

Performance Data Explanation

Sound Power Levels vs. NC Levels

The **Nailor Models: 3210, 3230 and 3240** dual duct terminal unit performance data is presented in two forms.

The laboratory obtained discharge and radiated sound power levels in octave bands 2 through 7 (125 through 4000 Hz) center frequency for each unit size at various flow rates and inlet static pressures is presented. This data is derived in accordance with ANSI/ASHRAE Standard 130 and AHRI Standard 880. This data is "raw" with no attenuation deductions and includes AHRI Certification standard rating points.

Nailor also provides an NC Level table as an application aid in terminal selection, which include attenuation allowances as explained below. The suggested attenuation allowances are not representative of specific job site conditions. It is recommended that the sound power level data be used and a detailed NC calculation be performed using the procedures outlined in AHRI Standard 885, Appendix E for accurate space sound levels.

Explanation of NC Levels

Tabulated NC levels are based on attenuation values as outlined in AHRI Standard 885 "Procedure for Estimating Occupied Space Sound Levels in the Application of Air Terminals and Air Outlets". AHRI Standard 885, Appendix E provides typical sound attenuation values for air terminal discharge sound and air terminal radiated sound.

As stated in AHRI Standard 885, Appendix E, "These values can be used as a quick method of estimating space sound levels when a detailed evaluation is not available. The attenuation values are required for use by manufacturers to catalog application sound levels. In product catalogs, the end user environments are not known and the following factors are provided as typical attenuation values. Use of these values will allow better comparison between manufacturers and give the end user a value which will be expected to be applicable for many types of space."

Radiated Sound

Table E1 of Appendix E provides radiated sound attenuation values for three types of ceiling: Type 1 – Glass Fiber; Type 2 – Mineral Fiber; Type 3 – Solid Gypsum Board.

Since Mineral Fiber tile ceilings are the most common construction used in commercial buildings, these values have been used to tabulate Radiated NC levels.

The following table provides the calculation method for the radiated sound total attenuation values based on AHRI Standard 885.

| | Octave Band | | | | | |
|------------------------------------|-------------|-----------|-----------|-----------|-----------|-----------|
| | 2 | 3 | 4 | 5 | 6 | 7 |
| Environmental Effect | 2 | 1 | 0 | 0 | 0 | 0 |
| Ceiling/Space Effect | 16 | 18 | 20 | 26 | 31 | 36 |
| Total Attenuation Deduction | 18 | 19 | 20 | 26 | 31 | 36 |

The ceiling/space effect assumes the following conditions:

1. 5/8" (16) tile, 20 lb/ft³ (320 kg/m³) density.
2. The plenum is at least 3 feet (914) deep.
3. The plenum space is either wide (over 30 feet [9 m]) or lined with insulation.
4. The ceiling has no significant penetration directly under the unit.

Discharge Sound

Table E1 of Appendix E provides typical discharge sound attenuation values for three sizes of terminal unit.

1. Small box: Less than 300 cfm (142 l/s)
(Discharge Duct 8" x 8" [203 x 203]).
2. Medium box: 300 – 700 cfm (142 - 330 l/s)
(Discharge Duct 12" x 12" [305 x 305]).
3. Large box: Greater than 700 cfm (330 l/s)
(Discharge Duct 15" x 15" [381 x 381]).

These attenuation values have been used to tabulate Discharge NC levels applied against the terminal airflow volume and not terminal unit size.

The following tables provide the calculation method for the discharge sound total attenuation values based on AHRI Standard 885.

| Small Box <300 cfm | Octave Band | | | | | |
|---|-------------|-----------|-----------|-----------|-----------|-----------|
| | 2 | 3 | 4 | 5 | 6 | 7 |
| Environmental Effect | 2 | 1 | 0 | 0 | 0 | 0 |
| 5 ft. (1.5 m) 1" (25) Duct Lining | 2 | 6 | 12 | 25 | 29 | 18 |
| Branch Power Division (1 outlet) | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 ft. (1.5 m), 8 in. dia. (203) Flex Duct | 5 | 10 | 18 | 19 | 21 | 12 |
| End Reflection | 10 | 5 | 2 | 1 | 0 | 0 |
| Space Effect | 5 | 6 | 7 | 8 | 9 | 10 |
| Total Attenuation Deduction | 24 | 28 | 39 | 53 | 59 | 40 |

| Medium Box 300 – 700 cfm | Octave Band | | | | | |
|---|-------------|-----------|-----------|-----------|-----------|-----------|
| | 2 | 3 | 4 | 5 | 6 | 7 |
| Environmental Effect | 2 | 1 | 0 | 0 | 0 | 0 |
| 5 ft. (1.5 m) 1" (25) Duct Lining | 2 | 4 | 10 | 20 | 20 | 14 |
| Branch Power Division (2 outlets) | 3 | 3 | 3 | 3 | 3 | 3 |
| 5 ft. (1.5 m), 8 in. dia. (203) Flex Duct | 5 | 10 | 18 | 19 | 21 | 12 |
| End Reflection | 10 | 5 | 2 | 1 | 0 | 0 |
| Space Effect | 5 | 6 | 7 | 8 | 9 | 10 |
| Total Attenuation Deduction | 27 | 29 | 40 | 51 | 53 | 39 |

| Large Box >700 cfm | Octave Band | | | | | |
|---|-------------|-----------|-----------|-----------|-----------|-----------|
| | 2 | 3 | 4 | 5 | 6 | 7 |
| Environmental Effect | 2 | 1 | 0 | 0 | 0 | 0 |
| 5 ft. (1.5 m) 1" (25) Duct Lining | 2 | 3 | 9 | 18 | 17 | 12 |
| Branch Power Division (3 outlets) | 5 | 5 | 5 | 5 | 5 | 5 |
| 5 ft. (1.5 m), 8 in. dia. (203) Flex Duct | 5 | 10 | 18 | 19 | 21 | 12 |
| End Reflection | 10 | 5 | 2 | 1 | 0 | 0 |
| Space Effect | 5 | 6 | 7 | 8 | 9 | 10 |
| Total Attenuation Deduction | 29 | 30 | 41 | 51 | 52 | 39 |

1. Flexible duct is non-metallic with 1" (25) insulation.
2. Space effect (room size and receiver location) 2500 ft.³ (69 m³) and 5 ft. (1.5 m) distance from source.

For a complete explanation of the attenuation factors and the procedures for calculating room NC levels, please refer to the acoustical engineering guidelines in the Nailor Terminal Units Catalog and AHRI Standard 885.