

Performance Data Caveat

Comparing Manufacturers' Sound Power Levels and NC Levels

CAUTION – ROUGH ROAD AHEAD

Many engineers rely on the NC tables in manufacturers' catalogs to give them both an estimate of noise levels in their proposed finished spaces and a comparison between manufacturers. This is a relatively easy process for the consultant or the contractor because NC values are a single number comparison and they are readily found in manufacturers' catalogs; however, THIS WILL NOT WORK. And that is the problem.

There is only one standard for predicting occupied space sound levels. It is ARI Standard 885, "Procedure for Estimating Occupied Space Sound Levels in the Application of Air Terminals and Air Outlets". Until the current version, ARI Standard 885-98, was released in early 2000, there were no recommended attenuation values for manufacturers to use when preparing catalogs. Consequently, each manufacturer was on his own to develop what criteria he wished to use for calculating the attenuation values in each sound path from the equipment and into the room. A careful examination of different manufacturers' catalogs will show a large variation. For example, a range from approximately 17 dB to 40 dB attenuated in the second octave band for radiated sound. You can find similar variations in octave bands 3 through 7. Yet they all claim to be ARI Certified. How can this be?



First, ARI certification does not encompass NC levels or any other room sound level predictions. There are no ARI certified NC values. ARI certifies only sound power levels as measured in a reverb room. Furthermore, ARI only certifies and tests units at one operating condition, the "Certified Rating Point". That is at 1.5" w.g. inlet static pressure and 2000 fpm inlet velocity. On fan powered terminal units, they also test the fan only condition with the fan set at the manufacturer's suggested maximum rating point. These fan set points may or may not match the respective primary damper airflows. These are the only points where ARI tests a terminal unit. They are not necessarily typical operating points for terminal units, and, in fact, most units are not operating at these points. However, if the manufacturer meets his submitted performance data at these points, then his equipment is ARI certified. Except for periodic testing, that is the end of ARI certification.

Second, as mentioned above, each manufacturer, up until now, has used whatever attenuation values he pleases to predict room sound levels for each sound path into the room. These values are deducted from the raw sound power levels that are generated per ASHRAE Standard 130 "Methods of Testing for Rating Ducted Air Terminal Units" and ARI Standard 880 "Air Terminal Units" to arrive at the predicted sound pressure levels and NC value in the space. If his equipment is very noisy, he may choose to use very high attenuation values to make his equipment look more competitive. If his equipment is quiet, he may use more reasonable values. Since the raw sound power levels are derived under ARI Standard 880, it might be assumed that all sound power level data and NC values are ARI certified, when they are not. Look closely, the ARI certification label is not supposed to be displayed on the page with the NC values. You should only find it on the page showing the sound power levels at the ARI certification rating points.



Comparing Manufacturers' Sound Power Levels and NC Levels (continued)

Another trick most manufacturers are now using is not tabulating application sound power levels at 1.5" w.g. inlet static pressure. By omitting this data from the catalog, it becomes very difficult to check it against the ARI rating points in the smaller boxes at the bottom of their respective catalog pages. **BEWARE THOSE MANUFACTURERS NOT SHOWING THE 1.5" W.G. INLET STATIC PRESSURE PERFORMANCE COLUMN WITH THE REST OF THEIR SOUND POWER LEVELS.** They may be attempting to make it hard for you to compare their relative data points.

ARI Standard 885-98 attempts to correct some of these problems. You will find in Appendix E, on the last page of the standard, a list of recommended deductions that can be used for charting catalog performance in predicting NC values in unknown conditions. This will even the playing field somewhat, but only after all the manufacturers have reprinted their catalogs. This can take up to 4 or 5 years. In the meantime, if you wish to use the NC values, be sure to specify NC values as calculated per ARI Standard 885-98, Appendix E. However, there are still shortcomings concerning the use of cataloged NC values.

Since NC values are single numbers, they do not reflect which octave band is setting the value (where the noise peaks). This can still cause some confusion. Units peaking in the 3rd or 4th octave bands are likely to be quieter in the room than those peaking in the 2nd octave band. They will also add noise differently to the other noise levels in the space, which will change the type of noise heard by the occupant. It is impossible to determine rumbly from hissy or neutral spectrums using only NC values. That is why ASHRAE no longer recommends using NC values for room noise level predictions. They now recommend RC values. RC values are averaged numbers with quality descriptors. (For a complete description of these ratings, see ARI Standard 885-98. It also describes why RC values cannot be applied to equipment because of their respective averaged values. You can download a free copy of ARI Standard 885-98 at www.ari.org on the Internet).

It is also important to note that the deductions in Appendix E of ARI Standard 885-98 are typical of a large number of averaged conditions. They are described in detail in the standard. However, this does not mean that they are relative to your job. They certainly are not specific to your job. They may be similar, and they may have no similarity at all. That is what ARI Standard 885 is all about: how you can reasonably predict the room sound levels of a particular room in a particular building with the proper known construction and finishing details. This could never be done in a manufacturer's catalog because these conditions are unknown at the time the catalog is printed. While Appendix E may be typical of an average office space, it is specific to none. Consequently it can only be used as general criteria.

The only way to compare performance between manufacturers using their respective catalogs is to look at their sound power levels as generated in reverb rooms. Those are the sound power levels by octave band, which are listed in all the catalogs. This is more difficult than single number comparisons, but it is the only way to compare without testing each unit in a fixed mock up environment. It is also the only way to add the sound pressure levels contributed by other pieces of equipment such as air handlers, ducts, dampers, terminal devices, etc. (This addition process by octave band is also described in ARI Standard 885.) Using these added numbers, the resultant sound pressure levels for the room can then be plotted on an RC chart to predict the room sound pressure level and quality.

All the NC values found in this catalog are calculated using Appendix E of ARI Standard 885-98.

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GENERAL PRODUCT OVERVIEW

