



**UNIVERSAL**

*Acoustic & Emission Technologies*

®

# Vent Silencers

## Technical Literature

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### **Combination Vent Silencers**

∴ HV Series

*Universal AET retains the right to update this technical sheet without notice.  
Please contact your Universal representative to verify the timelines of this technical literature sheet.*



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Toll-Free: 1-888-300-4272  
[www.universalAET.com](http://www.universalAET.com)  
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## Easy To Specify and Order

Vent and blowdown silencers are seldom a simple catalog selection. Usually, the purchaser provides detailed specifications and a system description that enables Universal to design a custom solution.

An even easier way is to simply send the valve manufacturer's data sheet for a vent to Universal and the experienced sales staff will recommend a silencer best suited for the application.

# HV Series

## Combination Vent Silencers

## Versatile Silencers

HV Series vent silencers effectively silence high-velocity air, steam, and gas vents and blowdowns to atmosphere where sonic or critical conditions exist in the valve. Typical applications include:

- steam boiler relief valves
- superheater header relief valves
- boiler startup and purge
- high-pressure air vents
- natural gas blowdowns
- switch valves
- compressor blowoffs
- autoclaves
- steam ejectors

## Standard Features

- inlet plenum covered with outer acoustic wrap and lag shell
- highly absorptive fiberglass acoustic fill and heavy-gauge perforated face sheets
- inlet nozzle and diffuser with flange drilled to 150# ANSI standards
- lifting lugs and bottom drain
- heavy-duty welded steel construction
- high-heat aluminum paint system
- vertical or horizontal installation

## Optional Features

- high-temperature acoustic fill
- material construction options such as stainless steel, Monel, and Hastelloy
- inspection openings
- mounting brackets and other special supports
- outlet head and nozzle
- restrictive diffuser built to ASME Section VIII, Division I, to maintain back pressure or control blowdown time
- elbows, tailpipes, and weatherhoods
- special paints
- side inlet

## A Complete Solution

Universal's extensive in-house engineering, manufacturing, and testing facilities ensure an optimized process, mechanical and acoustic solution for any application.

### Annular Ring



### Acousti-Tube™



High-Efficiency  
Acoustic Pack

Designed for  
Optimum Space  
Considerations

All-Welded Steel  
Outer Shell

Pack Retention with  
Pre-Compression

Lower Chamber  
Insulation  
(Except HV5  
and HV10)

Inlet Diffuser,  
Depending on  
Application

- The concentric annular ring design (left) and the wrapped Acousti-Tube vent silencer design (right) offer a choice of silencer profile and configuration to meet site-specific requirements.



# Application Methodology

## Vent Silencers

The HV Series comes with an inlet diffuser or orifice plate that is a critical element to the acoustic and mechanical performance of the silencer. Both the inlet nozzle and the diffuser/orifice plate are designed and constructed to withstand the thermal and impact stresses produced in high-pressure, high-temperature, continuous or intermittent vent and blowdown service.

In vent applications, critical flow will occur for most gases at valve upstream pressures greater than twice the outlet pressure. Vent and blowdown noise levels increase with increased pressure drop and are also affected by valve aerodynamic recovery characteristics. Large valve, low-pressure vents will produce relatively broadband low-frequency noise, while high-pressure vents with small valves will produce high-frequency noise.

Subsonic (or noncritical flow) low-pressure vent and blowdown applications do not require, nor in most cases does the valve have pressure drop available to permit, the use of an inlet diffuser. Contact Universal for silencer recommendations when a combination of both low pressure drop and acoustic requirements must be met.

The HV Series is offered in six standard acoustic ratings, ranging in attenuation from 15 to 70 db. The HV05 is offered for applications where only minimum noise reduction is necessary, while the HV30 is offered for applications where maximum silencing is necessary. Acoustic ratings are offered in sizes that cover a wide range of gas flow.

HV20 and HV30 acoustic ratings are offered for standard pipe diameters from 2" to 112". All other acoustic ratings are offered for standard pipe diameters of 12" to 112".

### Application Analysis

Use the following design information from the valve data sheet for system analysis and silencer selection:

- 1 Type of gas
- 2 Molecular weight or specific gravity
- 3 Ratio of specific heats
- 4 Flow rate (lb/hr, ACFM or SCFM)
- 5 Pressure and temperature upstream of valve and silencer
- 6 Maximum allowable pressure drop (PSI) for valve and silencer
- 7 Manufacturer's name, and valve type and size
- 8 Unsilenced noise levels from valve (if available)
- 9 Silenced noise level (required at desired distance from source)
- 10 Silencer inlet size and pressure rating
- 11 Inlet orientation, axial or side
- 12 Silencer orientation, vertical or horizontal
- 13 Piping arrangement, including schematic if available
- 14 Other required options

Form 88-0063 is available to record this and other information in a standard format (see page 4). Using this information, Universal will prepare computer analyses and a comprehensive technical proposal and price quotation. Silencer selection is based upon optimization of flow velocity, required acoustical performance, and pressure drop.

We are skilled in the application of process engineering principles that are needed to meet

your performance requirements successfully. A key element of a successful vent application is proper assignment of pressure drop in the piping, valve, and vent silencer. Valve performance and life can be considerably extended by appropriate distribution of pressure drop in the piping system, valve, and vent silencer. In many instances it is possible to reduce the pressure drop across the valve body to less than critical. This results in reduced valve actuator open/close force requirements. Reduced valve wear caused by cavitation damage and reduced through-valve-body noise are added benefits of this approach.

Universal can verify the valve flow and pressure drop characteristics from any valve manufacturer's data sheet. We offer a complete application engineering solution, including determination of blowdown time, bottled volume calculations, and complete valve, pipe treatment, and vent discharge acoustic performance predictions.

### Application Notes

Pipe size immediately downstream from a valve affects the noise spectrum octave band distribution. Universal Silencer has developed proprietary methods to predict this distribution and accurately select the appropriate balance

### 1 Silencer Ratings by Grade Classification

Series	Classification	Average Dynamic Insertion Loss (dBA)
HV05	Industrial	15–20
HV10	Commercial	20–30
HV15	Suburban	30–40
HV20	Residential	40–50
HV25	Critical	50–60
HV30	Hospital	60–70



# Product Description

## Vent Silencers

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### Application Notes

Pipe size immediately downstream from a valve affects the noise spectrum octave band distribution. Universal Silencer has developed proprietary methods to predict this distribution and accurately select the appropriate balance of reactive and absorptive elements in the vent silencer design.

Annular vent silencers are assembled with structural members that accommodate thermal expansion in high-temperature applications. The acoustic fill is long fiber, noncombustible, inert, vermin and moisture-resistant fiberglass of at least four-pound-per-cubic-foot density, protected by both a fiberglass cloth and a perforated metal face sheet. The silencer is packed with a minimum of 10% compression fill; pack retaining rings minimize voids and settling of the fill.

The silencer is designed so the inlet flange and diffuser are matched to the discharge rating of the valve. Often, Universal can create a more cost-effective valve and piping system by using a restrictive diffuser or orifice plate to stage the system pressure drop. For conservatism, vent silencers with restrictive diffusers are designed with pressure ratings that match the PSV inlet pressure rating. However, it is important to ensure that the control valve will not malfunction from the rated back pressure of the restrictive diffuser by reviewing the valve manufacturer's data sheet.

***Customers are encouraged to contact the Compressed Gas Association (CGA) for more standards related to preparation and cleaning for applications in pure oxygen service.***

### Construction Features

Universal vent silencers are welded heavy-duty units. The inlet nozzle and diffuser are constructed of steel and are welded. The diffuser provides controlled pressure expansion to atmosphere and uniform flow distribution through the acoustic section of the silencer.

The lined inlet plenum (expansion chamber) of the silencer is designed with a double shell separated by a layer of acoustic insulation and sound-deadening material. The inner shell is solid to prevent shell-radiated noise and migration of the acoustic fill. The transmission loss across the plenum and bottom head is comparable to the silencer attenuation.





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Acoustic & Emission Technologies

P.O. Box 411 Stoughton, WI 53589  
608-873-4272 Fax 608-873-4298  
info@universalAET.com  
www.universalAET.com

# Vent Silencer Specification Sheet

Form 88-0063

Please furnish all or as much information that is available in order to properly size the silencer

<b>Name:</b>		<b>Date:</b>							
<b>Company:</b>		<b>Tel:</b>							
<b>Address:</b>		<b>Fax:</b>							
<b>E-Mail:</b>									
<b>Project Reference:</b>									
<b>Gas Data</b>	<b>Type of Gas:</b>								
	<b>Molecular Weight:</b>								
	<b>Ratio of Specific Heats:</b>								
	<b>Pressure Upstream of Valve:</b>		psi(A)						
	<b>Temperature Upstream of Valve:</b>		°F						
<b>Blowdown Application</b>	<b>Pressurized Volume:</b>		ft <sup>3</sup>						
	<b>Maximum Blowdown Time:</b>		minutes						
	<b>Final Downstream Pressure:</b>		psi(A)						
<b>Venting Application</b>	<b>Peak Flow Rate (determined by valve mfr.):</b>		lbs/hr						
	<b>Maximum Allowable Pressure Drop:</b>		psi						
	<b>Continuous, Intermittent or Occasional Service:</b>								
<b>Valve Data</b>	<b>Maker:</b>		<b>Model:</b>						
	<b>Type:</b>	<b>Size (in):</b>	<b>Rating:</b>						
<b>Unsilenced Sound Levels</b>	<i>Please provide Unsilenced Sound Levels, if available. Include distance and direction from vent and attach any schematics, or sketches, if available. Show where the Required Silenced Sound Level applies on the sketch.</i>								
	<b>Octave Band Center Frequency (Hz)</b> Check box for SPL or PWL								
	31.5	63	125	250	500	1000	2000	4000	8000
	SPL <input type="checkbox"/> PWL <input type="checkbox"/>								
<b>Unsilenced Sound Level:</b>				dB(A) at		feet			
<b>Silenced</b>	<b>Required Silenced Sound Level:</b>				dB(A) at		feet		
<b>Mounting Requirements</b>	<b>Silencer Inlet Size and Rating:</b>								
	<b>Maximum Silencer Dimensions:</b>								
	<b>Inlet Orientation:</b>		Axial		Side				
	<b>Silencer Orientation:</b>		Vertical		Horizontal				
	<b>Supports:</b>	Skirt & Base Ring		Shell Lugs		Legs			
		Saddles		Nozzles		Other			
<b>Special Mat'l Requirements</b>	<b>Shell:</b>								
	<b>Internals:</b>								
<b>Finish</b>	<b>Standard:</b>	Hand tool cleaning, per SSPC-SP2 and solvent cleaning per SSPC-SP1 with high heat aluminum paint finish.							
	<b>Optional:</b>								
<b>Additional Comments</b>									

## **GLOBAL HEADQUARTERS**

**Universal**  
1925 Highway 51/138  
P.O. Box 411  
Stoughton, WI 53589 USA  
Phone (608) 873-4272  
Fax (608) 873-4298  
[www.universalAET.com](http://www.universalAET.com)



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