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HVAC SILENCERS



AIRMASTER EQUIPMENTS EMIRATES L.L.C.

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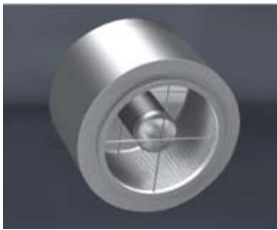
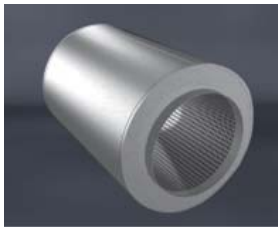
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Introduction

Since 1986, Air master Equipment Emirates LLC has operated in the Middle East and the sub-continent. Over the decades it has engaged in the manufacturing of quality air outlet products for the air-conditioning industry. At air masters our progressive growth is attributed to the hands-on approach by the top management in all aspects of commercial and technical management. A highly trained workforce, led by a team of experienced managers and engineers ensures delivery of quality engineered products to meet the clock-work schedules of our customers. At air masters we also believe it is our customer who make us what we are. Air master has participated in well over 1500 projects. We have undertaken and successfully executed projects for housing schemes, shopping malls, office complexes, hotels, hospitals, airport terminals, oil field projects, power stations etc. We recognize that the projects are the brainchild of some of the finest minds in project consultations. At air master's we have been privileged to work with the leaders amongst consultants. We at air master's are committed to providing you with the ultimate in products and services. This catalogue lists the HVAC duct silencer products manufactured by us.

**RECTANGULAR SILENCER****CIRCULAR SILENCER****CIRCULAR SILENCER**



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Construction Details

Casing

The outer shell of the silencer are constructed using zinc coated pre-galvanized sheet steel fabrications. The method of construction employs the highest standards and conforms to DW 144 industry specifications. The thickness of the sheet steel ranges from 22 gauge to 10 gauge depending upon the requirement for higher transmission losses.

Splitters

The splitters shall be fabricated using zinc coated pre-galvanized perforated steel sheets with an appropriate Acoustic media as the cavity infill. The percentage free area of the exposed perforated sheets shall be in the range of 25-50%. All splitters shall have aerodynamically designed bull-nosed leading and trailing edges.

Acoustic Media

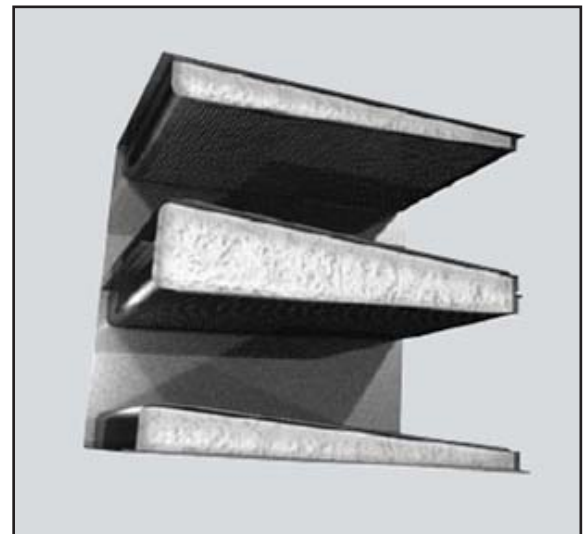
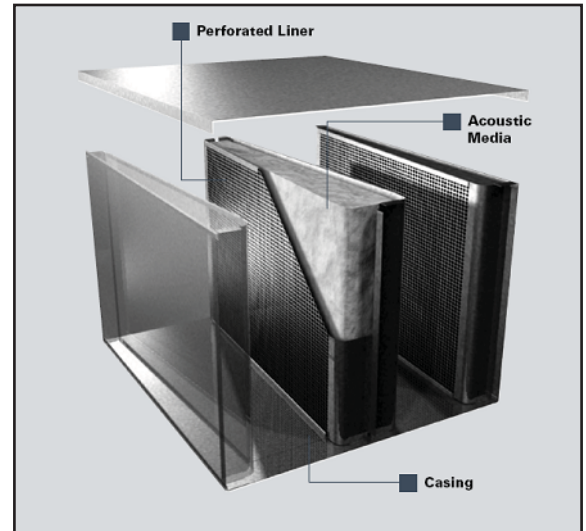
The Acoustic media is the internal sound absorptive material that absorbs the energy of the sound waves as they pass through the silencer. Fibrous or Foam type material are used as Acoustic Media as per hygiene requirements.

Liner

Liners are used to protect the internal acoustic media from erosion while encountering high velocities of air. Woven glass fibre cloth is used for all general indoor applications. For applications where moisture or other contaminants are important then film liners such as Mylar or Tedlar will be used.

Construction Standards

All components used in the construction of Airmaster Silencers conform to ASTM E84, UL723, and NFPA255 for a flame spread classification of 25 and a smoke development rating of 50.



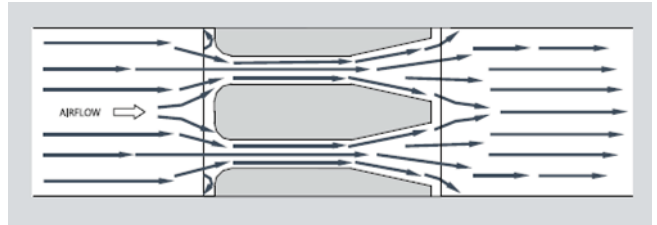


Performance Factors

When selecting a silencer to control noise in an HVAC system the following items need to be considered.

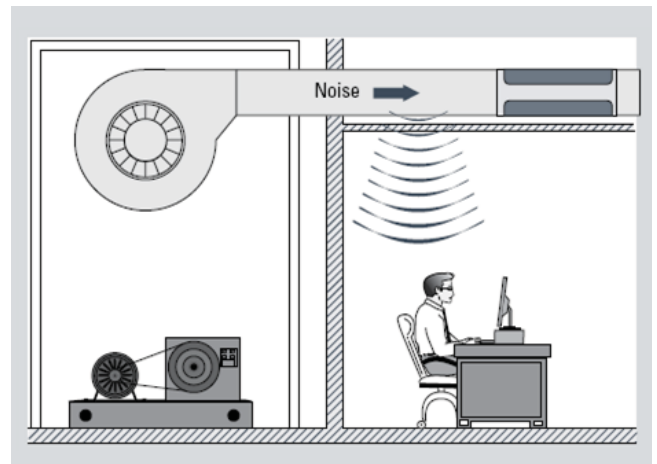
1. Airflow Direction & Velocity

The direction and face velocity of the airflow through the duct will directly affect the performance of a silencer. Both of these details must be known to make an optimum silencer selection.



2. Insertion Loss

The most important parameter in silencer selection is the insertion loss. Insertion loss is the decrease in sound pressure levels that can be expected when a silencer is inserted into the path between the source and the receiver. The data is provided as multiple dB values at octave band center frequencies typically ranging from 63 Hz to 8000 Hz.



3. Pressure Drop

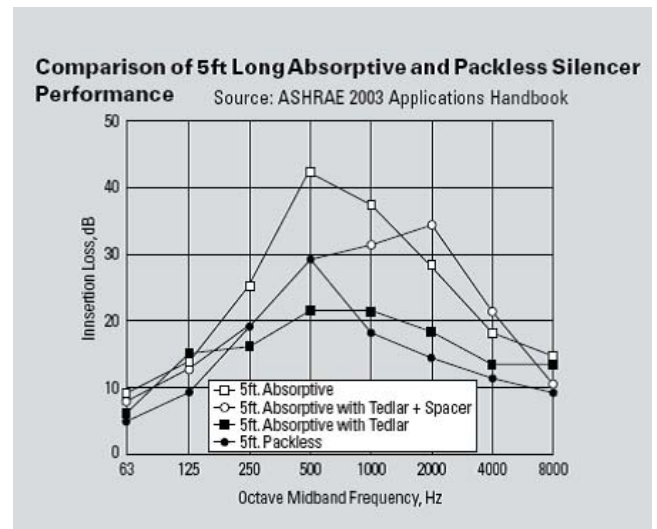
The second most important parameter in silencer selection is the added HVAC system pressure drop after inserting the silencer. A poor selection of silencer can make the entire system operate inefficiently or ineffectively. It is therefore desirable to keep the pressure drop of a silencer below 0.21 w.g. (50 Pa) for any residential or office type HVAC applications.

4. Regenerated Noise

Regenerated noise is the sound power created when airflows through a silencer at a given velocity and direction (forward or reverse). Since these values represent the amount of sound produced by the silencer a lower value will indicate better performance. It is important to note that generated noise will not affect the performance of a silencer if the generated noise levels are greater than 10 dB below the sound levels at the outlet of the silencer.

5. Transmission Loss

Transmission loss of a silencer casing describes the amount of sound that is allowed to radiate through the walls of the silencer casing. When selecting a silencer that will be installed above a noise sensitive space the transmission loss of the silencer casing, and the surrounding ductwork, should be reviewed.



Applicable Standards

All AIRMASTER Silencers are tested in our in-house testing facility according to **BS EN ISO 7235** standards for acoustic and aerodynamic performances.

BS EN ISO 7235 is an international standard published by ISO (International Standards Organization) as guideline for ascertaining the acoustic and aerodynamic performance of the duct silencers.

BS EN ISO 7235:2003 - "Acoustics. Laboratory measurement procedures for ducted silencers and air-terminal units Insertion loss, flow noise and total pressure loss."

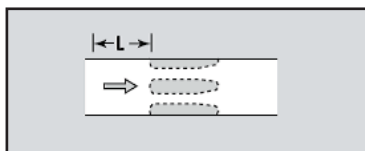
Silencer Inlet Applications



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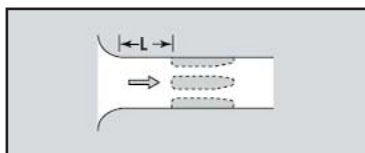
Silencer Inlet Conditions

In the examples below it can be seen that different types of conditions upstream of a silencer will result in an increased pressure drop and a deviation in cataloged performance based on the actual installation of the silencer. (L=3 to 4 duct diameters)



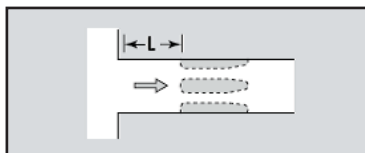
1. Straight Unobstructed Duct

The desired installation for a silencer will have 3 to 4 duct diameters of straight ductwork upstream. This type of installation will result in performance that is very similar to cataloged data.



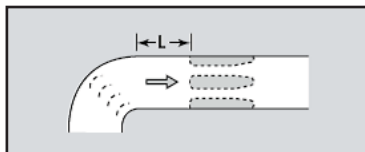
2. Free Air / Plenum with Smooth Inlet

When a silencer is installed 3 to 4 duct diameters down stream of a free air intake / plenum with smooth inlet, a pressure drop factor of **1.05** should be applied. This type of installation will result in a slight deviation from cataloged performance data.



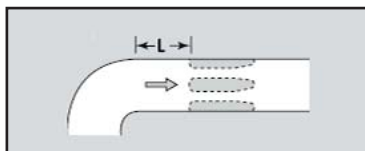
3. Free Air / Plenum with Sharp Inlet

When a silencer is installed 3 to 4 duct diameters down stream of a free air intake / plenum with sharp inlet, a pressure drop factor of **1.1** to **1.3** should be applied. This type of installation will result in a moderate deviation from cataloged performance data.



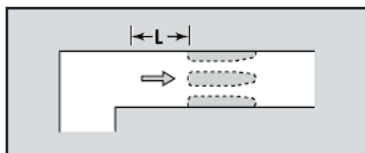
4. Radius Elbow with Turning Vanes

When a silencer is installed 3 to 4 duct diameters down stream of a radius elbow with turning vanes a pressure drop factor of **1.05** should be applied. This will result in a slight deviation from cataloged performance data.



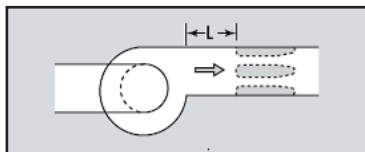
5. Radius Elbow with No Turning Vanes

When a silencer is installed 3 to 4 duct diameters down stream of a radius elbow without turning vanes a larger pressure drop factor of **1.1** should be applied. This type of installation will result in a moderate deviation from cataloged performance data.



6. Miter Elbow

When a silencer is installed 3 to 4 duct diameters down stream of a miter elbow an even larger pressure drop factor of **1.3** should be applied. This type of installation will result in a moderate deviation from cataloged performance data.



7. Fan Discharge

When a silencer is installed 3 to 4 duct diameters down stream of a fan, a pressure drop factor of **1.3** should be applied. This type of installation will result in a moderate deviation from cataloged performance data.

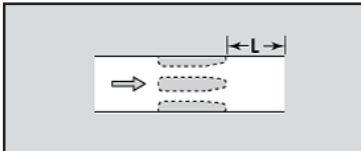


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Silencer Outlet Applications

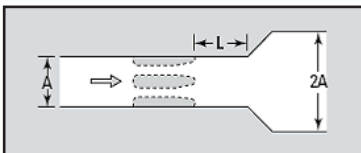
Silencer Outlet Conditions

In the examples below it can be seen that different types of conditions downstream of a silencer will result in an increased pressure drop and a deviation in cataloged performance based on the actual installation of the silencer. (L=3 to 4 duct diameters)



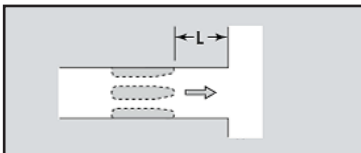
1. Straight Unobstructed Duct

The desired installation for a silencer will have 3 to 4 duct diameters of straight ductwork downstream. This type of installation will result in performance that is very similar to cataloged data.



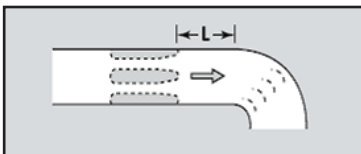
2. Free Air / Plenum with Smooth Inlet

When a silencer is installed 3 to 4 duct diameters down stream of a free air intake / plenum with smooth inlet, a pressure drop factor of **1.05** should be applied. This type of installation will result in a slight deviation from cataloged performance data.



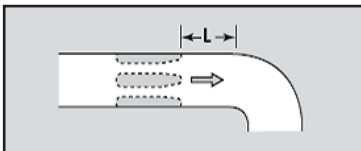
3. Free Air / Plenum with Sharp Inlet

When a silencer is installed 3 to 4 duct diameters down stream of a free air intake / plenum with sharp inlet, a pressure drop factor of **1.1 to 1.3** should be applied. This type of installation will result in a moderate deviation from cataloged performance data.



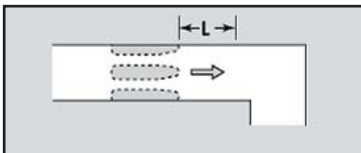
4. Radius Elbow with Turning Vanes

When a silencer is installed 3 to 4 duct diameters down stream of a radius elbow with turning vanes a pressure drop factor of **1.05** should be applied. This will result in a slight deviation from cataloged performance data.



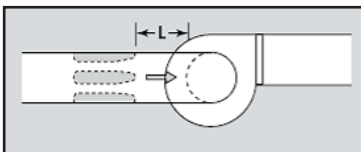
5. Radius Elbow with No Turning Vanes

When a silencer is installed 3 to 4 duct diameters down stream of a radius elbow without turning vanes a larger pressure drop factor of **1.1** should be applied. This type of installation will result in a moderate deviation from cataloged performance data.



6. Miter Elbow

When a silencer is installed 3 to 4 duct diameters down stream of a miter elbow an even larger pressure drop factor of **1.3** should be applied. This type of installation will result in a moderate deviation from cataloged performance data.



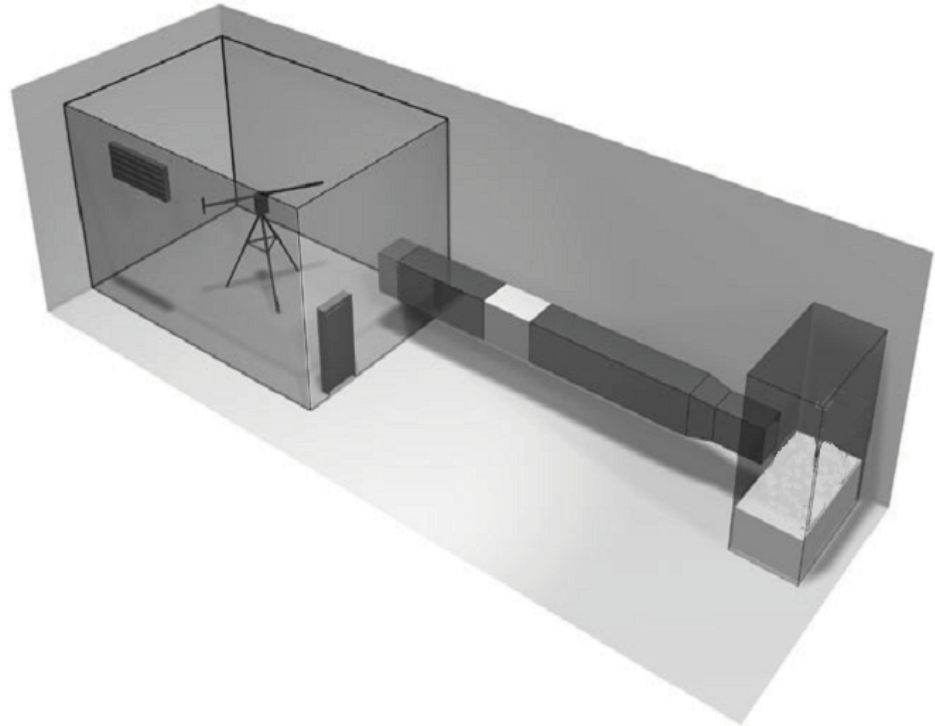
7. Fan Discharge

When a silencer is installed 3 to 4 duct diameters down stream of a fan, a pressure drop factor of **1.3** should be applied. This type of installation will result in a moderate deviation from cataloged performance data.



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Testing Methodology



Aero-Acoustic Laboratory

To obtain the dynamic insertion losses data, pressure drop characteristics and the regeneration noise of silencers, as specified in ISO 7235, the silencer unit should be installed in a straight length of ductwork that joins a single source chamber and a reverberation chamber. The ductwork upstream of the silencer entrance must be a straight run with no transitions or elbows for a minimum of 5 equivalent duct diameters, and downstream of the silencer should discharge no less than 10 equivalent duct diameters. The source chamber and the butting edges of the test duct should be constructed as a high performance sound enclosure to minimize noise breakout to a minimum. The source chamber shall be installed with a variable frequency high pressure handling fan that can produce an air velocity up to 20m/s in the test duct.

Airmaster Acoustics Pvt Ltd has developed and built a fully equipped and operational Aero-acoustic laboratory as suitable for testing the acoustic and aerodynamic performances of duct silencers according to ISO 7235 standards. The key features of our aero-acoustic testing facility are shown below:

A 600m³ Reverberation Chamber that is fully supported on an array of spring isolators and provided with non-parallel surfaces.

A 15m long rectangular/ circular test duct fabricated using 14 gauge pre-galvanized sheet steel and supported from vibration isolators.

A fan source chamber that houses a forward and reverse flow vane axial fan that can supply a duty of up to 20,000 l/s.

A signal source chamber that houses a pair of loudspeakers with a combined capacity of approximately 120dB.

A Multi-channel real time sound analyzer equipment with Type-1 accuracy for all measurements.

Rotating type microphone booms with a sweep diameter of 4.5m.

Controlled environment conditions with respect to room temperature and relative humidity conditions.