



Guide Specification

Containment Cooling®

EC5001C

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SUMMARY

This guide specification describes requirements for a rack level environmental control system relating to rack level heat containment. The EC system shall be designed to actively manage and remove heat from rack mounted equipment. The system shall manage heat removal through use of pressure controlled fans.

1.0 GENERAL INFORMATION

1.1. DESIGN REQUIREMENTS

The rack level environmental control system shall be deployed using an Geist EC factory assembled unit. The unit shall be designed to sit on top of a containment grade equipment enclosure and remove all hot air from the equipment enclosure. The unit shall be used in conjunction with precision cooling equipment or central station air handling units.

Performance Requirements:

- 1.1.1 The supply air temperature from the cooling unit shall be elevated to 75F +- 2F at 50% RH +- 10% RH.
- 1.1.2 The supply air temperature from the cooling unit shall be within 3F of the desired server inlet temp at 50% RH +-3% RH.
- 1.1.3 The return air temperature to the cooling unit shall be at minimum 90F.
- 1.1.4 The volume of supply air shall not exceed the airflow demanded by the IT equipment by more than 5% of the supply airflow.
- 1.1.5 The airflow required by the IT equipment shall be determined using differential pressure at the rack and not temperature. The rack or row airflow requirements shall be able communicated back to the monitoring/ control system.
- 1.1.6 The monitoring/control system shall be capable of aggregating the airflow for all airflow management devices and reporting the total IT airflow demand.
- 1.1.7 The airflow management system shall also be capable of reporting temperature and humidity at the inlet of the rack back to the monitoring/control system. The Monitoring/control system shall aggregate all temperature and humidity from all racks.
- 1.1.8 The Air Handlers supply air volume and temperature set-point shall be determined by the control/monitoring BMS system and the aggregated data.

1.2. SUBMITTALS

Submittals shall be provided with the proposal and shall include: Dimensional, Electrical and Airflow data, and typical Electrical Connections.

1.3. WARRANTY

The system shall be provided with a warranty against defects in material and workmanship for 1 year from date of shipment.

1.4. QUALITY ASSURANCE

The specified system shall be factory-tested before shipment and bear UL, cUL 60950, and FCC Class A labels.

2.0 PRODUCT

2.1. STANDARD FEATURES

2.1.1. CHASSIS ASSEMBLY

The chassis assembly has a powder coat paint finish comprised of multiple panels fabricated from 0.048” thick sheet steel. The chassis assembly sits atop a rack enclosure and accepts the EC Host Controller, EC Fan Cartridges and the EC System Ducting.

2.1.2. EC FAN CARTRIDGE

The fan shall be an electrically commutated type fan package with built in electronics and software to dynamically control the fan’s speed based upon communication signals from the host controller.

FAN

- EC10 fan cartridge - Nominal airflow capacity of 1120 CFM at 0” W.C.
- EC20 fan cartridge - Nominal airflow capacity of 2034 CFM at 0” W.C.

DISPLAY

The front panel of each Geist EC Fan Cartridge has 2 display elements, a numeric display and an LED Panel. Each numeric display illuminates cooling capacity in GREEN, to indicate normal operation, cooling capacity in RED to indicate an alarm condition or temperature alarm in RED FLASHING to indicate an alarm condition. Each LED Panel has 3 LEDs that illuminate GREEN to indicate normal conditions, ORANGE to indicate warning conditions and RED to indicate alarm conditions.

ALARMS & DIAGNOSTICS

Numeric Display	GREEN	RED	FLASHING RED
Cooling Capacity	Within defined acceptable parameters	Exceeded alarm condition	N/A
Temperature	N/A	N/A	Exceeded alarm threshold

LED Panel	GREEN	ORANGE	FLASHING RED
Capacity (cooling)	Within defined acceptable parameters	Exceeded warning threshold	Exceeded alarm threshold
Temp ¹	Within defined acceptable parameters	Exceeded warning threshold	Exceeded alarm threshold
System	Systems normal	N/A	<ul style="list-style-type: none"> > Loss of A/B Power feed > Missing fan cartridge > Mismatched fan types > Fan unit failed > Fan unit RPM > Fan end of service life

(1) Temp LED reports remote temperature, remote humidity or exhaust temperature

2.1.3. EC HOST CONTROLLER

CONNECTIONS

The EC Host Controller shall have the following connections:

- C14 type connector with A/B redundant power feeds utilizing a AC voltage between 90-208 VAC 50/60 Hz for the EC1001 and 208-240 VAC 50/60 Hz for the EC1001-230V
- Ethernet RJ45 connection for communication.
- Three (3) remote sensor inputs for temperature/humidity or power strip amperage sensor.
- Two (2) EC Fan cartridge hot-swappable connectors.
- Locking style pressure sensor connector suitable for use with the EC Pressure sensor.

SOFTWARE PACKAGE

The imbedded SiteX View software suite resides in the EC Host Controller and provides indication of system status using OK in GREEN to green to indicate normal operation, Caution in ORANGE to indicate warning conditions and ALARM in RED to indicate alarm conditions and has two key focal points for information; *Geist View Summary & Real-time/History Data*. Geist EC collects historical data for up to 1 month.

All system, capacity and environmental data is logged and can be displayed at various time scales from 15 minutes to 1 month. Geist EC is programmed and shipped from the factory with default alarm settings. Alarm threshold values and units can be changed to accommodate site requirements

COMMUNICATIONS

The Geist EC Containment Cooling System shall communicate over Ethernet using the following types of communication protocols:

- HTTP
- HTTPS
- SNMP
- DHCP

SETPOINTS

Geist EC is programmed and shipped from the factory with default alarm settings. Alarm threshold values and units can be changed to meet site requirements. *Remote Sensor Temperature* and *Humidity* high/low alarms are set to the ASHRAE allowable environment guidelines and high/low warnings are set to the ASHRAE recommended environment guidelines for IT equipment intake air.

ALARMS

SiteX VIEW SUMMARY	OK (GREEN)	CAUTION (ORANGE)	ALARM (RED)
System	Systems normal	N/A	<ul style="list-style-type: none"> > Loss of A/B Power feed > Missing fan cartridge > Mismatched fan types > Fan unit failed or low RPM > Fan end of service life
Capacity (cooling)	Within defined acceptable parameters	Exceeded warning threshold	Exceeded alarm threshold
Temp/Humidity ¹	Within defined acceptable parameters	Exceeded warning threshold	Exceeded alarm threshold
A/B Power Input	Both power feed available	N/A	One power feed was lost or has become disconnected. Indication is; A Feed Only or B Feed Only
Real-time/History	VALUE (GREEN)	VALUE (ORANGE)	VALUE (RED)
Cooling Load (capacity)	Value within defined acceptable parameters	Value exceeded warning threshold	Value exceeded alarm threshold
System Return (temp)	Value within defined acceptable parameters	Value exceeded warning threshold	Value exceeded alarm threshold
Remote Sensor (temp)	Value within defined acceptable parameters	Value exceeded warning threshold	Value exceeded alarm threshold
Remote Sensor (humidity)	Value within defined acceptable parameters	Value exceeded warning threshold	Value exceeded alarm threshold

(1) Temp LED reports remote temperature, remote humidity or exhaust temperature

Notifications in the form of email and SNMP trap events are delivered when an alarm thresholds has been exceeded. After changing E-mail or SNMP trap address information a test notification can be executed by selecting; Send Test Email or Send Test SNMP Trap..

UNITS

Units are set to imperial (Fahrenheit and CFM) as default but can be changed to display Metric (Celsius and MCH) or Imperial/Metric (Celsius and CFM).

FAN FAIL TEST - TEST & CONFIGURE PAGE

To determine the operational or environment effects of a single fan failure, select FAN A or FAN B, enter a Test Time in seconds and select Run Test. Operating and environment conditions can be observed remotely from the Geist View or Data Logging page.

PASSWORDS

The user shall be able to define passwords for each user and define user's security level within the software. There are three levels of access; administrator, control and view only.

2.1.4. EC PRESSURE SENSOR

The EC pressure sensor extends from the EC Host Controller to the vertical center of the rack load at the heat exhaust of the load. The sensor length is 6 Ft long providing ample length to reach this desired location. The EC Pressure Sensor provides closed-loop PID control to the EC Fan Cartridges with 100% fan speed fault response in a condition when the EC Fan cannot communicate with the EC Host Controller.

2.2. OPTIONAL FEATURES OF EC SYSTEM

2.2.1. EC SYSTEM DUCT

The EC System duct has a powder coat paint finish comprised of multiple panels fabricated from 0.048” thick sheet steel. The EC System Duct sits atop the EC Chassis Assembly and accepts the EC System Inter-Duct Connector. Duct shall be manufactured to length as specified in project documentation.

2.2.2. EC SYSTEM INTER-DUCT CONNECTOR

The EC System Inter-Duct Connector has a powder coat paint finish fabricated from 0.048” thick sheet steel. The EC System Inter-Duct Connector shall be used to join multiple EC System Ducts together to allow one ceiling opening per row of racks.

2.2.3. POWER CORD

Power cords shall be UL approved. Type and length is site specific and customer shall define connection type and length.

2.2.4. COMBINATION REMOTE TEMPERATURE AND HUMIDITY SENSOR

The sensor shall sense both temperature and humidity and have an accuracy range of;

TEMPERATURE SENSORS:

Range: -40 to 40C (-40F to 140F)

Accuracy: +/-0.5C

HUMIDITY SENSOR:

RH Accuracy \pm 2% RH

Repeatability: \pm 0.5% RH

Response time, 15s in slowly moving air @ 25 °C

Range: 0 to 100% RH, non-condensing

The cable shall be 12ft. in length with a connection type of RJ12

2.3. ELECTRICAL REQUIREMENTS

Each EC10 system shall require;

2.2 FLA at 120V-1 ph-60Hz or

1.3 FLA at 208V-1 ph-60Hz or

1.1 FLA at 230-1ph-50Hz

Each EC20 system shall require;

2.3 FLA at 120V-1 ph-60Hz or

1.4 FLA at 208V-1 ph-60Hz or

1.2 FLA at 230-1ph-50Hz

3.0 EXECUTION

3.1. INSTALLATION OF EC SYSTEM

3.1.1. GENERAL

Install system and components in accordance with the manufacturer's installation instructions and submittal drawings. Maintain recommended service clearances as outlined in installation instructions

3.1.2. RACK CONNECTIONS

Install EC chassis on top of rack per installation instructions provided by manufacturer.

3.1.3. DUCTING CONNECTIONS

Install chimney to top of EC chassis per installation instructions provided by manufacturer. If multiple units are to be connected in-a-row, install EC System Inter-Duct Connector per manufacturer's installation instructions.

3.2. FIELD QUALITY CONTROL

3.2.1. START-UP

Start-up the units in accordance with the manufacturer's start-up instructions. Test controls and demonstrate compliance with requirements.

3.3. COMMISSIONING

3.3.1. COOLING AND HEAT CONTAINMENT AIRFLOW BALANCING

This process can be done with load banks (AIRFLOW LOAD ONLY IF DESIRED) in the racks to push the correct amount of airflow or with IT equipment in operation.

Enable all Active Heat containment units to move air out of operating IT equipment racks.

Ramp all cooling unit fans equally to meet airflow requirements +5% of the required airflow

Open chilled water valve to allow unit to control to a 60F discharge air temperature.

Enable unity cooling control.

Cooling unit fans shall slow down uniformly to meet the IT airflow requirements and shall walk down to meet the airflow requirements.

Chilled water valve shall throttle to meet set point determined by the aggregated temp/humidity requirements.

System shall begin to operate in synchronous fashion.

Signal CRAC/ CRAH units to run at 25%, 50%, 75%, and 100% airflow to view operation of EC units

3.3.2. IT EQUIPMENT INLET TEMPERATURE VERIFICATION

This process should be done with a wireless temperature network to record data for a few days to ensure proper operation. Install wireless temp & humidity sensors at the inlets of the servers per ASHRAE guidelines.

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