MINKELS | modulan | Systems

WHITE SPACE

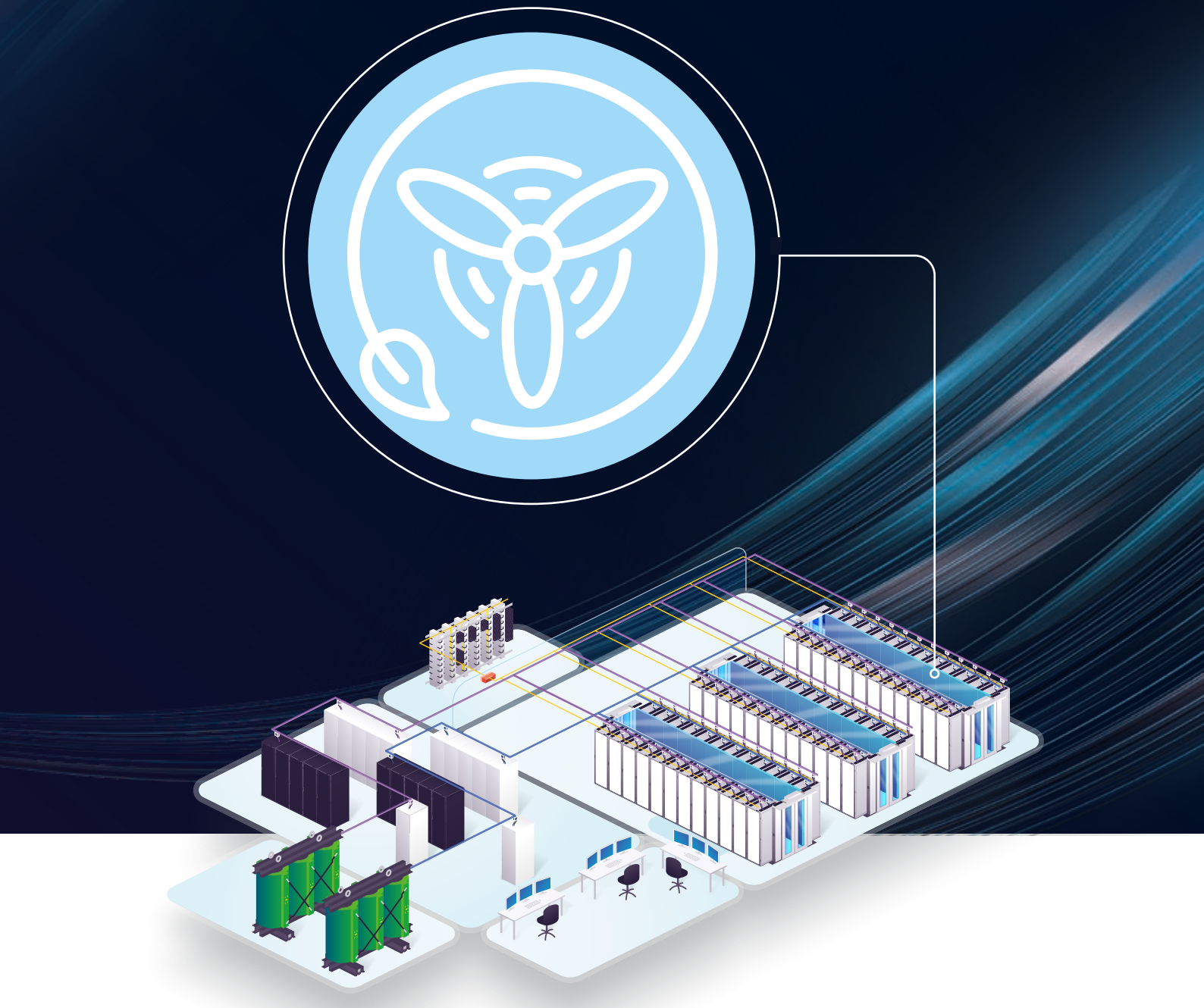
COOLING SOLUTIONS

RELIABLE, EFFICIENT, SCALABLE **DATA CENTER SOLUTIONS**
POWERED BY SPECIALIST BRANDS

legrand®

CONTENTS

SOLUTIONS **TO COOL** YOUR **DATA CENTER**

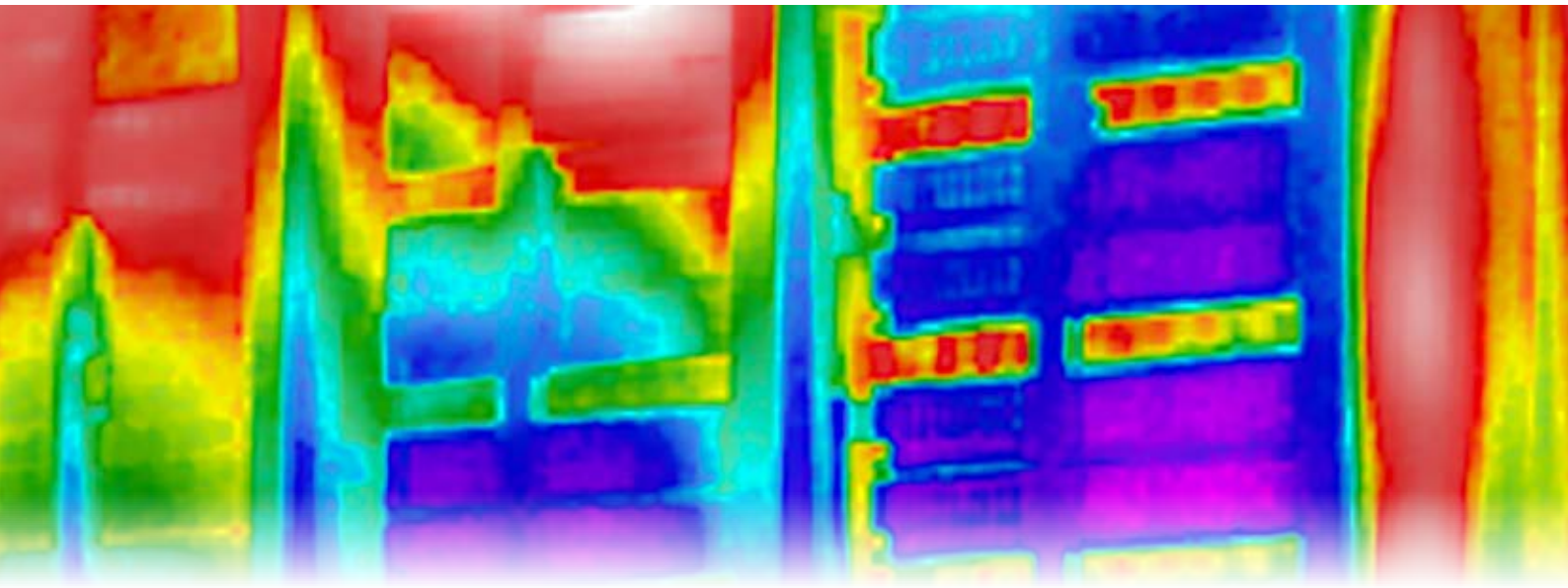


DATA CENTER COOLING: UNDERSTANDING COOLING AND THE IMPORTANCE OF SELECTING THE RIGHT SOLUTION FOR YOUR DATA CENTER

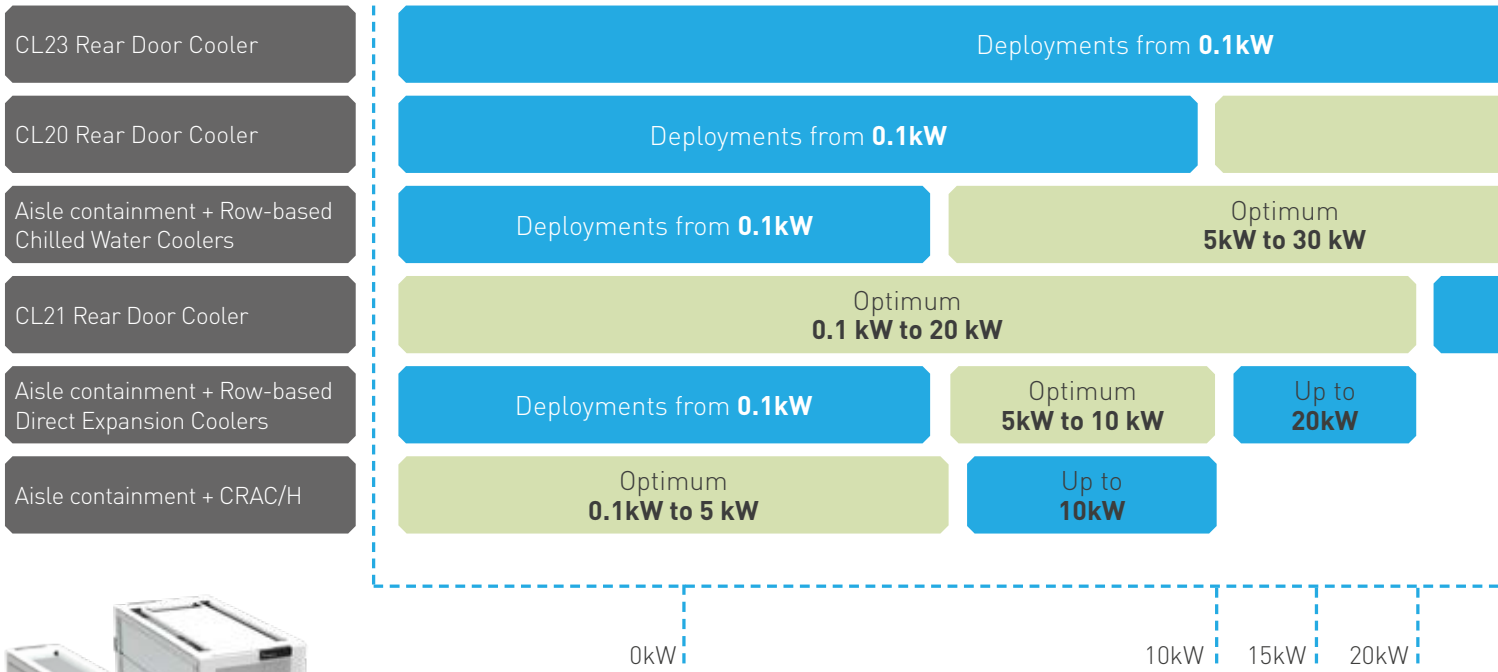
The definition of cooling is very straightforward: cooling is the removal of heat. When we talk about data center cooling, we mean transporting heat generated by IT equipment to the ambient air to maintain optimal temperatures and humidity levels for equipment within a data center facility. The complex challenge is how to achieve this.

Energy cannot disappear; all the IT equipment of a data center will eventually generate heat, meaning that one server receiving 1kW of power input will equal 1 kW of heat generated at some point. Removing this excess heat is critical to ensure IT devices and equipment operate at peak performance and efficiency.

Choosing the right cooling solution for your data center environment can improve efficiency and performance, dramatically impacting cost savings and Power Usage Effectiveness (PUE). The challenge data center managers face is how to select the right solution for their specific cooling requirements. Legrand provides market-leading cooling solutions and support through its specialist brands to ensure that all facilities can find the right solution to meet their individual needs.



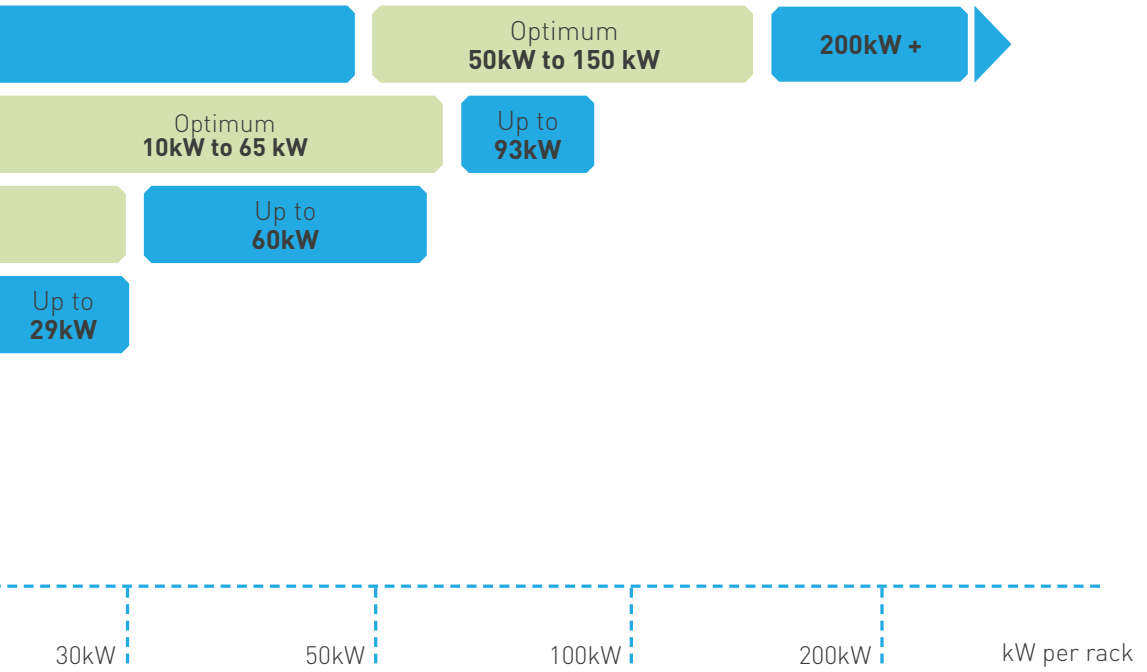
COOLING
Which option should you choose?



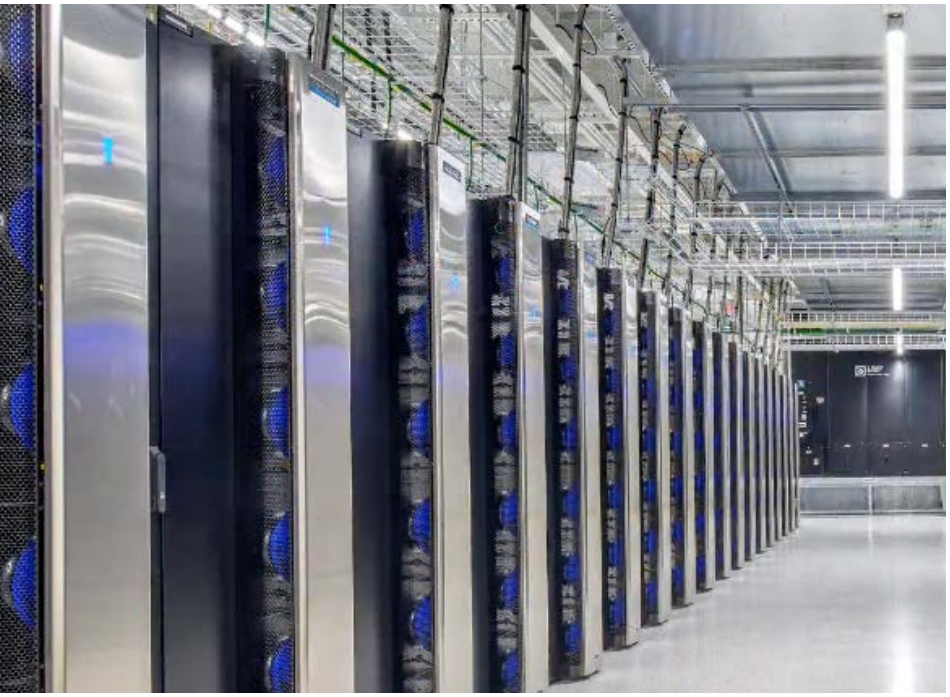
■ Row-based Chilled Water Coolers

■ Row-based Direct Expansion Coolers (DX)

■ Nexpand aisle containment with row-based coolers



CL21 Rear Door Cooler



CL20 and CL23 Rear Door Coolers

The overlap between CL21 rear door coolers and aisle containment + row-based coolers is solved depending on the specifics of the customer's deployment. Generally, in terms of CAPEX the Row-based is the preferred choice, whereas Rear Door Cooling will provide better efficiency and scalability.

Passive Cooling

Aisle containment

Free-standing containment

Vertical Exhaust Duct

AISLE CONTAINMENT

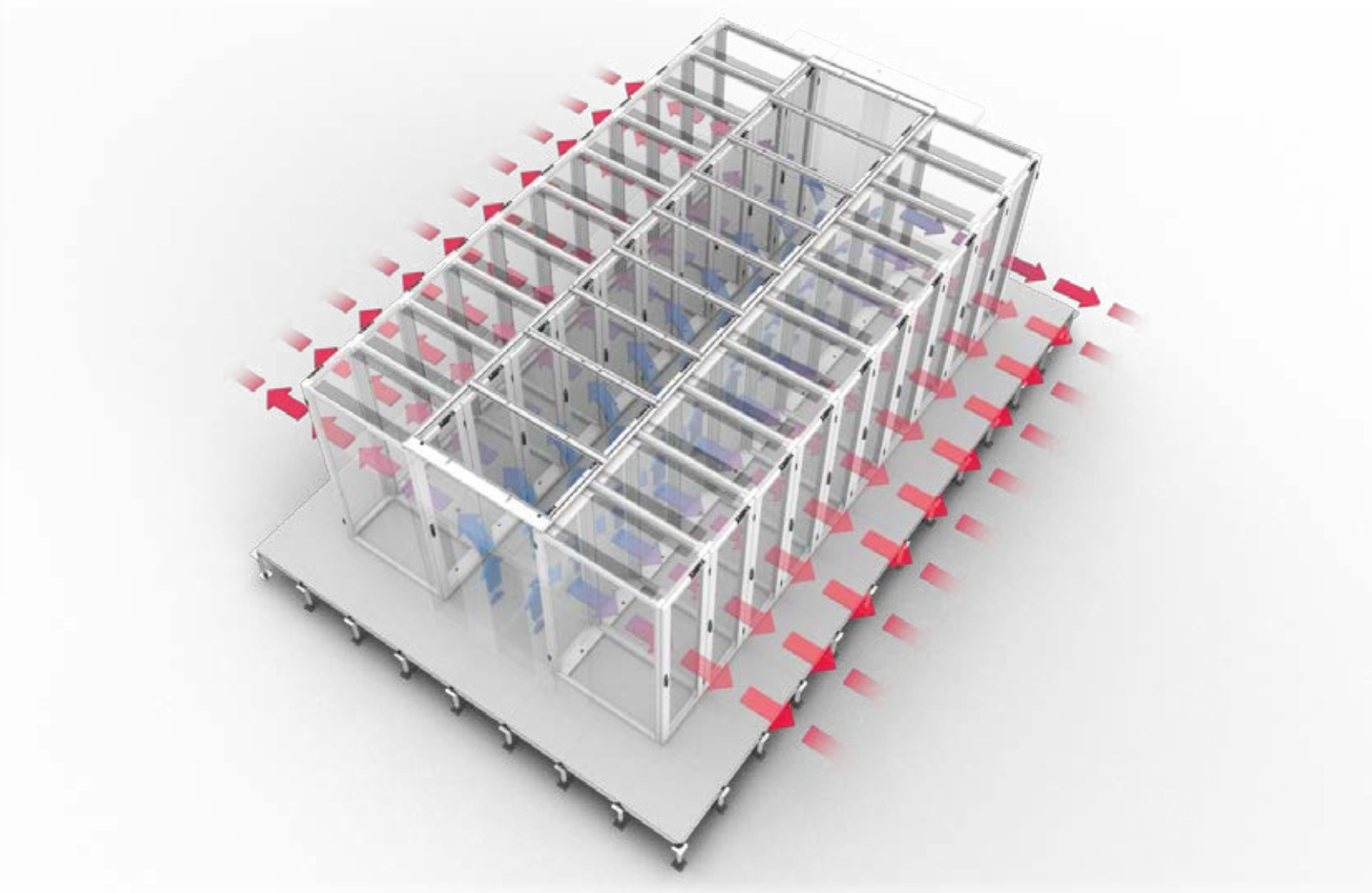
Aisle containment provides a solution to data centers' cooling challenges: the optimisation of cooling and energy efficiency through separating hot and cold airflows.

Aisle containment

Cold Corridor

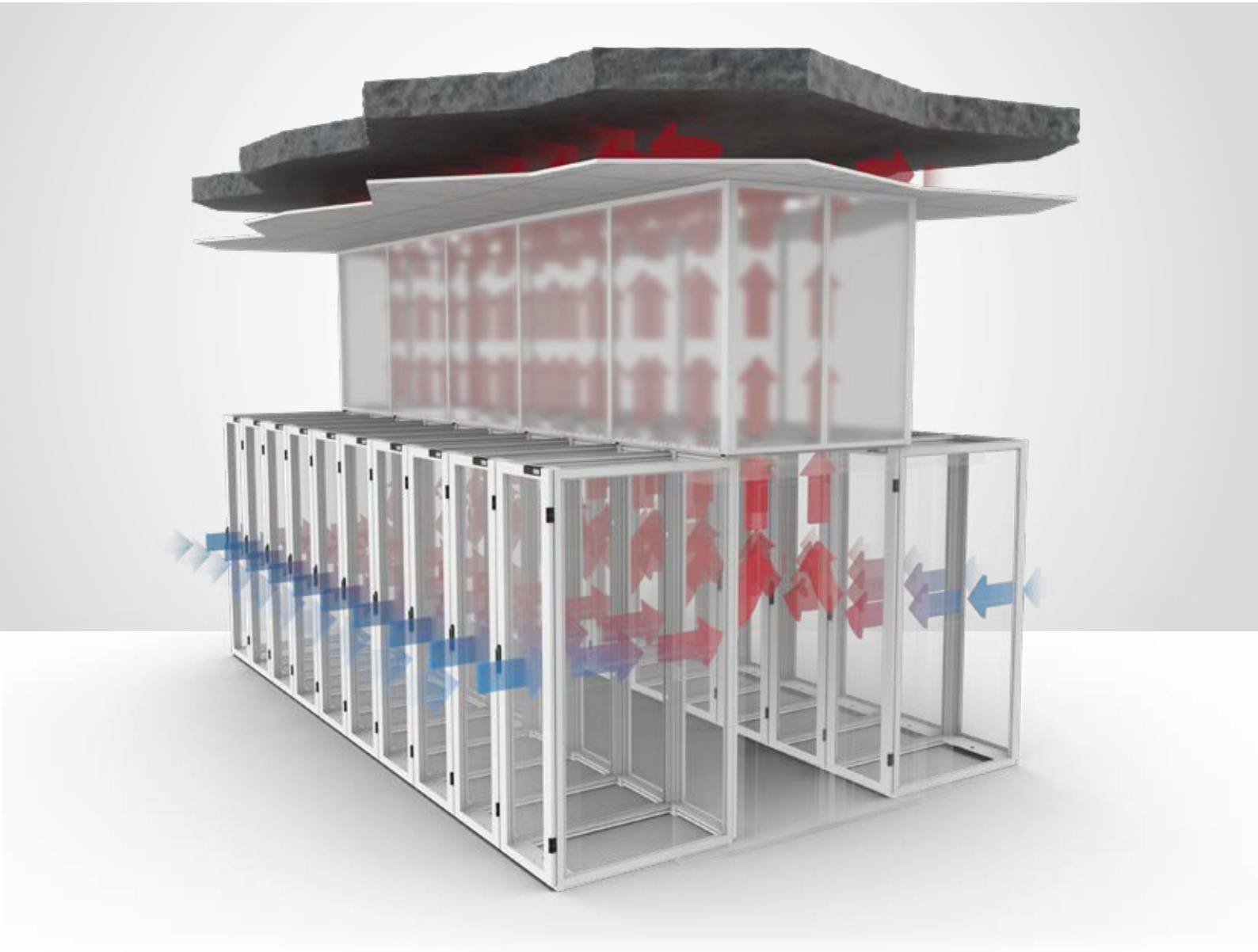
- Refrigeration provided by CRAC (Computer Room Air Conditioning) unit to the aisle;
- Servers expel hot air into the room;
- Room-dependent solution. Raised floor needed;
- Legrand's premium high-transparency roof or drop-away panels available for roof system;
- Swing doors or mechanical and electrical sliding doors are available;
- Roof & doors stand on cabinets.

FOR MORE DETAILED INFORMATION DOWNLOAD THE BROCHURE



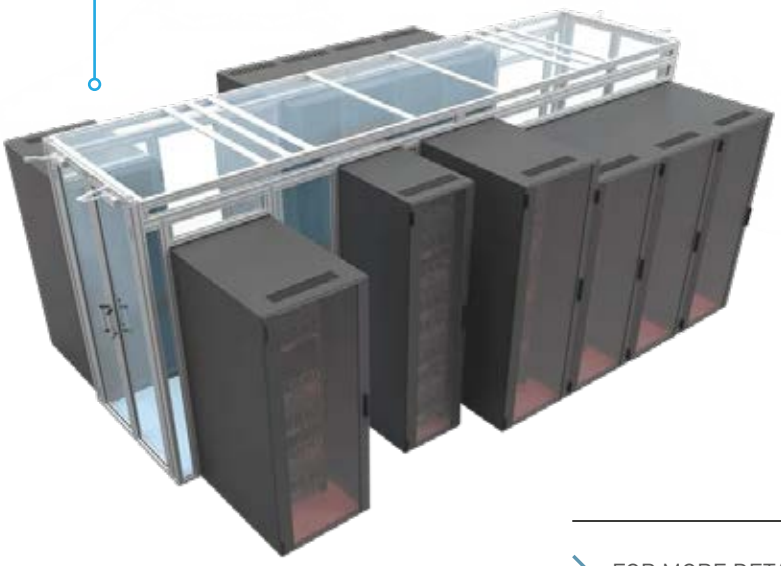
Hot Corridor

- Refrigeration provided by CRAC unit to the room;
- IT Equipment expel hot air to the aisle;
- Room-dependent solution. False ceiling needed;
- Legrand's transparent or translucent structures are available for vertical structures;
- Swing doors or mechanical and electrical sliding doors are available;
- Roof & doors stand on cabinets.



Every data center is unique. That is why we intentionally do not focus on an arbitrary standard! Rather, we adapt the standard to your requirements.

- Custom containment within any complex environment



Customised
Aisle containment

FOR MORE DETAILED INFORMATION
DOWNLOAD THE BROCHURE

FREE-STANDING CONTAINMENT

This is another approach to passive cooling, whereas in standard practice, the containment structure lies on the cabinets; in this case, it is self-supporting; which means that roof and door systems are independent of cabinets. Legrand offers two options to ensure that every customer can deploy the most optimal solution based on their constraints.

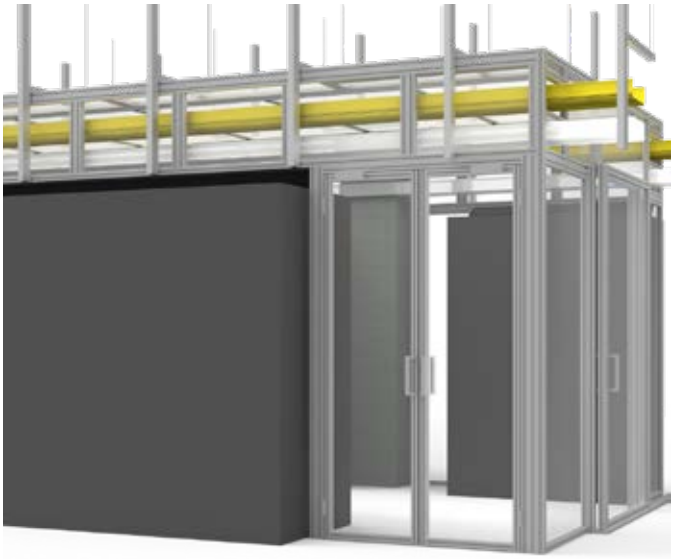
Ground Free-standing containment

- Refrigeration provided by CRAC unit to the aisle;
- Possible in cold & hot aisle configuration;
- Room-dependent solution. Raised floor or false ceiling required. Self-sustaining structure fixed to the ground;
- Legrand's premium high-transparency roof or drop-away panels available for cold corridor roof system;
- Transparent or translucent panels available for hot corridor roof system;
- Swing doors or mechanical and electrical sliding doors are available;
- Roof & doors independent of cabinets.

SPECIFICATIONS	
Aisle widths	1200 and 1800 mm
Free height available for use	2200 mm
Colour	White (RAL9003) and black (RAL9005)

Free-standing containment

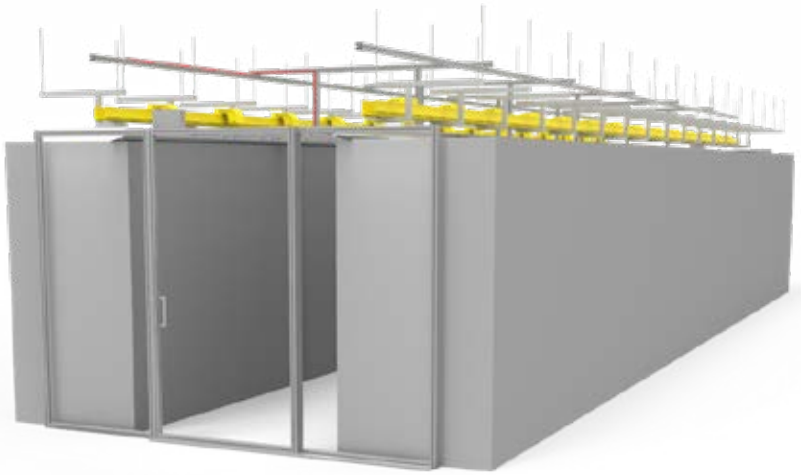
FOR MORE DETAILED INFORMATION
DOWNLOAD THE BROCHURE



SPECIFICATIONS	
Aisle widths	Flexible from 1000 mm up to 3500 mm
Free height available for use	Flexible. To be defined per project
Colour	Silver anodized

Hanging containment

- Refrigeration provided by CRAC unit to the aisle;
- Possible in cold & hot aisle configuration;
- Room-dependent solution. Raised floor or false ceiling required. Self-sustaining structure fixed to the ceiling;
- Legrand's premium high-transparency roof or drop-away panels available for cold corridor roof system;
- Transparent or translucent panels available for hot corridor roof system;
- Swing doors or mechanical and electrical sliding doors are available;
- Roof & doors independent of cabinets.

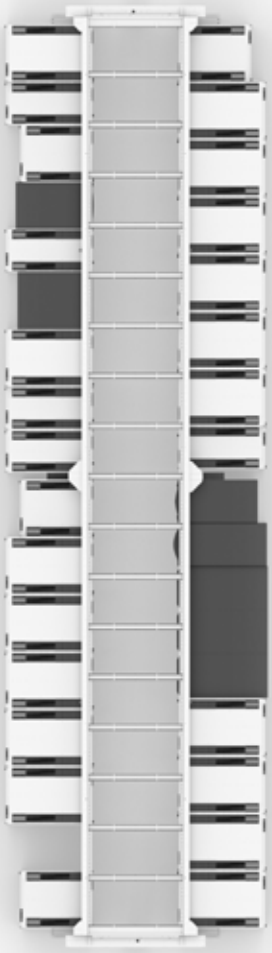


Hanging containment

FOR MORE DETAILED INFORMATION
DOWNLOAD THE BROCHURE

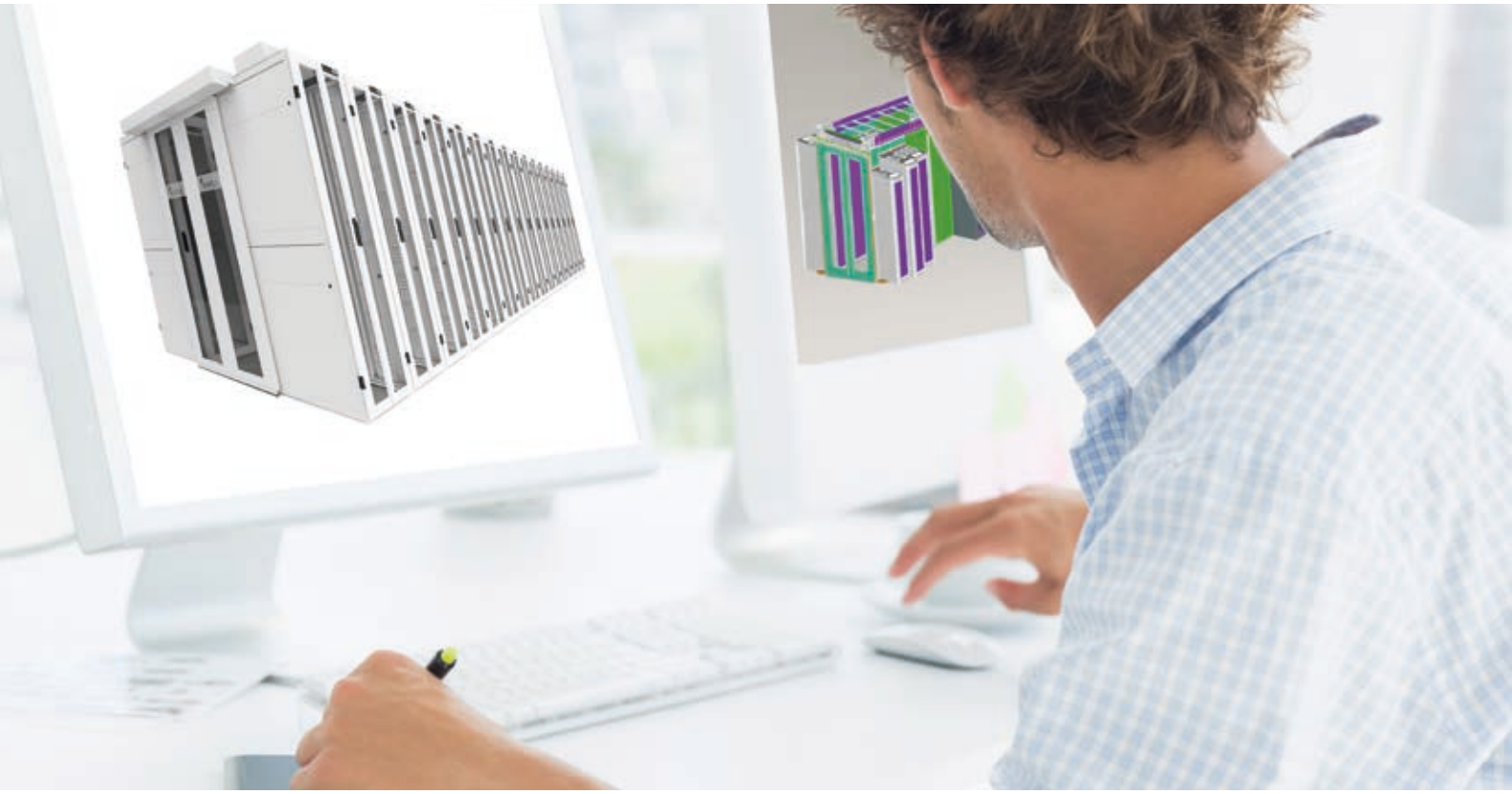
AISLE CONTAINMENT VERSUS FREE-STANDING CONTAINMENT

PHASE 1	PHASE 2	PHASE 3
Free Standing Cold Corridor with 8 standard cabinets and 1 integration cabinet.	Different sized cabinets are added. One cabinet is replaced by a new cabinet.	Different sized cabinets are added.
Auto sliding doors with keypad or RFID and the possibility to place a cross wall to save costs.	No reprogramming of management systems is needed.	Gradually the data center is filled without installation or reassembling of doors, roofs, sensors or fire extinguishing systems.
Sensors installed in the roof of the corridor.	Move the cross wall.	
Corridor is equipped with nozzles for a fire suppression system.		
The sensors, the security system are configured in the management system.		



FREE-STANDING PRESENTS VARIOUS ADVANTAGES COMPARED TO STANDARD CONTAINMENT:

- Option of easily fitting different cabinet heights within the same aisle;
- Major advantage in OPEX for multiphase projects. A Free-Standing solution allows the deployment of the full containment length in one go and the installation and certification of all security and fire safety elements. In a standard containment, this process must be repeated for each expansion;
- Energy savings in cooling. The entire length of the corridor will not need to be cooled as cross walls can be used. Build as you grow.



VERTICAL EXHAUST DUCT

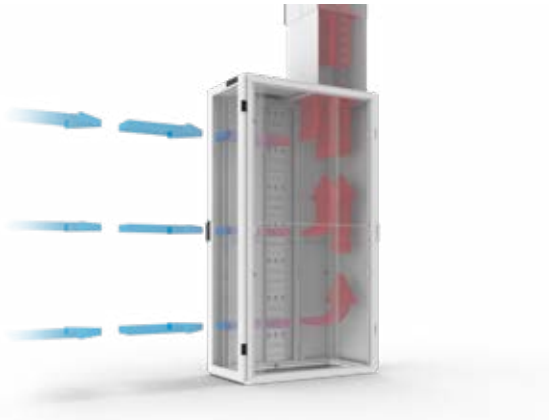
Legrand's Vertical Exhaust Duct solution provides the flexibility to place cabinets where needed. The benefit is that the room is always at a comfortable temperate since the hot air is expelled through a ducting system.

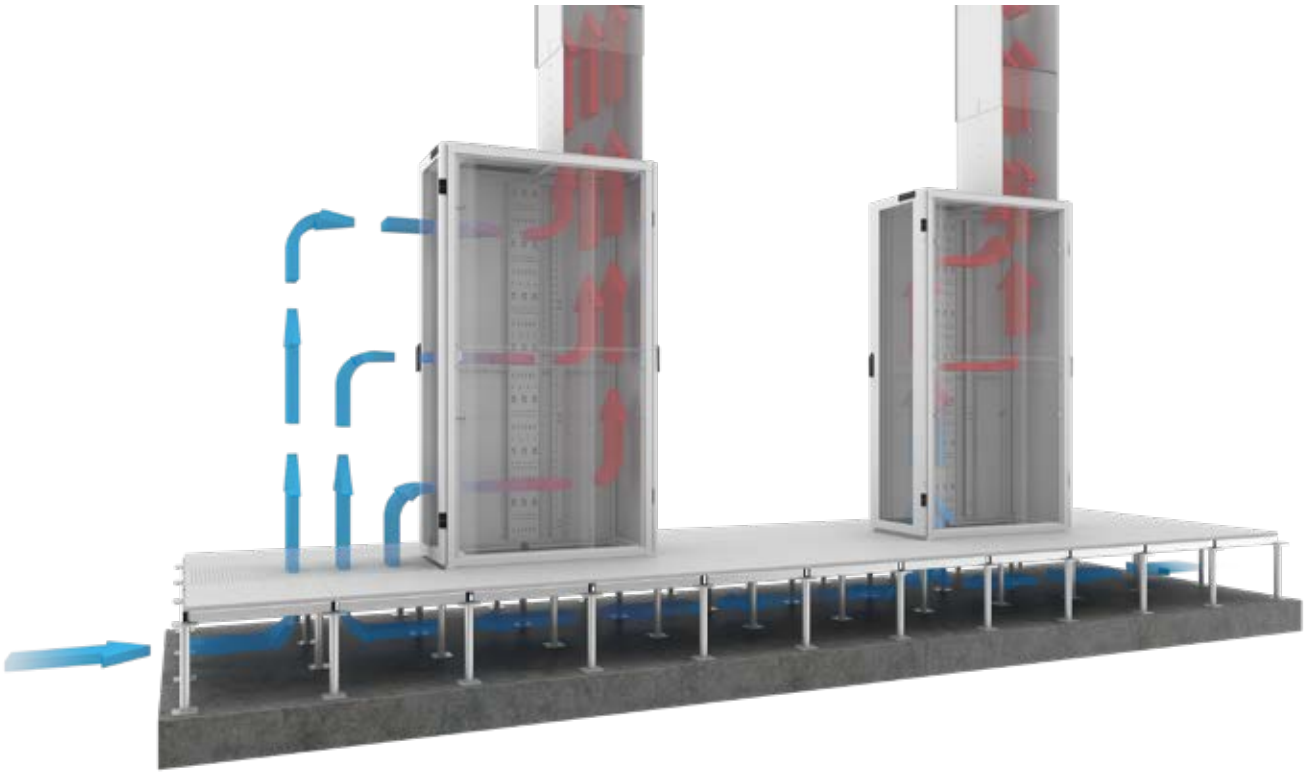
There is no need for investment in raised floors in an open loop configuration. If the front door is a glass door, then a raised floor is needed, so that cold air can enter from the bottom of the cabinet.

Another advantage to consider is that there is no need to integrate all the cabling within a hot or cold containment solution and worrying about possible air leakages. Thanks to the absence of hot or cold containment structures, cable management solutions always remain easily accessible.

A great benefit of the ducting system is that noise is also guided through the chimney, creating a very quiet working environment. Something that is not possible with other solutions.

SPECIFICATIONS	
Cabinet widths	600 and 800 mm
Telescopic heights	300 - 450 mm 400 - 650 mm 600 - 1050 mm 900 - 1600 mm
Colour	White (RAL9003) and black (RAL9005)





Active Cooling

Row-based Cooling

Rear Door Cooling

Legrand provides a leading portfolio of active cooling solutions suitable for all requirements, large or small. Active cooling is close to the heat source, shortening the airflow path, decreasing the fan units' power consumption, and providing a fast and dynamic response by the coolers to changing heat densities. Whether for a micro data center or a large-scale deployment with elevated heat densities, the active cooling equipment ensures that the data center can perform at its peak efficiency.

ROW-BASED COOLING

These cooling units are placed next to the cabinets and can handle heat loads ranging from 10kW to 60kW. These devices are used for two different deployments.

Closed loop = Micro Data Centers

- Refrigeration provided by row-based coolers;
- Heat density per cabinet shall be < 5kW;
- Room independent solution. No raised floor or false ceiling required;
- Suitable for small deployments of one to four cabinets with one or two coolers. Commonly seen in SMEs (small and medium-sized enterprises);
- It is recommended to consider cooling redundancy, Need+1 (N+1 coolers).

Micro Data Center
3 Nexpand cabinets with glass doors and
2 row-based coolers

Row-based cooling

FOR MORE DETAILED INFORMATION
DOWNLOAD THE BROCHURE

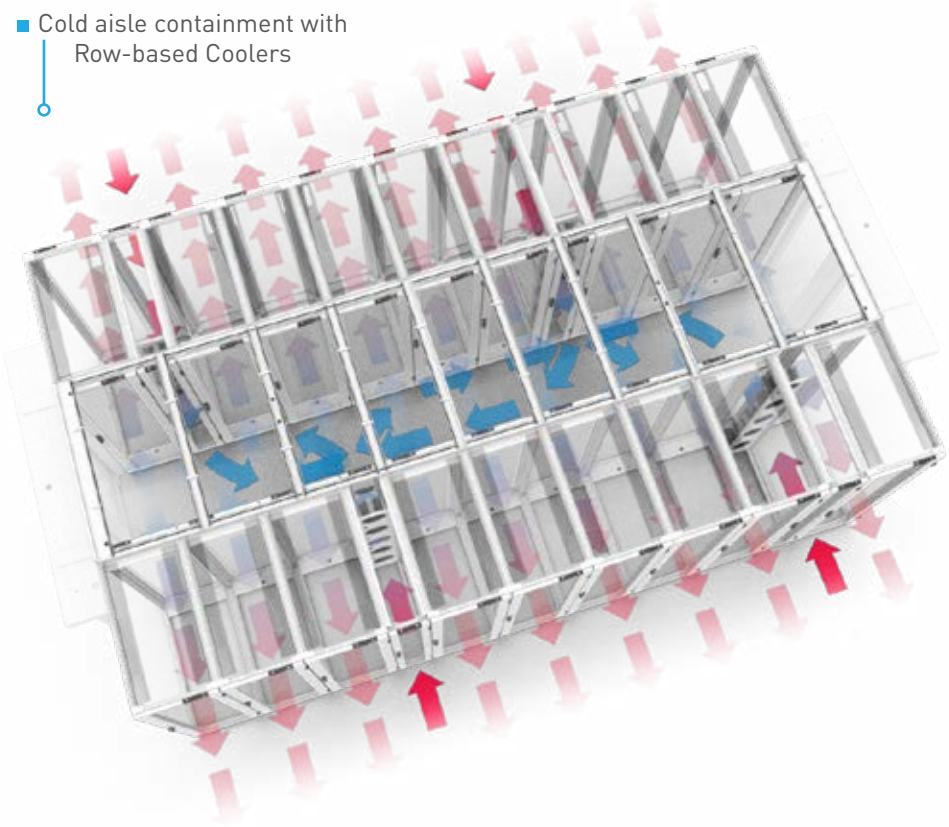
Open loop

- A combination of passive cooling technology (doors, roof and airflow management packages) and active coolers;
- Direct Expansion (DX) cooling technology (ranging from 10 to 20 kW) or Chilled Water (CW) cooling technology (ranging from 40 to 60 kW of cooling capacity in each cooler) are available;
- Supports both hot and cold containment configurations;
- Room independent solution. No raised floor or false ceiling required;
- Deployments are commonly seen in large-scale containments (big enterprises, colocation);
- It is recommended to consider cooling redundancy (n+1 coolers).

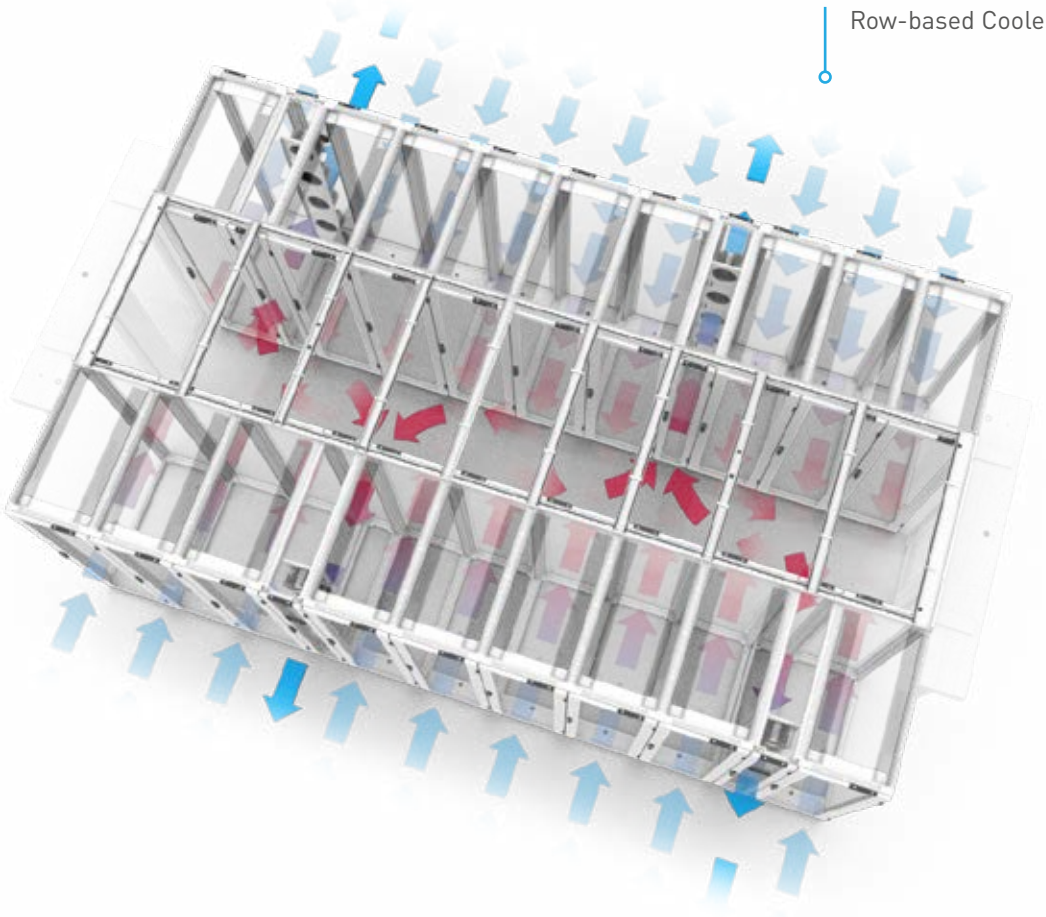
As a rule of thumb, for aisles where the total heat load is expected to be below 100 kW, DX coolers are the recommended technology, and beyond that threshold, CW coolers are more efficient.

It's always advised to contact your local sales representative to define the solution that best suits your needs.

Cold aisle containment with Row-based Coolers



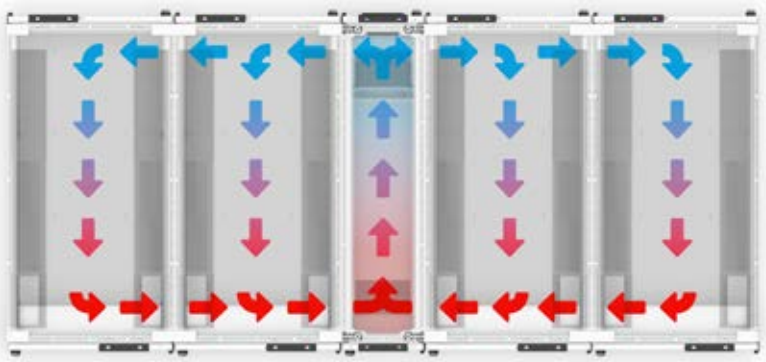
Hot aisle containment with Row-based Coolers



SCHEMATIC VIEW OF AIRFLOW PATHS

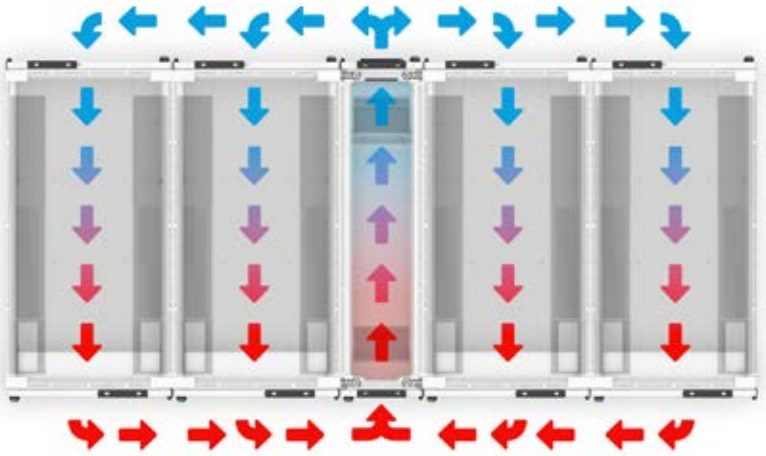
Closed loop

The hot and cold air is contained within the cabinets using glass and/or blind doors.



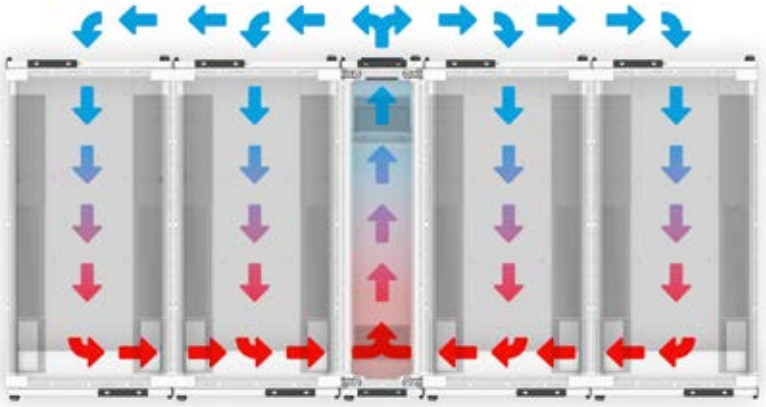
Open loop

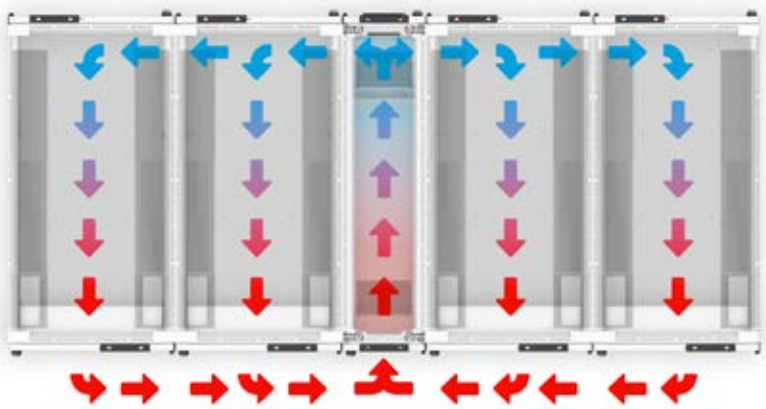
Hot/cold containment, the airflows go through perforated doors into aisle and room.



Hybrid loop

A middle-ground solution where one part of the cabinet is closed, and the other allows the airflow path into the aisle. Both cold and hot containment are possible. The first schematic is a cold containment configuration where the aisle is filled with cold air, and the second is a hot containment configuration.





REAR DOOR COOLING

Rear door cooling is the preferred technology for the most demanding applications with high heat densities, recommended for High Performance Computing (HPC) solutions.

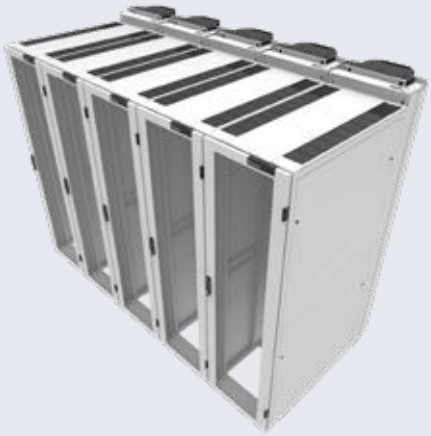
But rear door cooling is not only appealing because of its capacity to deal with very elevated heat densities; there are many other reasons why rear door cooling is increasing its presence in the market.

- Maximises free cooling thanks to high operating water temperatures;
- No refrigerant or costly dielectric solutions are used;
- There is no need for supplementary CRAC units;
- No aisle containment is necessary;
- Over 48% more footprint is available when compared to traditional aisle containment deployments;
- Achievable PUE of 1.03 where rear door coolers are used exclusively as the cooling technology;
- The hot water leaving the cabinet can be reused for other purposes in the facility such as heating;
- Our rear door coolers can be top and bottom fed as standard.

CL21 Smart Passive

Capacity	Up to 29kW
Available for	42U, 47U, 52U 600w, 750w, 800w

Passive solution in our Rear Door Cooling portfolio.



FOR MORE DETAILED INFORMATION
CONTACT YOUR SALES REPRESENTATIVE

CL20 ProActive

Capacity	Up to 93kW
Available for	42/47/52 U 600/800W

CL23 HPC ProActive

Capacity	Up to 200kW
Available for	47/52U 800W

Airflow Management

The vast majority of the power consumption in a data center comes from IT equipment, and cooling is another key player contributor. It is therefore critical to optimize the design of the cabinets and accessories to prevent air recirculation and the mixture of hot and cold airflows, which help us to diminish cooling needs. Legrand is proud to bring to the market the best-in-class airflow management solutions to ensure that the cold air is only arriving at the needed locations and nowhere else, thereby avoiding unnecessary extra cooling power consumption due to inefficacies.

AIRFLOW MANAGEMENT ACCESSORIES

Airflow management package

The airflow management package is a premium solution to enhance the performance of the IT equipment as it prevents the mixing of hot and cold airflows. It can incorporate different accessories to allow cable entry while controlling airflows.

Front panels

1U plastic panels that prevent the mixing of airflows where the customer has no servers installed.
Sheet metal options of different sizes are also available.

Bottom plinths

Our cabinets have been designed to be able to stand on the bottom frame directly, but when using the leveling feet is necessary the bottom plinths ensure a perfect air seal across the entire bottom part of the containment.
They have also been designed so that their L-shape perfectly helps align the containment.

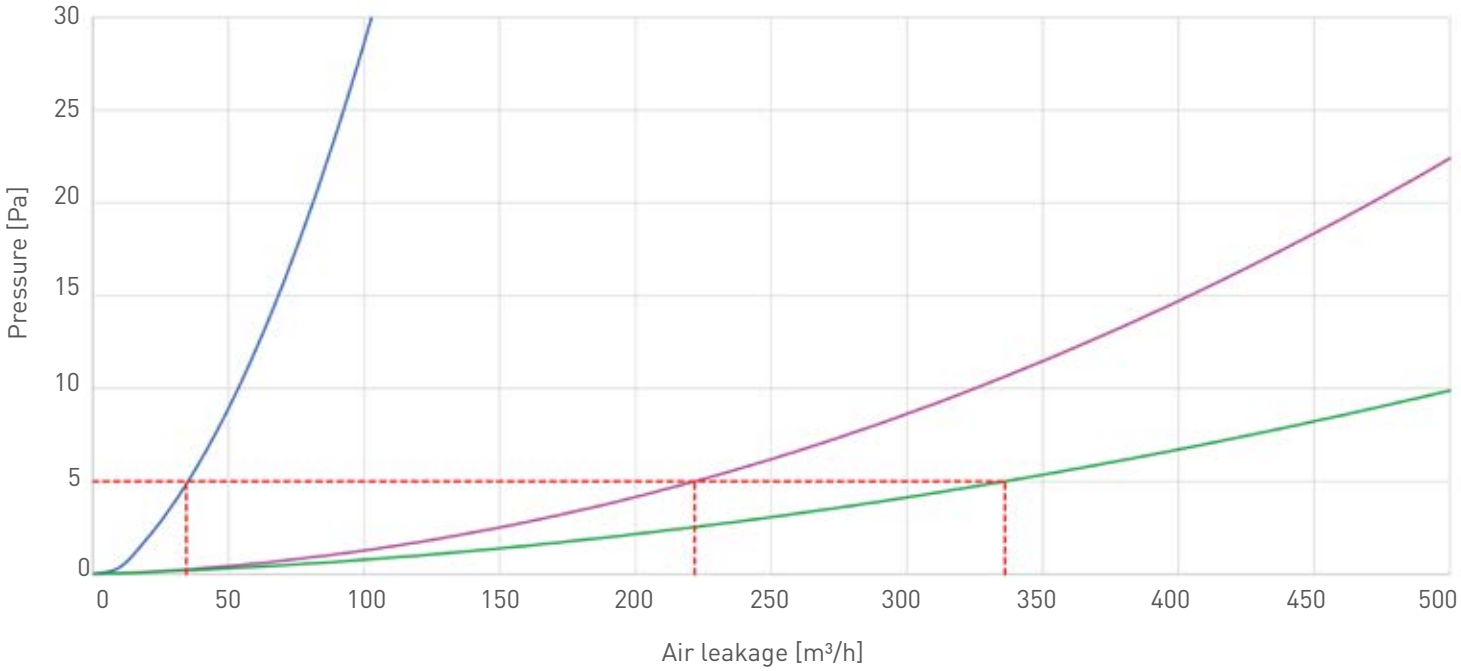
Sealing solution

Airflow management is where we excel, which is why even the smallest gaps are taken care of.

Our airflow seals have been specifically developed to prevent air leakages between cabinets, achieving a 100% sealed solution across the entire containment.

Airflow chart

The test represents the airloss within a cabinet with its best airflow management package solution in varying pressure conditions



Nexpand 800mm (w) and 47U (h)

Main **competitor A** 800mm (w) and 47U (h)

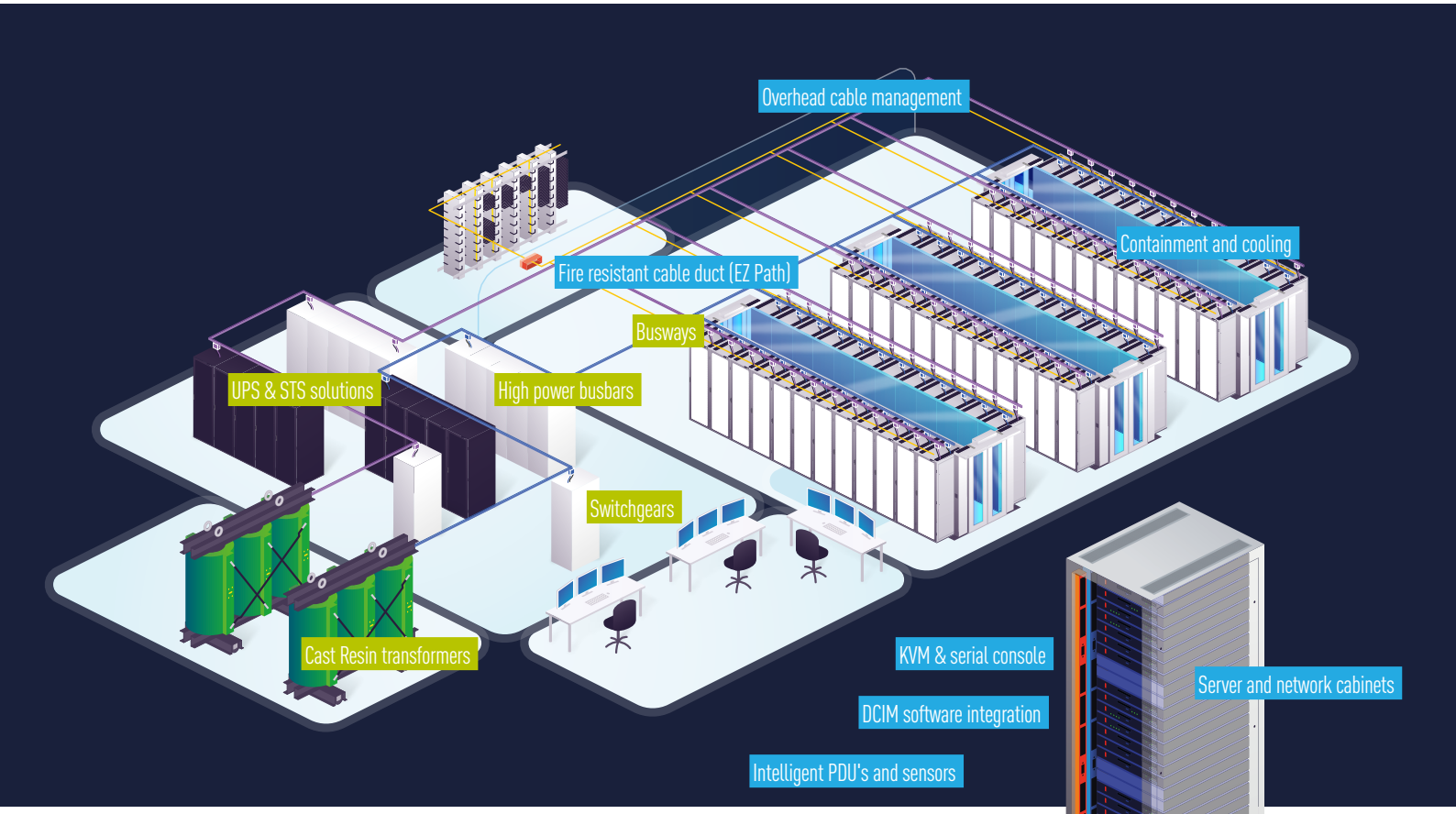
Main **competitor B** 800mm (w) and 48U (h)

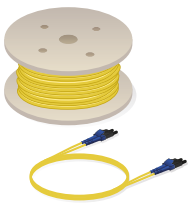
Thanks to our airflow management solution, the air leakage is reduced to the minimum. For example, at a pressure of 5 Pascal our air leakage is less than 40m³/h where competitors are above 200m³/h.

Test performed by an external party. For further insights on the test results contact your sales representative.

FOR MORE DETAILED INFORMATION
VISIT THE WEBSITE

OUR DATA CENTER GLOBAL OFFER





Structured fiber and copper cabling

GREY SPACE

WHITE SPACE

Covering all your IT infrastructure, cable management, and critical power needs!

With award-winning solutions from strong data center players, you benefit from optimal uptime of mission-critical operations. Our team of local specialists design and build innovative solutions, including enclosures, cooling, power, structured cabling, and access management, to meet your unique requirements.

OUR SPECIALIST BRANDS

legrand
Complete global solutions for digital and electrical infrastructure.

BORRI
Specialist in UPS for industrial applications and datacenters.

CABLOFIL
Using its global strength and market leading position, Cablofil has developed a complete range of cable management solutions.

COMPOSE
Specialist in passive data communication solutions, cabling of data centers, buildings and fiber optic infrastructures.

GEIGER
Data center fiber optic infrastructures, data center design and DCIM (monitoring & management) service and implementation.

MINKELS
Turn-key hot/cold aisle containment and enclosures for data center infrastructures.

modulan
Provider of fully customizable containment solutions. Maximum flexibility to cover customer needs.

PowerControl
A leading provider of uninterruptible power supply (UPS) solutions, trusted by businesses worldwide to protect their critical power loads and avoid unplanned business downtime.

Raritan
Proven leader of intelligent PDUs, transfer switches, environmental sensors, serial consoles and KVM-over-IP Remote Access switches.

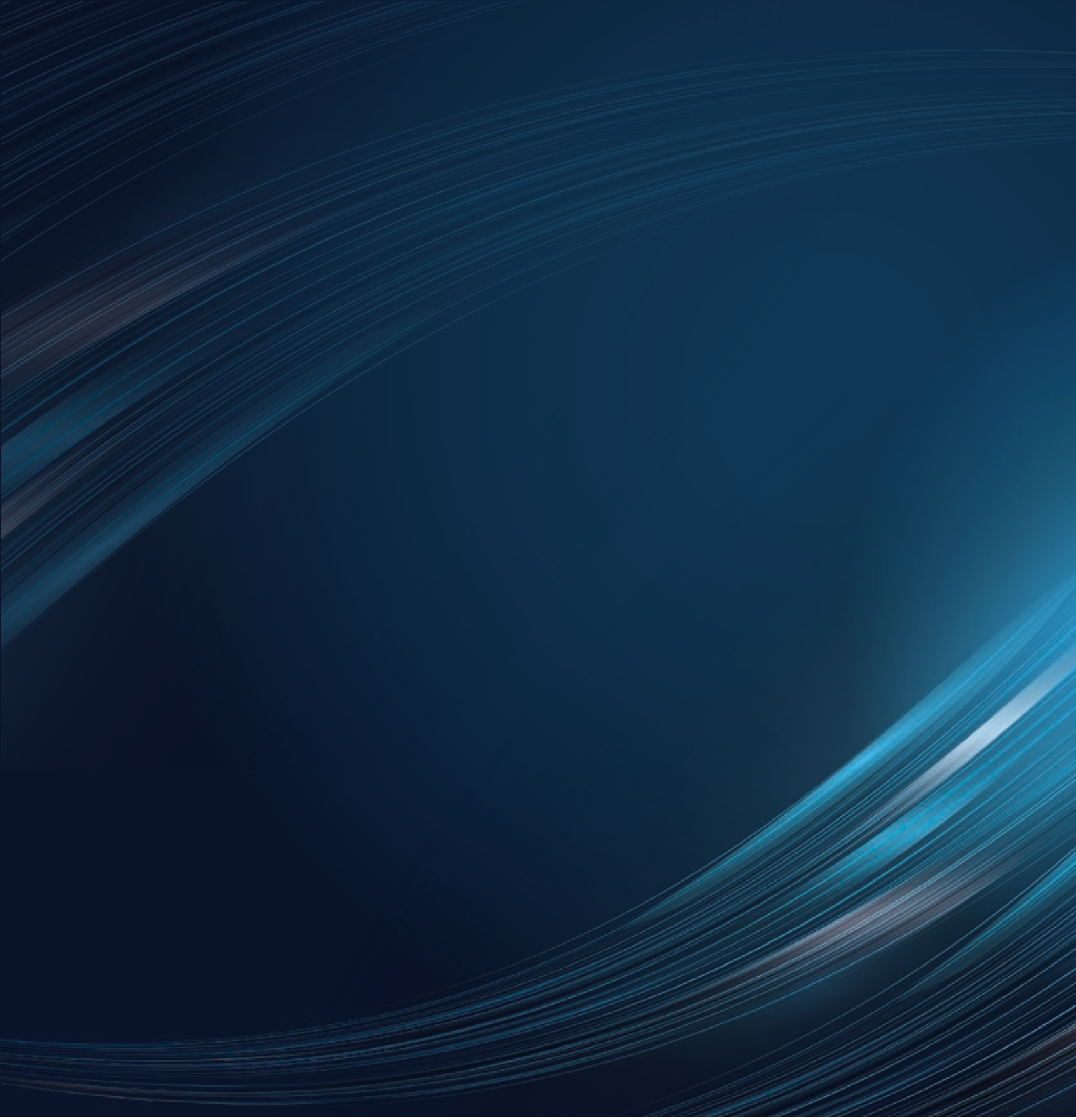
Server Technology
Leading specialist in customer-driven power, access and control solutions for monitoring and managing critical IT assets.

Starline
Starline has grown to become a global leader in busbar power distribution equipment

USystems
USystems provide cooling products that enhance data center cooling, providing these to global businesses, making their data centers more environmentally friendly.

VOLTADIS
Voltadis offers support in electrical power supply systems for data centers' grey rooms including design, commissioning, equipment supply, and installation.

ZUCCHINI
Zucchini has become a leading brand of cast resin transformers, offering one of the most comprehensive ranges on the market.



Headquarters
128, avenue de Lattre de Tassigny
87045 Limoges Cedex
France
Tel.: + 33 (0) 5 55 06 87 87
Fax: + 33 (0) 5 55 06 88 88

LDCS-Cooling-Feb-2023