PDHonline Course E509 (4 PDH)

Modular Datacenter Security Room Assembly Processes

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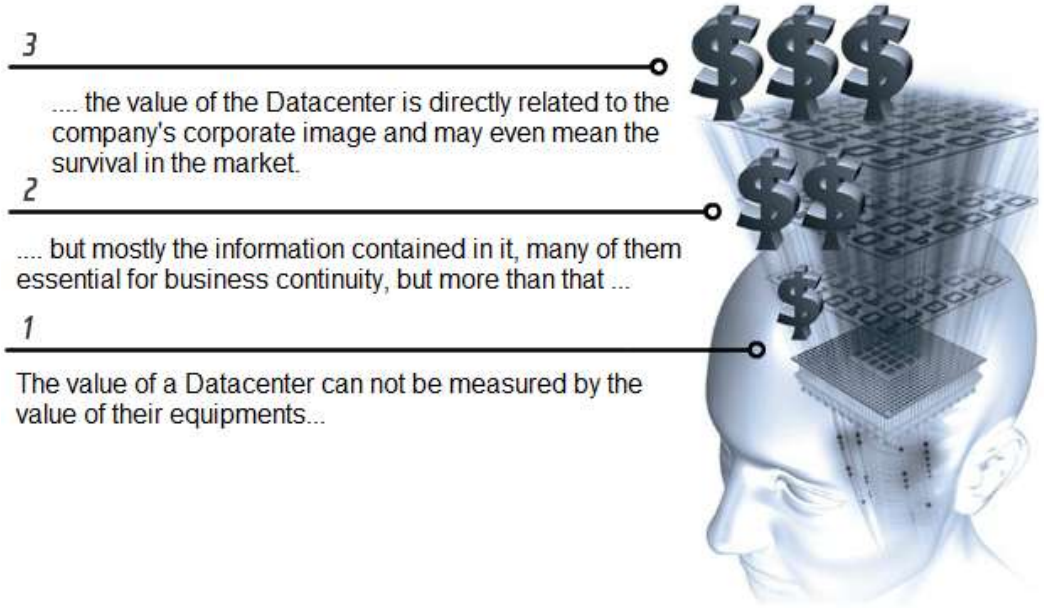
1. THE INFORMATION VALUE

Estimate the value of equipment and information of the Datacenter and the consequences of data loss, due to possible losses is a challenge that must be addressed, taking into account the true value of IT and datacenter for public enterprises and private.



LOSS OF A STOP... OR LOSS OF DATACENTER

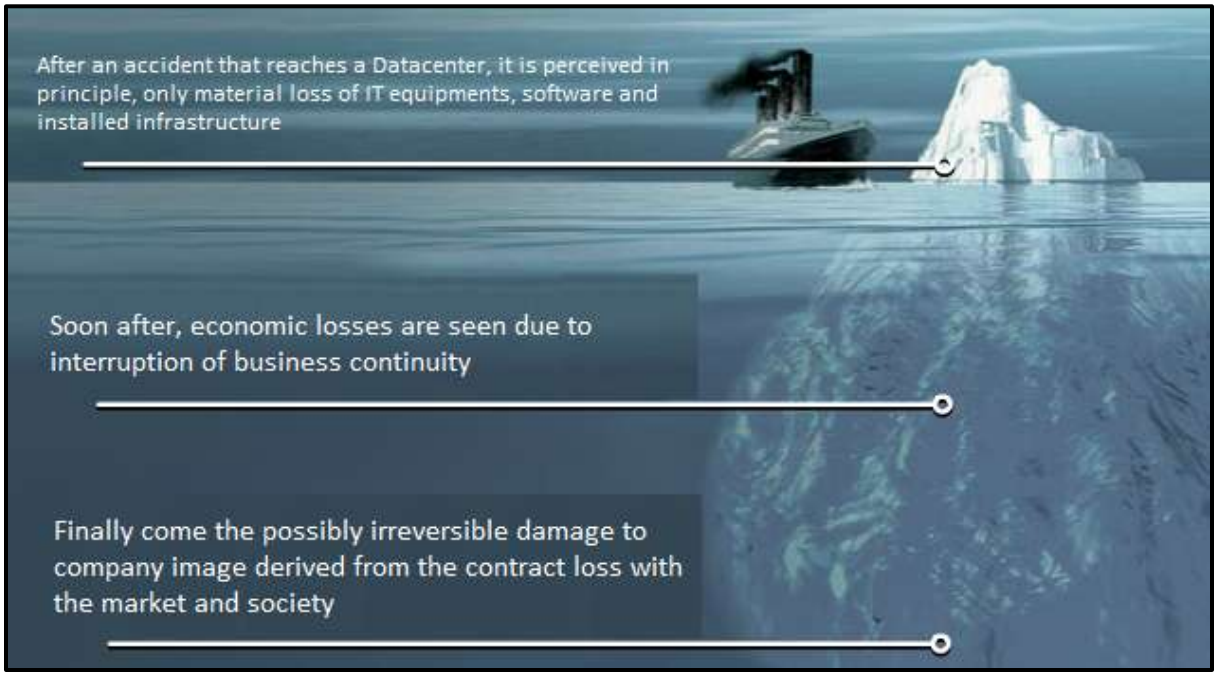


Fig.1-01

4 GEARS

There are four factors that must work in synchronization, so that a Datacenter can be considered truly secure and high availability, because if one of the gears does not work properly, the entire Datacenter stops.

INFRASTRUCTURE

The environment cannot be affected by the problems arising from the crisis in the Data-center and to meet the level of SLA desired. It needs to be designed with adequate and redundant systems of air conditioning, energy, communication and monitoring, with autonomy, adaptability and redundancy dedicated exclusively to critical environment.

PHYSICAL SECURITY

There is no point, if redundant systems in the critical IT mission equipment are not protected against physical risks, which may cause the stoppage of activities, as a possible fire, leaks, and jets of water combat, unauthorized access, theft or sabotage.

At no point have the redundancy of equipment if an accident occurs in the common environment. High availability requires that the environment is highly protected. In short: there is no high availability without security.

MAINTENANCE

A Datacenter requires constant care, preventive, corrective and adaptations to meet the renewal of hardware. It is not possible to guarantee the security and high availability of an environment - in the short, medium and long term – when not preventive and corrective maintenance are performed by highly skilled and trained to work in the IT environment professional services.

CONFORMITY

There are rules and regulations, national and international, to establish and recommend the adoption of best practices Infrastructure, Safety and Maintenance as well as, associations and institutes are accredited to the Datacenter Compliance Certification. Compliance and certification are the only guarantee for Security and High Availability Datacenter.

THREATS AND RISKS

PHYSICAL SECURITY

A datacenter where one or more gears has vulnerabilities do not work properly and is exposed to various physical risks and other threats. Let's learn more about these risks and threats.

The main physical security threats to a Datacenter are:

FIRE

The most devastating threats. In addition to the stop in operations causes the total or partial loss of equipment and data. It can be generated by a simple short circuit, common in environments that deal with energy and generate much heat or be caused by inattention, accidental or deliberate.

Fires can start in a neighboring environment for Datacenter. The fire carries other threats derived as heat, humidity, smoke and corrosive gases. So even a small fire can cause a great damage.

WATER

If presents as the threat to the Datacenter in various ways. Pipe leak on the environment, flooding from heavy rain, an internal leak or reservoirs, operation of sprinklers or even jets of water to fight the fire.

UNLAWFUL ACCESS, BURGLARY, THEFT AND SABOTAGE


Much of the incidents in data centers is due to human action, whether intentionally or accidentally, ranging from a simple mistake made by someone not authorized until premeditated actions of sabotage, espionage or theft of equipment and information.

IMPACT

In the case of falling debris caused by a landslide or a fire, an unprotected environment will surely suffer serious damages.

EXPLOSION

Explosion: Caused by an accident or intentional, explosions cause a devastating effect.

DUST

Present in most environments not watertight, dust contamination is a serious threat when there is a fire or another nearby fire, may cause serious damage to IT Equipment.

FIREARMS

It presents a problem in many urban centers.

ELECTROMAGNETIC PULSE

Electromagnetic fields can affect IT equipment interfering with its operation and erasing information recorded on discs and media.

SOLUTIONS NOT CERTIFIED

With respect to infrastructure, physical security solutions, illusory or palliative, represents a serious threat to datacenters.

Some companies adopt, as a solution to protect your environment, concrete walls or drywalls, which temporarily can stop the fire, these solutions do not protect the environment against heat, humidity and corrosive gases generated by a fire.

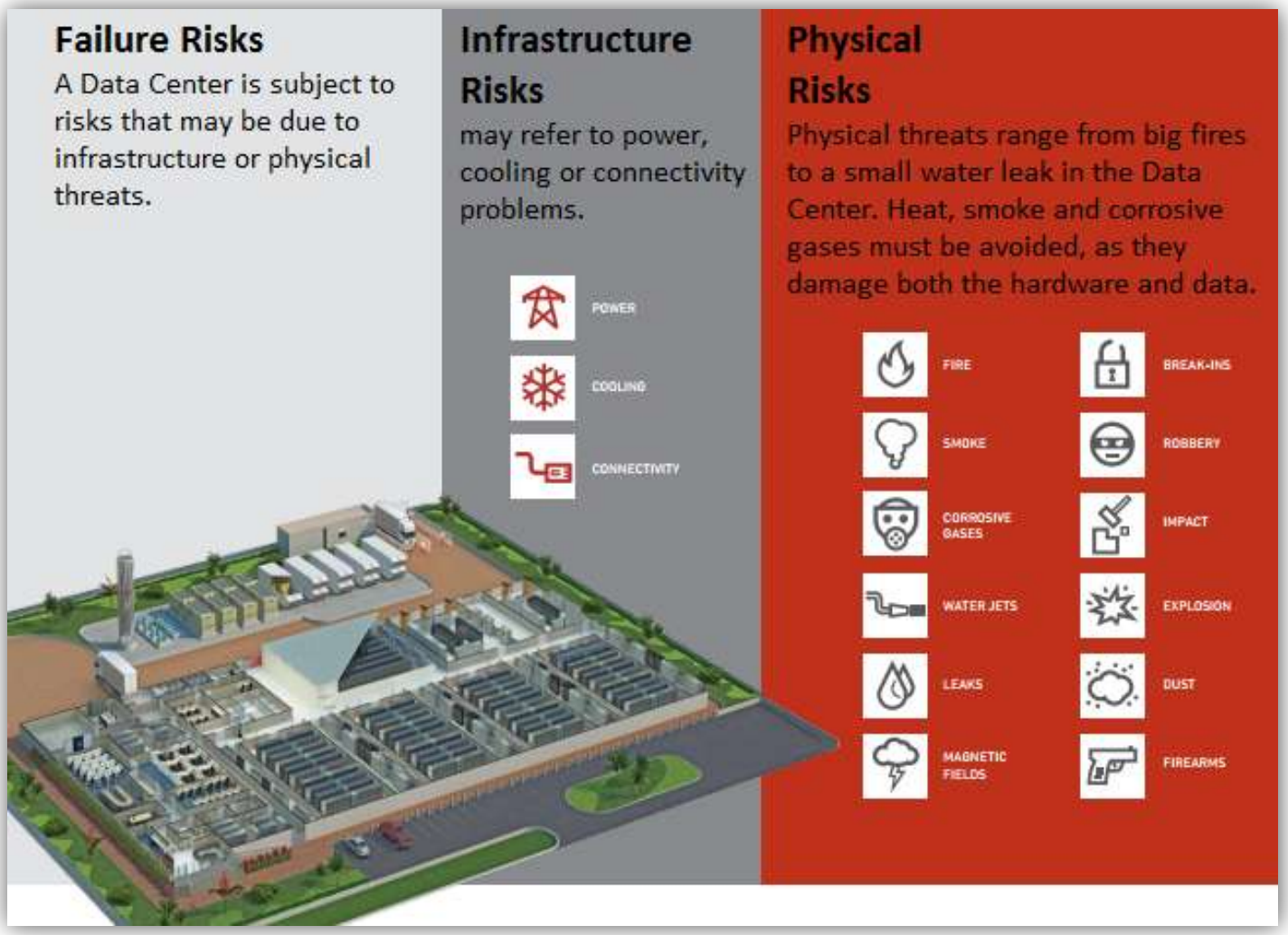


Fig.1-02

COMPLEXITY DATACENTER

THE THREATS IN DATACENTERS

New IT technologies - virtualization, consolidation and automation - bring to market increasingly powerful equipment, demanding and concentrating more power and generate more heat / m².

The problems related to the IT infrastructure in the datacenters tend to increase, unless they are designed appropriate projects of air-conditioning and power supply.

Large IT companies and their customers are concerned about the threats in the infrastructure of the datacenter. According to a survey by the Gartner Group, 69% of Datacenters have insufficient power and cooling for its production. And the servers continue to gene-rate more and more heat and demanding more and more energy / m².

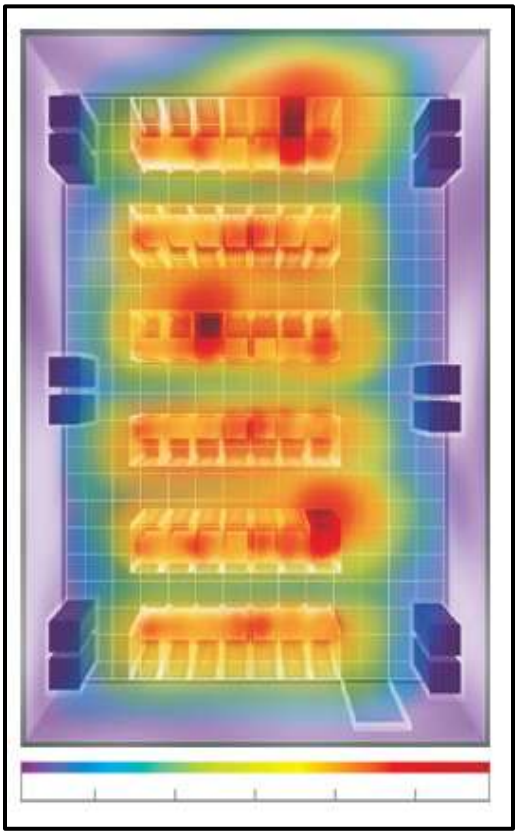


Fig.1-03

Heat Density hotspot zones (more heat m²).

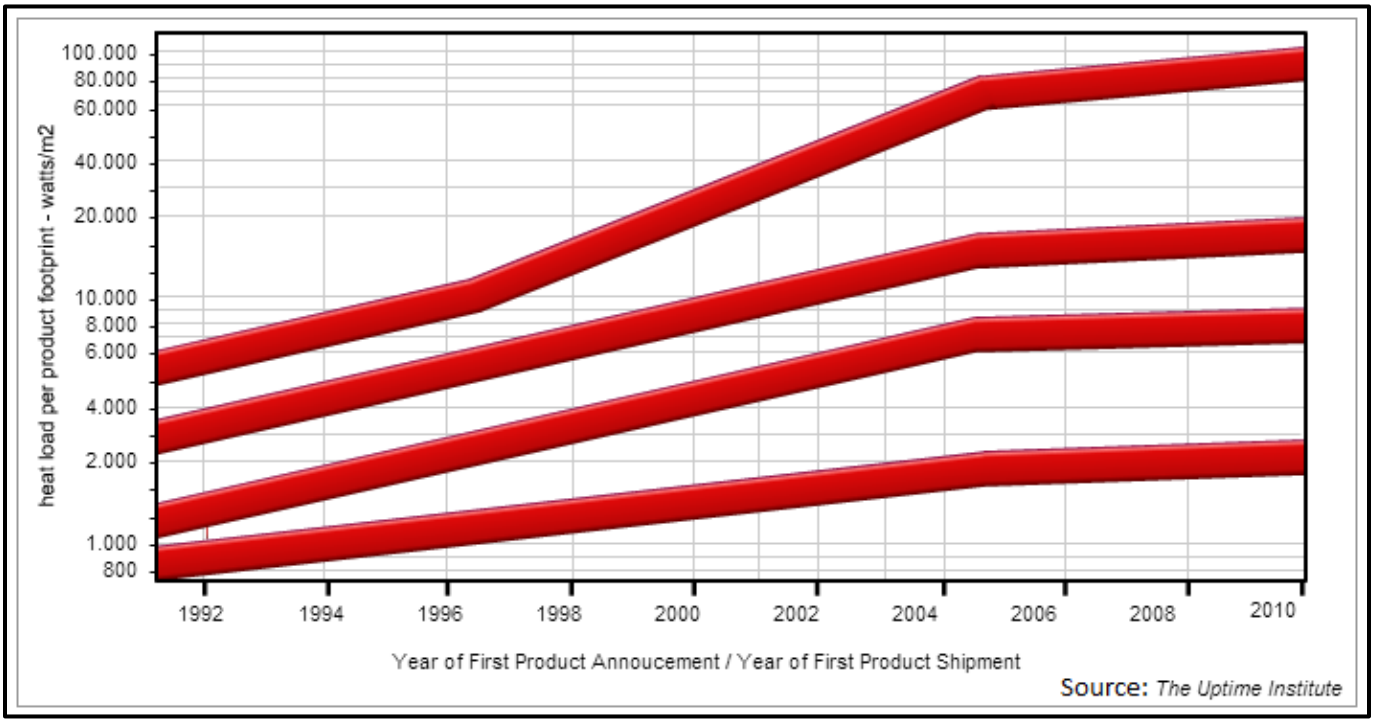


Fig.1-04

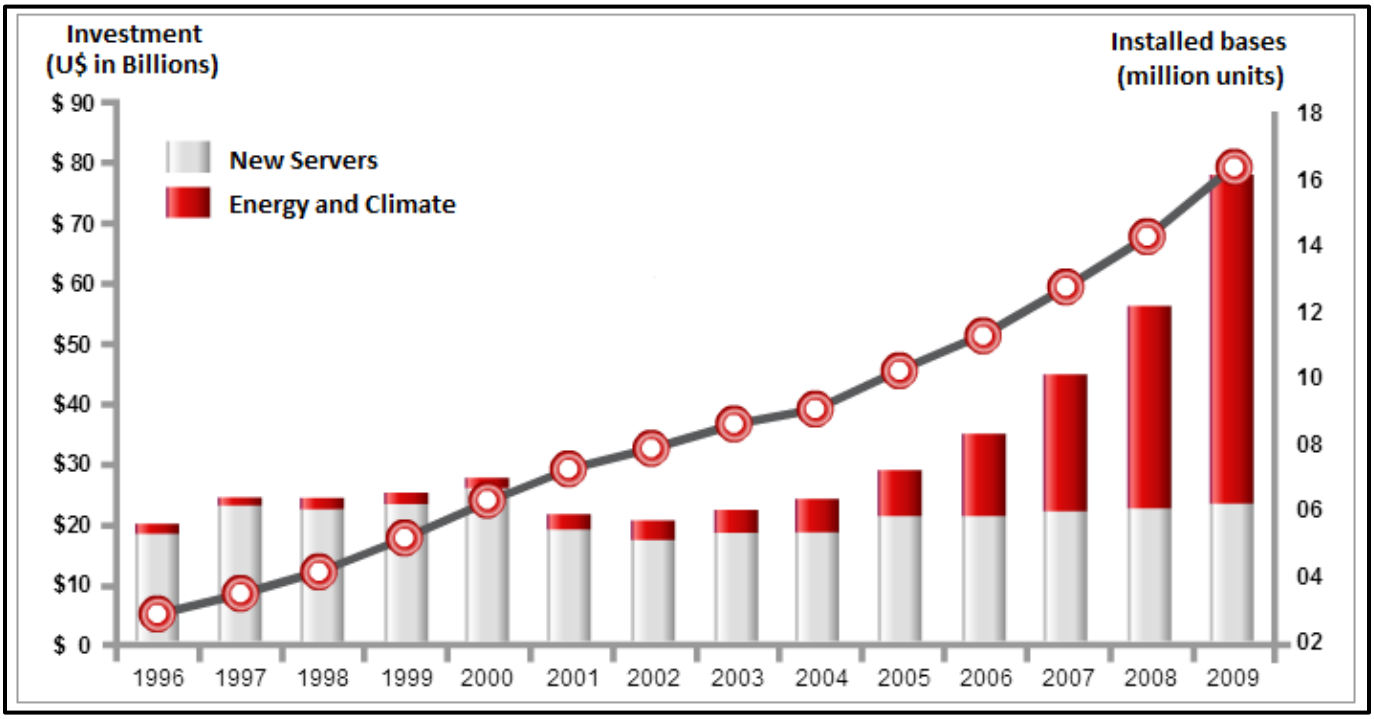


Fig.1-05

Fig.1-06

Fig.1-07

2. MODULAR DATACENTER SECURITY ROOM - INTRODUCTION

The Modular Datacenter Security Room is a sealed environment, tested and certificated, which protects the Datacenter against fire, heat, humidity, corrosive gases, smoke, water, robbery, unauthorized access, sabotage, impact, dust, explosion, magnetism and weapons fire (**Fig.2-01**).

Because it is fully modular and scalable, the Modular Datacenter Security Room can be mounted with the Datacenter in working and you can extend it or change it to another location, as required by the customer, preserving the investment made (**Fig. 2-02**). The Modular Datacenter Security Room is tested against various physical threats, according to the requirements contained in the ECB certification procedure, EIA / TIA and other standards tests.

Fig.2-01

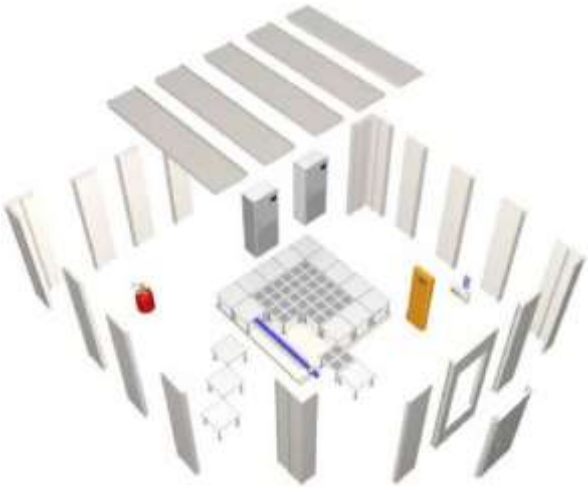


Fig.2-02

MODULAR SECURITY ROOM

Modular system or certificate based on modular elements that provide a quick and clean installation on site. The environments can be expanded rapidly in case of need, giving great flexibility to the environment files, and can also be dismantled and reassembled in another place. The elements are designed with 600 mm width and height defined by the project.

They are made with insulating materials and externally galvanized steel sheet and painted on both sides, giving good strength and mechanical stability. The joints between elements are joined by appliance without the use of welding, drilling or adhesives and possible location changes.

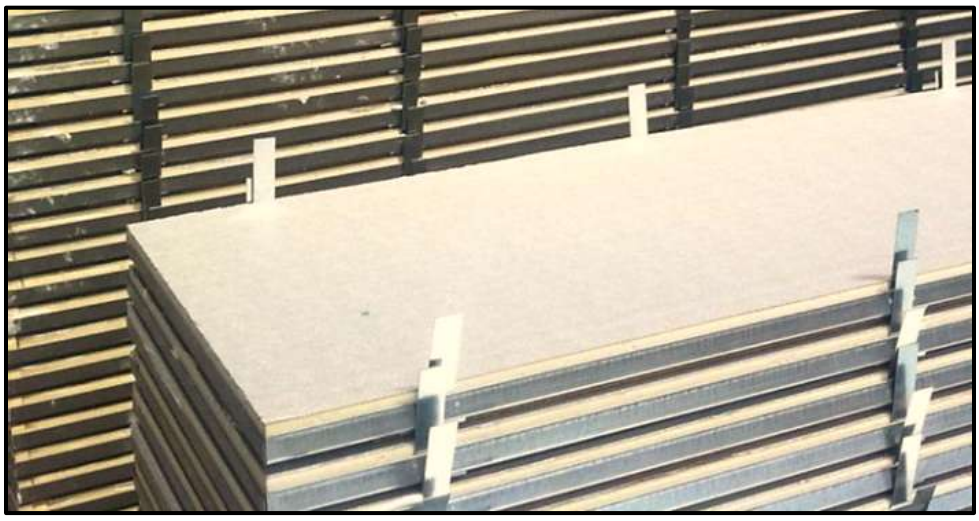


Fig.2-03

The fire resistance of these elements is 90 or 120 minutes.
Proven time through standardized tests by ECB.

CERTIFICATION

Certification is the process used worldwide to evaluate the quality and effectiveness of a product. This certificate must be issued by an independent entity (external to the manufacturing company), duly accredited by IAF official entity member (International Accreditation Forum), so that the certification process has validity and international technical and legal recognition.

Certifying that the product is actually in accordance with the rules and fulfills its role with proven quality and warranty.

Certification for Modular Datacenter Security Room is held by the TIA, IAF member.

Another important Certification is the ECB (European Certification Bureau) certification entity independent of security products at the international level (**Fig.2-04**), accredited by DAR (Deutsche Akkreditierungs Rat), German accreditation entity, IAF member, for certification of Modular Datacenter Safe Room.

Fig.2-04

3. CHECK LIST BASE

At the beginning of each project, after the manufacturing process and before the delivery of the materials on site, the project coordinator should receive a checklist with all items (elements) that will be submitted by the manufacturer.

The Check List should contain a list of all the elements for installation.

This is an important procedure to ensure successful installation.

4. RECEIVING THE ELEMENTS OF THE MODULAR SECURITY ROOM

Upon receiving (**Fig.4-01**) the elements of the room-safe and materials for installation, certain precautions should be observed in the storage and accommodation of the same (**Fig.4-02**).

Fig.4-01

Fig.4-02

Always leave the tracks and background elements in a more accessible location, as they will be the first to be installed (**Fig.4-03**). Followed by lateral elements and last ceiling (**Fig.4-04** and **Fig.4-05**).Caution: Do not stack more than 9 elements together.

Fig.4-03

Fig.4-04

Fig.4-05

If the raised floor is delivered with the elements of the Modular Security Room, it is advisable to stack (maximum 20 plates) and not too close. This avoids overloading the slab. This recommendation does not apply to perforated plates that are lighter than others.

5. DEMARCATION AND INSTALLATION OF PERIMETER PROFILES

Based on their X-FAB design (manufacturing - **Fig.5-01**), to begin the assembly of Modular Security Room, technicians must make a laser marking (**Fig.5-02** and **Fig.5-03**) - perimeter marking of Security Room.

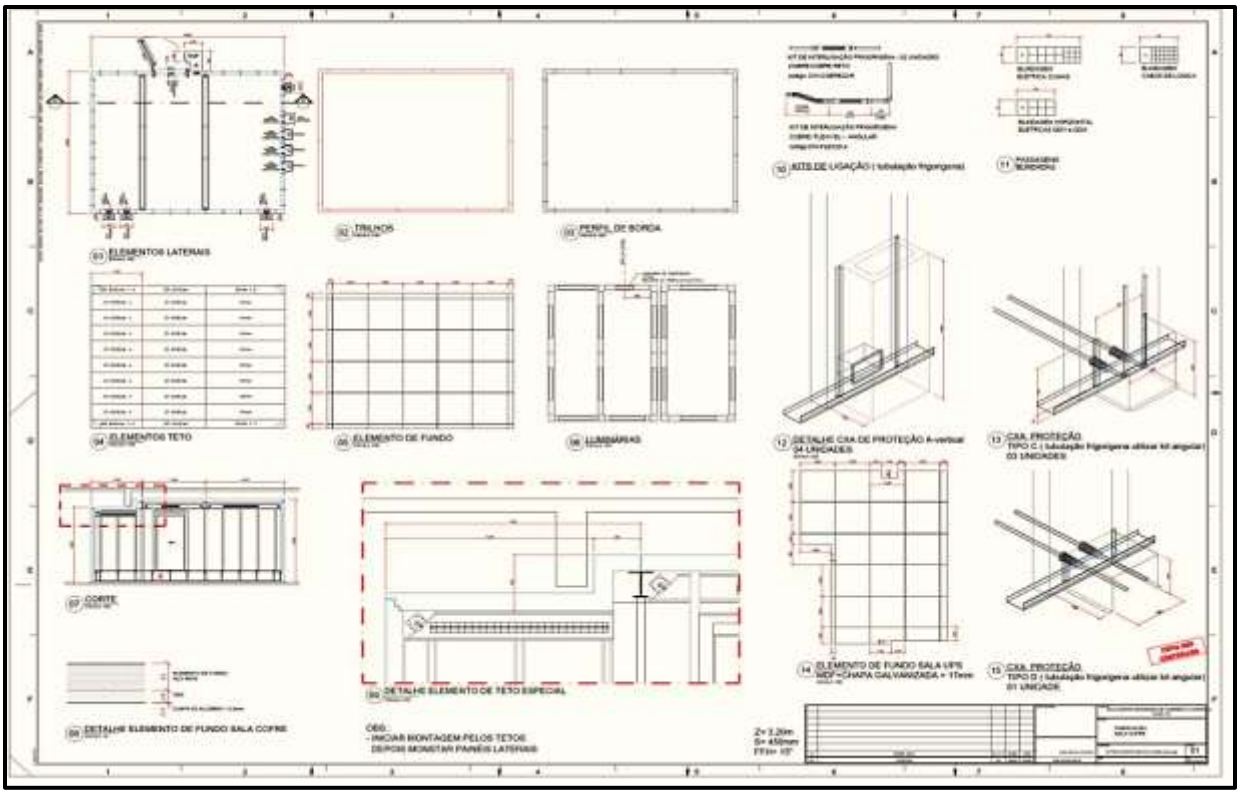


Fig.5-01

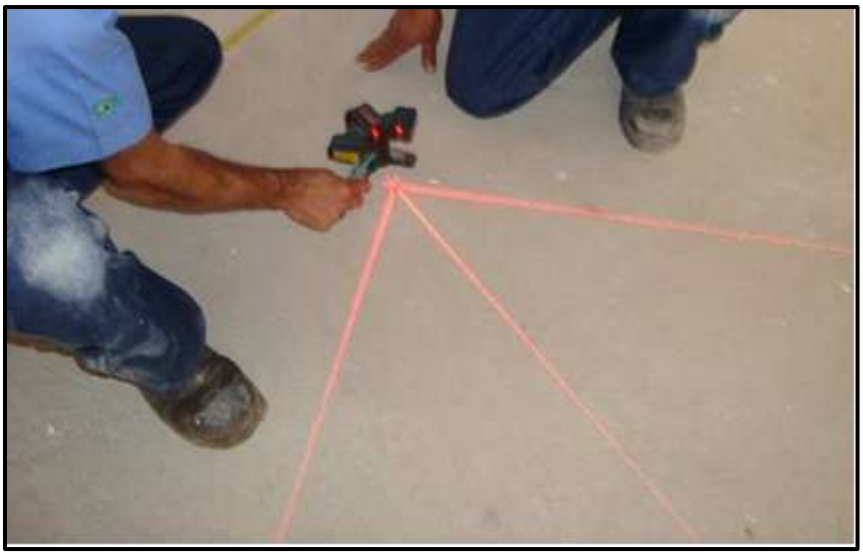


Fig.5-02

Fig.5-03

With the track perimeter, begins the process of installation of Modular Security Room. These initial steps occur in parallel, the beginning of a step does not imply that the former must be 100% complete. The next step then is the position of the aluminum sheet (thickness 0.5 mm ± - **Fig.5-04**).

Fig.5-04

They should be placed overlapping each other, where the small contact area between them receive the application of white silicone (**Fig.5-05**) and then the tape Duralfoil (**Fig.5-06**).

Fig.5-05 **Fig.5-06**

As the aluminum sheet is installed, you should start positioning and fixing the rails on the perimeter (or Profile Rail floor "U" 2420mm). Before placing them, however, should be glued the rubber tape (tape for sealing rubber with ceramic) at the bottom of the rails (**Fig.5-07**).

Fig.5-07

In the sequence, position and secure the profile with guide dowels and screws (**Fig.5-08** and **Fig.5-09**) along the room perimeter.

Fig.5-08 **Fig.5-09**

The leftover of aluminum sheets after the installation of the perimeter profiles should be cut, as shown below (**Fig.5-10**).

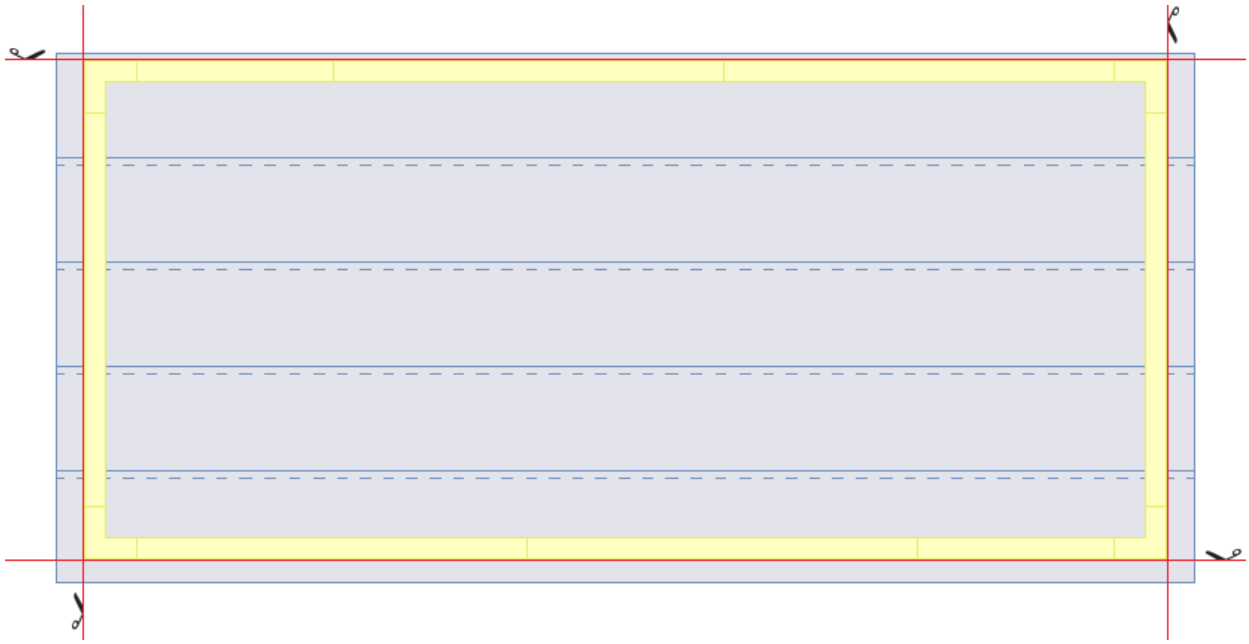


Fig.5-10

After the above processes, silicon must pass around the rail (**Fig.5-11**) to aid in sealing, as well as the seams between the parts

Fig.5-11

6. ASSEMBLY BACKGROUND ELEMENTS AND SIDE ELEMENTS

With installed and sealed rails, technicians should coat the inside of the rail, where the side elements will be supported, with the rubber tape (tape for sealing rubber with pottery), in the same way as was done in the bottom of it (**Fig.6-01**).

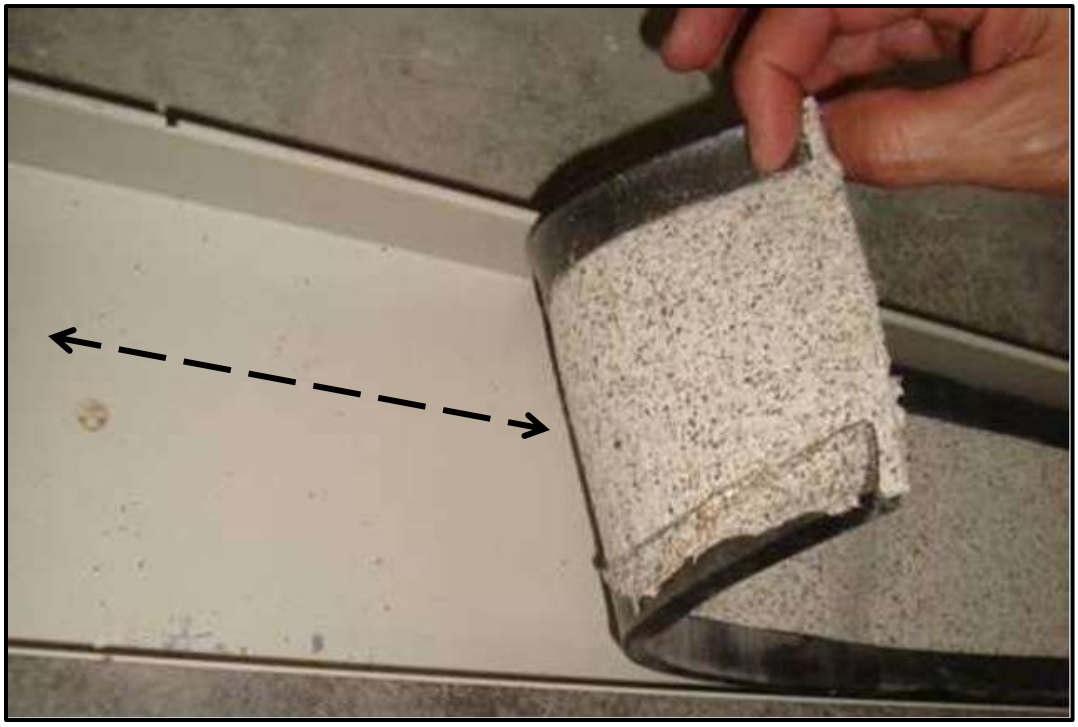


Fig.6-01

After fixation of aluminum sheet and perimeter track, you can begin the installation of plywood panels (**Fig.6-02**).

Fig.6-02

Between the plywood panels should be applied white silicone (**Fig.6-03**) to seal installation.

Fig.6-03

Up to now, these are the processes executed and completed. (**Fig.6-04**).

Fig.6-04

Then, to initiate the positioning of the plates of the Bottom Element (plywood with aluminum laminate), according to **Fig.6-06** and **Fig.6-07**, following the direction of the project (**Fig.6-05**).

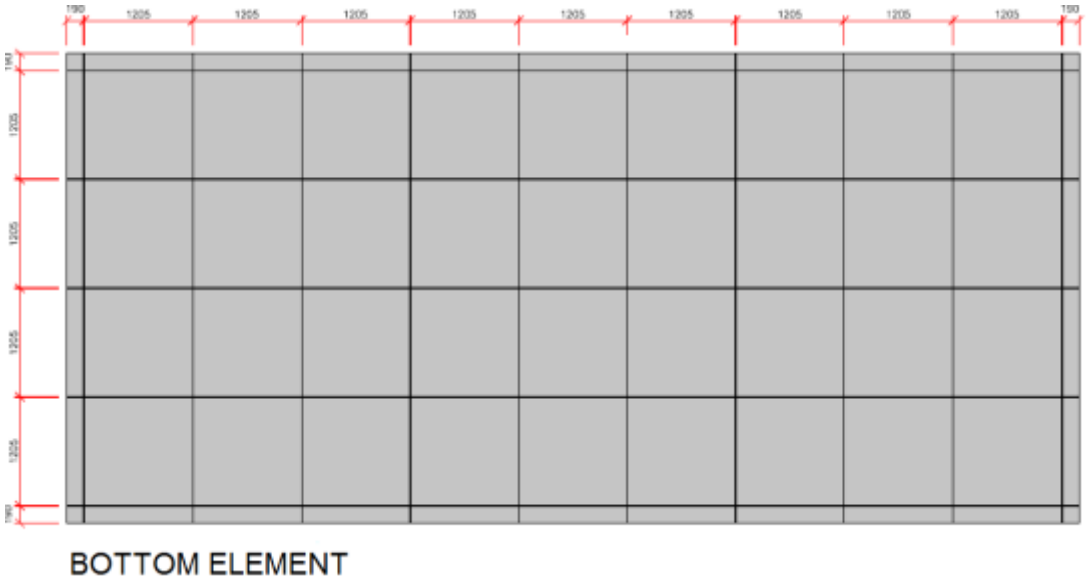


Fig.6-05

Fig.6-06

Fig.6-07

Between the plates of the Bottom Element is applied a thin silicone layer on the side where a strip of ceramic fiber tape (**Fig.6-08**, **Fig.6-09** and **Fig.6-10**) is glued. The tape helps to seal the gaps between the plates.

Fig.6-08

Fig.6-09

Fig.6-10

When all the Panels of the Bottom Elements were positioned, the panels should be welded to fix each other (**Fig.6-11**).

Fig.6-11

After installing the Bottom Elements, should begin installing the Side Elements. Before you place them, you must place in each of the side pieces, one Insulating Expanded Polyurethane Tape for sealing (**Fig.6-12**) on one side of the element.

Fig.6-12

With the tapes properly glued at the side of the Elements, should initiate installation thereof (**Fig.6-13**).

Fig.6-13

Every time an element is installed, it must be fixed provisionally by clamping wedges in Side Element (**Fig.6-14**). In details below, we have the foam between the Elements and the provisional wedge.

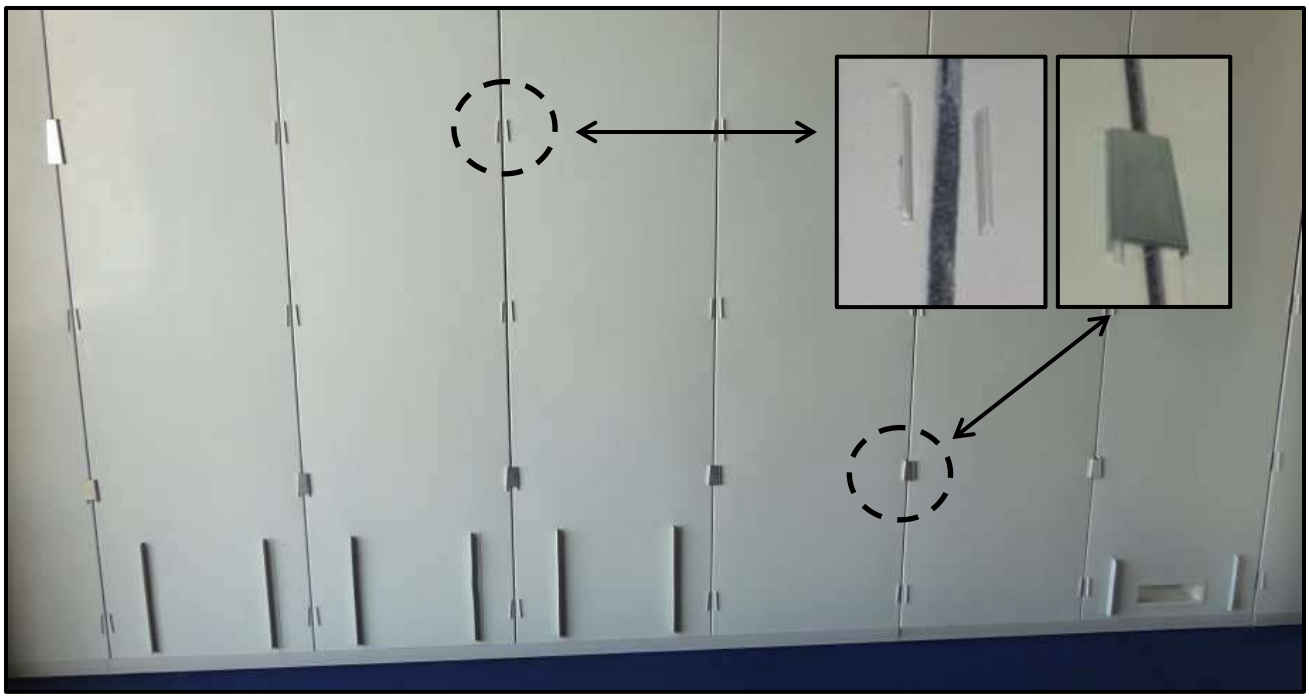


Fig.6-14

Below there are the details of the Side Element, illustrating where the wedge is fixed (**Fig.6-15**) and Side Element level conference installed (**Fig.6-16**).

Fig.6-15 **Fig.6-16**

7. FIXING COLUMNS

The columns are welded on the bottom and side elements of the cell. First, one must weld the base (console) in the column bottom element (**Fig.7-01**, **Fig.7-02**, **Fig.7-03** and **Fig.7-04**). Then install the column and the shoe (**Fig.7-02** and **Fig.7-03**), which will give support to the beam (**Fig.7-05**).

Fig.7-01

Fig.7-02

Fig.7-03

Fig.7-04

Fig.7-05

It is extremely important to note that before installing the column, the gap between the side elements of the site should be sealed with silicone and aluminum tape, stuck with the wedge (**Fig.7-06**) and the installed profile. By fixing the profile must pierce it, only where there are wedges, screwing and welding (**Fig.7-07**).

Fig.7-06

Fig.7-07

The column must be welded on the sides, in the points near the wedges.
Then the area should be painted (**Fig.7-08**).

Fig.7-08

8. INSTALLATION OF BEAMS

The beams are erected with the aid of a forklift truck or a lifting platform (**Fig.8-01** and **Fig.8-02**).

Fig.8-01

Fig.8-02

The beams must be positioned exactly on top of shoes, located above the column, and then welded. At the top of the beam, two strips of ceramic fiber should be placed for subsequent installation of the roof element (**Fig.8-03**).

Fig.8-03

9. INSTALLATION OF THE ROOF ELEMENTS

Before installing the roof elements attending to the polyurethane sealing expanded tape, on top of the side element to support the roof and assist in sealing the junction of the same (**Fig.9-01**).

Fig.9-01

The installation of the roof elements also has the help of the lifting platform (**Fig.9-02** and **Fig.9-03**).

Fig.9-02

Fig.9-03

The elements must be positioned next to each other and must be fixed between them through wedges (**Fig.9-04**).

Fig.9-04

Between the roof elements and the beam, a piece named ceiling support (**Fig.9-05**) must be fixed. When installing a ceiling support must be placed between each element and the ceiling beam (**Fig.9-06**).

Fig.9-05

Fig.9-06

The ceiling support must be bent on the beam. Next, a wedge should do the locking between the ceiling support and the roof element (**Fig.9-07** and **Fig.9-08**).

Fig.9-07

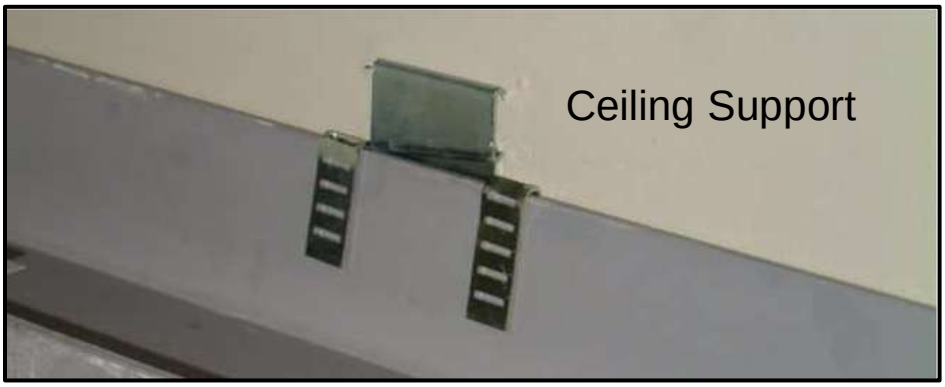


Fig.9-08

10. THE DATACENTER SECURITY ROOM DOOR INSTALLATION

The door of the Datacenter Security Room and the accessories are installed as the Side Element. (**Fig.10-01**, **Fig. 10-02** and **Fig.10-03**).

Columns must be installed and shoes must be welded directly into the roof elements (**Fig.10-04**).

Fig.10-01

Fig.10-02

Fig.10-03

Fig.10-04

Fig.10-05

11. APPLICATION OF INSULATING COMPONENTS / INTUMESCENT

Every joint between the elements, ceiling or side must be sealed using white silicone and self-adhesive aluminum tape. It is important to remember that only the tape should only be placed on top of the silicon, when it is dry. Below are the details for the installation of insulating components for the Bottom elements, side and roof, door, boxes and other:

Bottom Elements:
With Bottom Elements positioned and the weld points made, apply a layer of silicone in gaps between boards (**Fig.11-01**). With dry silicone, pass the self-adhesive aluminum tape (**Fig.11-02**).

Fig.11-01

Fig.11-02

Never let the silicone spreading on the Bottom Element, as shown in the pictures below (**Fig.11-03** and **Fig.11-04**).

Fig.11-03

Fig.11-04

Side Elements:

After fixing of the wedges, provisionally, to apply a layer of silicone between the elements (**Fig.11-05**) Wait silicone drying time and spend the aluminized tape and then lock the elements by wedges (**Fig.11-06**).

Fig.11-05

Fig.11-06

This procedure should be used both inside the Datacenter Security Room, as on the outside (**Fig.11-07** and **Fig.11-08**).

Fig.11-07

Fig.11-08

Never let the silicone spreading on the side Element, as shown in the picture below (**Fig.11-09**).

Fig.11-09

Roof Elements:

The application of insulating elements on the ceiling is similar to that used for the Side Elements, using silicone (**Fig.11-10**), aluminum tape and wedges (**Fig.11-11**).

Fig.11-10

Fig.11-11

The procedure must be performed both internally and externally in the Roof Elements and receive an insulation "standard" (Aluminized Durafoil), which should be placed on top of the roof, (**Fig.11-12**).

Fig.11-12

Columns:

It must pass the white silicone on the base of the door columns (**Fig.11-13**) and in the columns of the Datacenter Security Room (**Fig.11-14**). After drying of the silicone adhesive aluminum tape should be placed to complete the sealing of the installation.

Fig.11-13

Fig.11-14

Beams:

The gap between the Beam and the Roof Elements should also be applied to the silicon and aluminum tape (**Fig.11-15**).

Fig.11-15

Split Box and Protection Box:

The split Box (**Fig.11-16**) and protection (**Fig.11-18**) are used to protect the passages, both for power cables or data and the cooling pipes. The contact points of these boxes with Bottom Elements or Side must also receive the application of white silicone.

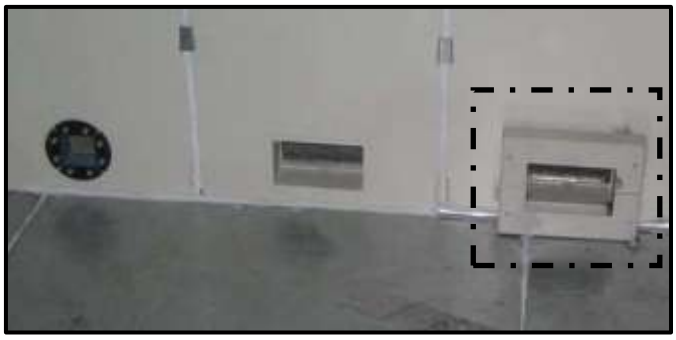


Fig.11-16

Fig.11-17

Fig.11-18

12. INSTALL THE FINISHING PROFILES

Finishing profiles are installed on top of the aluminized tape (**Fig.12-01**) and are engaged by pressure. Must be installed on all faces, internal or external, in the Datacenter Security Room (**Fig.12-02**).

Fig.12-01

Fig.12-02

Finishing profiles should finish close to the raised floor or finished floor (**Fig.12-03**). Below in the Raised floor there is no need to put the finishing profiles.

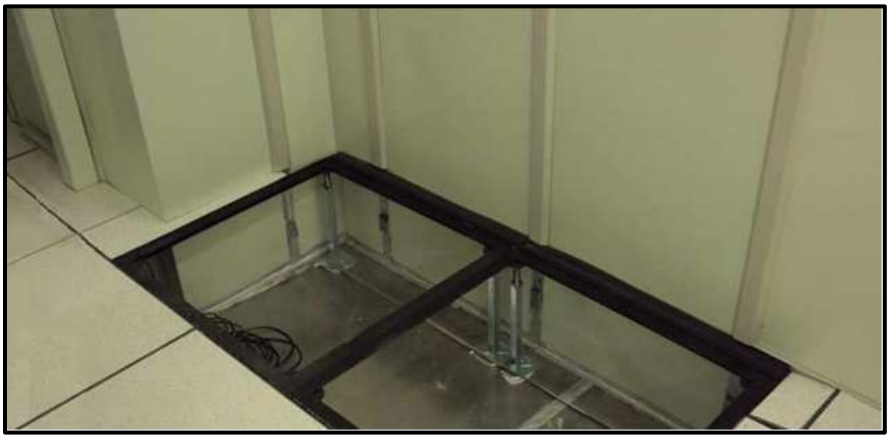


Fig.12-03

13. INSTALLATION OF LIGHTING PROFILES AND FIXTURES

After installation of the profiles for the installation of lighting.This structure is made up of parts. The first part to be installed is the (**Fig.13-01**).

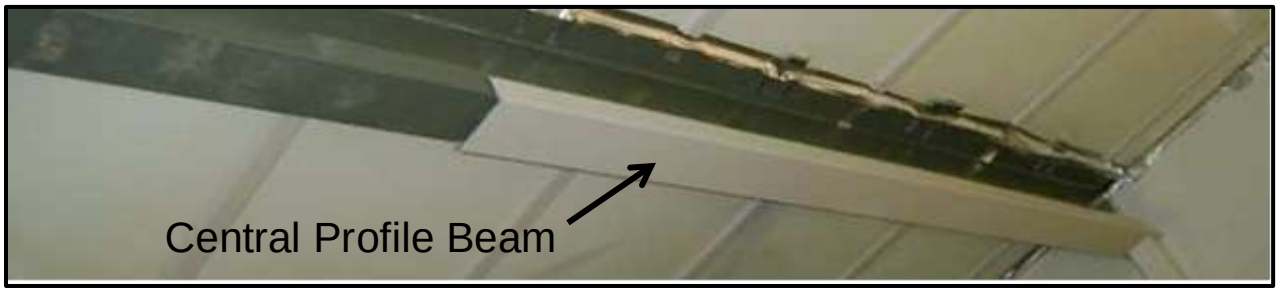


Fig.13-01

In sequence, the other parts of the profiles are installed (**Fig.13-02**).

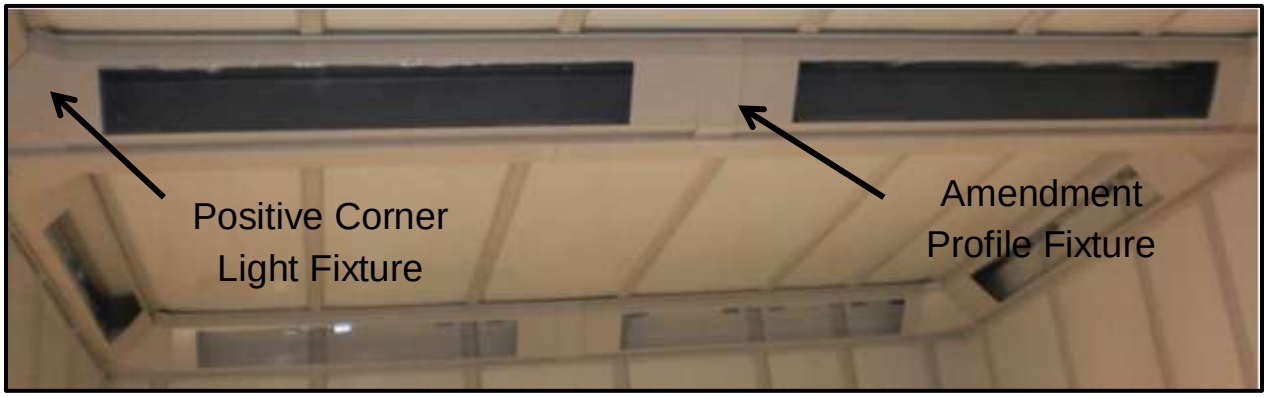


Fig.13-02

With profiles properly assembled, the next step is to place the fixtures (**Fig.13-03** and **Fig.13-04**).

Fig.13-03

Fig.13-04

14. RAISED FLOOR INSTALLATION

Fig.14-01

The first thing to be done is the placement of FFH bases as reported in project (**Fig.14-02**).

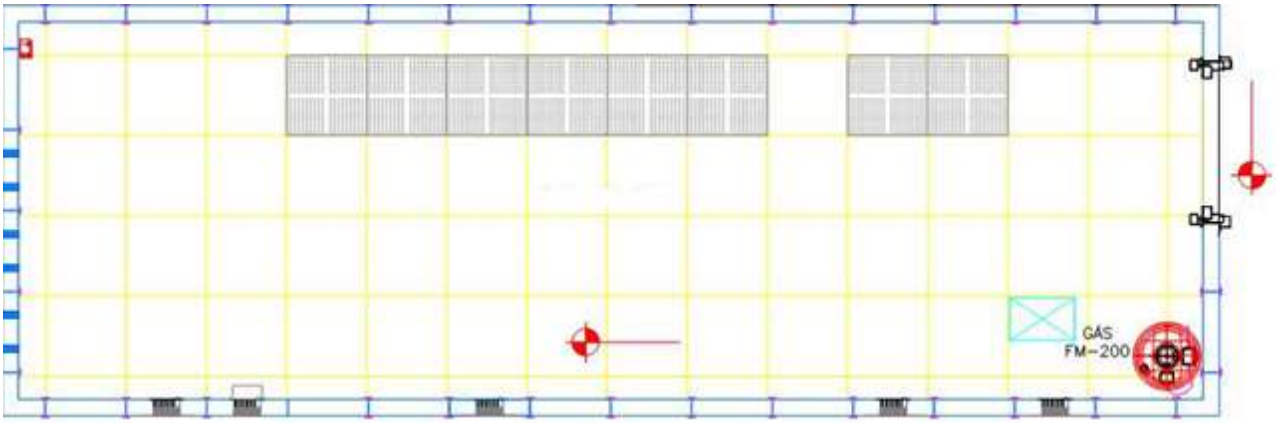


Fig.14-02

There are of 3.5" to 40". And the calculation that will be performed must follow as explained below (**Fig.14-03**), based on (**Fig.14-02**).

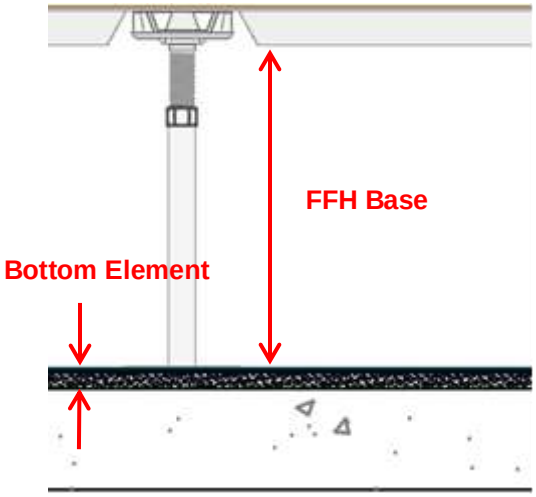


Fig.14-03

FFH (Finished Floor Height) is the exact height of the floor down, discounting the Bottom Element. The height of the crosshead is already taken into account.

Certified Room:
FFH = 0,400m – 0,062m = 0,338m
FFH = 0,338m / 0,0254m = 13,30" → FFH = 13"

[1] Bottom Element = 62 mm thick

UPS Room UPS:
FFH = 0,400 – 0,017m = 0,383m
FFH = 0,383m / 0,0254m = 15,07" → FFH = 15"

[2] Bottom Element (galvanized sheet + MDF) = 17mm thick

After completing the calculations to the heights of the FFH Bases, if there is a need for rounding, it is indicated that this rounding is done to a lower value (as seen in the example **Fig.14-03**). This difference is overcome by floor crosshead adjustment (**Fig.14-04**, **Fig.14-05** and **Fig.14-06**).

Fig.14-04

Fig.14-05

Fig.14-06

It is very important to clean the bottom floor before the raised floor installation (**Fig.14-07**).

Fig.14-07

At the time of installation, installers should position the bases in the positions shown in project (**Fig.14-08** and **Fig.14-09**).

Fig.14-08

Fig.14-09

After being positioned, they should be glued (Sticker Pesilox).

Fig.14-10

The bases and hangers that are on the perimeter of the Datacenter Security Room, you must put an ABS adapter, or perimeter adapter (**Fig.14-11**). This piece fixed by two screws, will assist in sustaining the floor plate (**Fig.14.12**).

Fig.14-11

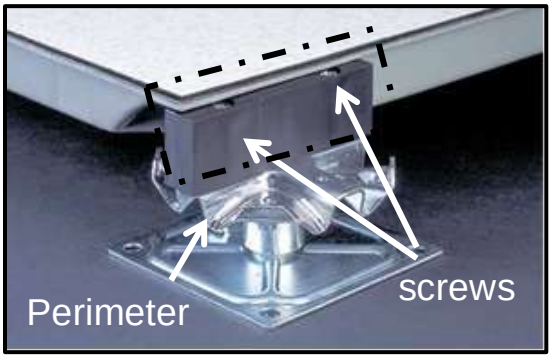


Fig.14-12

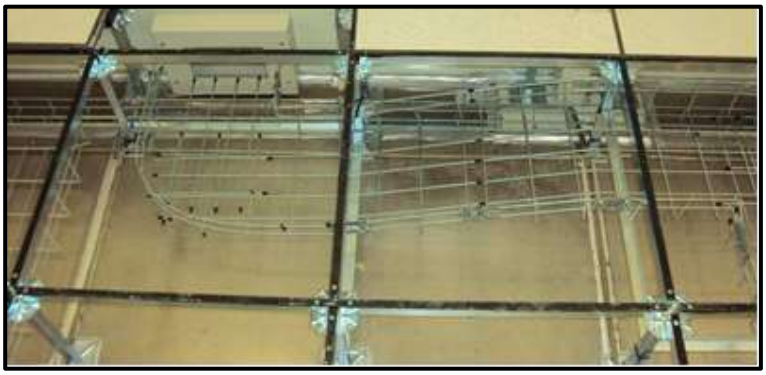


Fig.14-13

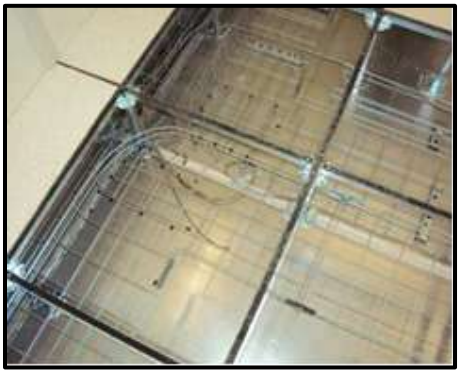


Fig.14-14

With the bases properly installed, it's time to position the floor boards. There are 2 types of plates, the plate 60x60cm CC1250 (**Fig.14-15**) and the perforated plate 60x60cm (**Fig.14-16**). In some projects, the common perforated plate is replaced by the High Flow Perforated Plate 60cm (**Fig.14-17**).

1. Plate 60x60cm CC1250:

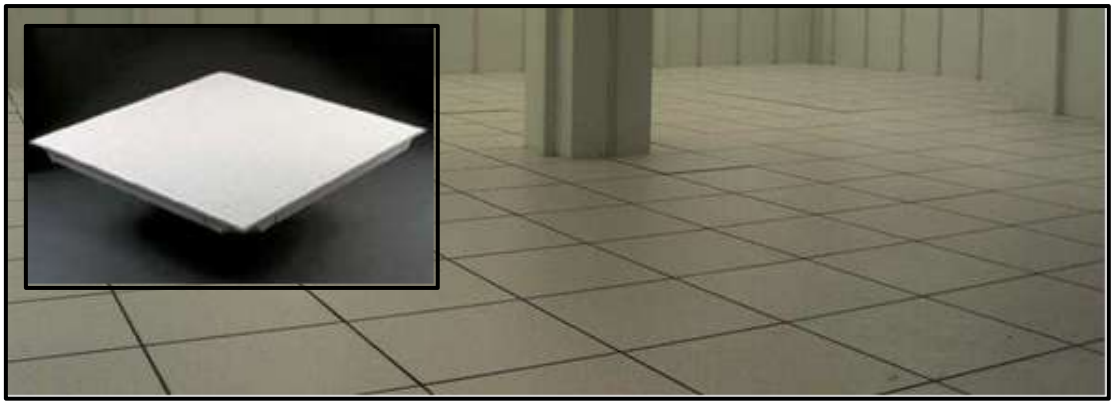


Fig.14-15

2. Perforated Plate 60x60cm:

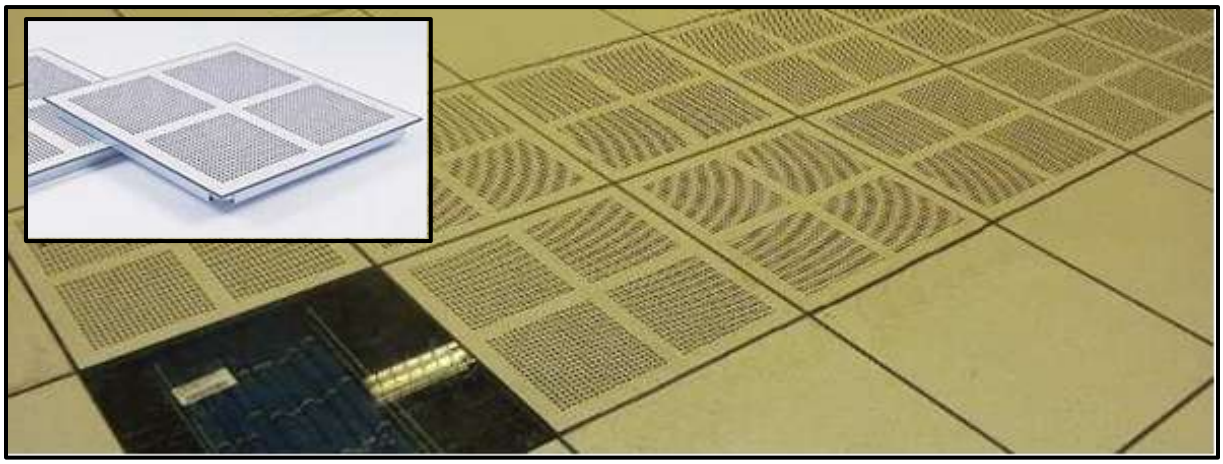


Fig.14-16

3. High Flow Perforated Plate 60x60cm:

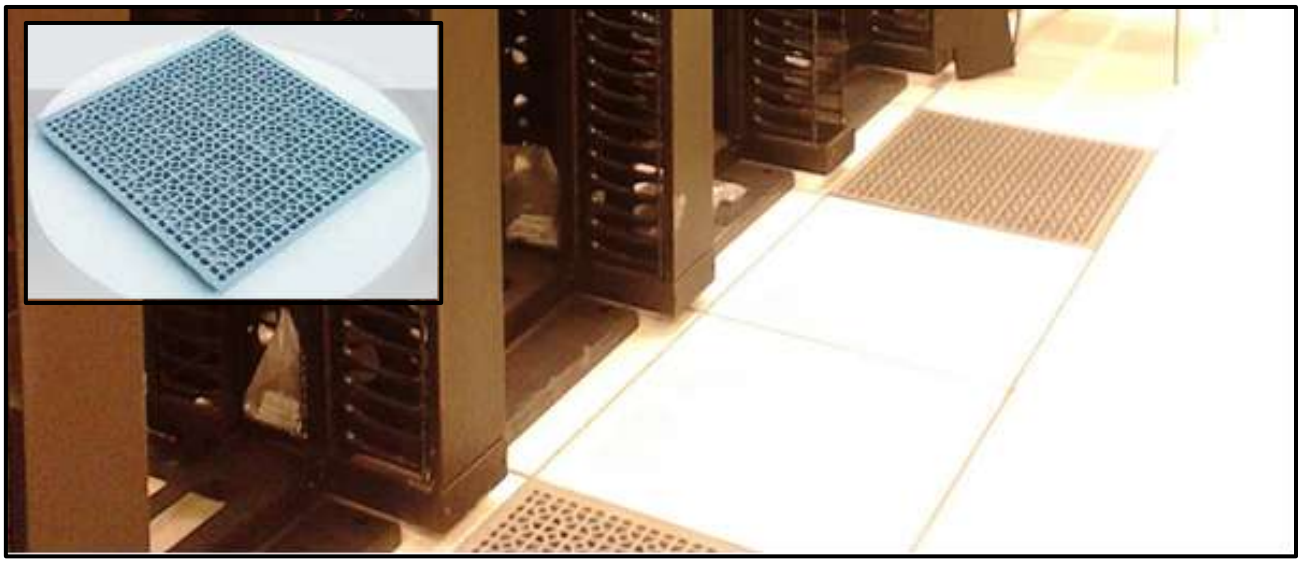
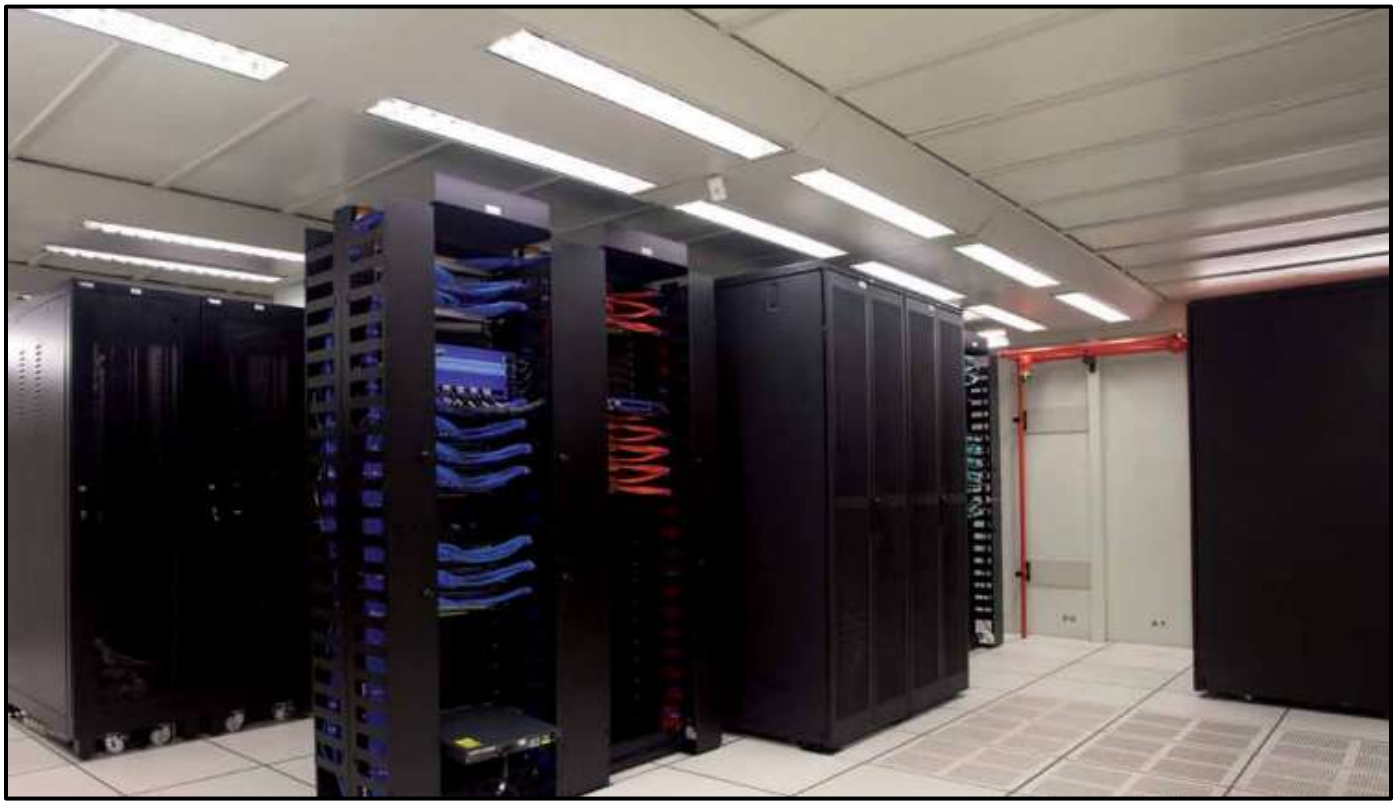


Fig.14-17

15. CASES







16. REFERENCES

TIA-942 – Telecommunications Infrastructure Standard for Data Centers

TIA-606-B – Administration of Telecommunications Infrastructure

NFPA 70E-2012 – Standard for Electrical Safety in the Workplace

ECB (European Certification Bureau)

DAR (Deutsche Akkreditierungs Rat)

IAF (International Accreditation Forum)

Gartner Group

The Uptime Institute