

Guide Specifications

EcoAisle Thermal Containment System

THIS GUIDE SPECIFICATION IS WRITTEN IN ACCORDANCE WITH THE CONSTRUCTION SPECIFICATIONS INSTITUTE (CSI) MASTERFORMAT. THIS SECTION MUST BE CAREFULLY REVIEWED AND EDITED BY THE ARCHITECT OR THE ENGINEER TO MEET THE REQUIREMENTS OF THE PROJECT. COORDINATE THIS SECTION WITH OTHER SPECIFICATION SECTIONS IN THE PROJECT MANUAL AND WITH THE DRAWINGS. WHERE REFERENCE IS MADE THROUGHOUT THIS SECTION TO "PROVIDE", "INSTALL", "SUBMIT", ETC., IT SHALL MEAN THAT THE CONTRACTOR, SUBCONTRACTOR, OR CONTRACTOR OF LOWER TIER SHALL "PROVIDE", "INSTALL", "SUBMIT", ETC., UNLESS OTHERWISE INDICATED. THIS SECTION IS WRITTEN TO INCLUDE THE 2004 MASTERFORMAT AND THE 1995 MASTERFORMAT VERSIONS. WHERE APPLICABLE, THESE ITEMS ARE BRACKETED AND, IN EACH CASE, UNLESS OTHERWISE INDICATED, THE FIRST CHOICE APPLIES TO THE 2004 MASTERFORMAT AND THE SECOND CHOICE APPLIES TO THE 1995 MASTERFORMAT.

PART 1 - GENERAL

1.01 SUMMARY

- A. The EcoAisle uses a series of panels, door frames and doors, and air blocks to enclose a hot or cold aisle zone which contains IT equipment warm exhaust air (HACS) or cooling unit supply air (CACS).

Hot Aisle Containment (HACS) - The hot aisle zone is the space between two rows of IT equipment racks with the hot air exhaust side of the IT equipment in one row of racks facing the opposite row; or between a single row of racks and an architectural wall, with the hot air exhaust side of the IT equipment in the row of racks facing the architectural wall. In this enclosed space hot exhaust air from all IT racks is collected inside of the EcoAisle. The exhaust air is cooled and conveyed to the outside of the EcoAisle where it is made available to IT equipment inlet air intakes. The HACS is available in ceiling panel or ducted return configurations

Cold Aisle Containment (CACS) - The cold aisle zone is the space between two rows of IT equipment racks with cold air being supplied between the two rows of racks (or one row of racks and an architectural wall) and the IT equipment exhausts hot air away from the aisle. In this enclosed space cooling unit supply air is collected inside of the EcoAisle. The cool air is supplied to the IT equipment while the IT equipment exhaust air is pushed outside the EcoAisle and returned to the cooling unit.

By preventing mixing of cool supply air and hot exhaust air, this self-contained configuration is capable of supporting a complete range of low, medium and high power/heat density loads, and can be deployed in multiple environments without affecting the surrounding area.

1.02 REFERENCES

- A. General: The publications listed below form a part of this Specification to the extent referenced. The publications are referred to in the text by the basic designation only. The edition/revision of the referenced publications shall be the latest date as of the date of the Contract Documents, unless otherwise specified.

1.03 SYSTEM DESCRIPTION

- A. Design Requirements: The EcoAisle shall be sized for two equal length rows of IT enclosures with supporting infrastructure or one row with an adjacent wall. Supporting aisle widths range from 3 to 6 feet (900 mm – 1830 mm). Hot and cold aisle, ceiling and ducted configurations are supported. Ceiling and duct panels must be constructed in a rectangular fashion and extend horizontally and vertically (angled panels or tapers are not supported). Refer to proper documentation for clearance requirements for various components. Data center floor must be level. Some third-party racks may be compatible.
- B. System Characteristics:
 - 1. Physical:
 - a. External width dimensions shall be the width of the aisle and two rows of enclosures (or aisle width plus one row of enclosures for single row configurations)
 - b. External depth dimensions shall be the length of the row of enclosures and any clearances for end-of-aisle doors.
 - c. The PDU shall have a maximum external height shall vary based off customer requirements.

1.04 SUBMITTALS FOR REVIEW

- A. Product Data: Provide for manufactured products and assemblies. Indicate dimensions, System layout, description and location of components, rough-in connections, and materials characteristics and connection requirements.
- B. Installation, Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, installation instructions, and maintenance and repair data.
- C. Submit installation - startup report provided by manufacturer's factory trained technician.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum 5 years documented experience with service facilities within 8 hours reaction time of Project site.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to the Project site in supplier's or manufacturer's original wrappings and containers, labeled with supplier's or manufacturer's name, material or product brand name, and lot number, if any.
- B. The customer shall store materials in their original, undamaged packages and containers, inside a well ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.

1.07 WARRANTY

- A. The manufacturer shall provide a one-year warranty against defects in material and workmanship for 12 months after initial start-up or 18 months after ship date, whichever occurs first. (Refer to the Warranty Statement for details.)
- B. Additional Owner Rights: The warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to and run concurrent with other warranties made by the Contractor under requirements of the Contract Documents.

1.08 MAINTENANCE

- A. The equipment supplier shall be capable to maintain, service, and repair the equipment for a period of two (2) years. The supplier is responsible to include all parts & labor and maintain the equipment in accordance to the equipment manufacturer's recommended guidelines as set forth in the equipment's user/operations manual.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design: Product specified is EcoAisle Thermal Containment System as manufactured by Schneider Electric. Items specified are to establish a standard of quality for design, function, materials, and appearance.
- B. Subject to compliance with these and related specification sections, the following Manufacturers may propose on the project: Schneider Electric
- C. Substitutions: Proposed substitutions must be approved prior to bidding. Alternate manufacturers/suppliers will be responsible for any required changes and associated costs if alternate is accepted.
- D. UL Listing: All system components shall be certified as suitable for this data center environment by documentation supporting UL Listings: UL484, CSA C22.2 No.236 and UL723S.

2.02 FEATURES

2.03 CEILING PANELS

- A. Ceiling panels shall be 6.0 mm thick Lexan clear-ribbed panels or 2.36 mm thick V0 clear panels with aluminum framing.
- B. Flame spread rates: Smoke development index "0-65" and flame spread index "0" in accordance with UL723 or ASTM84. Nominal thickness: 2.36 mm (V0 clear) –or-- Smoke development index "20" and flame spread index "0" in accordance with UL723 or ASTM84. Nominal thickness: 6.0 mm (Lexan)
- C. Minimum Light Transmission per ASTM D1003 equal to 82% or greater.

- D. Ceiling panels shall be designed to be supported by the frames of the IT Equipment racks. Ceiling Panel frames sizes shall be suitable to match up with various rack widths, row width, and hot aisle widths.
- E. The ceiling system shall be designed to permit removal of the ceiling panel from within the contained zone without the use of tools for service access to the space above the EcoAisle.

2.04 AIR RETURN SYSTEM

- A. Shall be 6.0 mm thick Lexan clear-ribbed panels or 2.36 mm thick V0 clear panels with aluminum framing.
- B. Flame spread rates: Smoke development index "0-65" and flame spread index "0" in accordance with UL723 or ASTM84. Nominal thickness: 2.36 mm (V0 clear) –or– Smoke development index "20" and flame spread index "0" in accordance with UL723 or ASTM84. Nominal thickness: 6.0 mm (Lexan)
- C. Minimum Light Transmission per ASTM D1003 equal to 82% or greater.
- D. Duct panels shall be designed to be supported by the frames of the IT Equipment racks. Ceiling Panel frames sizes shall be suitable to match up with various rack widths, row width, and hot aisle widths.
- E. The air return system shall be designed to permit removal of the airblocks from within the contained zone without the use of tools for service access to the space above the EcoAisle.

2.05 RACK EQUIPMENT BAYING KITS

- A. Metal and plastic components shall be supplied to establish consistent spacing between the racks or rack based equipment, and to fill the space to provide an air containment seal at the juncture between two adjacent racks or rack based equipment.

2.06 DOOR FRAMES AND DOORS

- A. Metal door frames and doors shall be provided to establish air containment at the end of two rows of racks. The door frame system shall match the height of the rack based equipment, and match the design width of the contained aisle.
- B. Doors shall be hinged or sliding, to permit access into the contained aisle for maintenance or servicing. Standard door operation shall not interfere with access or service on any rack or rack based equipment.
- C. Doors shall be provided with a window, handles and latches. The following options are available and should be provided if specified:
 - 1. Door locks and three matching keys per door
 - 2. Two proximity switches provided per door for open/closed status
 - 3. Automatic door closure system for sliding door
 - 4. Sliding Doors shall be provided with swing-open functionality in case of emergency inside the aisle.
 - 5. Door frame includes mounting for differential pressure sensor (Active Flow Controller)

2.07 FRAMES AND COMPONENTS SEALS

- A. Foam Rubber gaskets or metal/composite, brush, or plastic air blocks shall be installed at EcoAisle joints to minimize open gaps between containment system components, such as door frames, ceiling and duct panels, and IT Equipment racks and rack based equipment. Gasketing and/or air blocks may include, but not be limited to, the following.
1. Joints between adjacent ceiling/duct panels
 2. Joints between ceiling/duct panels and top of racks, if not metal to metal.
 3. Joints between door frames and ceiling/duct panels, if not metal to metal.
 4. Joints between door frames and racks at the end of the row(s).
 5. Joints between rack bottom rear frame and floor.
 6. Joints between duct panel and ceiling/roof of room.

2.08 SYSTEM AIR LEAKAGE

- A. The EcoAisle is not designed or intended to be air tight. The balance between exhaust air and supply air must be maintained by the match up of server airflow with airflow of the cooling equipment. The recommended minimum total per zone airflow for the cooling equipment is 5% more than the design IT Server airflow. This allows the cooling equipment airflow system to closely match the server airflow system, and avoids excessive cooling airflow system power consumption when variable speed/capacity cooling system fans/blowers are used.

2.09 OPTIONAL FEATURES

- A. Active Flow Control
1. See Active Flow Control Bid Spec
- B. Fire Safe Ceiling
1. UL Listing: The Ceiling System complies to UL484, EN 55022:2006, EN 55024:1998, EN 61000-3-2:2006, EN 61000-3-3:1995, EN 60950-1:2006, CFR 47 FCC Part 15:2011, ANSI C63.4-2003, ICES-003:2004, AS/NZS CISPR 22:2009.
 2. The Fire Safe Ceiling system shall contain one of the specified ceiling panels described in section 2.0.3.
 3. Shrinking panels or thermal links are not an acceptable substitution.
 4. Ceiling panel shall be resettable
 5. The Ceiling System shall be UL723S certified for use below fire suppression systems at the room ceiling level.
 - a. The ceiling system shall use thermal detection for panel release to be UL723S certified
 - b. The system shall activate at 135 degF or 57 degC
 - c. Multiple temperature switches per aisle must be provided for thermal event detection.
 6. The ceiling system shall have the option of panel release based on smoke detection to enable fire suppression system in the room
 - a. Smoke detection shall be supplied by customer
 - b. Smoke detector must send an on/off digital signal to control box (not an analog signal).
 - c. A normally closed dry contact smoke detector must be used
 - d. Smoke detector may utilize 24VDC output from existing power source

7. The Fire Safe System must have an audible and visible alarm to alert personnel of pending panel release. The system must hold the panels in place for 10 sec after alarm sounds and prior to releasing panels to allow personnel to exit the space in the event of a thermal or smoke event.
8. The ceiling system shall utilize electromagnets for panel release mechanism. The electro magnets shall be powered by supplies located in adjacent IT racks
 - a. The power supplies shall utilize dual inputs
 - b. The electromagnets shall be connected in series (one by one)
 - c. Voltage options are 100-120VAC or 200-240VAC single phase 50/60 Hz
 - d. The power supply can support up to 30 electromagnetic locks
 - e. If smoke detector will draw power from this power supply, the quantity will be decreased based on the power consumption of smoke detector
9. The ceiling system shall include a mechanical locking device to allow system to be serviced without panel release

C. Lighting

1. UL Listing: Lighting system complies to UL484, CSA C22.2 No.236, EN 55022:2006, EN 55024:1998, EN 61000-3-2:2006, EN 61000-3-3:1995, EN 60950-1:2006, CFR 47 FCC Part 15:2011, ANSI C63.4-2003, ICES-003:2004, AS/NZS CISPR 22:2009.
2. Available for both ducted and ceiling panel, single or dual rack row installations.
 - a. Shall provide additional duct mounting rail for duct configurations:
 1. Lights shall fasten to rail
 2. Wire covers used for spaces between lights
 3. The bulk of the wiring shall be hidden inside the rail behind each light and cover
 - b. Lights shall be mounted to upper corners inside contained aisle along aisle length
 - c. Lighting density options include: end-to-end, 300 mm, or 600 mm spacing between each light
 - d. Lights are to be install on both sides of aisle (or one side if otherwise specified)
 - e. Shall include all necessary cabling, connectors, and fasteners (no tools provided)
 - f. Across aisle cable shall be provided to minimize number of control units per contained pod
3. Specs
 - a. CCT = 5000K
 - b. CRI = 85
 - c. Typ Watts = 5, max Watts = 6
 - d. Lens = frosted
 - e. Lumens per foot = 187, Lumens/meter = 613
 - f. Length = 11-1/2", width = 1", height = 1/2"
4. Control Unit
 - a. Shall be mounted in rack
 - b. Voltage options are 100-240VAC single phase 50/60 Hz
 - c. Shall power up to 12 lights per control unit
 - d. Shall be provided with 2 power cords: (1) C13/C14, (1) C13/NEMA 5-15P
 - e. Group control capability for use of more than one control unit per contained pod. Up to five total control units can be grouped together

- f. Control unit comes with integrated rotary switch for adjusting light ON interval. Time settings shall consist of various presets from 1 to 75 minutes of light ON operation
 - g. Two group LED outputs on control unit (lights wired in series)
 - h. Integrated LED indicates power status of control unit
 - i. Controller is to be installed to mounting rails in lowest position of rack (preferably the OU position) (hardware provided)
5. Motion Sensor
- a. Shall provide two motion sensors per control unit
 - b. Capable up to four motion sensors per control unit
 - c. Motion sensors shall mount to door or curtain header (mounting brackets provided)
 - d. If any of the four motion sensors (per control unit) detect movement, LED bank will illuminate.
 - e. Utilizes a single RJ45 connection per motion sensor (shall be routed out of visibility)
6. Manual Light Switch
- a. Shall provide two manual light switches
 - b. Shall mount inside or outside of aisle
 - c. Shall mount via three methods (hardware provided): 1) Fastener 2) Magnet, or 3) hook and loop
 - d. Manual switch turns OFF the light bank
 - e. Motion sensors become inactive when a manual switch is pushed. After 10 seconds, motion sensors are automatically restored

D. Air Return System

- 1. Centralized hot air return system for room and external air handling systems
- 2. Shall consist of duct mounting rails and duct panels
 - a. Mount to top of racks and extend up to ceiling plenum
 - b. Allows for flexibility with overhead cabling and cable troughs
- 3. Adjustable height supports
 - a. Shall support duct structure and extend duct upward to ceiling plenum
 - b. Shall mount to top of racks and rack height adapters
 - c. Shall be adjusted to be level with ceiling
 - d. Shall be placed every 600mm apart spanning length of aisle
 - e. Shall be provided with mounting bracket for various racks
 - f. Shall be provided with removable lexan or V0 airblocks and all necessary hardware to seal gap between top of racks and bottom duct rail
 - g. Shall be provided with Modular PDU and/or Rack Mounting brackets if needed

E. Blanking Panels, Height Adapters, and Depth Extenders

- 1. Can be used to provide an aesthetic alternative for varying dimension enclosures.
- 2. Blanking Panels shall be placed where gaps between racks exist to seal contained aisle. The panel shall match the height of the enclosures and match the width of the gap. It shall not be mounted to any adjacent blanking panels nor shall it support any adjustable height supports.

3. Depth Extenders shall mount to front or back of APC by Schneider Electric enclosures to align aisle. The extender shall match the depth of the adjacent racks and match the width and height of the enclosure (including any height adapters) of which it is being mounted
4. Height Adapters shall mount to the top of APC by Schneider Electric enclosures to align the enclosure height. The height adapter match the height of the adjacent racks and shall match the width and depth of the rack (including any depth adapters) of which it is being mounted.

PART 3 - EXECUTION

3.01 MANUFACTURER FIELD SERVICE:

- A. Prepare, receive, inventory and install containment system components.
- B. Prepare and submit report of system installation indicating all system parameters.
- C. Provide the services of the manufacturer's technical representative to attend and participate in the on-site integration and to commission equipment. All vendors and contractors affecting the equipment specified herein shall be present at the same time.

PART 4 - PLANNING AND RECEIVING

A. ROOM PREPARATION

1. During the design of the room, consideration should be given to the following factors: ease of entry for the system, floor-loading factors, and accessibility of piping and wiring. The room must be sealed with a vapor barrier to minimize moisture infiltration. Polyethylene film (plastic sheeting) is a good vapor barrier for ceiling and wall applications. Rubber- or plastic-based paints should be applied to concrete floors and walls. The room should be thoroughly insulated to minimize thermal loads and make-up air (if required) should be preconditioned to reduce additional temperature, filtration, and moisture loads.

B. RECEIVING THE COMPONENTS

1. Your EcoAisle Containment System has been completely tested and inspected prior to shipment. To ensure that you have received the components in excellent condition, perform a careful inspection of the crating and the parts immediately upon receipt. Verify that all parts ordered were received as specified and that the components are the correct size necessary to fulfill your environmental control needs. Report any damage discovered to the freight carrier. If necessary, contact the Schneider Electric field service department for help in repairing or replacing damaged parts. While Schneider Electric is not responsible for damage incurred in transit, we want to make sure that you have no undue delays in your system start-up. Please refer to the unpacking sheet for more information.