INTERPRETATION IC 90.1-2010-39 OF
ANSI/ASHRAE/IES STANDARD 90.1-2010
Energy Standard for Buildings Except Low-Rise Residential Buildings

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Reference: This request for interpretation refers to the requirements presented in ANSI/ASHRAE/IES Standard 90.1-2010, Section G3.1.1 and Table G3.1.1A, regarding Baseline HVAC System Type and Description.

Background: I am completing a LEED energy model for an electrical substation building that has a high internal heat loads due to the equipment used. In our specific model, we have a higher percentage of rooms commonly considered minor parts of other typical projects such as electrical and mechanical rooms. In the ASHRAE 90.1 2010 standard scope, industrial buildings are covered by this standard (Section 2.1a item 4). This appears to be a change from the 2007 edition.

Our design requires approximately 90% of the spaces to maintain a cooling design temperature that is 10°F above the ambient air condition. That is the spaces will be no more than 10°F hotter than outside on the cooling design day. We use supply fans to move outside air through the space which will remove the heat internal of the space since it is cooler than the spaces design temperature. This air will then be exhausted outside through relief damper/louvers. Sensible output cooling capacity of our system is calculated by the sensible heat equation [$q_{sensible} = Q\ c\ (T_{space\ air} - T_{outside\ air})$] given fan airflow, constant (Density specific heat product), space design temperature, and an outside air temperature. Also, because of the high equipment heat loads in the spaces, most of the spaces within our building require cooling systems that meet the criteria of the cooled conditioned space definition. This is because we are using a cooling system that has a greater than a sensible output capacity of 5btu/h ft^2 of floor area. Therefore, we have non-mechanical cooling systems for these spaces. It should be noted that the cooling capacity of both a DX mechanical cooling system and a non-mechanical fan cooling system is obtained by outside air.

We are seeking to confirm our interpretation of which baseline system we should be comparing our proposed model to. To determine the baseline system type, Appendix G, Section 3.1.1, with reference to Table G3.1.1A, is used. It states for a building with our description (nonresidential, has 3 floors, electrical energy source, and is 32000 square feet) would need to use a baseline of system 6. Section G3.1.1 has exceptions of which we see only two that could have impact (exceptions b and e). Exception b may apply to separate single-zone areas with loads that differ significantly from the rest of the building. We will review this and are clear with how to do this and do not need further interpretation. We would like to discuss how exception e of section G3.1.1 relates to our building.

The way we interpret this exception, G3.1.1(e) places "heating only *systems*" as a qualifier for each item in the list of thermal zones. This way it could read:

"Thermal zones designed with heating only *systems* in the *proposed design*, serving
storage rooms,
stairwells,
vestibules,
electrical/mechanical rooms, and
restrooms not exhausting or transferring air from mechanically cooled thermal zones in the *proposed design*
shall use System type 9 or 10 in the *baseline building design*."

If this interpretation is correct, heating only systems in the proposed model are the only systems that would be required to have the baseline model modified to system type 9 or 10. In many areas of our building, we have sub-systems that utilize heating and non-mechanical cooled systems that use outside airflow for temperature control and have space cooling requirements greater than the cooled conditioned space definition (5btu/h ft^2). This would, in some instances, allow our proposed fan cooling only (non-mechanical cooling) system to be compared against a baseline design of system 6 (Packaged VAV with PFP Boxes).

If this interpretation is not agreed to, it appears that we would have to use system type 9 or 10 as the baseline case. Since Section G3.1.2.9.2 indicates that System types 9 and 10 should use the same type of controls in both the baseline and proposed systems, we would not be able to take of advantage of improved control methods we plan to use in the proposed system such as variable air volume to show energy savings.

Interpretation No. 1: Exception e to Section G3.1.1 places heating only systems as a qualifier for each item in the list of thermal zones and those zones shall use System type 9 or 10 in the baseline building design. However, exception e does not apply if a system has a proposed design that is not heating only since it also utilizes a non-mechanical cooling system. The system will have a cooling output capacity as determined by the sensible heat equation that meets the cooled, conditioned space definition (by exceeding 5 Btu/h ft^2 of floor area). The cooling capacity of an enclosed space may be met by using fans to move airflow from a cooler outside air temperature to a hotter space temperature. It should be noted that the cooling capacity of both a DX mechanical cooling system and a non-mechanical fan cooling system is obtained by outside air.

Question No. 1: Is this interpretation correct?

Answer No. 1: No.

Comments No. 1: Proposed design systems that include only heating and ventilation are mapped to baseline systems 9 and 10

Interpretation No. 2: Section G3.1.2.9.2 indicates that if the Proposed Building Design includes a fan(s) sized and controlled to provide non-mechanical cooling, the baseline Systems 9 and 10 shall include a separate fan to provide non-mechanical cooling, sized and controlled the same as the proposed building design. Thus, the fan power and motor efficiency are the only areas where the baseline and proposed non-mechanical cooling systems are allowed to differ, with the baseline parameters set as prescribed in Section G3.1.2.10, and the corresponding parameters of the proposed fan based on the specified equipment.

Question No. 2: Is this interpretation correct?

Answer No.2: Yes.