

HV Series

Combination Vent Silencers

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 Silencer to design a custom solution.

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

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

Annular Ring



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

Acousti-Tube™



- 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

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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 Silencer 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 4.5). Using this information, Universal Silencer 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 Silencer 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.

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	Hospital	50–60
HV30	Critical	60–70

Product Description

Vent Silencers

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 Silencer 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 Silencer 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.



Vent Silencer Specification Sheet

Form 88-0063 Rev. 2, 3/3/05

Tel.: 888.300.4272 • Fax: 608.873.4298 • E-mail: us@universal-silencer.com • Web: www.universalsilencer.com

∴ Please furnish all information available.

Name _____ Date _____

Company _____ Phone _____

Address _____ Fax _____

E-mail _____

Project Reference _____

Type of Gas _____
Molecular Weight _____
Ratio of Specific Heats _____

(Peak flow determined by valve mfr.) Flow Rate _____ pounds per hour

Conditions Pressure Upstream of Valve _____ PSIA

Temperature Upstream of Valve _____ °F

Maximum Allowable Pressure Drop _____ PSI

Intermittent or Continuous Service _____

Valve Type _____ Brand/Model _____ Size _____ Rating _____

Blowdown Application Pressurized Volume _____ ft³

Maximum Blowdown Time _____ minutes

Final Downstream Pressure _____ PSIA

(Please provide unsilenced noise levels if available. Include distance and direction from source and attach any schematics or sketches if available.)

Octave Band Center Frequency (Hz)

Noise Specifications

31.5	63	125	250	500	1K	2K	4K	8K

Unsilenced Noise Level _____ SPL dB(A) overall at _____ feet

Required Silenced Noise Level _____ SPL dB(A) overall at _____ feet

Mounting Requirements Silencer Inlet Size and Rating _____

Maximum Silencer Dimensions _____

Inlet Orientation _____ Axial _____ Side

Silencer Orientation _____ Vertical _____ Horizontal

Supports _____ Skirt and Base Ring _____ Shell Lugs _____ Legs

_____ Saddles _____ Nozzles _____ Other

Special Material Requirements Shell _____

Internals _____

Finish

Standard Hand tool cleaning, per SSPC-SP2 and solvent cleaning per SSPC-SP1 with high-heat aluminum paint finish.

Optional _____

Additional Comments _____