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June 7, 2010

Melissa Jones, Executive Director  
California Energy Commission  
1516 Ninth Street, Mail Stop 39  
Sacramento, CA 95814

RE: Application for Approval of Exceptional Method for Daikin Altherma System under  
24 C.C.R. § 10-109.b(4)

### **VIA FEDERAL EXPRESS**

Dear Ms. Jones:

Daikin AC (Americas), Inc. ("Daikin") respectfully applies to the California Energy Commission ("CEC") for approval of an Exceptional Method under 24 C.C.R. § 10-109.b(4). The Exceptional Method for which Daikin requests approval pertains to Daikin's Altherma air-to-water heat pump that performs both heating and cooling functions, and that includes integrated domestic water heating ("Altherma"). The basis for Daikin's application is that Altherma "cannot be adequately modeled using public domain computer programs," and therefore Daikin requests that the compliance option methodology contained in the application be approved as an Exceptional Method. 24 C.C.R. § 10-109.b(4). Daikin's application includes all of the required attachments and analysis to support approval of Exceptional Methods in the CEC's Compliance Options Approval Manual for the Building Energy Efficiency Standards under Title 24. Therefore, Daikin requests that the CEC approve its application for an Exceptional Method to demonstrate Altherma's compliance with Title 24. Although the CEC staff is required by 24 C.C.R. § 10-110(d) to submit its written recommendation on this application to the Commission within 90 days of receipt of the application, Daikin urges the CEC staff to submit its recommendation to the Commission in as many days fewer than the allotted 90 days as possible.

### **BACKGROUND INFORMATION**

Daikin's sister division, Daikin Europe N.V. ("DENV"), is currently marketing Daikin Altherma systems in Europe. DENV has independently verified full load performance and efficiency and provides calculation software to determine annual performance and efficiency under European standards and test methods that apply to this equipment class. Because no U.S. test methods currently exist to accurately calculate Altherma's energy performance and efficiency, Daikin applied to the U.S. Department of Energy ("DOE") for a waiver from test procedures under 10 C.F.R. § 430.27(a)(1). DOE granted Daikin a waiver from testing requirements for Altherma on December 15, 2009 (74 *Fed. Reg.* 66,319, copy attached).

As a condition of its waiver, DOE imposed an alternate test procedure on the Altherma systems covered by the waiver. 74 *Fed. Reg.* at 66,321. The alternate test procedure that DOE established for Altherma requires Daikin to test and rate the systems using the European standards that DENV currently applies to these systems. Specifically, DOE directed Daikin to rate the performance of Altherma using the following alternate test method:

Daikin shall be required to test and rate its Altherma heat pumps using these European Standards as follows:

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(1) Full Load Performance and Efficiency: --Daikin Altherma shall be tested and rated according to Standard EN 14511, *Air conditioners, liquid chilling packages and heat pumps with electrically driven compressors for space heating and cooling*. Daikin shall rate the Altherma full load heating and cooling performance (no domestic hot water, or DHW, contribution) using COP and EER.

(2) Annual Performance and Efficiency: --Daikin Altherma shall be rated according to EN 15316, *Heating systems in buildings—Method for calculation of energy system requirements and system efficiencies*. Under Section 4.2 of the Standard EN 15316-1, the calculation period is established to evaluate the annual energy use of the space heating and domestic hot water system. Using Section 4.3 of the Standard, the calculation methods in the standard determine operating conditions, such as heat demand and water temperatures, and energy performance for given operating conditions, including system thermal losses and recoverable losses. Standard EN 15316-4-2 provides the full energy calculation method used under the standard for seasonal performance of space heating and an integrated domestic hot water system. Daikin shall rate the combined seasonal performance factor of the Altherma using the Seasonal Performance Factor (SPF) according to EN 15316-4-2. The cooling operation shall not be accounted for in the SPF.

74 *Fed. Reg.* at 66,321. The DOE's waiver language continues by stating: "In making representations about the energy efficiency of its Altherma heat pump products, for compliance, marketing, or other purposes, Daikin must fairly disclose the results of testing under the alternate DOE test procedure described above." *Id.* The DOE waiver allows Daikin to rate its Altherma energy performance at its most efficient level as determined under the alternate DOE test procedure. DOE's waiver (which authorizes Daikin to sell Altherma in the U.S.) is expressly conditioned upon Daikin providing only accurate results from the alternate test procedure, and DOE reserves the right to revoke the waiver if it finds that Daikin has reported alternate test procedure results that "are unrepresentative of [Altherma's] true energy consumption characteristics." *Id.*

### **CURRENT TREATMENT OF ALTHERMA IN TITLE 24 COMPLIANCE DETERMINATIONS**

At the present time, in Title 24 compliance calculations Altherma is evaluated only with minimal efficiency credit for its performance. The result of this restriction is that in Title 24 calculations Altherma does not get credit for its full energy efficiency performance as measured by the European standards that DOE has designated as the alternative test procedure under the federal waiver described above.

Because Altherma is a combined space and water heating system, it can be used only with the CEC's Alternative Calculation Method Approval Manual for Residential Buildings. Since Altherma is a heat pump system that performs heating (and cooling) with an integrated domestic hot water supply function, the appropriate input for Altherma would be the Integrated Heating and DHW module under the Manual for Residential Buildings. However, at the present when users attempt to model Altherma's performance in the Integrated Heating and DHW module or input, the forms are locked, and they prevent Altherma from being modeled.

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Altherma also performs both heating and cooling functions, and so another appropriate input for Altherma under the Manual for Residential Buildings is the Heating and Cooling module or input.

Daikin's objective in applying for this Exceptional Method is for users of the CEC's Alternative Calculation Method Approval Manual for Residential Buildings to be able to input Altherma's full energy efficiency performance (as measured by the European standards incorporated into the DOE waiver) into all Title 24 calculations.

### **ALGORITHMS, ELIGIBILITY CRITERIA AND APPROVABILITY TEST**

**Algorithms** – The algorithms that Daikin requests be incorporated into the Exceptional Method approval are the calculation procedures used to determine the energy performance or benefit associated with Altherma under the European standards that are incorporated into DOE's alternative test method for Altherma. Specifically, Daikin requests that the CEC approve an Exceptional Method for Altherma that allows Title 24 energy calculations to derive the following values:

**Full Load Heating Capacity and COP**

(Per European Standard EN 14511 – Test Conditions and Methods defined in Section 2 and Section 3 of Standard 14511, respectively).

**Full Load Cooling Capacity and EER**

(Per European Standard EN 14511 – Test Conditions and Methods defined in Section 2 and Section 3 of Standard 14511, respectively).

**Seasonal Performance Factor (SPF)**

(Per European Standards EN 15316-1 and 15316-4-2 – General Calculation Method for System Energy Requirements and System Efficiencies is defined in Standard 15316-1, and Calculation Method for System Energy Requirements and System Efficiencies (Space Heating Generation Systems and Heat Pump Systems) is defined in Standard 15316-4-2).

Daikin has attached the European standards referenced above (along with related standards) to this application.

**Eligibility Criteria** – Daikin has enclosed an Altherma Split System Functional Diagram and Technology Overview Statement that explain the system design and describe the minimum requirements for Altherma installations.

**Approvability Testing** – Daikin has enclosed the current Altherma DOE Energy Efficiency Certification and Compliance Statement prepared pursuant to 10 C.F.R. Part 430 to document Daikin's compliance with the alternate testing requirements under the Altherma waiver. Daikin's certification to DOE is based on testing of Altherma conducted at Eurovent-certified independent testing facilities in Europe that documents Altherma's energy performance. Daikin has also enclosed its Altherma Simulator 3.3.2 software that allows users to select Altherma systems and simulate their performance, and an Altherma Sample Selection Report.

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### **CONCLUSION**

Based on this application and the supporting attachments and analysis, Daikin requests that the CEC approve its application for an Exceptional Method to demonstrate Altherma's compliance with Title 24 of the California Code of Regulations. Although the CEC staff is required by 24 C.C.R. § 10-110(d) to submit its written recommendation on this application to the Commission within 90 days of receipt of the application, Daikin urges the CEC staff to submit its recommendation to the Commission in as many days fewer than the allotted 90 days as possible.

Please contact either Mark Stanga at 202-669-2002 ([mstanga@verizon.net](mailto:mstanga@verizon.net)) or me at 972-245-1510 ([lee.smith@daikinac.com](mailto:lee.smith@daikinac.com)) if you have any questions about this application, or if you require additional information. Thank you for your consideration of this matter.

Sincerely,



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Lee Smith  
Asst Vice President – Residential Solutions  
Daikin AC (Americas), Inc.  
1645 Wallace Drive, Suite 110  
Carrollton, Texas 75006

cc: Deputy Director for Energy Efficiency & Demand Analysis  
California Energy Commission  
1516 Ninth Street, Mail Stop 28  
Sacramento, CA 95814  
RE: Energy Commission Approval of Compliance Options

Manager of Buildings and Appliances Office  
California Energy Commission  
1516 Ninth Street, Mail Stop 25  
Sacramento, CA 95814  
RE: Energy Commission Approval of Compliance Options

Chief of Accounting, Accounting Office  
California Energy Commission  
1516 Ninth Street, Mail Stop 2  
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RE: Energy Commission Approval of Compliance Options

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Enclosures:

- \$1,000 check payable to California Energy Commission (Accounting Office copy only)
- Completed Appendix A, Compliance Options Approval Manual for the Building Energy Efficiency Standards
- Brief description of operation or any special characteristics (Altherma Split System Functional Diagram)(on CD enclosed with Energy Efficiency & Demand Analysis and Buildings and Appliances Office copies only)
- Installation/manufacturing criteria applicable to proposed exceptional method (Altherma Technology Overview Statement and Altherma Sample Selection Report)(on CD enclosed with Energy Efficiency & Demand Analysis and Buildings and Appliances Office copies only)
- Empirical data showing energy conservation effect of the proposed method (Altherma DOE Energy Efficiency Certification and Compliance Statement)(on CD enclosed with Energy Efficiency & Demand Analysis and Buildings and Appliances Office copies only)
- Daikin Altherma Simulator 3.3.2 (on CD enclosed with Energy Efficiency & Demand Analysis and Buildings and Appliances Office copies only)
- European standards currently used to test and rate Altherma energy performance
- U.S. Department of Energy Waiver of Test Requirements and Establishment of Alternate Test Procedure for Altherma (on CD enclosed with Energy Efficiency & Demand Analysis and Buildings and Appliances Office copies only)