Genset Radiator Noise

Mark E. Schaffer, P.E.

Schaffer Acoustics Inc.
Pacific Palisades, CA

mark@schaffer-acoustics.com
**Sample Municipal Code Limits**

<table>
<thead>
<tr>
<th>Land Use</th>
<th>Daytime</th>
<th>Nighttime</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td>55 dBA</td>
<td>45 dBA</td>
</tr>
<tr>
<td>Commercial</td>
<td>65 dBA</td>
<td>60 dBA</td>
</tr>
<tr>
<td>Industrial</td>
<td>75 dBA</td>
<td>75 dBA</td>
</tr>
</tbody>
</table>

Codes *usually* require compliance during testing, but not during emergency operation.
Skid-Mounted Radiator
1500 KW Genset Mechanical Noise

With Radiator, 92 dBA

Without Radiator, 89 dBA

Octave Band Center Frequency in Hertz

L_p @ 15 meters in dB

ASHRAE TC 2.6
Acoustical Louver

**Length**
4” – 12 “

**Insertion Loss**
3 – 10 dBA

**Pressure Drop**
~0.25” w.g.
@ 500 FPM
Lined Duct Transition

**Length**
30” – 120”

**Insertion Loss**
1 to 5 dBA

**Pressure Drop**
0.0” w.g.
Sound Traps

Length
30” – 120”

Insertion Loss
10 to 40 dBA

Pressure Drop
0.05” to 0.30” w.g.
@ 500 FPM
Typical Low Noise 1.5 MW Genset Installation

118,000 CFM

Intake Air Sound Traps

Generator

Disch. Air Sound Traps

10’ long, 236 ft² face area
Low Noise Genset Installation with Remote Radiator

40,000 CFM

10’ long, 80 ft² face area

ASHRAE TC 2.6
Vertical Core Remote Radiator

Note narrow fan blades
Horizontal Core Remote Radiator
Remote Radiator Installation
Remote Radiator

Air Inlet View

Note wide fan blades
Radiator Noise Levels

Octave Band Center Frequency in Hertz vs. \( L_p @ 15 \) meters in dB

- **84” Skid-mounted**
- **64” Remote**
- **81” Remote**
- **93” Remote**
Fan Noise Level vs RPM

ASHRAE TC 2.6
**Differential Costs of Remote Radiator for 1500 KW**

<table>
<thead>
<tr>
<th></th>
<th>Skid-Mounted Radiator</th>
<th>Remote Radiator</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sound traps</strong></td>
<td>$94,400</td>
<td>$32,000</td>
</tr>
<tr>
<td><strong>Radiator</strong></td>
<td>($25,000)</td>
<td>($25,000)</td>
</tr>
<tr>
<td><strong>Room Ventilation</strong></td>
<td>$5000</td>
<td>$20,000</td>
</tr>
<tr>
<td><strong>Radiator Piping</strong></td>
<td>---</td>
<td>$10,000+</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>$99,400</td>
<td>$62,000+</td>
</tr>
</tbody>
</table>
Remote Radiator Benefits

- Smaller ventilation opening (1/2 to 2/3 smaller)
- Fewer or shorter sound traps (1/2 to 2/3 reduction)
- More space in generator room
- Option to select quiet radiator
- Option to locate radiator for lowest noise exposure to noise-sensitive areas
Radiator Noise Control Summary

- **Use acoustical louvers or sound traps for a skid-mounted radiator, if space is available.**
- **Consider remote radiator if space precludes sound traps for skid-mounted radiator.**
- **Consider several remote radiator fan selections, weighing cost, location and size.**
- **Consider VFD fan motor for lower speed & lower noise during cooler nighttime ambient air conditions.**