

January 2, 2020

Nailor Selectworks Selecting Watts/CFM for 33SZ and 35FH

Our code has dictated that we separate the mechanical/sensible cooling from the latent cooling in many applications design. The exception is if that mechanical cooling component can achieve 0.12 watts/CFM or less during ventilation only mode. If this exception is met, the component may remain on and part of the operation during ventilation.

The criteria for 0.12 watts/cfm is still fairly new for most manufacturers. Nailor has been doing it for a few years now with the introduction of their DOAS Fan Powered Terminal Unit (33SZ) and now the 35FH Fan Coil. The means of accomplishing this is due to the Epic Controller and Dynamic Control Strategy. Nailor Selectworks has added the watts per CFM column to the program outputs. However, these values and their calculations need to be adjusted to report values based on the right mode of operation. We have had to “trick” the program to get the correct information. We are hopeful that the new release of the software will be making this much easier. After initial unit performance selection, the program allows you to switch between Max CFM and Min CFM in the details screen of the selected unit. But the program doesn’t adjust the static pressure respective of the decreased airflow. So, in order to “trick” the program for lack of better term, we need to populate the max unit CFM with the ventilation rate and manual adjust the external static pressure while maintaining the selected model size. Select the unit in both design cooling mode and again at the ventilation mode.

For example, using a design criteria for a fan coil of 2,000cfm primary cooling and 0.5” ESP, we would select a model 35FH size 20. The standard minimum turn down is 800cfm (40% of nominal). It should be able to go lower but we are limited by the program. A reduction of airflow from 2000cfm to 800cfm reduces our static pressure to 0.08” as calculated through the Fan Law calculating static pressure change in relation to airflow:

$$\frac{SP_2}{SP_1} = \left(\frac{CFM_2}{CFM_1}\right)^2 \quad \frac{SP_2}{0.5"} = \left(\frac{800\text{ cfm}}{2000\text{ cfm}}\right)^2 \quad SP_2 = 0.08"$$

At the 800cfm level and decreased static pressure we are achieving less than 0.09 watts/cfm. Be certain to include Nailors dynamic controlled ECM.

First select the unit at the design conditions:

Design Performance Criteria	Tag1	Model	Quantity	Unit Size	Cig Fan Max (cfm)	OutletSP (in wg)	Motor Type	FiltersSP (in wg)	Unit TotalSP (in wg)	Application Watts Per CFM
FCU-1-1	D35FH		1	20	2000	0.5	ECM w/ Dynamic Controls	0.1	0.6	0.3835

Then select the unit for the reduced airflow and static pressure:

Ventilation Mode Criteria	Tag1	Model	Quantity	Unit Size	Cig Fan Max (cfm)	OutletSP (in wg)	Motor Type	FiltersSP (in wg)	Unit TotalSP (in wg)	Application Watts Per CFM
FCU-1-2	D35FH		1	20	800	0.08	ECM w/ Dynamic Controls	0.01	0.09	0.085

This is easily done line by line for fewer unit quantities. If the project contains a large number of units, it would be too cumbersome to select each line. In that case the evaluation can be done by exporting the original design unit selections, modifying the airflow while maintaining the unit size, and importing back into the program under a different file name. An Engineering White Paper will be released on the proper way to export/import with Selectworks.

If there are any questions or concerns, please feel free to contact the engineering department.

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