General Information

Engine Exhaust Silencers-Standard

Use one of two methods outlined to determine which silencing solution is optimal for your application.

Method 1

You must know the following information:

A exhaust flow rate (CFM)

B silencer inlet size (ft^2)

C level of silencing required

Calculate exhaust gas velocity by dividing the flow rate by the pipe area:

$$\frac{\text{exhaust flow rate (CFM)}}{\text{silencer inlet pipe area } (ft^2)}$$

Reference the pressure drop tables in the silencer spec sheets located on pages 8.3 and 8.7. Using the calculated exhaust gas velocity, find the corresponding estimated pressure drop on the table. If you have selected a silencer that achieves your silencing level requirements at an acceptable pressure drop level, you have identified the silencer that is right for you!

Exhaust Flow Rate Estimation

If exhaust flow rate is unavailable, estimate through the following equation:

$$\text{estimated exhaust flow rate} = \frac{D\ (in^3) \times \text{full load rpm} \times E \times (T^\circ + 460^\circ)}{C \times 941{,}760}$$

D = displacement in in^3
E = 0.85 efficiency for naturally aspirated engines
= 1.2 for engines with scavenging blower
= 1.4 for turbo-charged engines
T = exhaust temperature; if unknown, use 900°F for diesel and 1,200°F for gas engines
C = 1.0 (two-cycle engine) or 2.0 (four-cycle engine)

Method 2

If your pressure drop requirement is 1.0" Hg (approximately 13.62" H_2O) or less and exhaust flow rates are known, use the quick selection table below to select the most appropriate silencer without performing any calculations at all!

Regardless of the method you choose, the engine's exhaust flow rate (CFM) may be a mystery. If this is the case, use the above titled equation Exhaust Flow Rate Estimation. After estimating the exhaust flow rate, proceed with method 1 or 2.

Silencer recommendations following Method 2 are based on 1" Hg restriction and are only estimations. Considering uncontrolled variables such as piping systems, tail pipe loss, sudden expansion/contraction, flex, etc., Universal Silencer recommends that you select a unit one size larger or a low pressure unit (page 8.8) if either (a) the back pressure exceeds 1" Hg across the silencer, or (b) the back pressure is more than 50% of the allowable back pressure for the exhaust system (use the smaller of the two).

What Else Should I Know?

Universal Silencer exhaust silencers provide optimum performance for all applications by offering silencers crafted for four different attenuation grades. Due to the variability of different applications, performance levels are most accurately shown as broad range "expected attenuation bands," which are based upon typical conditions. These bands will not define the exact insertion loss for a specific application, since insertion loss is influenced by engine size, type, speed and unsilenced noise levels (see product spec sheets for attenuation, back pressure and design details).

Notes

Keep in mind that silencers are not designed to support their weight from the inlet or outlet tube, or support other components of the exhaust system, such as stacks. For the most efficient operation of all silencing units, proper mounting attachments are required.

Quick Selection Table

Inlet Pipe Area (ft^2)	Pipe Dimension (in/mm)	Industrial Silencer	Residential Silencer	Critical Silencer	Hospital Silencer
.0031	.75/19.1	41	35	29	—
.0055	1.0/25.4	73	63	52	—
.0085	1.25/31.8	113	98	80	—
.0123	1.5/38.1	163	142	117	—
.0218	2.0/50.8	288	250	206	—
.0341	2.5/63.5	450	380	325	—
.0491	3.0/76.2	650	565	470	—
.0668	3.5/88.9	880	770	640	—
.0873	4.0/101.6	1,160	1,000	830	790
.1363	5.0/127.0	1,810	1,580	1,290	1,290
.1963	6.0/152.4	2,600	2,250	1,870	1,770
.3491	8.0/203.2	4,600	3,900	3,340	3,150
.5454	10.0/254.0	7,200	6,200	5,200	4,950
.7854	12.0/304.8	10,200	8,800	7,500	7,100
1.069	14.0/355.6	14,000	12,000	10,200	9,700
1.438	16.0/406.4	18,000	15,500	13,700	13,000
1.760	18.0/457.2	23,000	19,800	16,800	16,000
2.180	20.0/508.0	28,400	24,300	20,900	19,700
2.640	22.0/558.8	34,400	29,500	25,300	24,000

Note: Find the lowest flow rate greater than or equal to the engine flow rate at the required silencing level. Exhaust flow rates are based on end-in end-out silencers. Refer to product spec sheets when determining side-in or middle side-in back pressure. Velocity should not exceed 15,000 ft/min regardless of the allowable back pressure (10,000 ft/min for spark arresting silencers).

∴ See pages 1.1–1.3 for ordering information | www.universalsilencer.com

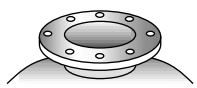
Product Specifications

Engine Exhaust Silencers-Standard

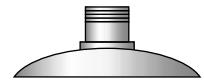
Drains are standard on all models with a 9" O.D. or larger. Models 26" or smaller have a coat of high heat-resistant paint. Models larger than 26" O.D. have a rust inhibiting primer under high heat-resistant paint. Maximum operating temperature is 1,250°F for aluminized units. Heat-resistant paint maintains its properties up to 900°F on aluminized steel and 1,100°F on mild steel.

		Industrial	Residential	Critical	Hospital	LPD-1	LPD-2	Space Saver
Application	Attenuation Level	18 dB	25 dB	35 dB	42 dB	28 dB	34 dB	25 dB
	Silencing Required	minimum	moderate	maximum	maximum	moderate	moderate to maximum	moderate to maximum
	Ambient Noise	medium to high	low to medium	low	low	medium to high	low to medium	?
Fitting	Flanged	•	•	•	•	•	•	•
	Pipe Threads	•	•	•				•
	Slotted Pipe End							•
	Companion Flanges Offered	4"–22"	4"–22"	4"–22"	4"–14"	4"–22"	4"–22"	4"–22"
Construction	Double-Wrapped Body			•	•		•	
	Type 1 End-in,End-out	•	•	•	•	•	•	
	Type 2 Side-In,Side-Out	•	•	•	•	•	•	
	Type 3 Side-In, End-Out	•	•	•	•			•
	Type 4 Middle Side-In, End-Out	•	•	•	•			
	Up to 26" O.D.	aluminized steel	aluminized steel	aluminized steel	aluminized steel	aluminized steel	aluminized steel	aluminized steel
	26" to 36" O.D.	aluminum/ mild steel	aluminum/ mild steel	aluminum/ mild steel	aluminum/ mild steel	aluminum/ mild steel	aluminum/ mild steel	aluminum/ mild steel
	Greater than 36" O.D.	mild steel	mild steel	aluminum/ mild steel	aluminum/ mild steel	mild steel	mild steel	aluminum/ mild steel

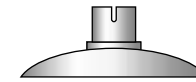
∴ See pages 1.1–1.3 for ordering information | www.universalsilencer.com



"A" Mounting Flange:
Standard in sizes 4" to 22". Drilling matches 125/150# ASA standard.



"B" Male Pipe Threads:
NPT ends offered in sizes 4" and smaller.



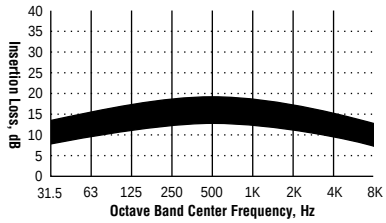
"S" Slotted Pipe Ends:
Slotted ends offered in sizes 2" through 6".

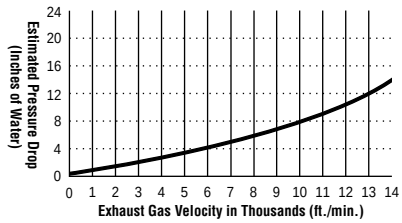
Product Performance

Engine Exhaust Silencers-Standard

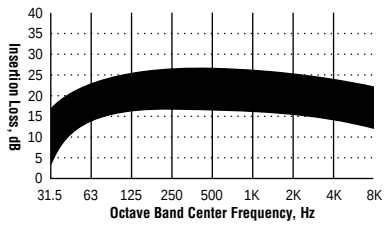
Typical Attenuation Curve

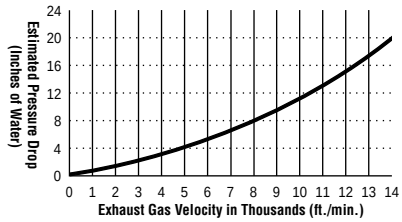
Pressure Drop



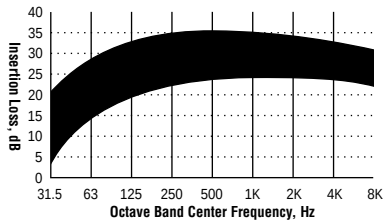


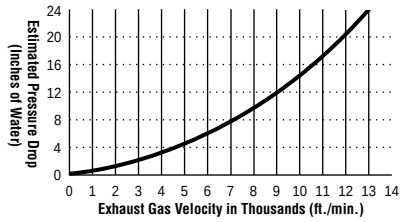
Industrial Grade



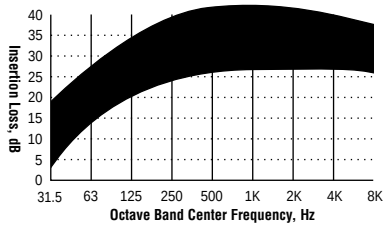


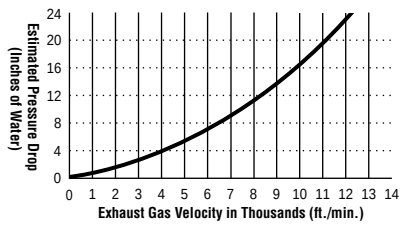
Residential Grade





Critical Grade





Hospital Grade

Note: When figuring pressure drop for side or middle side inlet, add 3" H_2O to back pressure shown on curve.

∴ See pages 1.1–1.3 for ordering information | www.universalsilencer.com