ENGINEERING BULLETIN

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PRODUCT: Fan Powered Terminal Units – Model Series 35SXC STEALTH™ XC

SUBJECT: Model Series 35SXC STEALTH™ XC Quick Overview

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Acoustical Privacy in Exposed Utility Space Applications

The architectural advantages of an exposed utility space (EUS) in place of a suspended acoustical tile ceiling can be debated, but the fact is that they are a reality, often in prime spaces. The removal of the acoustical tiles, however, has exposed design issues seldom considered in the past. The lack of an acoustical barrier between the occupant and overhead mechanical equipment has made it necessary to reconsider the selection criteria of noise making HVAC equipment. It has been found that it changes the overall acoustical nature of the space in terms of sound transmission from sources in the space itself, sound reverberation times, and the effects on air distribution and thermal comfort. When the suspended ceiling is not present to help in absorbing sound generated both in the occupied space and from the above EUS, the resultant acoustical environment in the occupied space becomes more sensitive to sound generated by the mechanical equipment and other noise sources in the space above the occupied zone.

After several years of research and development, Nailor has designed a series fan terminal specially designed to operate in the EUS environment, the 35SXC (STEALTH™ XC/ STEALTH™ with exposed ceiling). Utilizing a highly effective inlet silencer along with carefully integrated interior construction elements, a design has been created that has an acoustical profile that complements the observed space attenuation found with EUS designs.

Difference between 35SST and 35SXC

The result is an acoustical signature that closely follows the NC curves in several frequencies. The following graph illustrates the difference between the 35SST (STEALTH™) and the 35SXC (STEALTH™ XC) in EUS mockup tests.

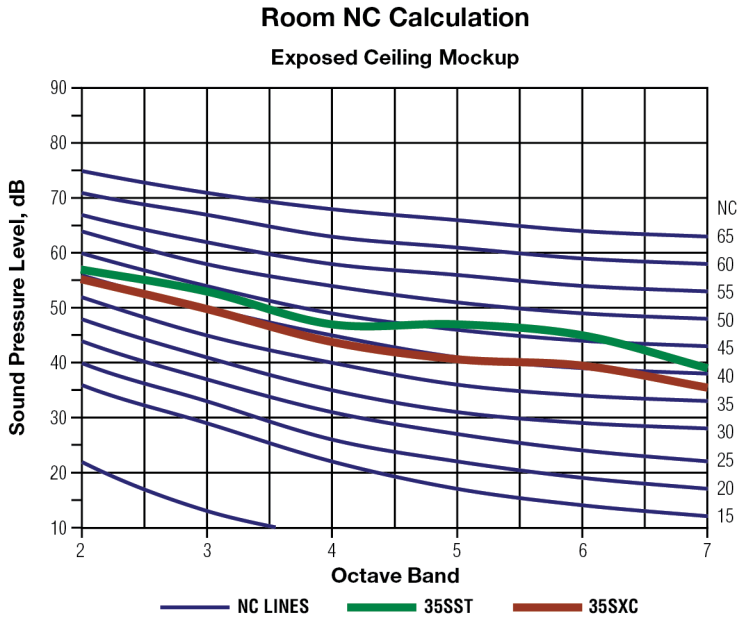

Figure 1. 35SST and 35SXC comparison, mockup room.

Economic Considerations.

By creating an acoustical signature optimized for EUS applications it is possible to use close to the same number of 35SXC terminals to deliver the same air quantities to the space as a design utilizing the 35SST with a suspended acoustical ceiling. In addition, the room sound level with the 35SXC design will be an RC-Neutral, helping to overcome the "hissy" sound that results with most fan box designs when there is no ceiling to absorb high frequency sounds coming from other noise sources above the occupied space, allowing for a design of NC40-45 where an NC35-40 is more often required to achieve the same "acoustical quality" with a suspended acoustical tile ceiling.

Problem With Using AHRI 885 Recommended Sound Deductions for EUS Applications.

AHRI Standard 885 has a recommended, but largely untested procedure for estimating sound when there is an EUS. This technique has been found to grossly underestimate the resultant space sound pressure, as shown in the following graph, likely because it fails to account for the now significant effects of other sound sources in the upper part of the space. In this test, measured NC was found to be 5 NC higher than predicted, and set in the 3rd to 6th octave bands, instead of the 2nd.

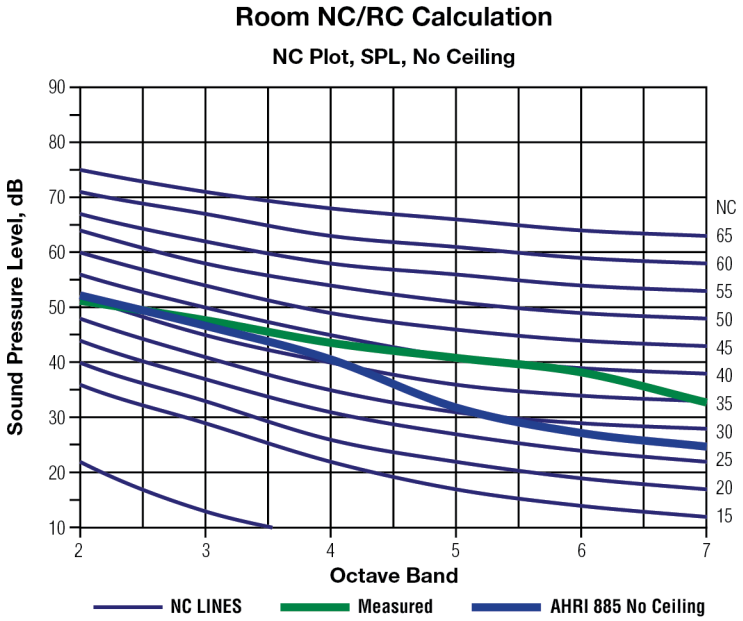

Figure 2. Measured vs estimated sound using AHRI 885 method for exposed plenums.

Appendix E is designed primarily as a means for comparing different manufacturer's sound data with a level playing field. It appears that to do so with an EUS may lead to a serious understatement of the sound levels that will result. As there is presently no industry agreed upon "EUS Transfer Function", designs for spaces with exposed equipment may well require mockup tests. Issues such as type of ducts supplying and leaving terminals will have to be considered, and even single duct VAV terminals may well have similar issues.

Everyone involved needs to understand that the EUS environment differs significantly from the traditional open office with a suspended acoustical tile ceiling. The design requirements are significantly different, and acoustical specifications need to take all this into account if acceptable acoustics are to be found in the resultant spaces. After construction it will be very difficult to make changes to meet the new reality of the EUS designs.