Application for Manufacturer Entry to the UC Davis Western Cooling Challenge

Manufacturer(s):

Name of WCC Entry:

Date:



University of California, Davis

1450 Drew Avenue, Suite 100

Davis, CA 95618

wcec.ucdavis.edu

# Letter of Intent

Please submit a cover letter expressing your company’s intent to submit an entry to the Western Cooling Challenge. Provide a brief description of the technology to be entered, identify any partnerships represented by the entry, provide a timeline for when the entry will be ready for testing, and confirm your intent to provide equipment and cooperative support to WCEC and partners as needed for laboratory testing of the equipment. If the entry is in partnership with another company, both companies must submit a letter with this application.

# Overview of Company

Please provide a 100-word (max) summary description of (each) company applying to be considered as a participant in the Western Cooling Challenge.

# Overview of Western Cooling Challenge Entry

Please provide a 400-word (max) summary description of the technology to be submitted. Include the basic technology description, the cooling capacity, intended market(s) for the technology (e.g.: commercial, Dedicated Outdoor Air Supply (DOAS), etc), any important limitations (e.g.: cooling only), key attributes of the technology (e.g.: improved IAQ), and estimated impacts on energy use and peak electricity demand for cooling.

# System Schematic

Please provide a cartoon schematic that identifies all major energy and water consuming components, heat transfer elements, and air paths. Please clearly indicate outdoor air, return air, exhaust air, and supply air streams. ***If this information needs to be kept confidential, please indicate such.***

# System Characteristics

Please provide the following additional system characteristics to help describe the entry.

|  |  |
| --- | --- |
|  |  |
| Operating Weight (*lbs*) | xx |
| Dimensions (L/W/H) (*in*) | xx |
| Min/Max Outdoor Air Fraction5 (*%*) | xx |
| Min/Max Supply Air Flow Rate (*cfm*) | xx |
| Min/Max Return Air Flow Rate (*cfm*) | xx |
| Min/Max Process Air Flow (*cfm*) | xx |

# Operating Modes

Please provide a list and description of the operating modes that for the system. At a minimum, WCEC will test the equipment at full capacity operation for each WCC test condition, but if possible, laboratory tests will map performance under various operating modes. An example explanation of the operating modes is as follows:

|  |  |  |
| --- | --- | --- |
|  | Cooling Mode | Description |
| 1 | **Economizer**  **EXAMPLE** | Dampers shift to provide 100% outdoor air, return air will exit through a relief damper, and indirect cooling and DX cooling will remain off. |
| 2 | **Indirect Cooler** | System will operates at the designed outdoor air fraction, and fan speed will vary between P% flow and Q% supply air flow. |
| 3 | **Indirect + DX Stage 1** | Description |
| 4 | **etc** | Etc |

|  |  |  |
| --- | --- | --- |
|  | Heating Mode | Description |
| 1 | **Stage 1 Heat** | Description |
| 2 | **Etc** | Description |

# Sequence of Operations

Please describe the sequence of logic that determines operation in each operating mode, as well any variation of fan speed or capacity within a particular operating mode. A truth table such as the example below could be a clear way to describe the operating modes.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *Cooling Mode* | *Independent Conditions* | | | *Component Operations* | | | | |
| **EXAMPLE** | TOSA | Scheduled  Occupancy | ΔT=(Troom-Tsp) | Indoor Blower | OSA Damper Position | RA Damper Position | Compressor(s) | Fan Speed |
| Off | NA | NO | ΔT≤0 | OFF | CLOSED | 100% OPEN | OFF | OFF |
| Ventilation Only | NA | YES | ΔT≤0 | ON | 100% OPEN | X% OPEN | OFF | OFF |
| Indirect + DX1, min OSA | TOSA ≥ TSP | YES | ΔT>0 | ON | 100% OPEN | X% OPEN | 1 | 60% |
| Indirect + DX1, 100% OSA | TOSA ≤ TSP | NA | ΔT>0 | ON | 100% OPEN | CLOSED | 1 | 60% |
| Indirect + DX2, min OSA | TOSA ≥ TSP | YES | ΔT>2 | ON | 100% OPEN | X% OPEN | 1 & 2 | 90% |
| Indirect + DX2, 100% OSA | TOSA ≤ TSP | NA | ΔT>2 | ON | 100% OPEN | CLOSED | 1 &2 | 90% |
| Unoccupied DX1 | TOSA ≥ TSP | NO | ΔT>0 | ON | CLOSED | 100% OPEN | 1 | 60% |
| Unoccupied DX2 | TOSA ≥ TSP | NO | ΔT>2 | ON | CLOSED | 100% OPEN | 1 & 2 | 90% |
| Enhanced Economizer | TOSA ≤ TSP | NA | ΔT>0 | ON | 100% OPEN | CLOSED | OFF | 30% |

# Estimated System Performance

Use the table below to provide estimates of the following cooling performance characteristics at various operating conditions.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | AHRI 340/360 Conditions  (*Full Capacity*) | WCC Peak Conditions  (*Full Capacity*) | WCC Annual Conditions  (*Full Capacity*) | WCC Annual Conditions  (*Part Capacity)* |
| Outside Air Conditions, db/wb (*°F*) | 95/75 | 105/73 | 90/64 | 90/64 |
| Return Air Conditions, db/wb (*°F*) | 80/67 | 78/64 | 78/64 | 78/64 |
| Cooling Mode |  |  |  |  |
| Supply Air Temperature (*°F*) |  |  |  |  |
| Supply Air Humidity (*lb/lb*) |  |  |  |  |
| Total Power (*kW*) |  |  |  |  |
| Other Energy Input (*–*)\* |  |  |  |  |
| Water Use (*gal/hr*)[[1]](#footnote-1) |  |  |  |  |
| Supply Air Flow Rate (*cfm*) |  |  |  |  |
| Outdoor Air Fraction (*%*) |  |  |  |  |
| Process Air Flow Rate (*cfm*) |  |  |  |  |

\*Other energy input includes natural gas (or other fuel) consumed (eg: to regenerate desiccant) as part of the integral process of the machine. Please specify that fuel, and units of measurement. If the system is designed to utilize waste heat or hot water from another process please specify the rate of thermal energy consumption between the water inlet and outlet.

# Water Treatment

If the system uses water, please discuss whether or not water treatment is required, and what type of treatment is recommended. If no water treatment is required please describe how water quality is managed (include mineral, algal, and micro-biological concerns).

# Cost

Estimate the mature-market price for the equipment, as well as the anticipated current sales price. Please indicate the delivered cost to the customer, as well as the estimated cost of installation. Provide some explanation as to any difference between current pricing and mature market costs, and comment on the reasons for cost differences (if any) between this and conventional rooftop equipment. ***If this information needs to be kept confidential, please indicate such.***

# Controls

Will the system require a specific type of control interface, will it operate from a typical aftermarket thermostat (analog 24VAC contact closure call for cooling, heating, etc)?

# Fault Detection & Diagnostics

Please describe any fault detection and diagnostic capabilities.

# Manufacturing Capacity & Commercial Viability

The intent of the Western Cooling Challenge is to assist the advancement and commercial application of impactful cooling technologies; participants must be prepared to support marketing, sales, manufacture, installation, warranty, etc, for at least 500 units per year. Please provide a narrative explanation to demonstrate your company’s ability to produce WCC certified equipment at this scale. Include equipment engineering guidelines, installation and operations manuals, sales literature, and other materials to demonstrate that your company is prepared to provide necessary customer support for the commercial product.

# Product Development Timeline

What is the estimated date that a unit will be available for laboratory testing? The equipment for laboratory testing must not be a prototype. The equipment must be available for purchase, and the system tested must include all components that will be provided in the commercial unit. Testing of an early model machine may not allow certification if major revisions are made after laboratory testing.

# Additional system configurations

Certification of one size and configuration of machine does not necessarily certify other sizes or system configurations. If this product is one amongst a line of various sizes and configurations, please indicate whether or not other related equipment should be considered for Cooling Challenge certification.

# Contacts

Please provide contact information for each person responsible for activities related to the Western Cooling Challenge

|  |
| --- |
| Contacts |
| Jonathan Woolley, Assoc. Engineer, Western Cooling Efficiency Center, UC Davis [jmwoolley@ucdavis.edu](mailto:jmwoolley@ucdavis.edu), office: (530) 752-1001, mobile: (530) 204-7619 |
| Mark Modera, Director, Western Cooling Efficiency Center, UC Davis, [mpmodera@ucdavis.edu](mailto:mpmodera@ucdavis.edu), |
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|  |
|  |

# Other Resources

Please enclose any external documentation, white papers, reports, guidelines, specifications, or other material that help to explain the equipment and its measured performance.

1. Water use should include all on-site water demand by the system, including any bleed or purge water use during steady state operation for water hardness of 200 ppm (as CaCO3). [↑](#footnote-ref-1)