



## **Tech Tip # 101**

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### **DOAS Pre-Requisites for LEED Credits and Compliance to ASHRAE 90.1**

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#### **Introduction**

The LEED rating systems are based on accepted energy and environmental principles and strike a balance between known, established practices and emerging concepts. In LEED 2009, the allocation of points between credits is based on the potential environmental impacts and human benefits of each credit with respect to a set of impact categories. The impacts are defined as the environmental or human effect of the design, construction, operation, and maintenance of the building, such as greenhouse gas emissions, fossil fuel use, toxins and carcinogens, air and water pollutants, and indoor environmental conditions.

Desert Aire dehumidifiers can be applied in many ways in order to earn credits. The Energy and Atmosphere and Indoor Environmental Quality are key areas of the standard where application of Dedicated Outdoor Air System Units can assist in obtaining credits. Desert Aire DOAS units are designed to provide high levels of efficiency for their specific purpose and have positive impacts on other HVAC systems in the building. Application can assist in optimization of energy use and allow for monitoring and increased delivery of outdoor air as prime examples.

In addition to the specific credits that are the basis for certifications awarded, there are minimum requirements that must be met. This paper focuses on EA Prerequisite 2: Minimum Energy Performance.

#### EA Prerequisite 2: Minimum Energy Performance

LEED EA Prerequisite 2 has several options for compliance to the prerequisite. Option 1 is a whole building model energy simulation. Among the base requirements of this option is compliance with the mandatory provisions (Sections 5.4, 6.4, 7.4, 8.4, 9.4 and 10.4) in Standard 90.1-2007.

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Section 6.4 of ASHRAE 90.1 is specific to HVAC equipment and system equipment efficiencies, verification, and labeling requirements. The section indicates that the requirements apply to specific equipment indicated in the tables in the standard.

- Air Conditioners and Condensing Units
- Heat Pumps
- Water-Chilling Packages
- Packaged Terminal and Room Air Conditioners and Heat Pumps
- Furnaces, Duct Furnaces, and Unit Heaters
- Boilers
- Heat Rejection Equipment

Although in some respects a dedicated outdoor air system may be considered air conditioning equipment or contain a heat pump cycle for heating, the tables indicate minimum performance in reference to specific standards. For air conditioners and heat pumps the standard referenced is AHRI 210/240 or AHRI 340/360 depending on the unit capacity. These standards do not apply to DOAS systems due to both the specifics of the AHRI standards and the testing conditions.

1. Based on the Functions indicated in both the AHRI 210/240 and 340/360 standards, the Air Conditioner tested in this standard “provides air-circulation”. Although DOAS units move air, “air circulation” through the space is not a function of the machine.
2. Conditions indicated in the AHRI standards referenced do not apply to 100% outdoor air units. The Standard Rating Conditions, Cooling reflect an “Indoor Section” condition of 80°F dry bulb and 67°F wet bulb coincident with an Outdoor Section condition of 95°F dry bulb and 75°F wet bulb. In essence, there is no indoor section to a dedicated outdoor air system. The use of a separate value for air over the conditioning section and the condensing section would not be logical. In calculating IEER according to the AHRI standards, the outdoor condition is a calculation based on the unloading capability of the machine. With a DOAS unit this would be circular logic. The resultant values in any case would not provide a comparison or realistic value for energy efficiency as defined in the 90.1 standard.

The ASHRAE 90.1 standard specifically indicates that equipment not listed in the tables referenced may be used. This provides the opportunity to utilize specialized equipment such as dedicated outdoor air system units to optimize the HVAC system as a whole.

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From a practical perspective it is important to understand that the Desert Aire dedicated outdoor air system unit is optimized for 100% outdoor air conditions to maximize the moisture removal efficiency and allow for the complete HVAC system to operate at peak efficiency. It does this by:

1. Design – Unit airflows, refrigeration system, and energy recovery devices are optimized for moisture removal efficiency and the peak energy transfer based on outdoor loads through the range of conditions.
2. Application – Use of the DOAS with supply conditions lower than outdoor air optimizes the efficiency of the air circulating air conditioners. (Burg 2009 – Capacity Control of Dedicated Outdoor Air Systems, Seminar 44 - Optimizing of DX-DOAS Systems, ASHRAE Annual Meeting)
3. Control – Control over cooling capacity of dedicated outdoor air system effectively uses any sensible cooling byproduct to reduce or eliminate the use of other air conditioning equipment under specific loads.

In all of these respects the dedicated outdoor air system unit is specially designed and operates differently than a standard unitary air conditioner. The conditions, rating requirements, and method of testing in the AHRI 920 proposed standard are specific to the design and operation of DOAS units. As the testing methods are standardized and the certification programs are enacted Desert Aire will certify and list the ratings of DOAS units. It is highly likely that the pending AHRI 920 standard will become integral to ASHRAE 90.1 minimum requirements in the future.