

CALIFORNIA ENERGY COMMISSION

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August 9, 2011

Daikin AC (Americas), Inc.
1645 Wallace Drive, Suite 110
Carrollton, TX 75006

Attn: Lee Smith

RE: INITIAL EVALUATION OF COMPLIANCE OPTION REQUEST—Daikin Altherma
Air-to-Water Source Heat Pump

Dear Mr. Smith:

The purpose of this letter is to again confirm the California Energy Commission's receipt of your formal application for a Compliance Option and provide staff's initial evaluation of your request and its supporting documentation.

Daikin seeks this Compliance Option request for residential buildings to allow the Altherma Air-to-Water Source Heat Pump system to be used in new and/or existing homes by establishing the equipment efficiency rating necessary to calculate the Altherma system's contribution to meeting building energy compliance pursuant to the Building Energy Efficiency Standards (Standards).

The Altherma Air-to-Water Source Heat Pump can provide space heating and cooling and domestic water heating. An exterior heat pump extracts heat from outside air, transferring the heat through refrigerant piping to a refrigerant-to-water heat exchanger, then distributes the water-based energy for space heating (fan coil or radiant) and space cooling (fan coil or radiant), and water heating (domestic hot water) via an indirect tank. Your application is complete and Energy Commission staff recommends consideration of this request for approval and that a Staff Workshop is held to discuss the issues and proposals which are included in your request.

Background

On June 23, 2010, the Energy Commission received an application and supporting information from you on behalf of Daikin AC (Americas) requesting approval of a Compliance Option for an Exceptional Method for the Altherma Air-to-Water Source Heat Pump. Exceptional Methods are alternative calculation methods to analyze designs, materials, or devices that cannot be adequately modeled using the procedures approved for the Standards and incorporated into the Energy Commission's public domain reference computer program. Your application is consistent with the Compliance Options procedures in Section 10-109 of the Standards.

Staff communicated receipt of this application and proposed two alternative approaches for you to move forward. Regardless of the preferred approach, additional information was necessary from you to support your application.

In a letter dated January 6, 2011, you indicated to Energy Commission staff that your preferred approach was the compliance modeling approach noted as “Option A.” This approach required end-use calculations of the efficiency descriptors to be used for the Altherma system when in space conditioning and water heating modes based on the Department of Energy’s (DOE) waiver to meet federal appliance standards and authorization to use efficiency ratings resulting from the system’s European test data. That information was included with your letter.

Energy Commission staff and representatives of Daikin met on March 15, 2011 to further clarify dynamics of the Altherma system and its interface with calculated efficiency ratings from DOE’s authorized use of European equipment testing.

Compliance Option

Equipment used to show compliance with the Standards must meet federally mandated efficiency levels. However, the Altherma Air-to-Water Source Heat Pump does not meet testing criteria of DOE covered appliances nor is it subject to California Appliance Efficiency Standards; hence, this system does not have efficiency descriptors to use for showing compliance with the Standards.

In 2009, the DOE granted Daikin an interim waiver exempting the Altherma appliance from using the federal efficiency test procedures. Waivers are given to appliances that have a design or function that cannot be measured using existing testing procedures.

In early 2010, the Energy Commission posted on its website equipment efficiency listings for the nine Altherma systems to be used for compliance purposes with the Standards. These efficiency listings are the minimum federal equipment levels for heat pumps:

- Space heating—HSPF 7.7
- Space Cooling—SEER 13
- Water heating—Energy Factor (EF) 0.904

Daikin is seeking approval of a Compliance Option, Exceptional Method, for the Altherma Air-to-Water Source Heat Pump to change the current allowed efficiencies to be based on their European test results.

- Daikin’s request does not require modifications to performance computer modeling nor does it propose modifications to the prescriptive packages.
- Daikin’s request does not require special calculations or enforcement checks that are different than those currently specified in compliance reference information.

- Daikin’s request does not change or modify compliance reference information used by the Standards—Reference Appendices, Residential Compliance Manual, or Compliance Forms.

Staff Initial Evaluation

Staff believes the request is warranted and the submitted content of information supporting the Altherma system and its various installed configurations is appropriate for the purpose of the request. The Altherma system can operate in multiple modes—space heating, space cooling, and water heating, and can be configured by the installer to meet varying needs using combinations of equipment having different operational parameters and control schemes.

A central concern of staff has been to recommend performance efficiency descriptors that don’t exaggerate system operation performance and can be field verified using approved compliance documentation procedures. The information provided for the Altherma system suggested using equipment descriptors (i.e., HSPF, SEER, and Energy Factor) based on European testing results that most closely represented ambient and delivery temperatures used in Standards reference documents.

Staff recognizes that the system’s design and installation are dependent on the actual building, climate zone, and conditioning functions necessary for the occupant’s needs. However, performance data for this system is only available from the manufacturer or their field representatives. In addition, energy use of the Altherma system is dependent on the “balance of system” equipment that is not tested or captured within allowed compliance modeling procedures. Staff’s discussions with you and from reviewing the documentation supporting your application indicate that this system can provide its end source of operation through the heat pump or through the water heater. From this perspective, staff recommends for compliance purposes that the Altherma system be described as either a:

- Split System Heat Pump, or
- Combined Hydronic

Staff proposes the following efficiencies to be used for all Altherma systems:

Space Heating	HSPF—11 (split system heat pump)
	EF—2.4 (combined hydronic)
Space Cooling	SEER—13
Water Heating	EF—2.4*

*When separate stand alone water heater is not used

➤ *Need for Additional Data or Information*

Staff believes there is no need for additional data or information to support the intent of this Compliance Option request at this time. The Compliance Option process allows the Energy Commission to recognize new methods and procedures by approving them separately than those already in Standards reference documents which have been

adopted by regulation. Daikin should be aware that it is their obligation to respond to specific informational needs or issues of the public once this request becomes available for public review.

➤ *Need for Additional Energy Commission Staff Work*

Staff believes there is no need for additional analysis or work to support the intent of the Daikin request. It should be noted that the Energy Commission may need to address issues that might be shown to have adverse environmental consequences. Daikin should be prepared to consult with staff on these matters.

➤ *Additional Cost to Complete Application Review*

The Energy Commission has received the \$2000.00 application fee required by Section 10-109 (b) 3D of the Standards in support of Daikin's Compliance Options request. Daikin should be prepared to respond to and address issues brought forward during public review of this proposal.

Action to Move Forward for Public Review

Staff is prepared to make your application and supporting information available for public review. If you agree with the information contained in this letter and after reviewing the attachment you wish staff to make your application and supporting information available for public review pursuant to the process described in Section 10-110 of the Standards, please let us know at your earliest convenience.

Sincerely,

A handwritten signature in black ink, appearing to read "David W. Ware". The signature is fluid and cursive, with a long horizontal stroke at the end.

David W. Ware
High Performance Buildings and
Standards Development Office

Attachment