

INDUSTRIAL NOISE SERIES

Part III

NEAR-FIELD NOISE

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NEAR FIELD SOUND LEVEL

1. NEAR FIELD SOUND LEVEL

The immediate area around equipment is called the near field. The near field sound is of course the sound in that area; usually specified to be measured three feet or one meter from the equipment at five feet or 1.5 meters above grade (typical range of ear height). This also applies to structures and ducting to address breakout noise; that is, noise that comes through walls.

First, there are no regulations limiting the near field sound level, it is whatever the owner or developer determines. Frequently, a sound level limit of 85 decibels (dB) is cited but this limit does not come from U.S. OSHA (see Part IX). OSHA¹ regulates worker noise exposure, not the sound level. OSHA states that when the 8-hour time-weighted averaged (TWA) sound level equals or exceeds 85 dB the owner/operator shall institute a hearing conservation program, and to avoid this expense, the sound level around equipment is usually limited to 85 dB.

2. WHERE IS THE CRITERION?

It is important to understand the application of imposing a near field sound limit and where it is applicable. When applied to complex arrangements each position or location requires a unique amount of silencing. The following illustration shows various near field locations.

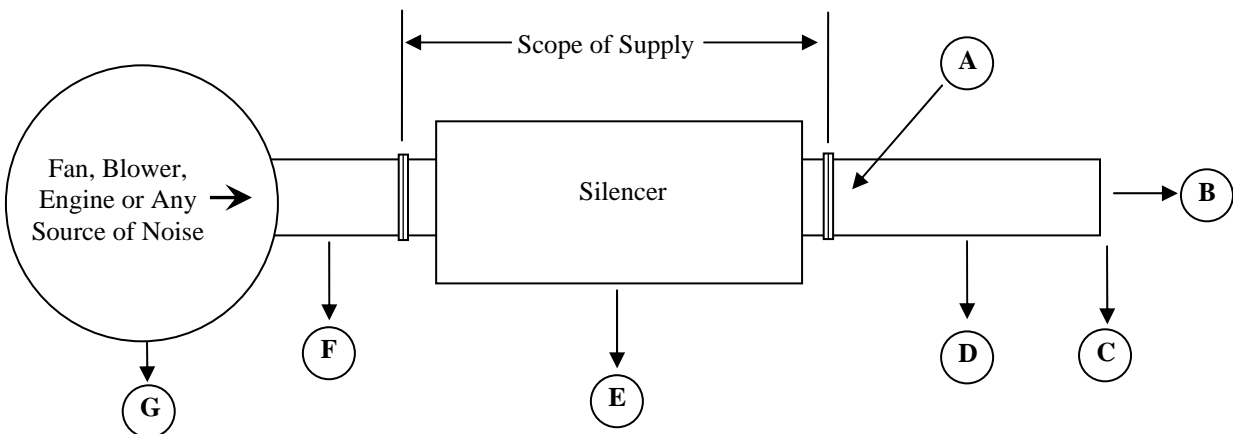


Figure 1 – Inlet, Exhaust or Vent Silencer Arrangement Showing Criterion Locations.
The connecting ducts or pipes on either side of the silencer can be very long.
The following table identifies the type of noise at each location identified in Figure 1.

¹ General Industry Standards, U.S. code of federal regulations (CFR), Title 29 Part 1910 Section 95, Occupational Noise Exposure

Table I – Type of Near Field Noise

Location	Type of Noise
A	Airborne noise inside duct
B	Airborne noise radiating directly off the opening
C	Airborne noise radiating off to the side of the opening
D, E, F	Breakout noise through (duct) walls
G	Machine noise that can include self ventilation and breakout noise

The sound level of the airborne path, as illustrated, is controlled by the amount of silencing. The breakout noise is controlled by the duct wall size and construction. The sound level around the machine depends on many factors and the supplier of the machine may have to provide specialized noise mitigation features.

The following table gives a qualitative assessment of the necessary silencing for each location. Of course, the amount of silencing depends on the sound limit specified.

Table II – Figure 1 - Descriptions of Relative Silencing

Location	Relative Amount of Silencing
A	A large amount of silencing required.
B	A little less silencing than needed for A.
C	Much less silencing than needed for B.
D	Usually less silencing than needed for C.
E	Sound level depends on the size of the silencer.
F	Silencer does not provide any noise reduction in this area.
G	This is complex and requires special study

The near field sound levels at positions D through F are easily affected by the sound level from the machine if close to the machine. This makes it difficult to determine compliance at times.

3. WHERE AND WHAT IS THE SOURCE OF NOISE?

Figure 1 shows that diligence is needed to clearly understand and specify how the sound limit applies. A sketch can easily answer and clarify a lot of questions and particularly, if the sound exiting the open end of the duct is elevated and well away from an area that could be occupied by personal. The distance from the open end of the duct to where the sound limit applies can be used to the advantage of reducing the amount (and cost) of silencing.