SAIFOR®

CUBO®

AISLE CONTAINMENT SYSTEM

BUILDING A CUBO

INFRASTRUCTURE FOR DATACENTERS

English version

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Certifications and guarantee

All the company's products in this catalogue have been designed and manufactured in compliance with the following certifications:

- UNE EN ISO 9001:2008
- UNE EN ISO 14001:2004
- (EC) Regulation No. 1221/2009 EMAS
- Machinery directive 2006/42/EC
- Low voltage directive 2006/95/EC
- Electromagnetic compatibility directive 2004/108/EC

SAIFOR is a leading company in the design, manufacturing and integration of high-performance solutions for Data Centers and Control Rooms.

The SAIFOR group designs and produces its products entirely in Barcelona (Spain). The production plant has state of the art machinery that gives us the greatest flexibility to adapt to the individual requirements of our clients, as well as strict compliance with our commitments and Environmental Responsibility Policies.

SAIFOR is positioned as an advanced technological company, offering highly reliable and durable products that strictly comply with the most demanding European quality standards.

ENGLISH EDITION 16. E.0029111

Energy efficiency in datacenters

The energy efficiency is one of the biggest challenges that datacenter infrastructures are facing today.

The datacenters need to have constant measurements, optimize their operational processes and have them controlled to be able to face the energy consumption challenge.

Energy efficiency in 6 steps

6 Steps to get energy efficiency in the datacenter infrastructure:

1. Measure the PUE.

a. To control energy we have to measure the equipments and the infrastructure consumptions, this will provide us with the information of the state of our datacenter.

2. Understand the airflows and control them is vital to have operational efficiency in a datacenter.

a. Avoid the mixing between the cold and hot air.

b. Eliminate the hot spots.

c. Be sure of avoiding leakage.

3. Control the temperature.

a. Raise the infrastructure temperature helps to reduce the energy consumption.

4. Use free cooling, save energy using HDC aisle units.

5. Datacenters lighting System.

a. Reduce 1-2% the consumption, installing high tech lighting systems.

6. Manage growing cable densities

a. Capable of mixing different types of equipment in one place,

b. Manage large amounts of cables.

Implementing these changes we will obtain big benefits that will provide energy and cost savings and will prolong the life of the datacenter.

Savings, security, availability are the main advantages of energy efficiency.

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AISLE CONTAINMENT SYSTEM

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Why the cubo solutions?

With SAIFOR's CUBO solutions we create the containment defining thermal aisles, avoiding the mixture between the hot and cold air. This physical barrier allows to operate the Datacenter at a higher temperature range, optimizing the datacenter functions and providing operational and energy savings.

Measure the datacenter energy, be efficient.

The energy consumption has to be controlled, that is why constant measurement should be taken that allow us checking the operational efficiency of the infrastructure and the equipments.

- We can only control and improve the things that we can measure, that is why we have to check the equipments and infrastructure energy consumptions values constantly, comparing them with the one taken before, this will allow us to prove the efficiency and to be able to apply the necessary actions.

One way to optimize the consumption and have a perfect energy distribution is by using our intelligent PDUs with Sentry energy Management System.

Airflows control, security.

Zero Airflow solutions, control airflows, increase infrastructure efficiency and reduce the energy consumption inside the installation.

Applying the Zero Airflows solutions a increase of a 15%-30% can be obtained, increase the redundancy, reduce the CO2 emission, allow an increase of 5-10% Kw/rack of the energy in the rack (it is easy to prove, because when the charge energy increases in the rack, the PUE improves).

- In hot and cold aisle a control of the airflows is provided avoiding air recirculation, improving the air intake on the top of the rack and improving the returning air to the CRAC.
- At the racks level, the Zero Airflow system avoids air recirculation, minimizes hot spots, optimizes the fans use and improves the passive airflow.
- In the raised floor, reduces the air loss, optimizes airflow, improves the airflows in the rack and minimizes the air obstructions.

These solutions combined with SAIFOR's cooling solutions increase energy efficiency, due to a passive cooling management that avoid the mixing between the cold and hot air, isolate the unwanted flows that come from the equipment on the side, provide the right cooling of the equipment and create cooling with special fans.

Control the temperature, be quiet.

- Increase the datacenter temperature helps reducing the energy consumption. To get this SAIFOR has designed an advanced cooling system, which includes EC variable speed fans.
- With the HDC + cooling systems the maximum cooling capacity is scalable from 20kw-71kw.
- Allows creating high density areas in the same row of racks.
- Keep cooling stable.
- Eliminate the hot spots.

Free cooling, more with less.

- Get the maximum from the outside air, using SACS solutions for high density aisle.
- Our HDC system (High Density Cooling) for aisles and racks allows reaching the highest efficiency level for high density datacenters.
- HDC system allows water intakes between 6 ° and 20 °, it has been specifically designed for a high performance cooling with high temperatures water inlet, increasing the time of using free cooling, eliminating condensation and thereby maintaining compressors off for a longer period of time, this will provide greater energy savings.
- Reduce CO2 emissions.
- Redundancy at aisle level, allowing to turn of aunit if it is necessary for maintenance.
- Modular and scalable application.

Light the datacenter, control de consumption.

- Minimize 1-2% of the consumption using intelligent lighting systems inside the aisle.
- SAIFOR solutions datacenter lighting systems, guarantee savings, security and technology. The lighting is fitted at the aisle level, several sensors are located to turn on the lights only when it is necessary and all the lighting systems are LED providing more efficiency.

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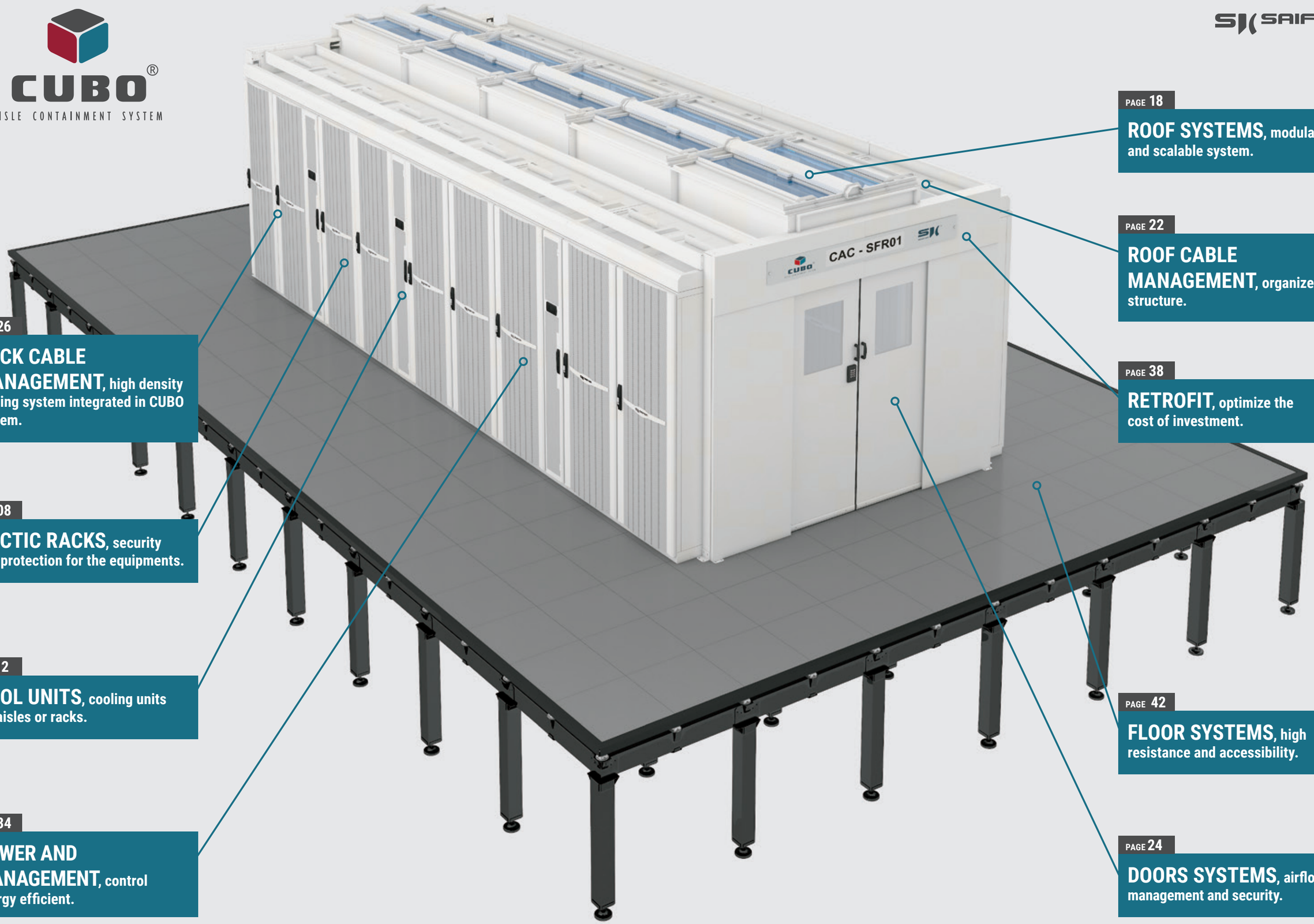

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ROOF SYSTEMS, modular and scalable system.

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ROOF CABLE MANAGEMENT, organize and structure.

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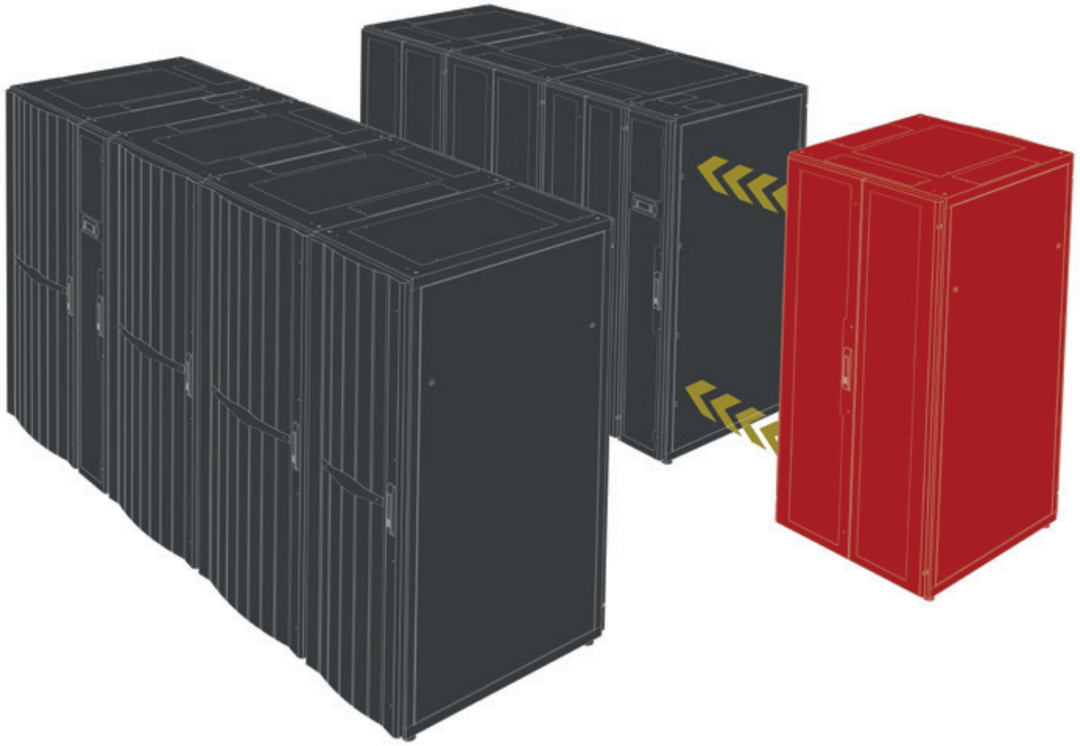
STEP 01

ARCTIC SERVER RACKS

ARCTIC RACKS, security and protection for the equipments.



ARCTIC racks are specially designed to be used in servers' applications, offering security, stability, easy installation and maximum ventilation. They are manufactured in different depths that could be adapted to the needs of the infrastructure (800, 1000, 1200, and the specials of 1300 and 1400, which came with additional accessories in three different heights 24U, 42U and 47U).

ARCTIC design allows installing any kind of server in the market, because it has a modern sliding mounting system that allows fitting the server at any depths in the rack.

The wide range of ARCTIC accessories is an additional advantage that allows making any change in the rack, if it is necessary in the future, being up to date in the investigation and development of scalable and flexible solutions for the integration of new equipments in de datacenter.

ARCTIC "ZERO U" solutions offer the possibility of installing each racks individually, providing additional units for complementary equipment in vertical position.

ARCTIC is the per fect base to create hot and cold aisles, integrating all the solutions both for power and for cooling and also controls the airflows and active security, necessary in this kind of installation.

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STEP 01

ARCTIC SERVER RACKS

Arctic racks

Arctic racks models are manufactured in standard with different heights (24U,42U,47U), two widths (600mm and 800mm), four depths (600mm,800mm,1000mm,1200mm), with “ZERO U”, “ZERO AIRFLOW” and cable management.

With the revolutionary SAIFOR sliding mount systems, it is possible to fix the mount in any depth position. At the same time, in case of installing different server models or brands, the racks can be equipped with partial rear mountings that provide 3 different depths inside the rack.

ARCTIC offers a wide variety of door for the front or sides of the rack, that are adaptable to infrastructure, were they will be installed.

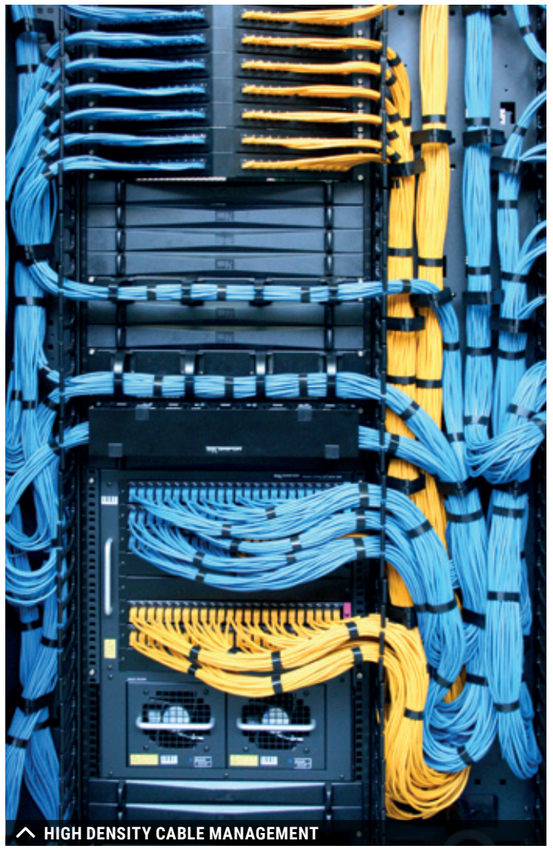
They have improved technical features and also have an exclusive and aesthetic design. In V2 doors model de passive cooling ventilation increases, because it has 81% of its surface perforated, which allows greater natural ventilation. The glass or blind doors model increase the IP protection value necessary for IP Cooling installations.

ARCTIC racks have a wide accessories range specific for cable management, power management and airflow management. This range is especially designed to support up to 1500 kgs of load.

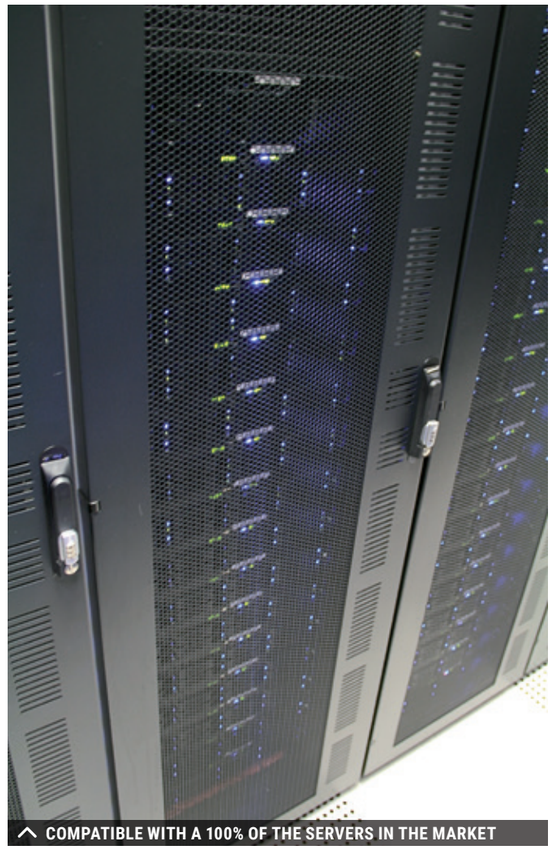
The combination of ARCTIC racks with the rest of CUBO solutions for closing aisles, allows assuring that it is the best solution for integration in an existing or new datacenter.

Advantages

- **Optimize the space of the infrastructure.**
- **Passive cooling capacity for high density server’s environments.**
- **Advanced cable system to reduce obstructions and to protect power and data connections.**
- **Interior cable access system to allow optimizing the cable system in general.**
- **Independent locking security system by racks.**
- **Accessories system with brushes to allow passing the cables without any breakage or friction.**
- **The racks depths can be up to 1400 mm.**
- **Easy lateral access betwen racks-**
- **A universal kit that allows installing any CDUs system in the market in “ZERO U “ positions.**
- **“ZERO U” Vertical cable management that facilitates the release of space in the 19” of the rack, improving the cooling of the equipment.**
- **Offer 6U vertical in each mount and can also offer additional 24U in 42U-47U racks.**
- **Include accessories for airflow controls, “ZERO AIRFLOW”.**
- **High load capacity.**
- **Multiple solutions of active and passive security.**
- **Remote management of security, environment and power.**
- **Sophisticated manufacturing systems that allow reducing CO2 emissions and power consumption.**



HIGH DENSITY CABLE MANAGEMENT



COMPATIBLE WITH A 100% OF THE SERVERS IN THE MARKET

MULTIPLE SAFETY AND ACCESSIBILITY OPTIONS

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STEP 02

HDC AISLE UNIT

COOL UNITS, HDC+ units for aisles or racks.

1

Open configuration operation, it is recommendable to combine the HDC+ Front units with the SAIFOR CUBO air containment system.

2

For greater efficiency of the system, the use of CUBO air containment is recommended to combine the HDC+ Side units with the SAIFOR CUBO air containment system.

The constant progress in technology has created brand new, compact and powerful equipments, implying a direct increase of the energy and cooling consumption in a datacenter.

Cooling is the main problem in datacenter, because 50% of the energy consumption is used by them, being partially wasted by a low design, planning, installation and/or maintenance efficiency.

To provide the solutions to face the challenges that datacenters are facing today, SAIFOR has designed a wide range of advanced cooling solutions for medium or high density installations, these solutions provide the right cooling and maximum energy efficiency.

The new HDC+ aisle cooling machine is a natural evolution of its reliable HDC predecessor, offering more power and modularity to adapt even better to the needs of each installation.

The newest HDC+ cool unit from SAIFOR features an optimized design providing Faster Cooling availability, Higher Cooling capacity and the Strongest Reliability in the market of In row cool units.

HDC+ cool unit, in any of its versions Front/ Side/Lateral features a high efficient design that in combination with SAIFOR's unique airflow management solutions achieve best-in-class results in terms of efficiency.

It is highly recommendable to combine HDC+ Front units with the air CUBO containment system.

The CUBO containment system contains the air in the confined aisle to avoid hot and cold air mixing as well as air recirculation air that is common in data centres.

This physical barrier enables the set point temperatures of the machines to be increased, thus reducing the consumption of the equipment that cools the water and therefore increasing the efficacy of the global cooling system in the data centre. Another advantage of the CUBO system combined with HDC+ units is flexibility to carry out n+1 redundancy at the cooling unit level in contained aisles.

HDC+ aisle unit

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STEP 02

HDC AISLE UNIT

Features

SCALABILITY

Modular design allows for quick Power upgrade by adding additional fan modules.

HIGH COOLING CAPACITY

State-of-the-art design & the Best components to achieve best in class cooling capacity.

ENERGY EFFICIENCY

Complex algorithm to control operation & EC fan modules compliant with European standards ErP2015.

REDUNDANCY & RELIABITY

Dual Power infeed, independent power lines for each fan & Fail safe mode to keep operation independent of controller.

FREE COOLING

Specific design to work on high inlet water 12-20°C temp maximizing free cooling operation.

HUMIDIFICATION

HDC+300 can be upgraded with 3Kg/h humidifier and HDC+ 400 with 3Kg/h & 8 Kg/h humidifier.

CUSTOMIZATION

Modular Design allows for tailor-made configurations to adapt HDC+ to singular requirements.

FAST INSTALLATION

All accessories delivered already installed & factory tested.

FAST MAINTENANCE

Greater interior space, improved accessibility and tool less fan modules for efficient operation.

Advantages

- **Improve the operational and energy efficiency controlling the temperature drive, manage 100% of the EC fans' speed and regulate operation automatically.**
- **Optimize the installation and maintenance costs, because they have a design that could be custom-made adapting to the request of the installations, offer a long life to the ventilators, they don't need a raised floor and they accept connections at the top and bottom of the units.**
- **Performance and control security, remote management through Web that is integrated locally, closing system options by keyboard or by card reading, offering three levels of security access.**
- **Dual system of collecting water by condensation and/or possible leakage.**
- **High density filters with high particulate filtration.**
- **High density zone in a same row of racks.**
- **Stable and constant cooling.**
- **Multiple redundancy options by adding extra units.**
- **Maintenance access to the product through the front or the rear area.**
- **Adaptable to any type of racks or installation by retrofitting.**

Funcionality

AUTOMATE Mode Full automatic operation.

MANUAL Mode Manual set up of operation parameters, suitable for test & start up.

ECO Mode Precise operation limited to installed power on cabinets.

MANTENIENCE Mode Specific parameters for an efficient & comfortable operation.

Total Availability

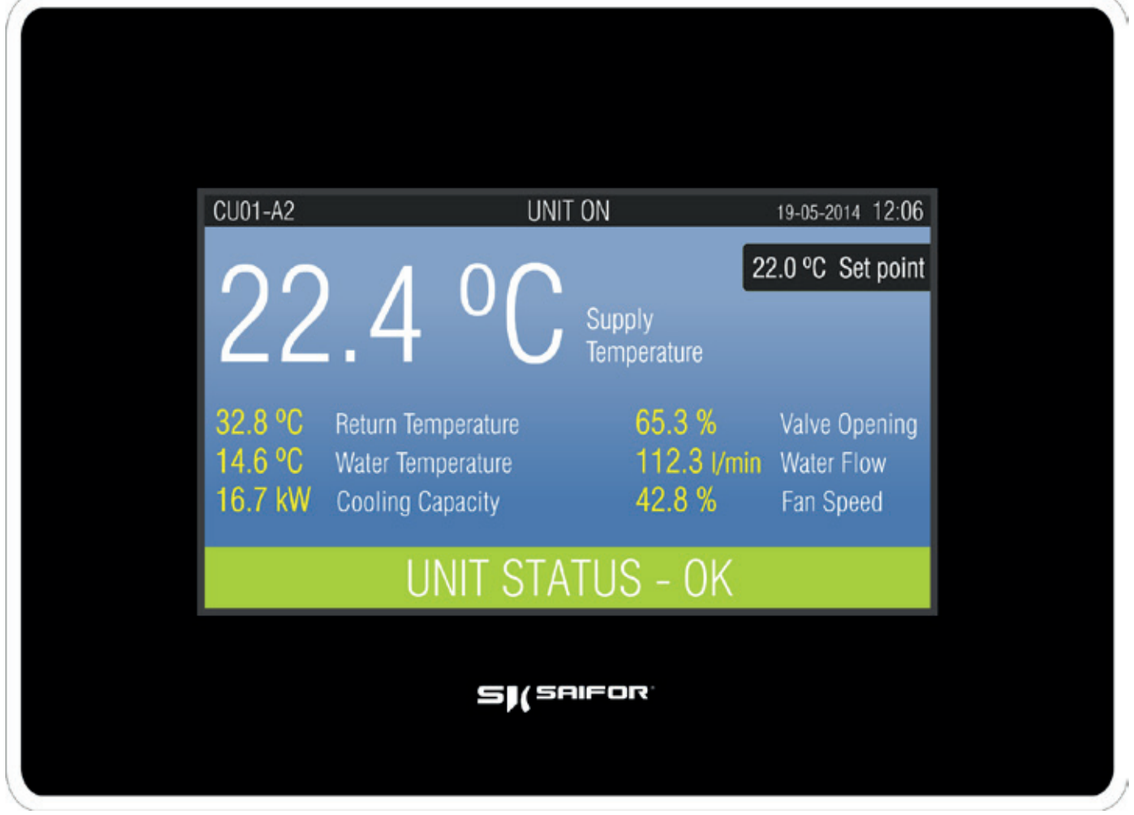
LOADSHARING Mode Load sharing Mode: Up to 10 cool units can be connected to each other.

FAIL-SAFE. Mode 100% Manual regulation of fan speed and water valve in case of controller malfunction.

FAN FAILURE Mode Fan speed increase of operational fans in case that any fan gets a failure or during maintenance test

EMERGENCY Mode Specific parameters can be configured for emergency operation according to hot/cold aisle containment.

HIGH DENSITY UNITS FOR AISLE OR RACK



LOCAL OR REMOTE MANAGEMENT AND MONITORING SYSTEM

Building a CUBO®

STEP 02

HDC AISLE UNIT

HDC+ can work with high cooling water and air temperatures

Cool units

Thanks to its state of the art heat exchanger, HDC+ can work with high cooling water and air temperatures, thus contributing to the overall efficiency of the installation.

It is ideal for small and medium-sized datacentres configured in rows of hot/cold aisle racks, and is an ideal complement to an existing cooling system to neutralize hotspots when CRACs are insufficient.

Although it is not indispensable, it is highly recommendable to combine HDC+ Front units with the air CUBO containment system.

The CUBO containment system contains the air in the confined aisle to avoid hot and cold air mixing as well as air recirculation air that is common in data centres.

This physical barrier enables the set point temperatures of the machines to be increased, thus reducing the consumption of the equipment that cools the water and therefore increasing the efficacy of the global cooling system in the data centre. Another advantage of the CUBO system combined with HDC+ units is flexibility to carry out n+1 redundancy at the cooling unit level in contained aisles.

HDC+ Side

This design guarantees maximum airflow and the greatest operational performance in each machine, thus contributing to improve operations and availability per m2 in the data centre.

HDC+ 400 produces a maximum airflow of up to 10.350 m3/h, with a capacity of up to 71 kW, the values for HDC+ 300 being a maximum airflow of 7,050 m3/h, with a nominal capacity of up to 49.5 kW.

The side distribution of air minimises mixtures of airflow and turbulences in the aisles. It also reduced losses due to deflection. As a whole, this achieves greater performance and efficiency in each machine.

Can be installed between racks or at the beginning of the row. Valid for hot and cold confinement aisles.

Each HDC+ Side unit has the capacity to cool up to 6 racks in line, as required by the installation.

HDC+ Front

This HDC+ version incorporates a new design for the front discharge EC cooling units. After several aerodynamic tests, a design has been obtained that increases airflow and its side distribution in the cold aisle.

The optimised design of the powerful cooling modules need no door and takes the maximum advantage of the machine's width in order to incorporate larger fans. Overall consumption is significantly reduced at medium and low speeds, and airflow is increased to 9050 m3/h for HDC+ 400 and 6200 m3/h for HDC+ 300.

In Premium configurations and optional for basic configurations, the front cooling modules incorporate an LED trim to give the unit a state of the art appearance and at the same time help servicing illumination, identifying the distribution of aisles and machines in operation.

HDC+ Rack

It has been designed to isolate the rack from the external environment.

HDC+ incorporates as standard a system for automatically opening the doors in case of emergency, enabling the doors to be opened and evacuating heat, thus gaining critical failure response time.

HDC+ Rack includes access control by authentication (display/remote), and enables the status of the hermetic doors to be monitored, so as to avoid a door staying open and the mixture of interior air with that of the room.

It has insulating panels on the sides, resulting additionally in a notable reduction of the noise produced in the room and improving comfort when installed in the proximity of the users.

Thanks to the modular fan system, cooling capacity can be scaled according to the increase in IT equipment fitted in the rack, therefore it is ideal for high density in Premium version, and for micro data centres in basic versions.

HDC+ Rack is not compatible with Cubo.

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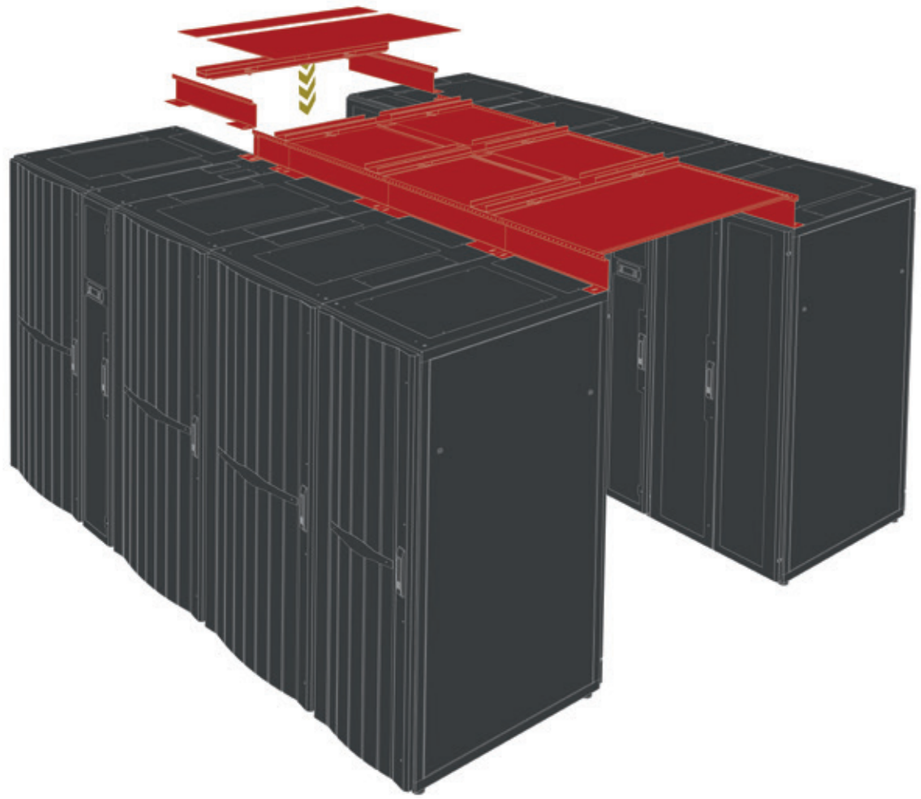
Building a CUBO®

STEP 03

AUTOMATIC ROOF SYSTEM

ROOF SYSTEMS, modular and scalable



SAIFOR different roof systems are specially designed to avoid airflow loss inside the containment. They are manufactured with resistant and high quality materials, easy to install and maintenance, with different configuration options.

The standard roof allows closing completely the top part of the aisle. This system is available with two different methacrylate panels, the transparent and the translucent facilitating that the lights from the room get into the aisle.

Cabling duct system incorporates all the advantages of previous model, facilitating the pass of the cables, through the aisle in an organized and hidden way. Thanks to the integrated duct system, it easy to access from the interior.

Roof system with emergency panels opening, this roof is completely automatic, which is activated in case of an incidence inside de datacenter.

When the emergency system is activated the roof panels and the doors of the containment are automatically opened, allowing the gas or water suppressant to get into the aisle, minimizing the damage of the installation. It also includes a duct cabling that enables the communication between the different aisles of the containment.

This system is combined with SAIFOR automatic doors opening solutions, allowing a total access of the extinction system in the containment.

All SAIFOR's roof systems, allow the installations of lighting points, which are activated with the doors opening and they also offer additional security options to control temperature, smoke, unwanted access, vibration or humidity. This system is per fect for installations with ARCTIC racks or any other manufacturer, by applying SAIFOR retrofitting solutions.

Automatic roof system

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STEP 03

AUTOMATIC ROOF SYSTEM

Roof system

STANDARD ROOF SYSTEM
Panel roof system, modular and scalable, which allows an optimal control of the airflows inside the aisle, avoiding the mixing of the hot and cold air.

This system allows sensors, detectors, alarms or extinction system inside the aisle.

Available for different aisle widths. Adaptable to be used in retrofitting projects.

ROOF SYSTEM WITH CABLE DUCT
With the same characteristic as the previous one, this system includes a longitudinal and transverse duct system, which improves the right cabling between the aisles in the containment. The access to the cabling can be done from inside of the aisle o from the top of containment, facilitating the maintenance tasks in the datacenter.

EMERGENCY ROOF PANELS OPENING SYSTEM
This system is completely automatic; it is activated in case of incidences inside the datacenter.

In case of emergency the panels open automatically allowing the pass of the water or gas inside the containment. This solution it is not necessary to modify the sprinklers extinction systems inside the datacenter.

This system incorporates an electromagnetic lock that allows connecting directly with the infrastructure BMS system, activating automatically when there is an incidence.

The central section of this roof system has a deflection design that opens the panels 105° allowing the water and gas to get into the containment, making easier to clean and maintenance the panels, because when they are open there is a total access to the roof.

The roof also includes a longitudinal and transverse cable duct to manage the cabling between aisles.
This system is combined with SAIFOR automatic doors opening solutions, is the perfect solution to face any possible incidence in the datacenter.

Available for different aisle widths. Adaptable to any retrofit project.

Patented product no. 201230191

Advantages

- **Modular and scalable system**
- **Easy to install and maintenance**
- **Complete closing of the aisle, avoiding airflows losses or the unwanted mixture of air.**
- **The panels are adapted to the length and width of the installation.**
- **Multiple configuration modules that combine the width of the panels with the width of the racks.**
- **Transverse and longitudinal cable duct management options for Roofs.**
- **Active (automatic opening) or passive roof systems (fixed).**
- **The system is easy to adapt in existing infrastructures by using SAIFOR retrofitting system.**
- **Allow extracting one or more racks without dismounting the structure.**
- **Connection to the BMS or alarm system to activate the doors automatically, in case of emergency.***
- **Combined with SAIFOR's automatic doors opening system, allow that in case of emergency the opening of them will be at the same time as the roof panels.**
- **Admit the installation of different security systems like sensors, detectors, alarms, etc…**
- **Electromagnetic closing that allows a direct communication with the BMS or the alarm system to activate the system.**

*** Only available for the roof system with emergency panels opening.**

EMERGENCY AUTOMATIC ROOF OPENING

CONTAIMENT AIR FLOW

MULTIPLE AISLE WIDTH OPTIONS

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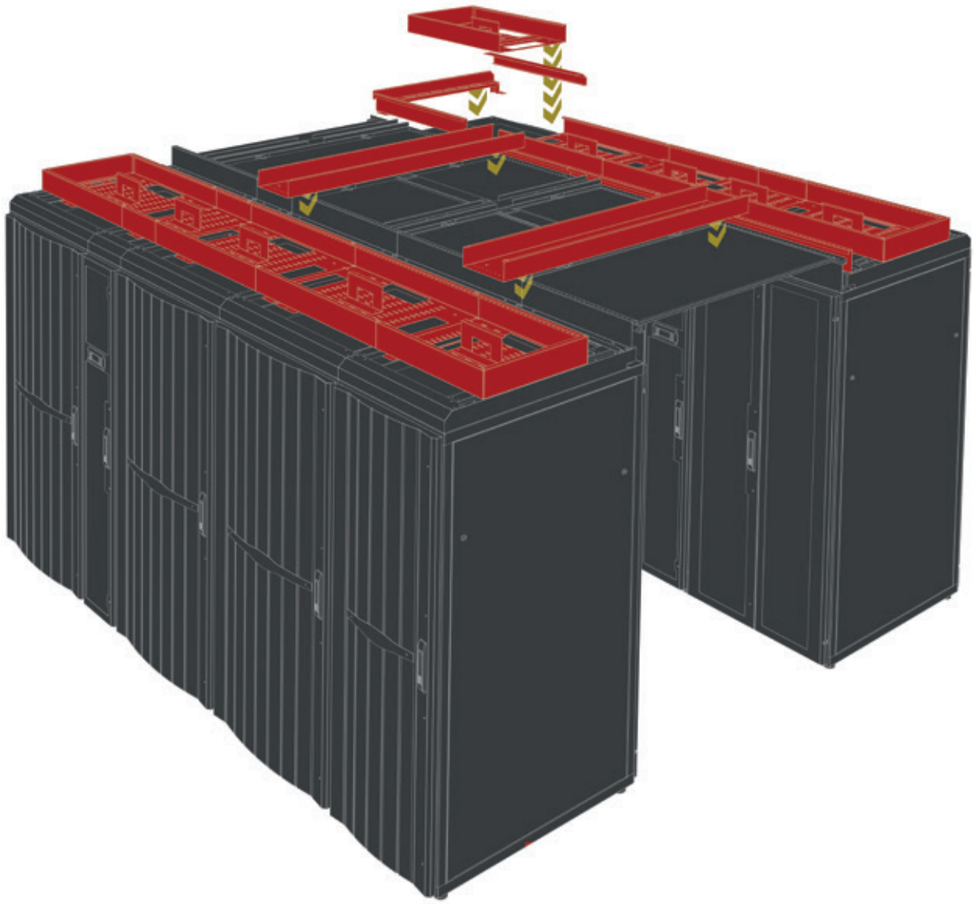
Building a CUBO®

STEP 04

CABLE MANAGEMENT

ROOF CABLE MANAGEMENT, organized, structured

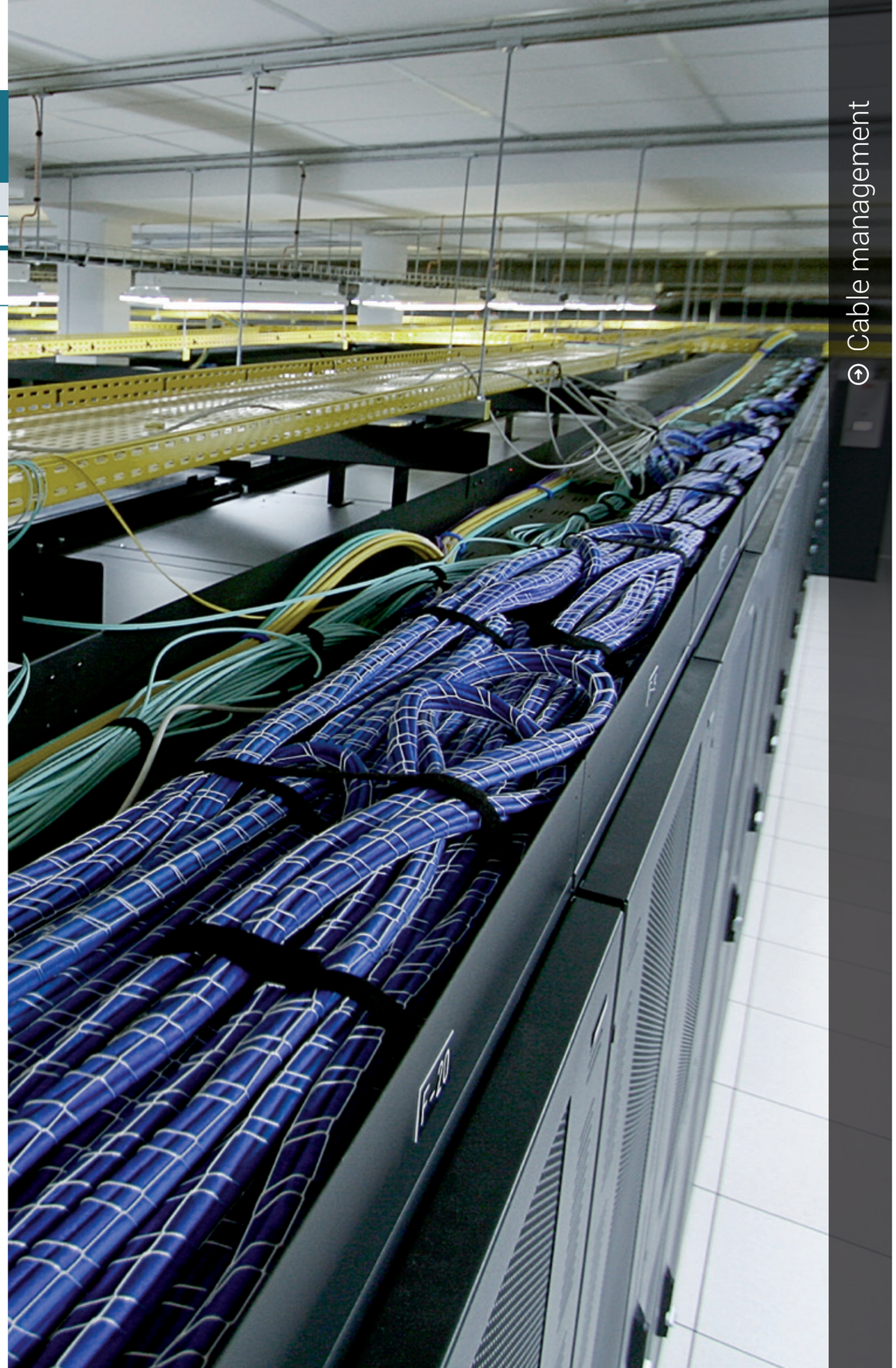


SAIFOR offers as part of CUBO solutions an intelligent cable management system that allows organizing a great amount of cabling, longitudinal, transverse or vertical, regardless the infrastructure duct system, but allowing the communication between them.

CUBO duct system can be at roof level or vertical in the rack interior, both solutions have an innovative design, to be installed easily and quick, which allows minimizing the installation time and providing a reduction of the costs.

SAIFOR duct system for roof:
This system is fitted on the racks structures allowing that the cabling of the equipments could be distributed in an organized way around the datacenter. Keeping the aesthetic of the infrastructure.
With the installation of two duct system in parallel the cables of data and energy can be separated in a safe way.

SAIFOR vertical cable duct system:
It is installed in the rear part of the racks, allowing the conduction of the cables from the roof to the interior of the racks, besides the CDUs system installation, provide stability and additional control to the cabling system.



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STEP 04

CABLE MANAGEMENT

Cable management

Modular and scalable system, which allows the communication of the infrastructure cabling with the CUBO system. Facilitating the expansion of the cable in an easy way.

These upper ducts have been designed to support high density of cabling, installing two different modules, improving the management of great amount of cables or separating the data and energy cabling.

The transverse and longitudinal configurations, improve the communication of cabling between the row of racks and the different aisles of the installation.

They also incorporate a communication system specially designed for the access of cabling to the racks, once they are in, they can be guided through a vertical duct system specially manufactured for SAIFOR's racks.

Their design allows that they can be installed in the production plant reducing drastically the installation costs in the infrastructure.

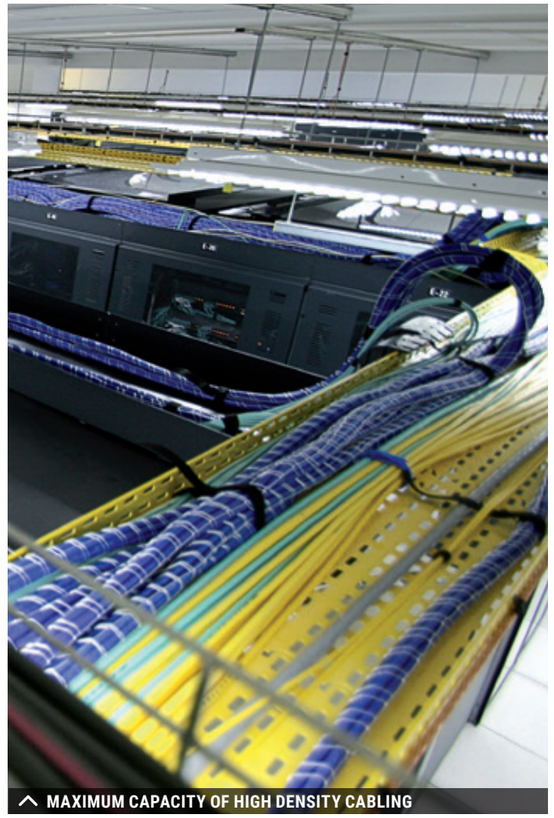
A wide range of accessories is available for this system, being adaptable to any infrastructure in the room.

Adaptable to retrofitting project.

Advantages

- **Longitudinal and transverse cable ducts system for roofs.**
- **Modular and scalable system that allows that the infrastructure can be optimized or expanded in an easy way.**
- **Allow that the cabling management from the datacenter infrastructure to the racks to be efficient and structured.**
- **Through the division panels allows the separation of the data cables and the electrical cables, which improves the installation process, maintenance and performance of them.**
- **Manage in an organized way the infrastructure cabling between the row of racks and the aisles, they could be installed in longitudinal or transverse position.**
- **Include a earth continuity with a quick connection to the rack.**
- **Include a grounding system with a quick connection with the mass system of the racks.**
- **Admit the parallel mount of 2 units, facilitating the installation of high density cables.**
- **Facilitates the pass of cabling between racks, thanks to an opening system they have in the base.**
- **Avoid airflow loss in the racks access, through the ZERO AIR FLOW system.**
- **Have a great number of accessories specially designed to the security and well performance of the structured cabling.**

CONNECTIVITY WITH OTHER DUCT SYSTEMS



MAXIMUM CAPACITY OF HIGH DENSITY CABLING

CUSTOMIZATION OF ARCHITECTURAL OBSTACLES

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Building a CUBO®

STEP 04

CABLE MANAGEMENT

WIREX, the cleverest CABLE MANAGEMENT

Manage growing cable densities, larger network equipment demand an efficient and flexible solution, capable of mixing different types of equipment in one place, and manage large amounts of cables.
This is why we have created **WIREX**.

01. Save space gain design

Space Optimized, Wirex minimizes distances between switches and panels pacth optimizing wiring lengths.

It allows the maximun amount of **cables** to be **organiazed** in a minimun **amount of space**, which means a footprint reduction in ata centers.

Wide and versatile Paneling System to close access to wiring and to **improve aesthetics**.

02. Organize better quicker install

Adapted to new wiring trends. **WIREX** Organizes and manages efficiently high densities structured cabling.

More confortable connectivity, which improves tracing cable.

Cable Plastic Managers integrated and multiple, horinzotals and vertical; rings, fingers, removable hinged covers, which helps not only to the good **organization** and optimization of the space, but also to the aesthetics and **optimal** air channeling. Vertical cable chanel prepared for high density cabling, accessories for organization and support wiring. Upper cable chanels with access inside the rack.
Optional dual hinged metal doors provide easy access to vertical pathway and provide visual and audible feedback on closure, removable. Optional simple and hinged paneling, removable. This features allow easy physical access inside the rack and increases the speed of **installation** or any configuration change.

03. I am flexible configure me

Fully scalable and configurable, it comes with a wide range of accessories to meet all kinds of configurations and allows efficient organization.

It allows you easily to add and remove cables. **Available in 2 Post Rack, 4 Post Rack and Rack version**. Versions 2 and 4 post rack are totally aesthetically integrated and compatible with **ARCTIC** racks. Rack version can be integrated and compatible with **CUBO closed system**. Accepts either fiber or copper patch panels. Allows installation of 19" vertical patch panels increasing units capability.

Double doors and options of **hinged paneling** and totally removable. Doors available with custom logos and backlight-led.

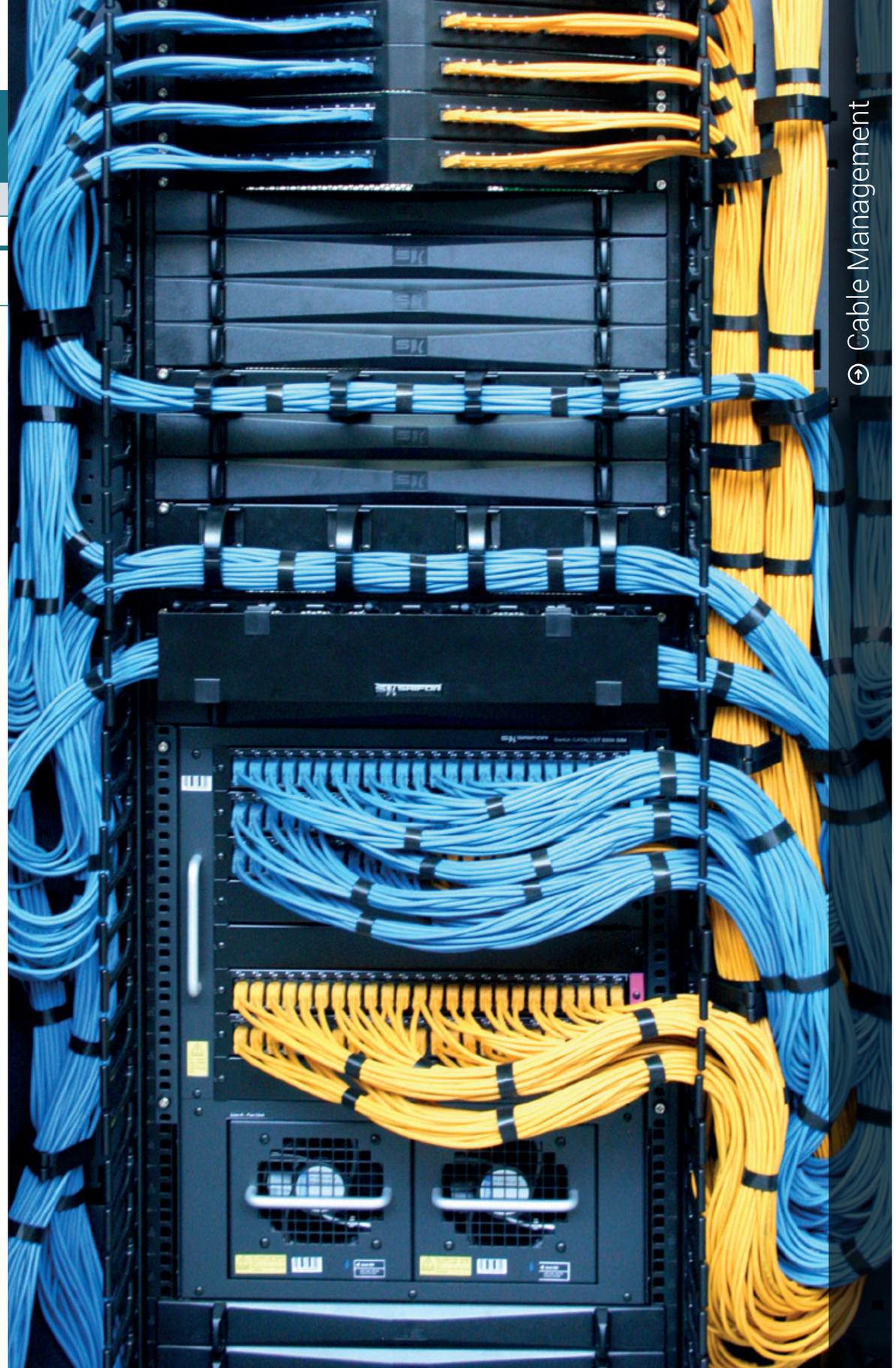
04. Safe caring sure conection

Secure connection. Not aggressive egdes. It provides proper bend radius protection ensuring optimal cable radius preventing deterioration or breakage.

Along with inset innovative flexible fingers maximize the care and **protection** of the equipment and cables, keeping the structured cabling system unhurt and totally functional.

05. Zero airflow saving energy

Passive thermal management to achieve **zero airflow**. Lower inlet temperatures. **Less thermal stress** on system, improving reliability. Less energy usage reducing cost.



Cable Management

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STEP 04

CABLE MANAGEMENT

Components & Features

1

Innovative flexible fingers maximize the care and **protection** of the equipment and cables.

2

Removable hinged covers, helps the good **organization** but also to the aesthetics and **optimal** air channeling.

3

It allows the maximun amount of **cables** to be **organiazed** in a minimun **amount of space**.

4

Double doors and options of **hinged paneling** and totally removable.

Rack version can be integrated and compatible with **CUBO** closed system, for configurations type “corridor Hot / Cold”.

Doors: Optional sure close dual hinged metal doors provide easy access to vertical pathway and provide visual and audible feedback on closure, removable.

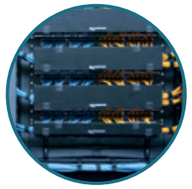
Paneling: Optional simple and hinged paneling, removable.

Vertical cable chanels: Two types: High density, and vertical type patching. Cable Chanels Versions in one and two sides.

Plastic Fingers integrated in the vertical gutters.

Plastic spools to wind in excess wire pathway and provide visual and audible feedback on closure, removable.

Plastic cables managers integrated in multi-position rack / vertical cable managers.

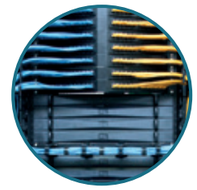


Range of organizing panels for horinzontal cable in one and two sides, cables and duplex.

Horizontal cable manager: rings type with open accessibility.

Horizontal cable manager: fingers type with with hinged removable taps.

Upper cable chanels with access inside the rack.



Communication “Bridge“Cable Chanels of wiring front to post.

Patch transition tray. (Front bridge 19“).

Thermal management panel Kits for switches with side ventilation equipment.

Wheels Kits and transport feet with trims sockets.

Velcro.

Doors available with **custom logos** and **backlight-led**.

Structure for rack post 2 and 4 with customizable **backlit logo**.

Available for 42u and 47u, deeps 1000 and 1200 for rack version, and deeps 600, 800, 900, 1000 for rack post 4 version.

Fixing Kit to a rack for PDU.

Brackets for releasing tension.

19“ Tray for coiling cables.

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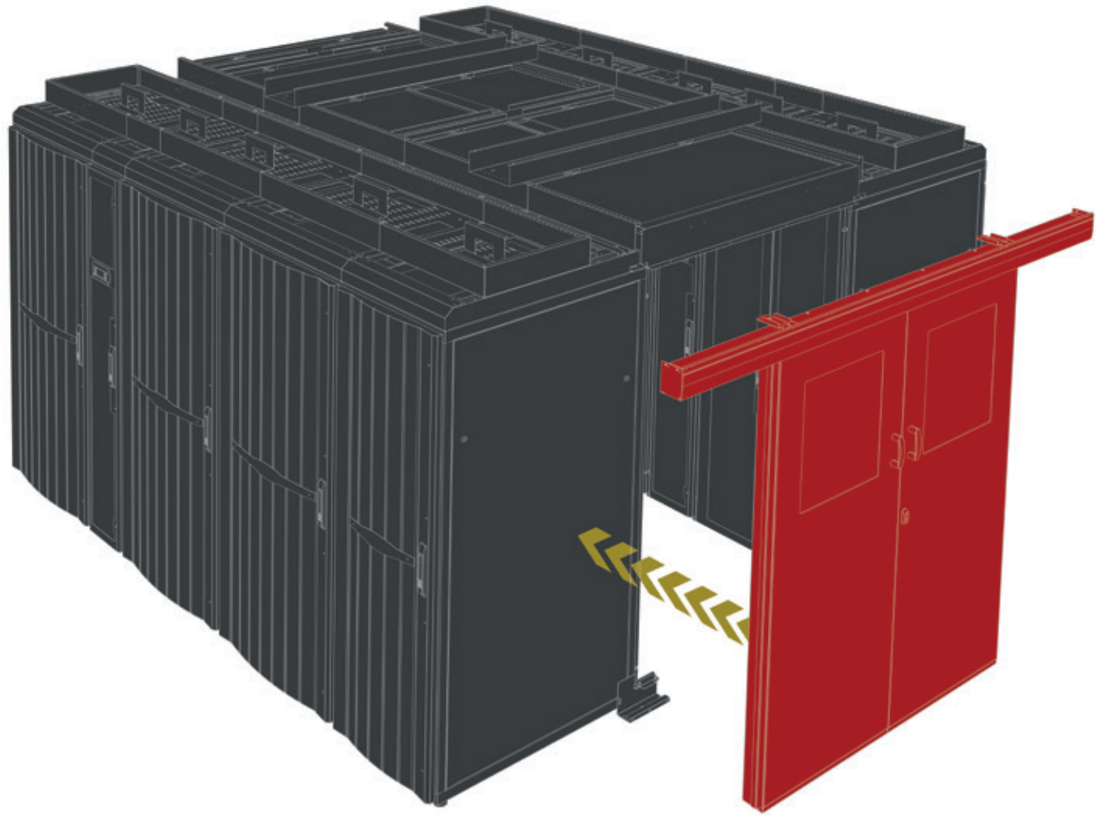
STEP 05

DOORS SYSTEM

DOORS, airflows management and security



SAIFOR offers a wide range of doors designed to complement and optimize the CUBO closed containment solutions for hot and cold aisles.

One of the most important requests is the aisle airflows control, that is why the doors have been designed for an easy access to the aisle, but they also facilitate the control of the airflows losses, contributing to the necessary efficiency in a datacenter.

Beside, these door systems provide different active security systems to protect the access to the equipments inside the containment. The combination of mechanical and electrical accessories provide these systems of optimal security measurements, offering to the IT managers all the necessaries tools to control the access to the datacenter.

Among the door ranges that SAIFOR offers, there are the following models, emergency automatic doors opening, sliding doors with electronic opening, by code, by key or card, manual hinged doors, sliding manual doors with different security locks and glass doors with automatic opening and closing system.

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STEP 05

DOORS SYSTEM

Doors system

AUTOMATIC GLASS DOOR.

This door has an automatic closing and opening system, which is activated through sensors, with a telescopic frame that allows a wider opening of the doors, optimizing smaller spaces.

The glasses provide an aesthetic design to the environment and allow a better visual control of the equipment in the infrastructure from inside out.

AUTOMATIC DOOR OPENING FOR EMERGENCY.

This door has been specially designed to improve the security of the equipment installed in the containment in case of fire, because when the emergency alarm is activated, the doors open automatically facilitating the access of the extinction systems.

SEMI-AUTOMATIC SLIDING DOOR WITH MECHANICAL OR ELECTRICAL LOCK SYSTEM.

This door has a sliding manual opening system that is installed on a rail system; this allows an easy access to the containment.

The models of doors with an electromagnetic lock include a central locking that guarantees the closing of all the doors in an electrical and joint way. At the same time in case of emergency the electronic system is deactivated and allows opening the doors easily.

This door design can be used in retrofitting project, because it can be adapted to any existing installation.

MANUAL DOOR, RECOMMENDED FOR SMALL CLOSINGS.

Models of doors with hinged opening, hinged or sliding totally manual systems, in which any access security system lock can be installed either mechanical or electric.

SELF-HOLDING DOOR.

This system has been specifically designed for retrofitting installations. Through an innovative system the frame allows to be mounted in any existing infrastructure.

This door also incorporates the previous features mentioned.

Advantages

- **The different doors systems allow having a general control of the temperature and security inside the datacenter , their features provide energy savings and efficiency of the infrastructure.**
- **Airflows control, because the doors seal the containment avoiding leakage.**
- **Temperature control inside the datacenter, avoiding the airflows the overall temperature of the system keeps constant.**
- **Easy installation and maintenance.**
- **Flexible, because can be installed in any of our racks systems and also can be used in any retrofitting project adapting perfectly to any brand of rack in the market.**
- **Improve energy efficiency and the equipment predictability of those that are installed in the containments racks.**
- **Minimize the air mixture keeping a constant temperature from the top to the bottom of the aisle.**
- **Optimize the space.**
- **Profitable, because reduce the operational costs.**
- **Provide energy efficiency by blocking air leakage or the mixing of hot and cold air.**
- **Security, can have different opening systems, with key, electronic, by iris or fingerprint recognition, etc...**

1

AUTOMATIC GLASS DOORS

- Automatic opening and closing.
- Security access by key, card, keypad, fingerprint, etc...
- Complete visibility from inside out.
- Reduce installation space
- Possible to be connected with the infrastructure BMS.
- Easy installation and maintenance

2

SLIDING DOORS WITH SEMIAUTOMATIC CLOSING

- A Semi-automatic closing system with position opening lock.
- Security access by key, card, keypad, fingerprint, etc…
- High airflows control.
- Reduce installation space.
- Remote access to the containment.
- Easy installation and maintenance.

3

AUTOMATIC EMERGENCY OPENING DOOR

- Door opening activate by emergency incidences or alarms.
- Security access by key, card, keypad, fingerprint, etc...
- High airflows control.
- Reduce installation space.
- Possible to be connected with the infrastructure BMS.
- Remote accesses to the containment.
- Easy installation and maintenance.

4

HINGED DOORS

- Manual hinged doors for reduced spaces where it is not possible to install a double sliding door.
- It is usually fixed on a wall or on the side of the rack.

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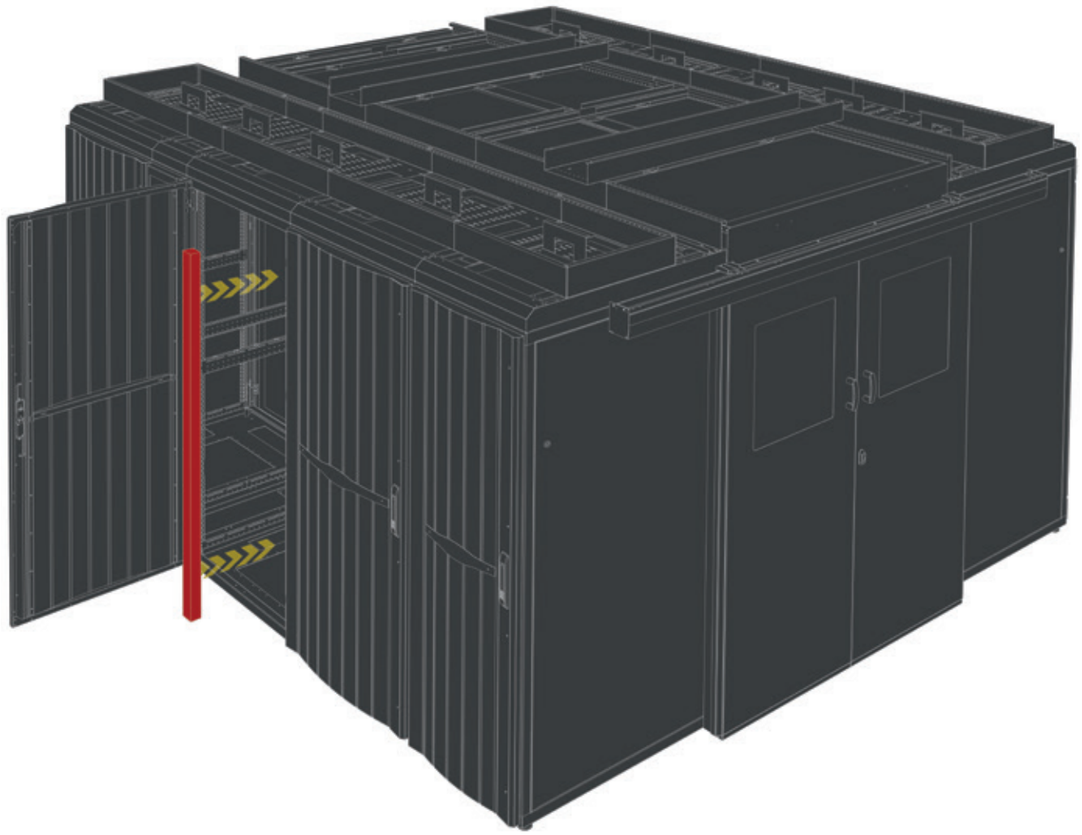
STEP 06

CONSUMPTIONS MANAGEMENT AND MONITORING

POWER AND MONITORING, energy efficiency control



With an intelligent control we are able to know what is connected to the datacenter infrastructure power supply, this is essential to reduce downtime and to maximize the energy efficiency in the datacenter.

The distribution units manage energy capacity, reduce downtime and improve energy efficiency. It is a flexible system that allows supervising and controlling the power sockets, using key operative parameters that include temperature, power input and state of SAI systems and also allow improving downtime and efficiency while reducing CO2 emissions.

The Smart Sentry monitor is a system that allows measuring, monitoring and controlling the energy consumptions of the datacenter, the information comes from all the CDUs installed in the datacenter. All the PDUs are managed and controlled by one device, and one IP, facilitating the energy consumption of the datacenter.

Obtaining the 5 nines in energy consumption is almost impossible, but with a right power distribution system, CDU combines with a Sentry Power System, we can get the right power distribution and also avoid power loss.

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STEP 06

CONSUMPTIONS MANAGEMENT AND MONITORING

Power and monitoring

BASIC CDUs

With energy distribution to all the equipments and devices, with capacity that can go from 2kw-6kw per Rack.

METERED CDUs

Which offer a distribution to all the equipments in the rack, with a capacities between 2kw-22kw per Rack.

SMART CDUs

Offer an intelligent distribution with a remote control of the supply and the environment. The network interface they have incorporated, indicate all humidity and temperature levels through the Web and also they have an alarm system through the browser to inform about incidences when the predefined threshold are exceed.

SWITCHED CDUs

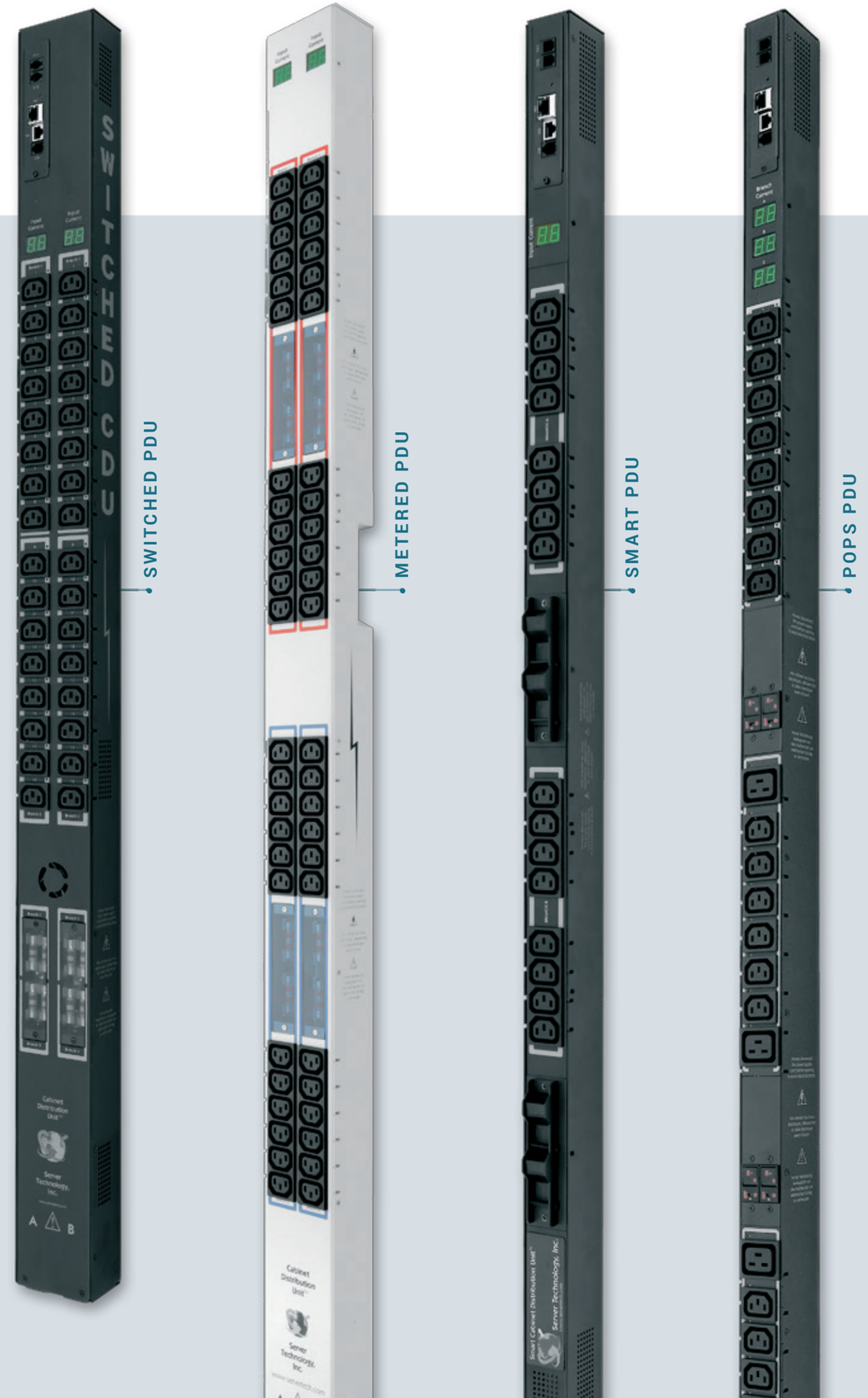
Allow supervising and controlling the rack supply network in a secure way. They send an alert by e-mail or SNMP if the defined threshold are exceed.

POPS SWITCHED CDUs

These combine the functions and features of the Switched CDUs, but with the capacity of administrating the energy individually per each outlet. With this system the power information is available by each device, by application, by CDU or per each Rack.

Advantages

- **FLEXIBLE MOUNTING OPTIONS**
  Mounts of vertical CDUs at the rear or side part of the rack, to avoid using important space to mount 19" equipment.
- **BRANCH CIRCUIT PROTECTION**
  All Sentry CDUs compliant the norm EN 60950-1:2001, to protect the branch circuits and use fuse or automatic safety switches for each branch.
- **INPUT CURRENT SUPERVISION**
  The exclusive CDU True RMS current monitoring system has a crucial function to prevent overload in high density environment. The LED screens located in outside structure of the CDU indicate the input current in each phase or branch circuit.
- **ENVIRONMENTAL SUPERVISION**
  An external probe system, with 3 meters of cable, it is in charge of measuring the humidity and temperature. When some threshold exceed, the user receives an alert by e-mail or SNMP.
- **EXPANSION MODULE**
  Our exclusive link method for additional outlets in individual CDUs, under the same IP, is compatible with the redundant supply system.
- **IP ACCESS, SECURITY AND COMMUNICATIONS.**
  Web interface, SSL, SSH, TELNET, SNMP access y RS-232, Ethernet 10/100 Base-T, SSLv3/TLSv1, SNMPv2, TACACS+, LDAP, LDAPS, RADIUS, DHCP, SMTP/Email y Syslog.
- **INDIVIDUAL CONTROL PER OUTLET**
  The individual control of outlet or group of outlet, with turn on, turn off and restart functions; allow doing restart operations in the network for equipments and servers without any response.

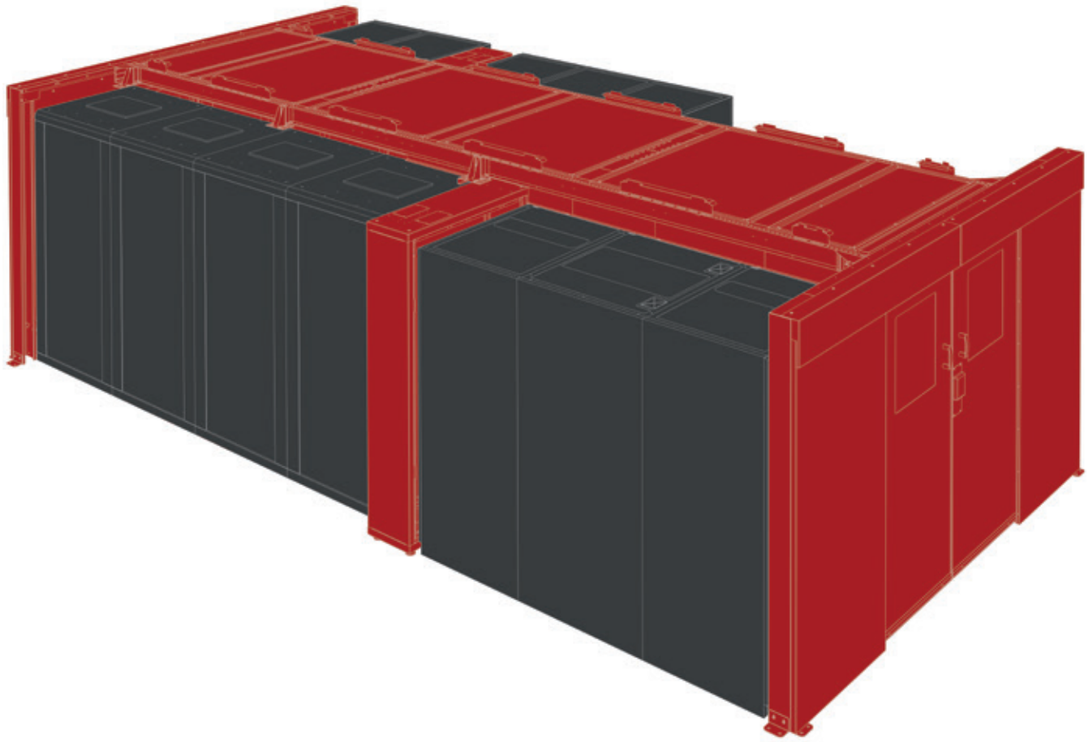


Building a CUBO®

STEP 07

RETROFIT DESIGN

RETROFIT, optimize investment costs



The traditional cooling system in datacenter, either under the floor or in the room, brings with themhigh energy costs to keep the right and constant temperature that assures the right performance of the installed equipments.

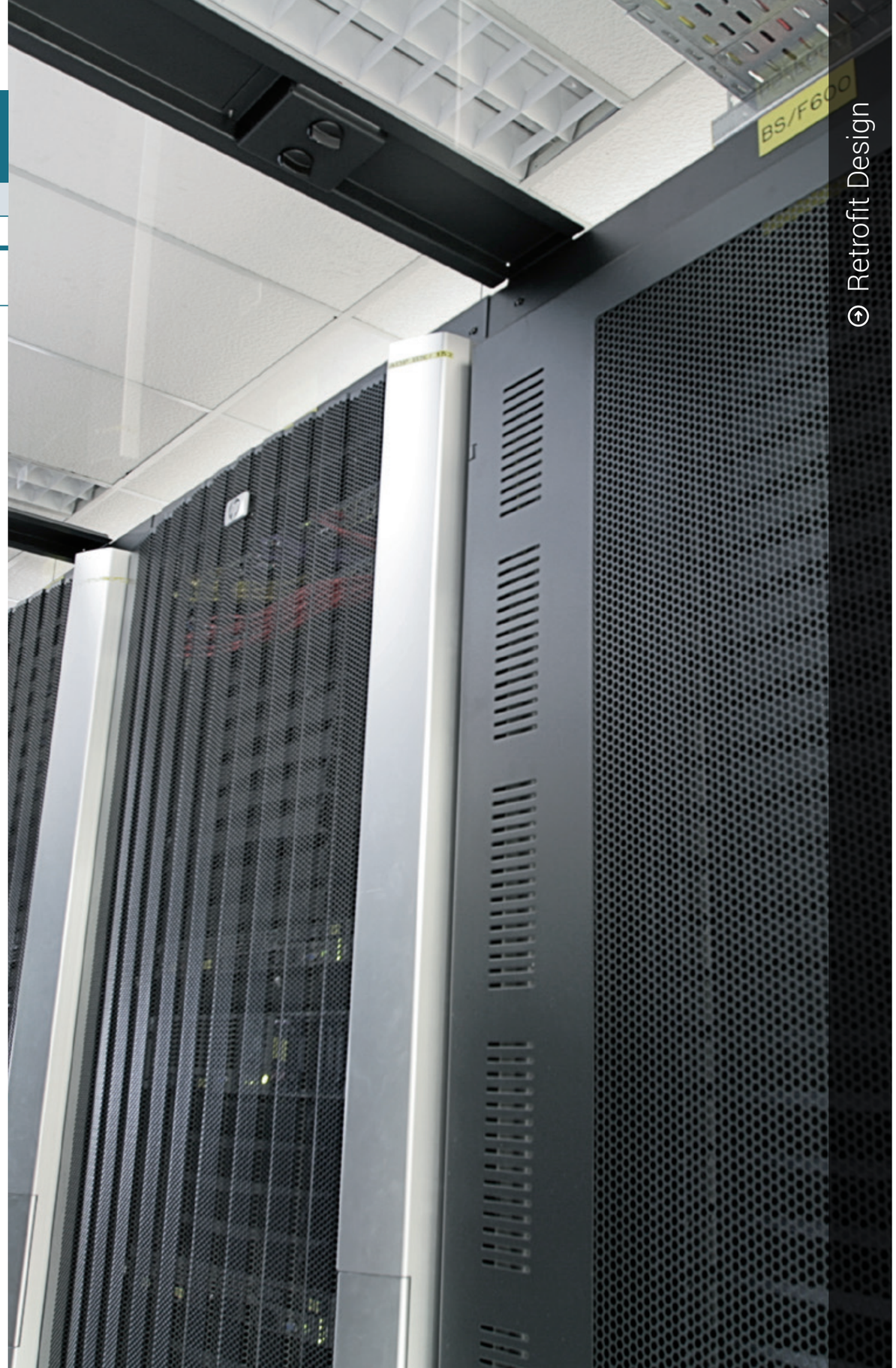
The general problem is the mixing of the hot and cold airflows. This entails consistent use of all cooling elements, which provide a very low air supply temperature to the output of the machines (CRACs), which when mixed with the high temperatures dissipated by the equipment, keep an optimal temperature service in the room.

This implies the continuous use of compressors, circuit pumps, ventilators, and other analogue cooling elements, on the other hand the creation of hot spots increases the use of ventilators. The retrofit solutions try to reduce the energy consumed by cooling, raising the temperature in the room, and at same time to prolong the useful life of the equipments together with a reduction of maintenance costs.

In order to get this, the main solution is the physical separation of the hot and cold air. SAIFOR offers a highly modular system, with a high degree of customization that allows closing the hot and cold aisles, even with products that are not from SAIFOR, and without interrupting the regular performance of the datacenter.

Knowing that every retrofitting project is unique, SAIFOR has a highly qualified team with a wide experience in custom-made retrofitting to get the maximum efficient of the existing installation, foreseen a future expansion and adjust the budget to the maximum.

One of the advantages of SAIFOR as a manufacturer with engineering, a production plant and its own product, is the guarantee to a good performance, because we ensure the perfect integration of our solutions, combined with CUBO solutions, our highly precise cooling units to those facilities where high density is required, and also the cable management solutions and power cabling.



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STEP 07

RETROFIT DESIGN

Retrofit

Aspects to take into account before doing a retrofitting:

ACTUAL SITUATION AND OBJECTIVES.
It is essential to have a real and precise view of the state of the datacenter and the possibilities of improving it. Some installations allow savings of more than 30%, however some increase their cooling and/or redundancy capacity.

TECHNOLOGY AND OPERATIONAL REQUIREMENTS.
The work team has to be aware of all the mechanical or electrical information of the structure. Through this information the solutions and specific strategies can be designed and implemented to increase the power capacities per rack from 5-15 kw/rack. for example SAIFOR cooling aisle units allow increasing the specific power per rack in defined areas without interfering with the regular development of the datacenter.

ENERGY CONSUMPTION.
Establishing energy consumption elements like smart CDUs will allow us to know the detailed consumption of the installed equipment, enabling to establish periodic controls and specific cooling actions, also emergency procedures, like stopping some equipment in determined situations.

CABLE MANAGEMENT.
At the time of doing a retrofitting a cable management system must be implemented to minimize the airflows obstruction caused by the great amount of cables, this system also has to include the airflows track that include the air intake of the IT equipment at rack level and the discharge areas under the floor. A correct installation of the cabling can help maintaining an effective air management and also to avoid the creation of hot spots in the datacenter.

DATACENTER DENSITY.
When the main reason to develop a retrofitting is the density, the most important thing to take into account is the isolation of hot and cold air. To get this, it is recommended to install cooling aisle units like SAIFOR HDC Aisle, guaranteeing that all the installed equipments receive the right temperature.

PUE MANAGEMENT.
This allows knowing the effectiveness of the energy usage, also allows quantifying and validates the actions implemented..

SCALABILITY AND MODULARITY.
Although retrofitting is normally applied to those infrastructure that are reaching the limit for which they were designed, SAIFOR specialization allows providing resources to extend the optimal life of existing infrastructure and improve their efficiency life cycle at physical infrastructure and cooling level.

Advantages

- **The different doors systems allow having a general control of the temperature and security inside the datacenter , their features provide energy savings and efficiency of the infrastructure.**
- **Airflows control, because the doors seal the containment avoiding leakage.**
- **Temperature control inside the datacenter, avoiding the airflows the overall temperature of the system keeps constant.**
- **Easy installation and maintenance.**
- **Flexible, because can be installed in any of our racks systems and also can be used in any retrofitting project adapting perfectly to any brand of rack in the market.**
- **Improve energy efficiency and the equipment predictability of those that are installed in the containments racks.**
- **Minimize the air mixture keeping a constant temperature from the top to the bottom of the aisle.**
- **Optimize the space.**
- **Profitable, because reduce the operational costs.**
- **Provide energy efficiency by blocking air leakage or the mixing of hot and cold air.**
- **Security, can have different opening systems, with key, electronic, by iris or fingerprint recognition, etc...**

CUSTOM MADE CLOSED CONTAINMENT TO AVOID AIRFLOW MIXTURES


CUBO SOLUTIONS ADAPTED TO RACKS FROM OTHER MANUFACTURERS


INTEGRATION OF OBSTACLES FROM THE ARCHITECTURAL CONSTRUCTION

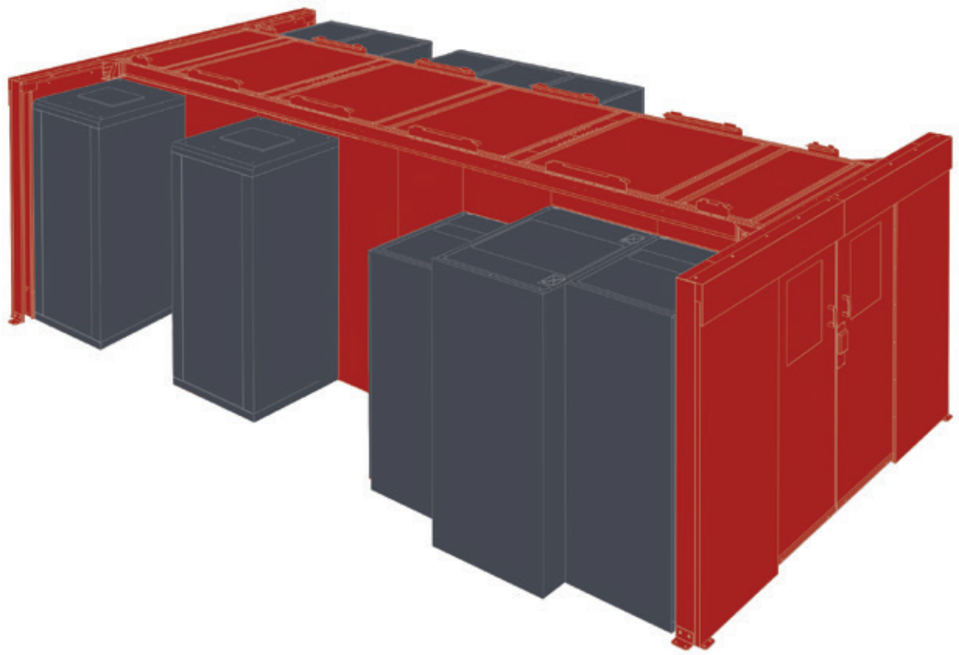

OPTIMAL SOLUTIONS ADAPTED TO EXISTING SPACES

Building a CUBO®

STEP 08

CUBOX PLUS SYSTEM

CUBOX+ SYSTEM. Where flexibility and profitability go hand in hand.



Saifor proudly presents “CUBOX PLUS SYSTEM” CPS, the solution for those data centers where flexibility, prevision and profitability are a prerequisite; It allows to add new racks of different sizes, measures and even from different manufacturers.

The CPS is an ultra-modular and cost-efficient, free standing aisle containment system. It offers the possibility of adding racks according to the customer needs keeping options for separating warm and cold air flows in an energy efficient manner, which allows monitoring investment in racks according to demand and need over time.

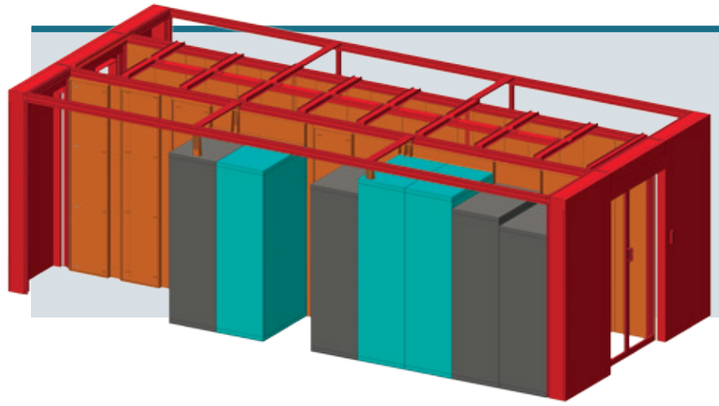
CUBOX PLUS SYSTEM offers the same energy efficiency as a traditional thermal aisle containment system.

CPS is made from an ingenious aluminum support structure, highly modular and flexible, which allows to create any configuration.

Aisle containment doors and roof system are the same as those used in a traditional CUBO closed system and with all its variants: sliding doors; manual or automatic , system roofs; fixed or folding (emergency), central lighting, placement areas for sensors and wiring.

Racks of different types, heights, widths and depths can be incorporated into the CPS structure, therefore clients have the freedom to customize the system depending on their needs.

CUBOX PLUS SYSTEM is the growing continent of your data center, a flexible, cost-effective and the definitive solution that minimizes the initial investment costs (CAPEX).

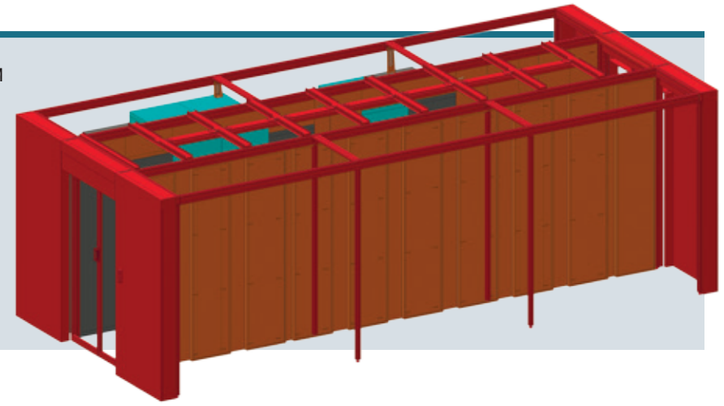


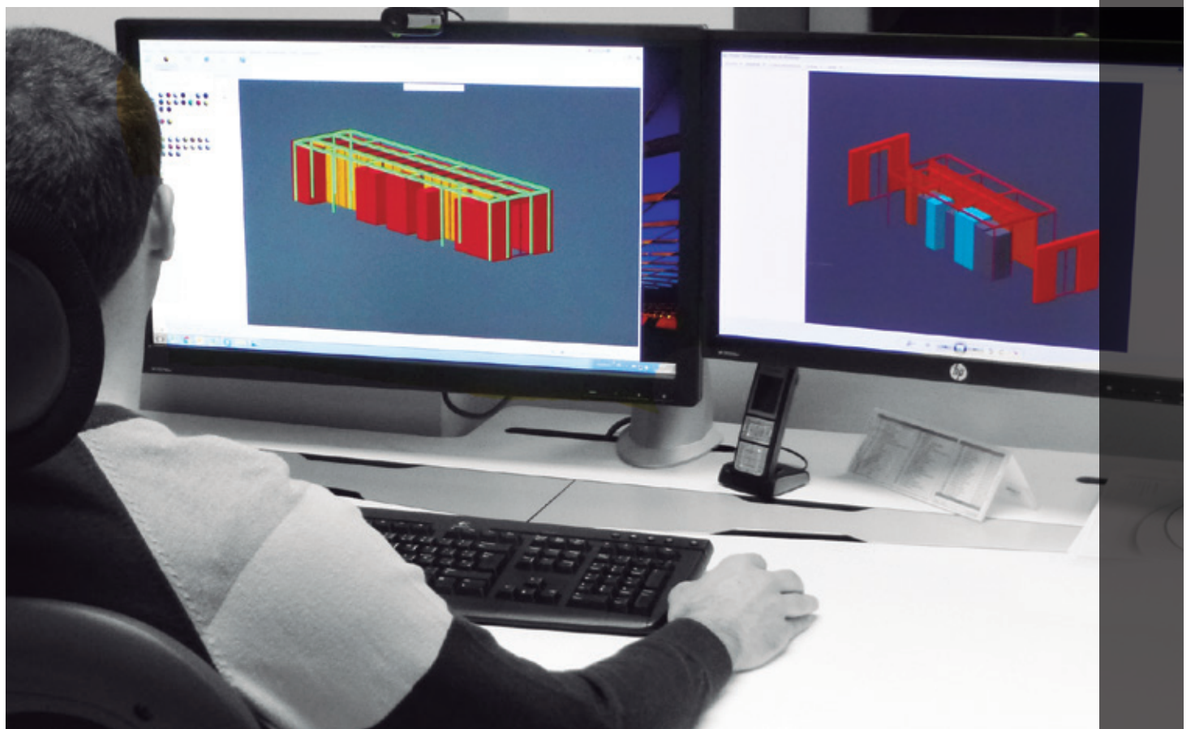
1

Aisle containment doors and roof system are the same as those used in a traditional CUBO closed system.

2

The CUBOX PLUS SYTEM is an ultra-modular and cost-efcient, free standing aisle containment system.





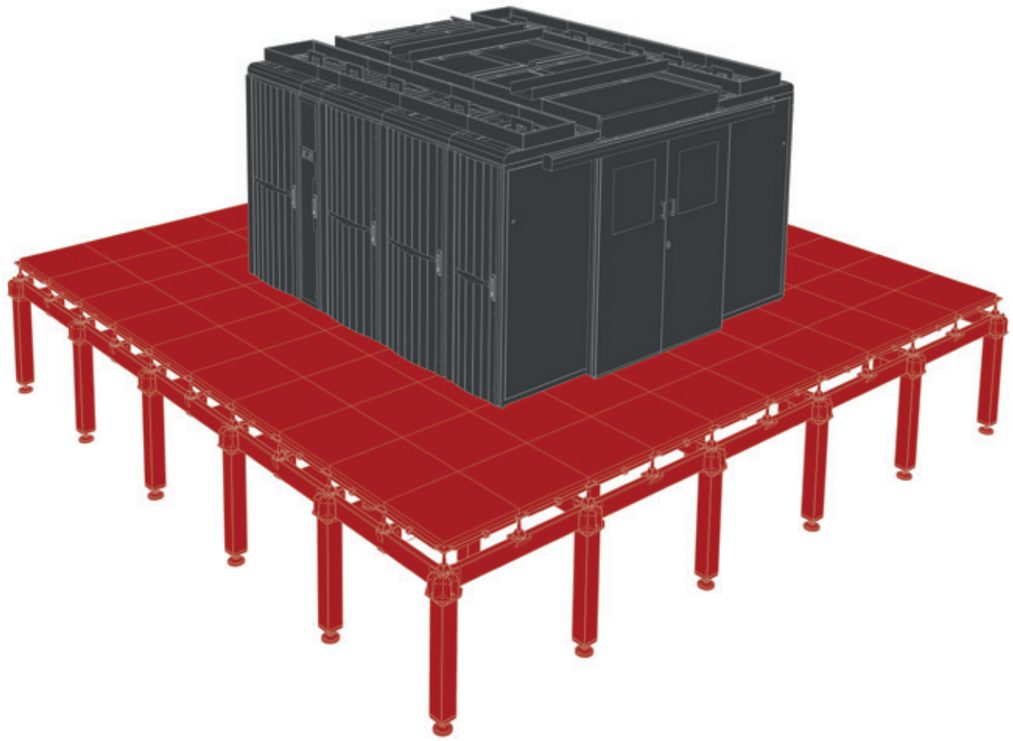
SAIFOR

Building a CUBO®

STEP 09

HIGH RESISTANCE FLOORS

RAISED FLOOR, high resistance and accessibility



SAIFOR raised floor is a high resistance, modular and patented solution that allows creating useful services zones under the datacenters, capitalizing the real estate investment, providing security, great capacity and a great space form maintenance.

Unlike other traditional floors, which columns are located in on a 600x600mm grid, SAIFOR's raised floor is installed on columns highly resistant of 1200x1200mm grid or 2400x2400mm one. Thank to its special design, it is not necessary to use Maltese cross reinforcements between columns, because these reinforcements only nullify or preclude the access.

As time goes traditional flooring end up being chaotic, dirty and unworkable. SAIFOR raised floor is design to be different from the traditional raised floor, it is made to create workable zone, allowing free movement without obstacles under the datacenter. Because of this the maintenance, cabling and installation can be easily done in a quick, comfortable, clean and safety way.

On the Other hand, SAIFOR can manufacture any height, always keeping a minimum of 1200mm between structure columns. Many accessories are available for cabling ducting and organization of data cables, electrical installation, lighting, water pipes, cooling channeling.

Another key feature of SAIFOR's raised floor is its high resistance. The structural system of columns and beam has been designed to support high loads. The part of the pavement tile allows any standard tile in the market with these dimensions 600X600 (24" x 24"), if it is not needed a high load resistance tile or tiles highly durable and resistance like SAIFOR's flooring, which allows the pass of the robot for maintenance without modifying the pavement flatness.

This system also has a tile expansion joint that allows absorbing the dimensional temperature changes, causing a little flexibility in the pavement that avoid that the remaining components that are worn by continued use.

SAIFOR's raised floor meets all the guaranties and requirements of the market and it is certified as a Class 6/2/A/2 floor according to the standard EN 12825.

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Building a CUBO®

STEP 09

HIGH RESISTANCE FLOORS

Raised floor

Modular and scalable.

High resistance truss structure that allows distributing the power.

Without height limits.

Space between structure columns up to 2400mm.

Class 6/2/A/2 floor according to the standard EN 12825.

Class A1 fire resistance.

High water resistance.

High corrosion resistance.

Breaking load > 20.5 Kn.

Security factor 2.

Slip resistance with a friction coefficient of 1.0-1.2.

High resistance tiles.

Air ventilation grilles from 0-100%

Joint tiles

100% compatible with 600x600 (24”x24”) tile in the market.

A wide range of structure cabling solutions.

Floor fixation with different systems as earthquake proof, etc…

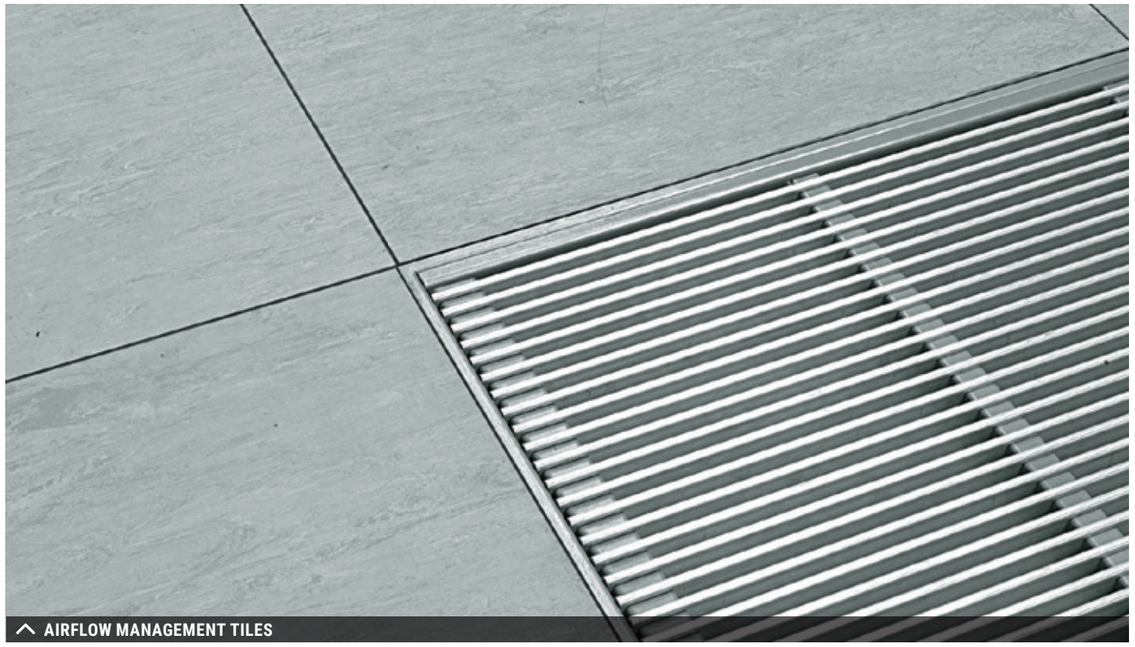
Patented product No. 201230193

Advantages

- **High load resistance, that allows the use of heavy systems in whole raised floor surface.**
- **SAIFOR raised floor is the most resistant in the market.**
- **Every zone or space are highly flexible and stable.**
- **The lower spaces with a width of 2400mm create lower sub-zones in the datacenter, which facilitates the installation of cabling, the cooling distribution and constant infrastructure maintenance.**
- **High resistance tiles, with expansion joint models or ventilation grille for plenum systems.**
- **Compatible with any 600x600 (24”x24”) tiles in the market.**
- **Avoid the use of reinforcement in the lower structure (like “Maltese cross”) that nullifying useful spaces for maintenance and equipment.**
- **Reduce cable and cooling systems installations costs.**
- **SAIFOR raised floor is versatile and offers the possibility of changes in the installation in the future.**
- **Have a wide range of accessories for the right distribution of cabling.**

MULTIPLE FINISHES OPTIONS

HIGH RESISTANCE MODULAR STRUCTURE AND GREAT INFERIOR ACCESSIBILITY



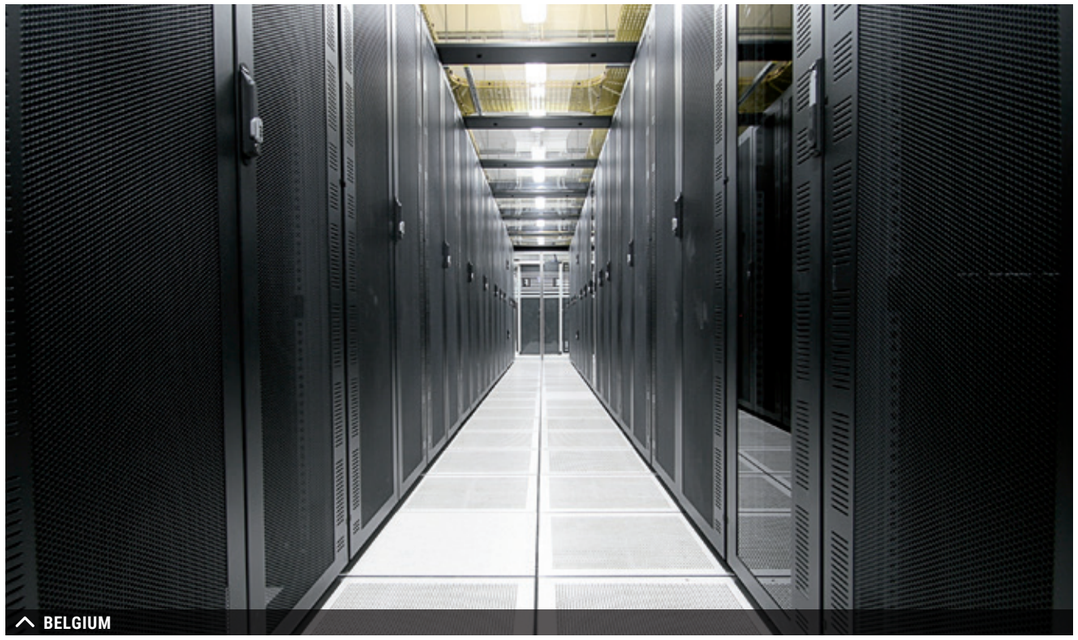
AIRFLOW MANAGEMENT TILES

SAIFOR

CUBO®
AISLE CONTAINMENT SYSTEM

Worldwide


QATAR


BELGIUM


POLAND


FRANCE


SPAIN


THE NETHERLANDS


MOROCCO


FRANCE

Why SAIFOR?

SAIFOR has more than 30 years of experience offering quality and services.

SAIFOR was funded in 1985 and it is a private property. Saifor is a leading company in designing and manufacturing custommade solutions for datacenters and mission critical control room. Specialized in 19" racks and custom-made technical furniture, **SAIFOR** has more than 30 years of experience offering quality and services, even today it is one of the leading companies in the Datacenter infrastruc ture and Control Room industry.

In **SAIFOR**'s headquarters there is its central design center and the production plant that has more than 12000m2 with the latest machinery, it is located in Vallbona d'Anoia, Barcelona-Spain.

SAIFOR has its showrooms in Barcelona (Spain), Palaiseau (France), Kontick (Belgium) and UAE (Dubai).

SAIFOR also has facilities to provide any installation or shipment around the world, the combination of its companies in Palaiseau (France), Kontick (Belgium) and a partners official network, allows **SAIFOR** to develop any project in any part of the world.

Our team of engineers are highly qualified in the designing area and supported by the R+I+D department, solving any technical issue and looking constantly for new ideas to keep **SAIFOR** ahead of technologies.

The design of its facilities and the Know How of **SAIFOR**'s professionals, allow facing the Green IT policies of the company and the manufacturing of high quality product.

Quality and environment are important aspects in **SAIFOR** mission. Each one of **SAIFOR**'s professionals has the commitment and responsibility needed to get the highest quality combined with a high respect for the environment.

SAIFOR is a certified company:
- ISO 9001 to quality since 1997
- ISO 14001 environmental since 2000
- EMAS environment since 2000

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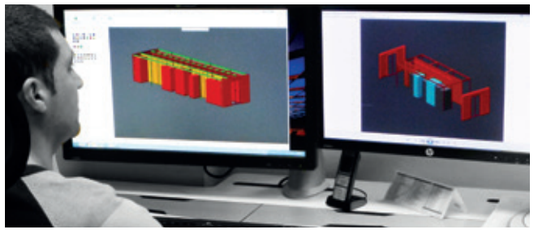

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