

*Cabinet Level
Containment*



IsoFlo Cabinet

*Isolated Airflow Cabinet for
Raised Floor Data Centers*



IsoFlo[®] Cabinet

Cabinet Level Containment

Tate's IsoFlo cabinet completely isolates the IT cooling from the rest of the facility. Automated airflow controls reduce energy costs and provide the most efficient use of the data centers IT cooling capacity. The dedicated airflow path for equipment cooling aids in the implementation of fully economized or passive airflow cooling designs.

Cabinet Benefits

- **Efficient** - Cabinet level containment allows for increased inlet air temperatures and completely eliminates bypass airflow.
- **Operationally Cost Effective** - The ability to incrementally increase the equipment inlet air temperature or use passive airflow supply allows IsoFlo to provide a very cost effective data center cooling platform.
- **Capital Cost Effective** - IsoFlo cabinets are more cost effective than cabinets with aisle containment, and offer mechanical equipment savings in new build.
- **Flexible** - There is no requirement for hot/cold aisle layout. The isolated airflow paths and standard module sizes of the chimney and airflow panel allow the cabinet to be deployed in any new or existing pod or cage configuration.
- **Monitoring and Control** - Automatic airflow controls allow for simple integration with the building management system and DCIM can provide real time information to the data center manager.



Improve Cooling Efficiency

Tate's Fully Contained Cabinet Optimizes the Opportunity for Air-Side Economization

Air side economization is one of the most efficient methods to cool the data center. However a dramatic increase in the operating temperatures of a data center has been historically hampered by two restrictions, IT hardware intake temperature limitations, and the need for human occupancy within the data center.

ASHRAE's 2011 Thermal Guidelines have expanded the allowable thermal ranges for IT hardware. These new classes theoretically solve the IT hardware issues, but do not eliminate the human occupancy issues. Cabinet level containment, which allows for full containment of supply and return air, separates the IT airflow from the human occupied space.

Cabinet level containment is also more cost effective during the initial build compared to individual racks with aisle level containment. The extended thermal ranges allow for 100% free cooling for the entire year in almost any location on the planet.



Legacy Airflow Design

Legacy airflow designs limit the IT equipment cooling temperature. Without containing the air streams the supply air used to cool the equipment must be used to cool the facility for human occupancy thereby limiting efficiency in order to maintain comfort.



Cabinet Level Containment

Using a fully contained cabinet allows the IT hardware air streams to be separated from the people. This provides opportunities to expand inlet cooling temperatures and efficiently supply airflow without the concern of human comfort or wasteful bypass air.

Cost Effective

IsoFlo Significantly Improves Efficiency without Additional Capital Investment

Using IsoFlo to create a fully contained data center eliminates additional space requirements, and decreases the capital cost associated with the acquisition of the rack and containment portion of the data center build.

Total cabinet level containment offers additional value over aisle level containment, lower first costs and the ability to continually reduce cooling operating costs throughout the life of the data center as hardware requirements change.



Cost Effective Cooling

Cabinet level containment enhances the ability to operate IT hardware at a reliable and predictable temperature, while being cost effective.

Cabinet level containment virtually eliminates bypass air in the data center. By-pass air is any airflow supplied for cooling equipment that does not pass through the equipment before being returned to the CRAC unit or exhausted out of the building.

The ability to incrementally increase the IT hardware inlet air temperature using total cabinet level containment provides a very efficient data center cooling operation platform using conventional data center cooling equipment. The use of this cooling strategy coupled with raised floor delivery allows for the segregation of load types with different thermal restrictions into zones for optimal operation.

Tate's cost modeling and analysis service can help generate detailed financial reports based on your specific data center design. Call us at [877-999-8283](tel:877-999-8283) to set-up a consultation.



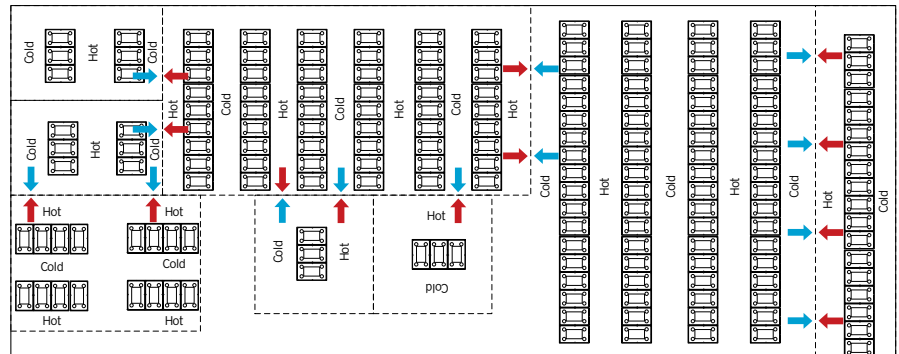
Flexible Deployment Options

Excellent Solution for Collocation and Other Divided Data Centers

Flexible Deployment

As IT hardware thermal operational requirements progress in the future, the total cabinet level containment strategy allows for flexible deployment of IT equipment. The subdivision of the space into cages results in nonuniform IT hardware layouts that complicate airflow management, and often remove the possibility of using aisle level containment. The IsoFlo cabinet creates a fully contained data center without additional space requirements.

The ability to zone the data center is another advantage when considering customers with differing thermal requirements. Customers or IT hardware requirements may allow for the deployment of various cooling strategies which have lower energy cost to operate, allowing for flexible operational decisions.



Managing Nonuniform Rack Layouts

The ability to create an efficient data center without the need for uniform hot/cold aisle layout or aisle level containment can be a big advantage in many facilities. The diagram above represents a colo facility with many customer cages that have been deployed in a less than optimal layout. Rack inlets and exhausts are facing each other and in many cases there is no easy way to install a containment system. Tate's IsoFlo cabinet eliminates these issues because the fully contained airflow path allows it to be deployed independently of any defined configuration.



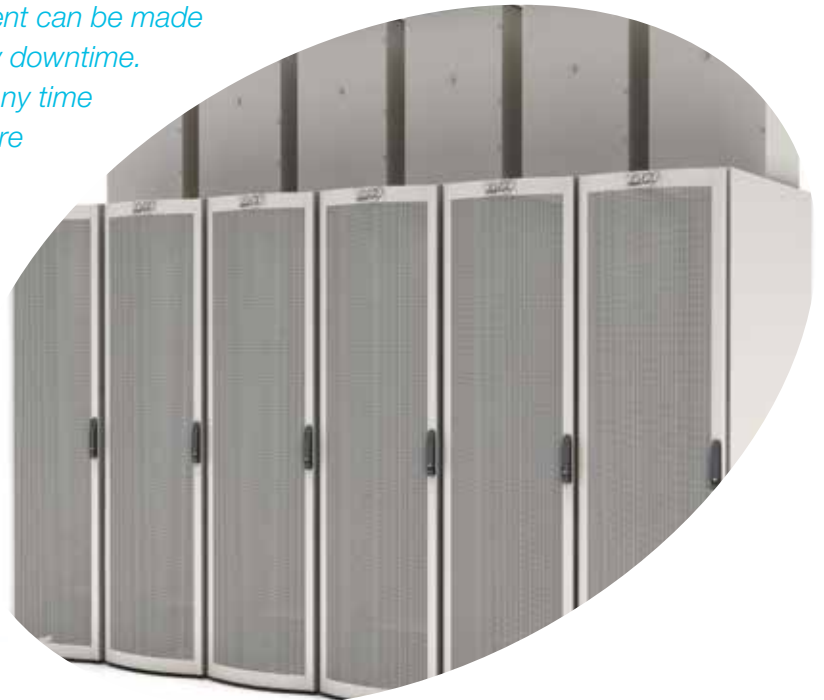
Zoning the Data Center

Another advantage of using cabinet level containment is that a single data center or pod can be zoned to operate at different cooling temperatures. In the diagram above a single 20,000 sq ft. pod has been divided into three different zones using plenum divider. The plenum divider allows each zone of the underfloor plenum to be supplied by different roof top air handlers each supplying different air temperatures without dividing up the white space above the floor.

Deployment in a Continuous Row

Build in Flexibility and Redundancy with Shared Supply and Exhaust Plenums.

The decision to use cabinet level containment can be made without extreme logistical planning or costly downtime. IsoFlo Cabinets can be installed at almost any time in any type of data center environment where a supply and return plenum is present. The airflow supply panel fits seamlessly into a standard raised floor system and the chimney is designed for easy installation in a typical drop ceiling. Regardless of your facilities floor-to-ceiling height or power and cable service distribution strategy the IsoFlo Cabinet is designed to accommodate your needs, with fast easy installation and retrofit.



Complete Flexibility

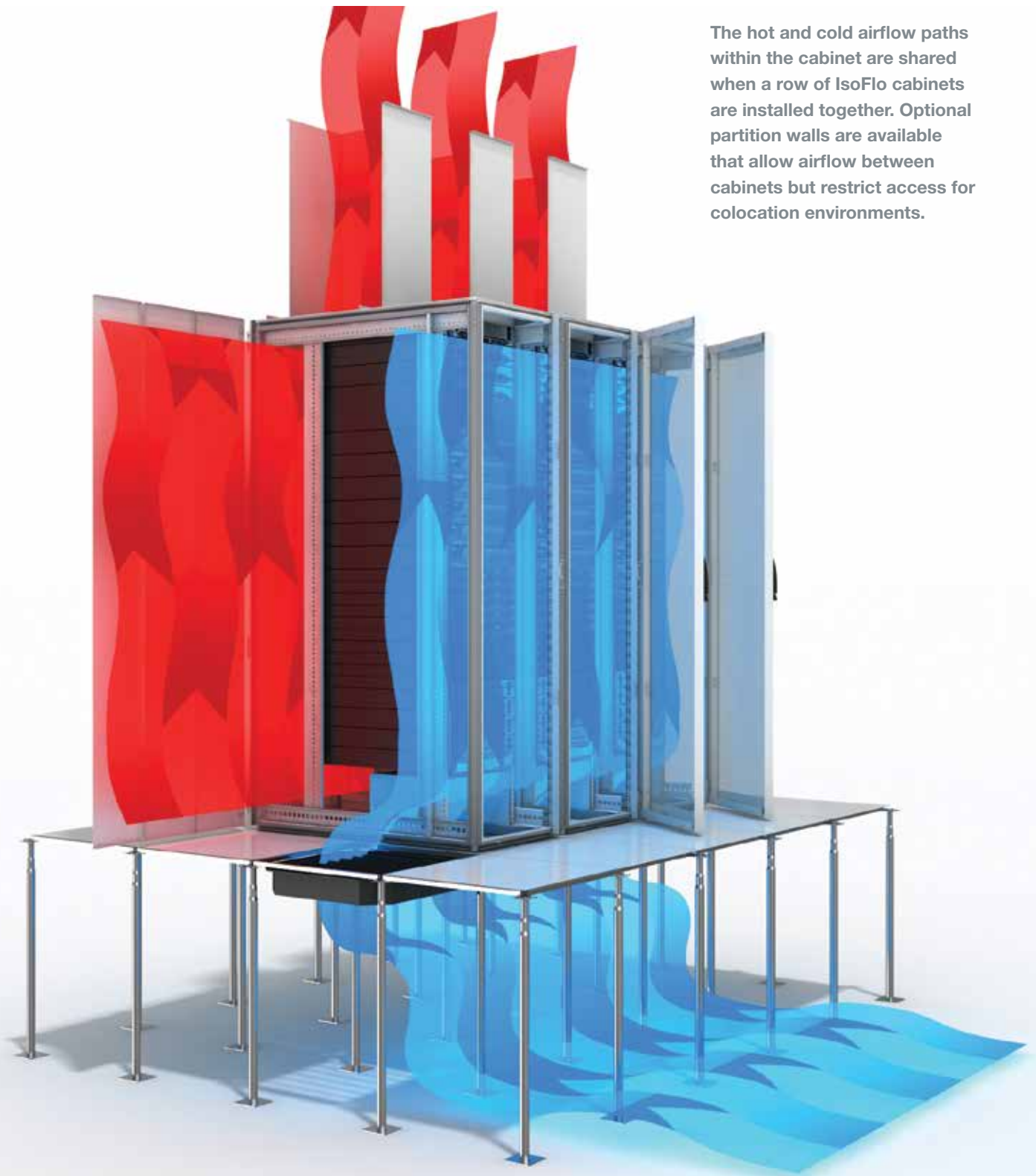
Tate's IsoFlo cabinet can be installed almost anywhere in any data center environment. The full 42U of open mountable equipment space provides enough capacity to add the equipment needed. The automated airflow controls provide instant rebalancing for equipment changes and inlet air temperatures can be adjusted to accommodate the widening operational ranges of newer equipment.

Increase Reliability

Installing a full row of IsoFlo cabinets together enables the entire row of equipment to share one common air delivery path. The result is improved reliability. If one server ramps up and requires additional cooling the air from other cabinets can be accessed and used to cool the equipment making the changes at the individual server level more manageable.

Installing rows rather than individually contained cabinets will also reduce the cost of side walls and may reduce the expense on airflow controls.

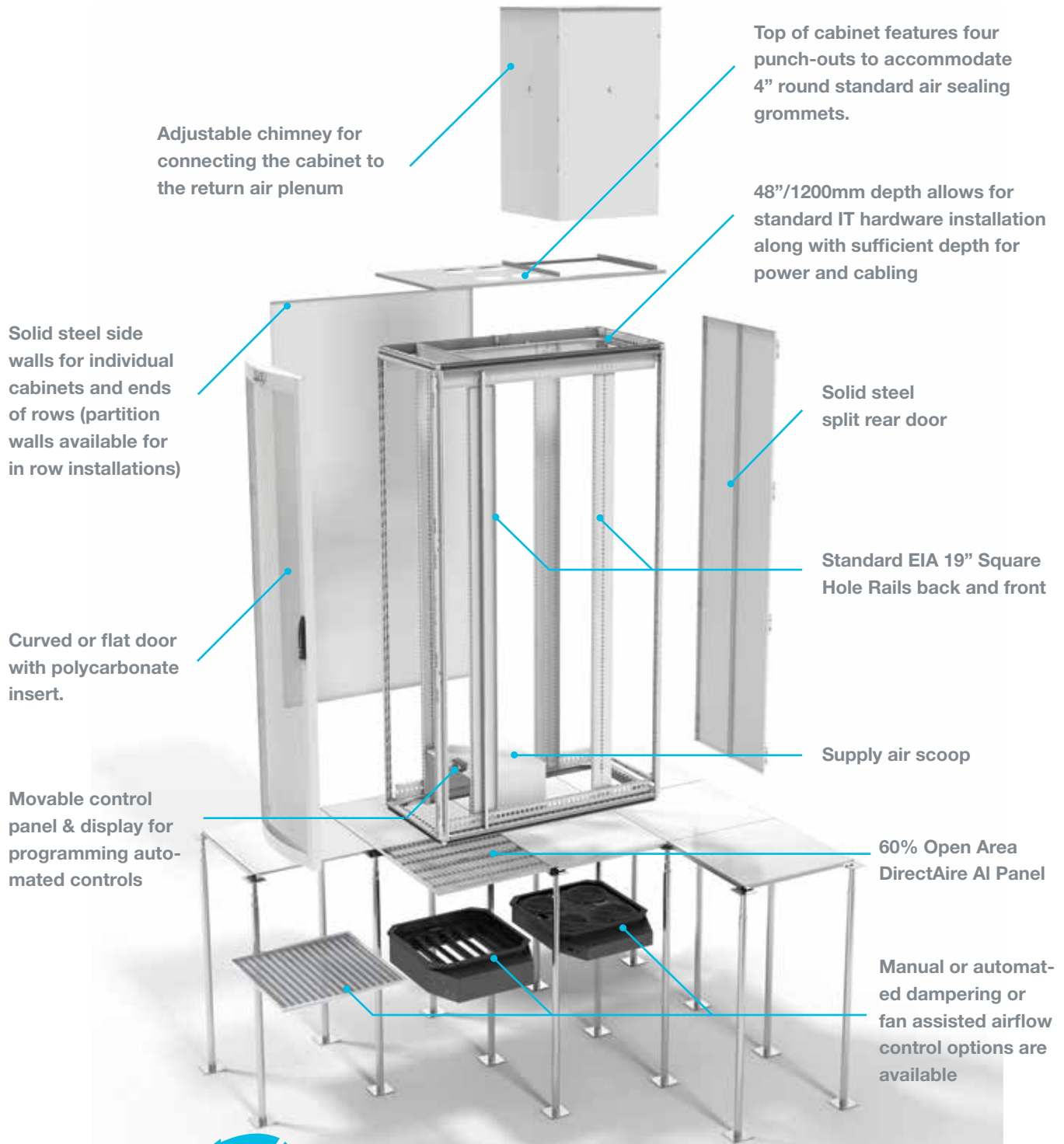


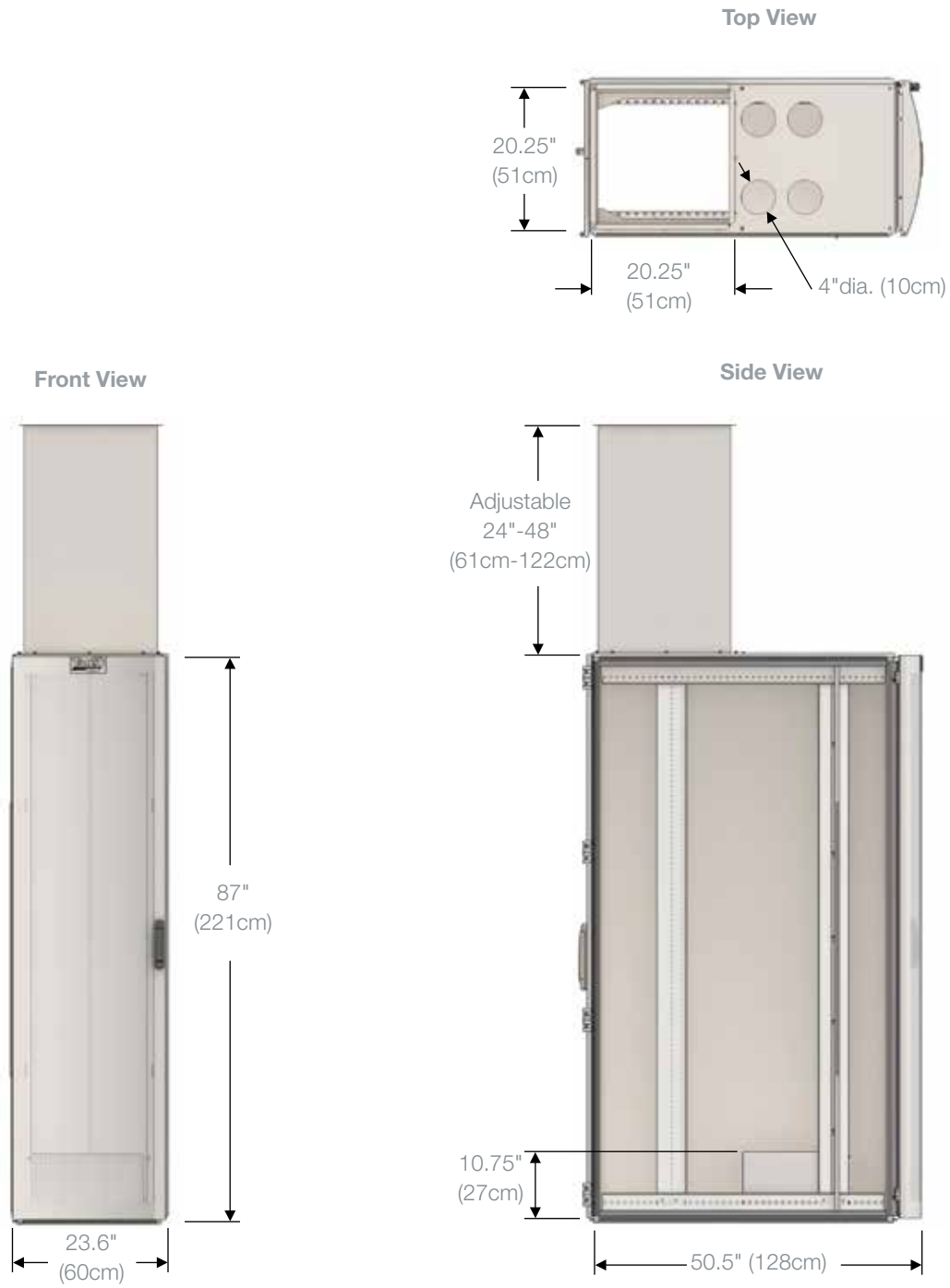


The hot and cold airflow paths within the cabinet are shared when a row of IsoFlo cabinets are installed together. Optional partition walls are available that allow airflow between cabinets but restrict access for colocation environments.

Intelligent Cabinet Design

Flexible Design for High Performance





Standard Cabinet Configuration

	Dimensions (H x W x D)	Cooling Capacity*	Max. Load	Mounting Space	Chimney Dimensions
IsoFlo Cabinet	87" x 23.6" x 50.5"	1.5-20.4 kW	3200 (14.2kN)	42U	20.25" square x 24-48" tall

*Based on 0.10" H₂O static pressure and 25°F ΔT

Managing Airflow through the Cabinet

Control Options for Improved Efficiency

Monitoring and adjusting the amount of airflow into the cabinet can improve the performance of any cooling system.

In an existing or new data center which uses CRAC/CRAH units for cooling, supplying only the right amount of air needed to cool the equipment is critical to operating efficiently even with a completely contained airflow path.

Even a fully economized solution that uses large fans can save additional energy by controlling the amount of airflow into the cabinet. Server power management techniques significantly change power consumption between peak and idle states. The airflow into the cabinet should be controlled to meet the peak energy demands, while operating efficiently during idle times.

Convenience

Using automated controls to manage the airflow into the IsoFlo Cabinet eliminates the need for manual rebalancing. Once the new equipment is powered on the automated controls will adjust to the new load density of the cabinet to maintain the proper airflow and the desired temperature.



Movable Control Panel

The control panel can be mounted anywhere inside the cabinet for easy access to the SmartAire/PowerAire programming controls and display monitor.



SmartAire® P

The SmartAire automatic variable-air-volume damper adjusts the amount of airflow into the cabinet for variable load conditions ensuring the proper amount of cooling is maintained.

Key Features

- Fail safe operation, opens to 100% during failure
- Optional BMS interface and DCIM integration
- Six vane damper for large variable open area from 0-100%
- 23.1" x 26.7" x 6.2" (58.7cm x 67.8cm x 15.7cm)
- 19W/VA Peak – 5W/VA Typical
- Pressure Controlled



Opposed Blade Damper

The opposed blade damper features a wide range of adjustment and very little airflow resistance. Easy access through the panel's surface allows for manual airflow balancing for IT hardware with fixed airflow requirements.

Key Features

- Unlimited range of airflow settings
- Easily adjustable from above without panel removal
- Mounts directly to the DirectAire airflow panel
- Extruded aluminum construction



PowerAire® Quad P

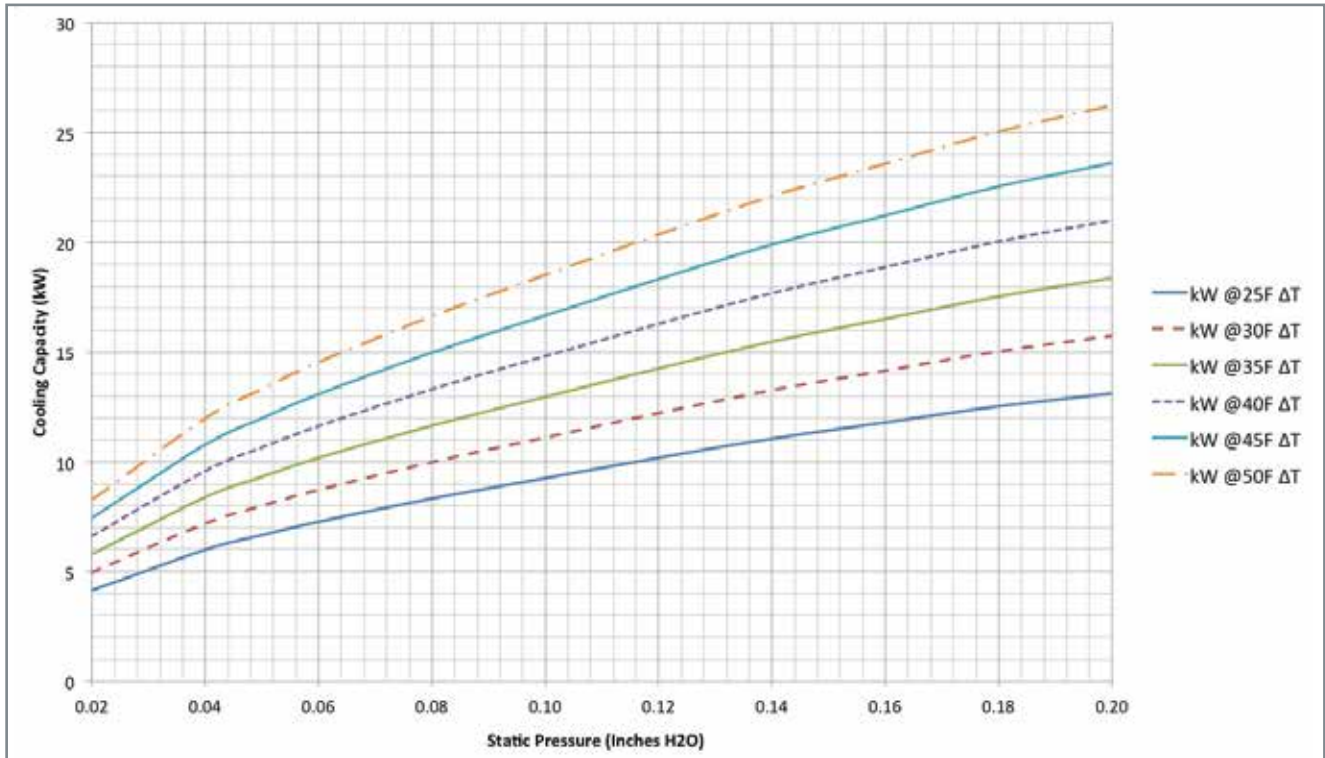
The PowerAire Quad fan is equipped with 4 fans connected in parallel to provide built-in redundancy. Equipped with variable speed fan drives all four fans can be throttled up or down based on the load requirements.

Key Features

- 4 x EC Fans for airflow supply redundancy
- Fan speed is variable from 0-100%
- Consumes < 255 W at 100% fan speed
- 23.1" x 26.7" x 4" (58.7cm x 67.8cm x 10.2cm)
- Pressure Controlled

Charts & Capacities

IsoFlo Cooling Capacity at Varying ΔT 's



Cooling capacity per rack is based on the DirectAire AI under the IsoFlo Cabinet with no controls.
The following equation was used: CFM/126 (CFM needed to cool 1kW @ 25°F ΔT)

IsoFlo Cooling Capacity with Different Control Devices

DirectAire AI Airflow Panel	0.02" H ₂ O (5 Pa)		0.04" H ₂ O (10 Pa)		0.06" H ₂ O (15 Pa)		0.08" H ₂ O (20 Pa)		0.10" H ₂ O (25 Pa)	
	CFM (L/s)	(kW/Rack)	CFM (L/s)	(kW/Rack)	CFM (L/s)	(kW/Rack)	CFM (L/s)	(kW/Rack)	CFM (L/s)	(kW/Rack)
No Controls										
	519 (245)	4.1	753 (355)	6.0	912 (430)	7.2	1046 (494)	8.3	1164 (549)	9.2
Opposed Blade Damper										
0% Open	87 (41)	0.7	129 (61)	1.0	162 (77)	1.3	191 (90)	1.5	217 (102)	1.7
100% Open	506 (239)	4.0	714 (337)	5.7	873 (412)	6.9	1007 (475)	8.0	1124 (530)	8.9
SmartAire P										
0% Open	82 (39)	0.7	117 (55)	0.9	145 (68)	1.2	163 (77)	1.3	186 (88)	1.5
100% Open	497 (235)	3.9	713 (336)	5.7	872 (412)	6.9	973 (459)	7.7	1091 (515)	8.7
PowerAire Quad P										
100% Fan Speed	1759 (830)	14.0	1777 (839)	14.1	1799 (849)	14.3	1846 (871)	14.7	1869 (882)	14.8
PowerAire P										
100% Fan Speed	2489 (1175)	19.8	2519 (1189)	20.0	2541 (1199)	20.2	2549 (1203)	20.2	2567 (1211)	20.4

Cooling capacity per rack is based on: CFM/126 (CFM needed to cool 1kW @ 25°F ΔT)
Capacities may vary based on rack configuration and options.



Tate has been an industry leading global provider of innovative next generation products for data center applications for over 50 years. Our world-class manufacturing plants have the flexibility to create modular solutions quickly with up-front cost optimization and Tate's in-house engineering team has the experience and industry knowledge to design the best solutions from concept to completion.

Our wide range of custom manufactured data center products include raised access floors, structural ceilings, and containment, as well as, airflow panels and controls which work together to maximize your data center's performance. Tate is your single source solution builder for your data centre.

Corporate Headquarters:

7510 Montevideo Road,
Jessup, MD 20794
Tate Hotline: 1-800-231-7788
Tel: +1 410 799 4200 Fax: +1 410 799 4207

Production Facilities:

7510 Montevideo Road,
Jessup, MD 20794
52 Springvale Road,
Red Lion, PA 17356
Tel: +1 717 244 4071 Fax: +1 717 246 3437

Canadian Sales & Support Office:

880 Equestrian Court, Oakville,
ON L6L 6L7 Canada
Tate Hotline: 1-800-231-7788
Tel: +1 905 847 0138 Fax: +1 905 847 0141

Australian Sales & Support Office:

28 Biloela Street, Villawood NSW 2163
Tel: +61 02 9728 4111 Fax: +61 02 9728 3088

Asia Sales & Support Office:

19 Cecil Street
#05-15, 5th Floor, The Quadrant
Singapore 049704
Tel: +65 6653 5358

Central and South American Sales & Support:

Tel: +1 443 995 1808

European Sales & Support:

B16 Ballymount Corporate Park,
Ballymount Avenue,
Ballymount, Dublin 12, Ireland
Tel: +353 (0) 87 1238383

Middle East Sales & Support:

Jebel Ali-Lahbab Road (E 77 Road)
Dubai Investment Park
United Arab Emirates
Tel: +971 56 199 8368

tateinc.com

A Kingspan Group Company



Tate components are proudly made in the U.S.A.