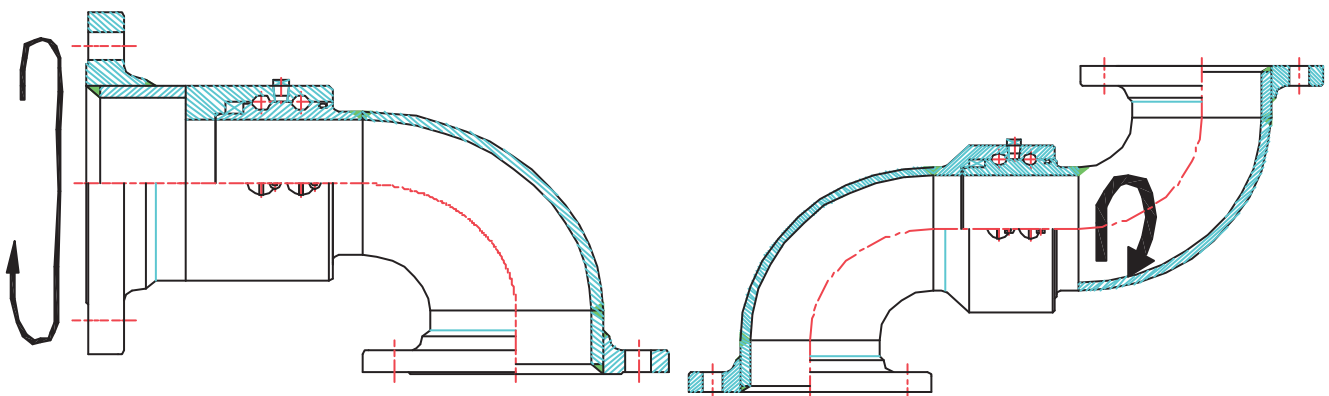
MODEL : WS501



MODEL : WS502

◆ DESIGN AND FUNCTION

The Models WS501, WS502 feature a double row of ball bearings to ensure alignment and load carrying ability. These are available in cast iron, steel and stainless steel. The swivel joints are fully sealed units specifically designed for submerged service in such as articulated pipe drain system for floating roof tank. This swivel joints is used for air, oil, water, gas and other chemical products. The big and medium size pressure steel swivel joint incorporates a widely spaced. Pressure-machined and hardened dual ball raceway that provides extra moment load capabilities.

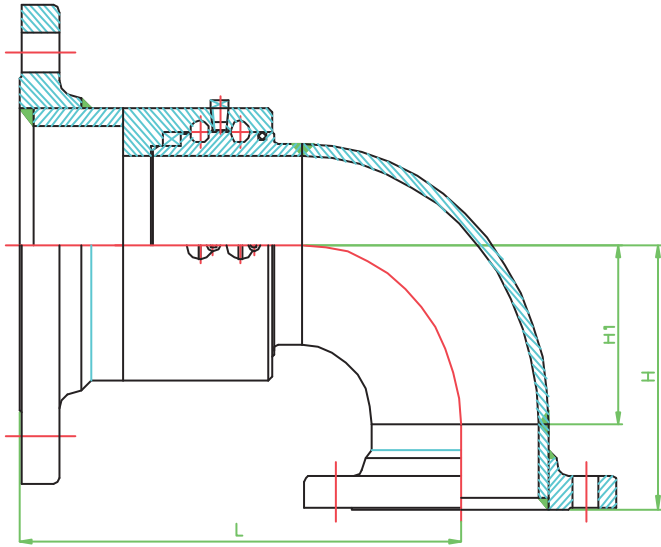


WS501

WS502

◆ **DRAWING AND DIMENSION**

MODEL WS501

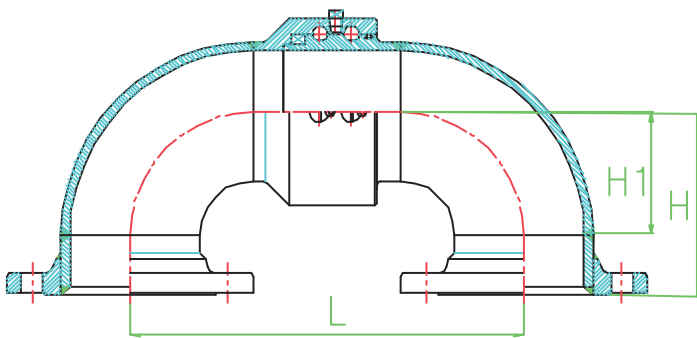


DIMENSION TABLE

UNIT : mm

SIZE	L	H	H1
3"	230	133	63.5
4"	277	178	101.6
6"	395	241	152.4
8"	489	305	203.2
10"	600	356	254
12"	700	419	304.8
14"	794	483	355.6
16"	886	533	406.4

MODEL WS502



DIMENSION TABLE

UNIT : mm

SIZE	L	H	H1
3"	267	146	76.2
4"	323	178	101.6
6"	461	241	152.4
8"	571	305	203.2
10"	702	356	254
12"	817	419	304.8
14"	927	483	355.6
16"	1035	533	406.4

FREE VENT (MODEL WFV10)

- Size

: 2" through 12"

- Available in

: Aluminum, Carbon Steel, Stainless Steel

- Other size and material to be consulted by factory.



MODEL : WFV10

◆ INTRODUCTION

Free Vent is designed to be used on tanks containing non-volatile liquids and on vent pipe extremities. Model WFV10 provides protection against rain, dirt, birds, insects and other foreign matter from entering storage tanks while allowing atmosphere and vapors to flow freely. Installation is quick and easy.

◆ DESIGN AND FUNCTION

