



PDHonline Course M571 (7 PDH)

Identification Datacenter and Safe Room

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DATA CENTERS INFRASTRUCTURE:

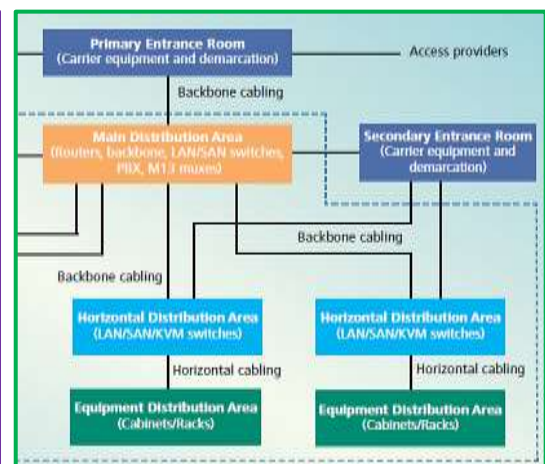
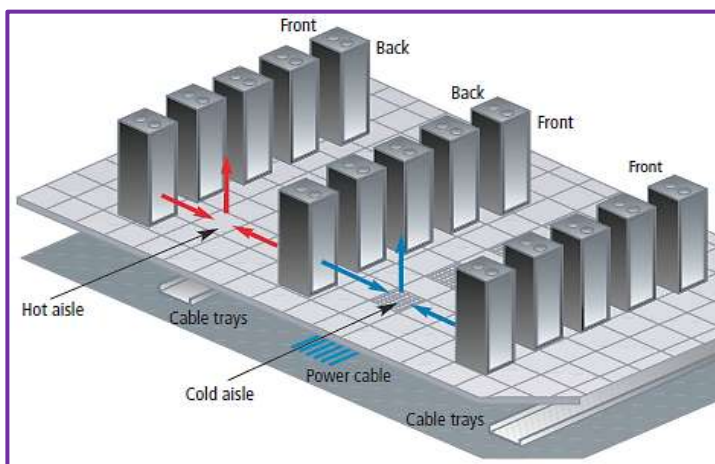
Data Centers are facilities used to house computer systems and associated components, such as telecommunication equipment, data and storage systems, backup power supplies (UPS's and DRUPS's), redundant data communications connections, environmental controls, HVAC (air conditioning), fire control suppressions, and many other safety devices.

Data Center Requirements: Design guidelines for data centers, started in 2005 with the ratification of "TIA/EIA-942: Telecommunications Infrastructure Standards for Data Centers", developed to ensure uniformity in design, performance, improvement and for data center designers who are beginners in the building development process. A good part of the standard involves facility specifications, functional areas, and equipment placement in a hierarchical star topology

IT operations are a crucial aspect of most organizational operations around the world. If a system becomes unavailable, company operations may be impaired or stopped completely, and for this reason a data center has to offer a secure environment which minimizes the chances of a security breach. A data center must keep high standards for hosted computer environment. This is accomplished through redundancy of UTP cables, fiber optics and power cabling, including emergency backup power generation.

Telcordia (formerly Bell Communications Research, now part of Ericsson) "GR-3160, NEBS Requirements for Telecommunications Data Center Equipment and Spaces", also provides guidelines for data center spaces within telecommunications networks, and environmental requirements for the equipment that may be applied to data center spaces, housing data processing, or Information Technology (IT) equipment.

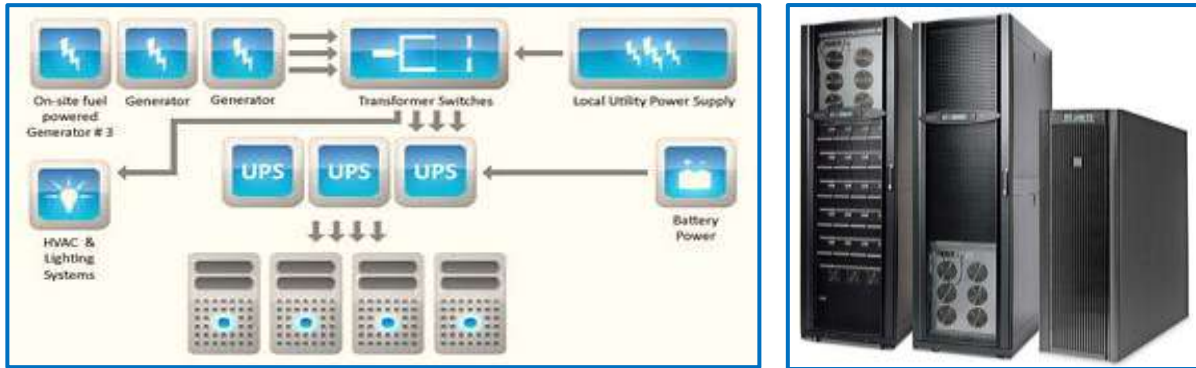
Data Center Pathways: The standard lists many recommendations for cable management, such as each cable type must have separate racks and pathways. Power cables must be in separate pathways with a physical barrier. Abandoned cable should be removed. And large data centers should have access floor systems for running cable.



Hot and Cold Aisles: *Cold aisles* should be in front of the cabinets and racks. *Hot aisles* should be behind the cabinets and racks where the hot equipment air is exhausted. Cabinets and racks should

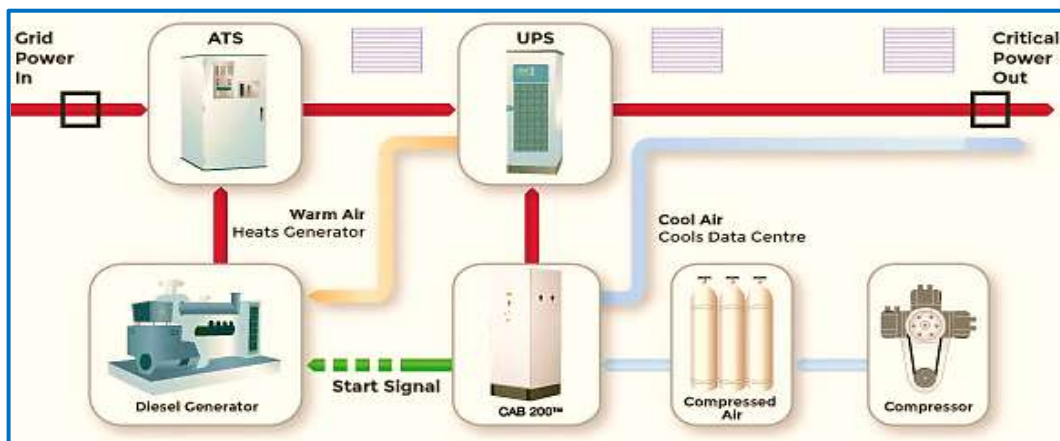
be arranged in rows with the fronts facing each other to create the “hot and cold” aisles. A minimum of 1.2 meters (3.9 ft.) of front space must be provided for equipment installation.

UPS (Uninterruptible Power Supply): Is an electrical apparatus that provides emergency power when AC input source fails, commonly used in Data Centers. Most of the UPS installations use only *batteries for power supply*, usually up to several *tens of minutes*, but sufficient to start a standby power source or shut down the protected equipment. For longer backup time the UPS must be coupled with a generator using diesel or gas fuelled internal combustion engine or micro-turbine as a prime mover.



DRUPS (Diesel Rotary Uninterruptible Power Supply): Combine the functionality of a battery-powered or flywheel-powered UPS and a diesel generator. When mains electricity supply is within specification, an electrical generator with a mass functions as motor to store kinetic energy in an electro-mechanical flywheel. Typically a DRUPS should have enough fuel to power the load for days or even weeks in the event of failure of the mains electricity supply.

At the same time (or with some delay, for example 2 to 11 seconds, to prevent the diesel engine from starting at every incident), the diesel engine takes over from the flywheel to drive the electrical generator to make the electricity required. The electro-magnetic flywheel can continue to support the diesel generator in order to keep a stable output frequency.



Data Center Spaces: When planning a data center, plan plenty of “white space” or empty space to accommodate future equipment. The basic elements include:

- **Entrance Room(s):** Recommended that this be outside of the computer room for security.
- **Main Distribution Area (MDA):** Is in a centrally located area to house routers and switches. It includes the main cross-connect (MC), and may include a horizontal cross-connect.
- **Horizontal Distribution Areas (HDA):** There may be one or more HDAs, for distribution point for horizontal cabling. The HDA houses the horizontal cross-connects and active equipment, such as switches.
- **Equipment Distribution Areas (EDA):** These are where the horizontal cables are terminated in patch panels.
- **Zone Distribution Area (ZDA):** This is an optional interconnection or consolidation point between the EDA and HDA for zone cabling.

Data Center Recommended Cables: Both TIA/EIA-568-B standards, and TIA-942 recommend:

- ✓ 100-ohm twisted pair cables, Category 6. (The Augmented Category 6 is still in draft form);
- ✓ 50 and 62.5-micron Multimode optical fibers. (Laser-optimized 50-micron is recommended);
- ✓ Singlemode fiber optic cables;
- ✓ 75-ohm coax cables. (According to requirements in TIA/EIA-568-B.2 and TIA/EIA-568-B.3).

In 2005, ANSI/TIA-942 “*Telecommunications Infrastructure Standard for Data Centers*”, defined four levels (called tiers) for data centers. *TIA-942 “Data Center Standards Overview”* describes the requirements for the data center infrastructure. The Tier 1 is the simplest data center, which is basically a server room, following basic guidelines for the installation of computer systems.

Tier 4 Data Centers have the most stringent levels, designed to host mission critical computer systems, with fully redundant subsystems and security zones controlled by biometric access controls methods. Another consideration is the placement of the data center in a subterranean context for data security, as well as, environmental considerations such as HVAC cooling requirements.

Data center networks are always requiring higher speeds, greater scalability and higher levels of reliability to better meet new business requirements. Then, modern copper cables are becoming an integral part of the overall system design. The *Intellinet 10 Gbps Direct Attached Small Form-Factor Pluggable (SFP+)* copper cable is fully optimized for 10 Gbps solutions. These cables are perfect for in-rack connections between servers and top-of-rack switches.



Redundancy: The crucial operations of any data center are the fail-safe systems that enable continued operation even under catastrophic conditions. The standard includes four tiers of data center availability. The tiers are based on research from the Uptime Institute. The higher the tier, greater is the availability. The levels are:

Tier Level	Requirements
1	Annual downtime: ~28.8 hours (1729.2 minutes) Non-redundant capacity components Single path for power and cooling Expected availability of 99.671%
2	Annual downtime: ~22 hours (1361.3 minutes) Single path for power and cooling Redundant components (N + 1) Expected availability of 99.741%
3	Annual downtime: ~1.6 hours (94.6 minutes) Multiple power and cooling paths Redundant components (N + 1) Expected availability of 99.982%
4	Annual downtime: ~0.4 hours (26.3 minutes) All cooling equipment is dual-powered, including chillers and heating, ventilating and air-conditioning (HVAC) systems. Redundant components 2 (N + 1) Expected availability of 99.995%

Note: N indicates need or level of redundant components for each tier with N representing only the necessary system need. In the U.S., beginning in 2014, must meet strict emissions reduction requirements according to the U.S. Environmental Protection Agency's "Tier 4" regulations for off-road including diesel generators. These regulations require near zero levels of emissions.

Mechanical Engineering Infrastructure Design: Data Center mechanical engineering infrastructure design addresses mechanical systems, such as heating, ventilation and HVAC (air conditioning), humidification and dehumidification equipment, pressurization, etc. Modern designs include modularizing IT loads, and optimized building construction.

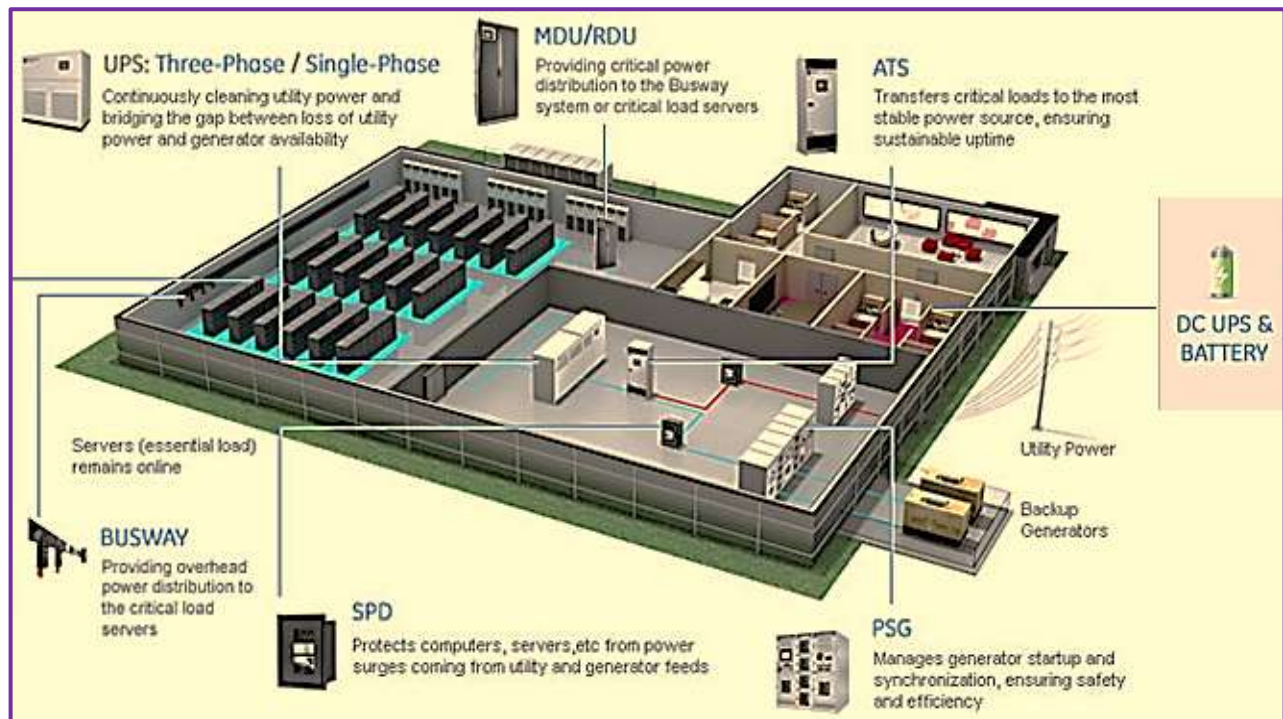
Electrical Engineering Infrastructure Design: Data Center electrical engineering infrastructure design is focused on designing electrical configurations, such as utility service planning, distribution, switching and bypass from power sources, UPS systems, etc. Modern electrical design is modular, scalable and available for AC low and medium voltage requirements, as well as DC.

Technology Infrastructure Design: Data Center technology infrastructure design addresses the telecommunications cabling systems, including horizontal cabling, voice, modem, and facsimile telecommunications services, premises switching equipment, computer and telecommunications management connections, keyboard/video/mouse connections and data communications. Wide area, local area, and storage area networks should link with other building signaling systems (e.g. fire, security, power, HVAC, EMS).

Modularity and Flexibility: Data center modules are pre-engineered, standardized building blocks that can be easily configured and moved as needed. A modular data center may consist of data center equipment contained within shipping containers or similar portable containers. But, in a de-

sign style, components of the data center are prefabricated and standardized, so that they can be constructed, moved or added to quickly as needs change.

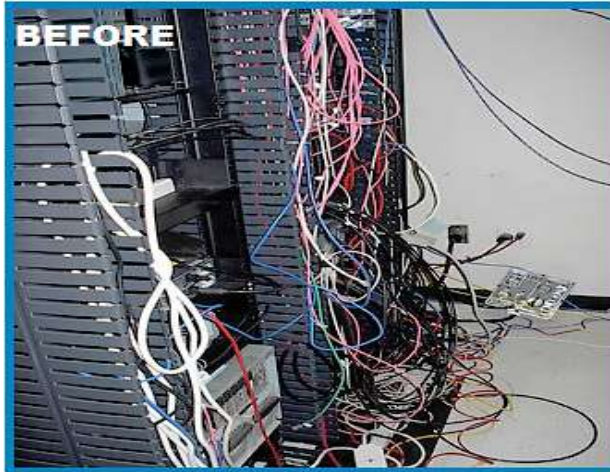
Environmental Control: Air conditioning is used rigorously to control the temperature and humidity in the data center. ASHRAE's "*Thermal Guidelines for Data Processing Environments*" recommends a temperature range of 18-27°C (64-81°F), a dew point range of 5-15°C (41-59°F), and a maximum relative humidity of 60% for data center environments. The temperature in a data center may naturally rise, because the electrical power used also heats the air.



Documentation and Labeling Cables: There are a myriad of details involved the telecom room, not to mention the entire facility. Getting everything down on paper before a single wire is pulled is one way to insure that a neat, logical, and orderly product ensues. For wire run documentation, even single Excel spreadsheet templates may be used.

A good installation is necessary, and must have adequate space and light to work on the room. All the wires and cables must be labeled. The ground conductors must have heat shrinks required on insulation displacement terminations. Once all the work is done, the wire installation must be documented with all necessary changes and additions (there are always changes and additions) to keep the documentation updated.

Cabling maintenance in a bad environment system is often very cumbersome, if patch cables are not properly routed, labeled and documented, creating a lot of problems on the network. In addition, the incorrect routing and connecting of power cables pose potential fire hazards and can increase the likelihood of major network outages. A dark, cramped area will lead to a hurried work, poor workmanship, and mistakes in wiring. Not only is the mess unattractive, but it also limits the overall functionality of the entire system.



Labeling & Color Coding: The elements in a system must have alphanumeric codes, or labels, for each location, pathway, cables, termination points, and should contain all the information re-lated to that component, including linkages. The codes or labels must be consistent, logical, easily readable and should withstand environmental conditions. The labels must be printed or produced mechanically, recommended to simplify maintenance and system administration. For easy label identification, a rule of thumb is that each end of a cable must be the same color.

Label Color Coding		
Color	Pantone Number	Element Identified
Orange	150C	Demarcation point (central-office termination)
Green	353C	Network connections on the customer side
Purple	264C	Common equipment
White		First-level backbone
Gray	422C	Second-level backbone
Blue	291C	Horizontal cabling terminations
Brown	465C	Interbuilding backbone
Yellow	101C	Auxiliary circuits
Red	184C	Key telephone systems

A. HANG TAGS

1. Alphanumeric Coordination Labels:



The alphanumeric coordination labels consist of letters and red numbers on white background. As the name implies, are used to establish coordinated and facilitate location within the Datacenter and Safe Room (**Fig. A1-01**).

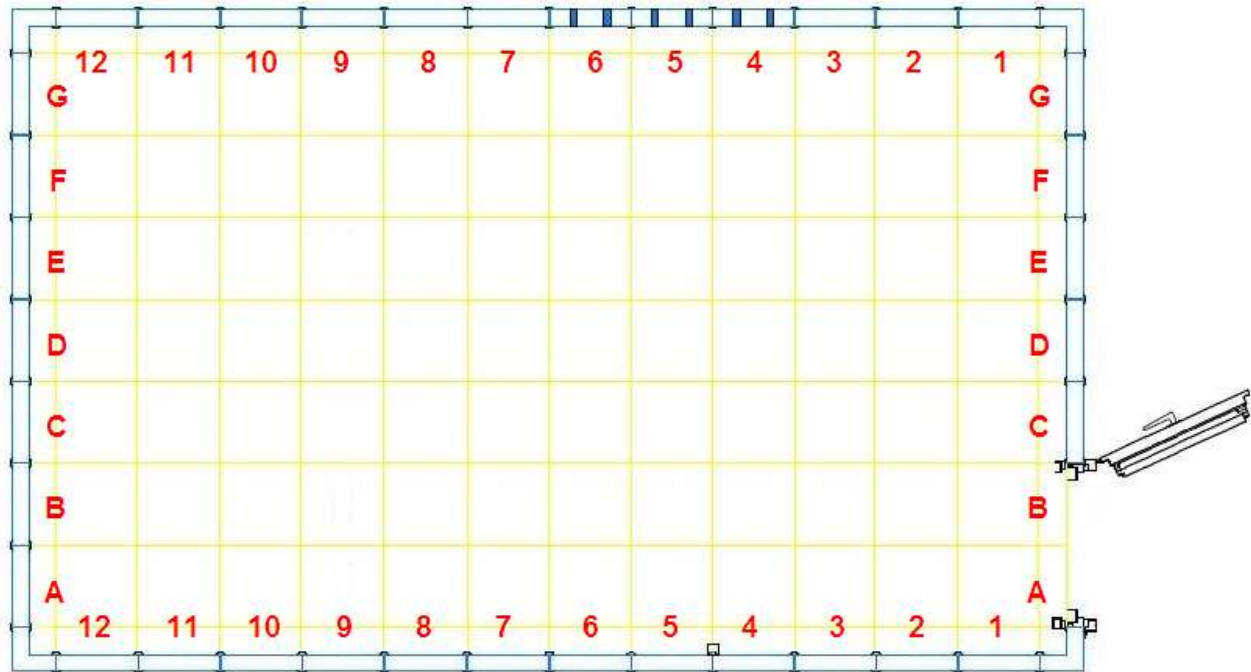


Fig. A1-01

The alphanumeric coordination labels should be placed at the bottom of side member 15 cm high above the floor level in the center of the plate (**Fig. A1-02** and **Fig. A1-03**), always positioning the numbers at the higher side of the room and, consequently, the letters on the lower side (**Fig. A1-01**).

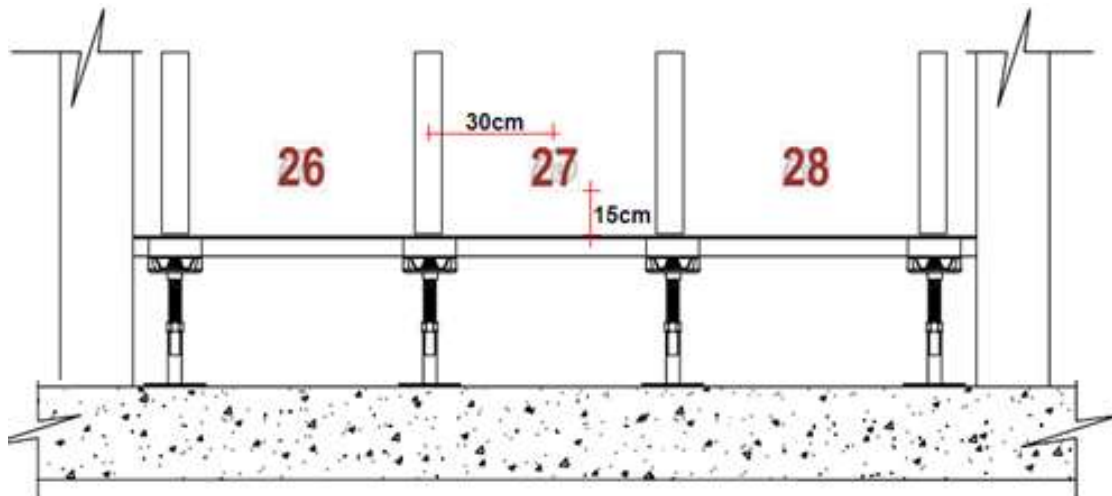


Fig. A1-02

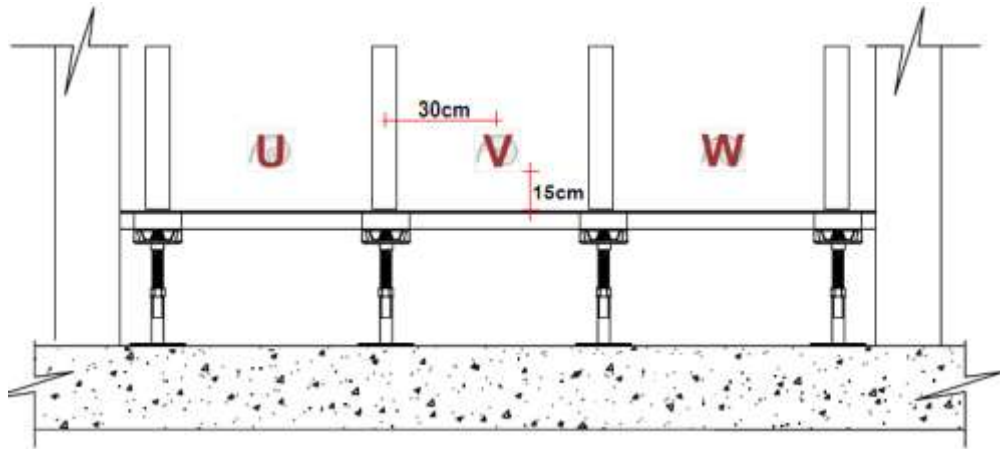


Fig. A1-03

In some cases, the side element does not coincide exactly with the raised floor plate; In such cases, one should take into account the center of the floor plate to glue the coordination labels (Fig. A1-04).

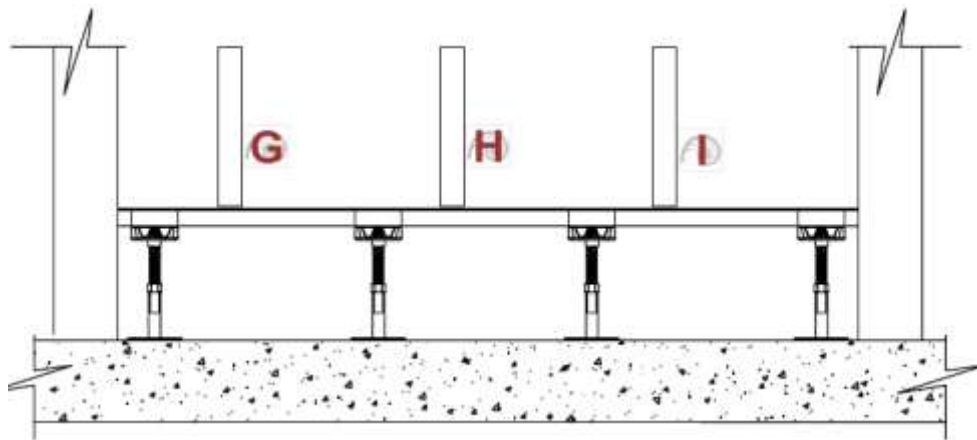


Fig. A1-04

The definition of the starting points of the coordination alphanumeric labels (A-1), is of utmost importance to take into account a possible expansion of Datacenter or Safe Room (Fig. 1-05), and avoiding future problems (Fig. A1-06).

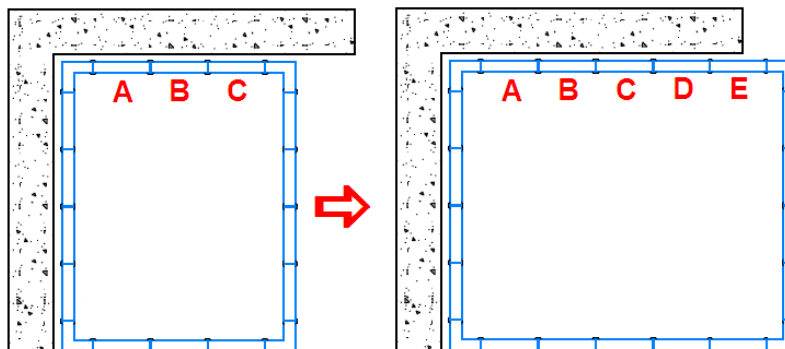


Fig. A1-05

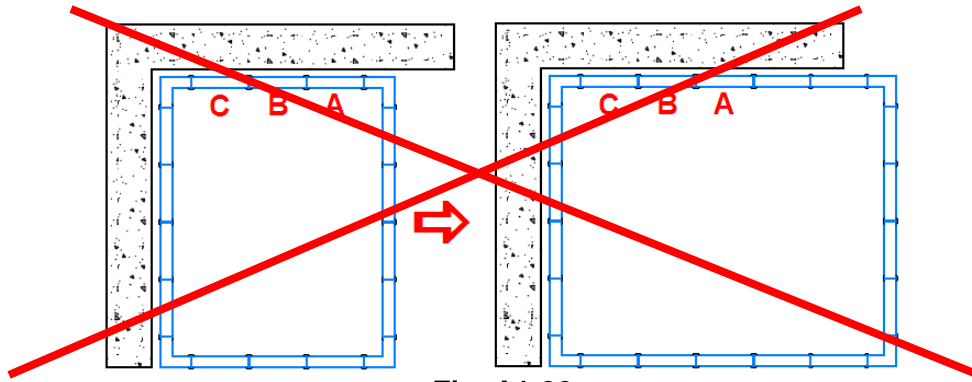


Fig. A1-06

Another important item to be considered, is the size of the Datacenter or Security Room, and consequently on how many elements to receive the IDs (Fig. A1-07).

Example:

- If the amount is less than or equal to 26 elements A, B, C, D, E, F ... X, Y, Z.
- If the amount is larger than 26 elements: AA, AB ... AY, AZ, BA, BB ... CZ, DA, etc.

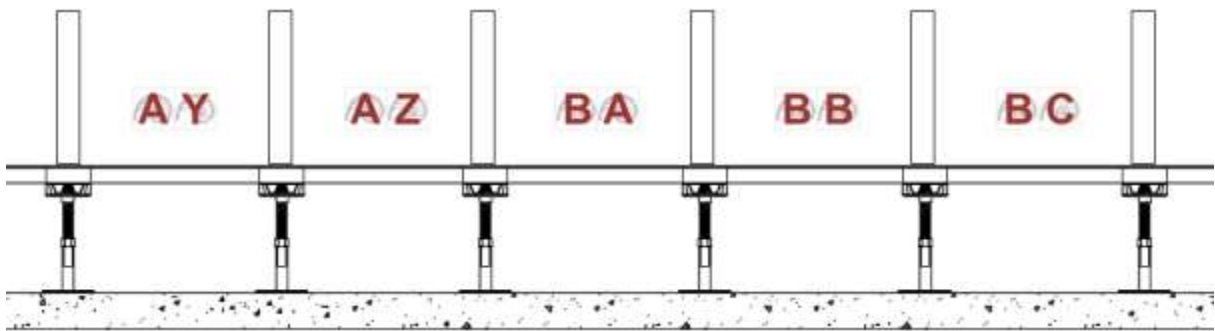


Fig. A1-07

2. Alphanumeric Climate Labels:



The alphanumeric climate labels are made (as well as the coordinates) for red letters and numbers; But in this case, white on red background.

As the name implies, are used to identify groups and climate equipment, must always be positioned in an easy visualization site (Fig. A2-01) and thereby facilitating identification between the evaporator and its respective condenser (Fig. A2-02). Below are suggestions:

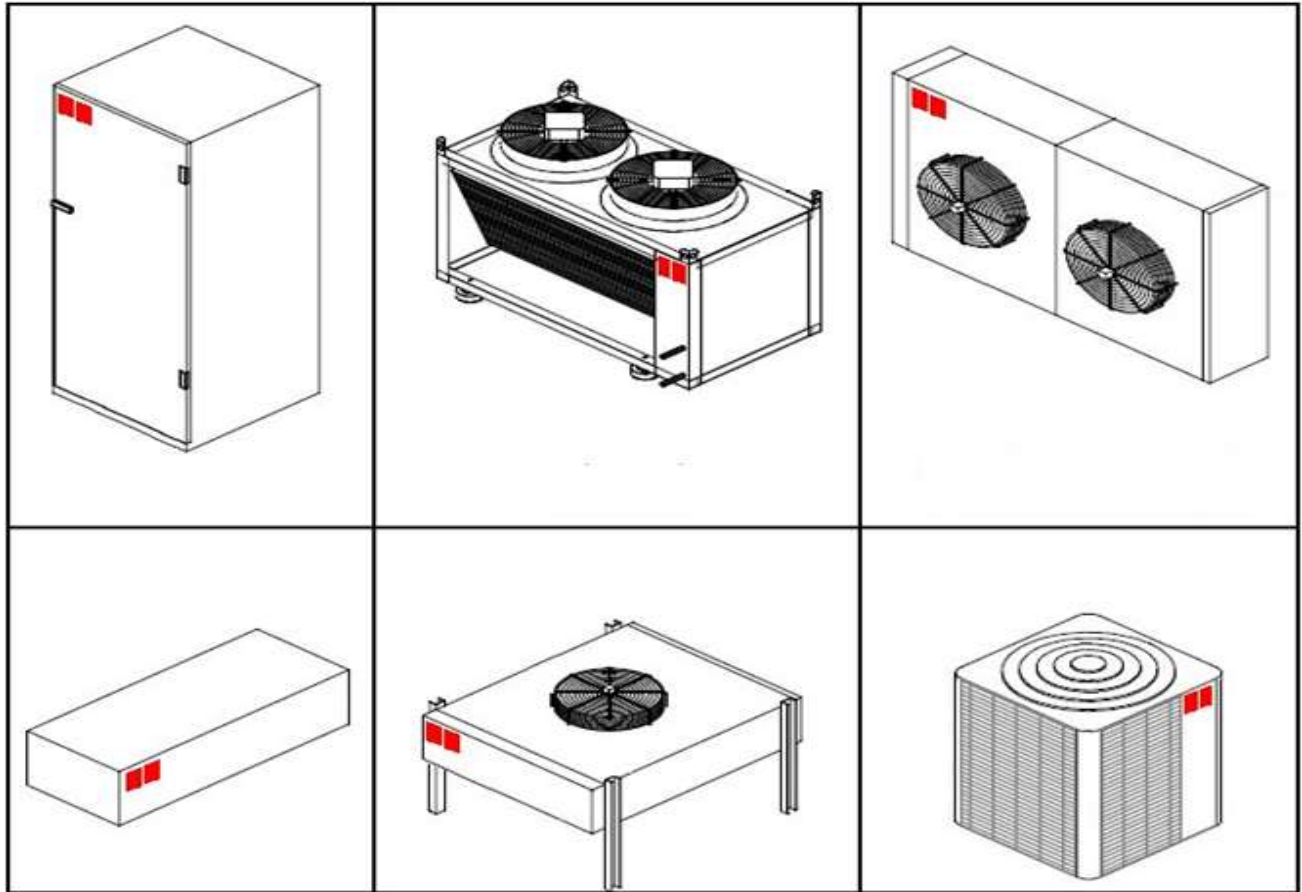


Fig. A2-01

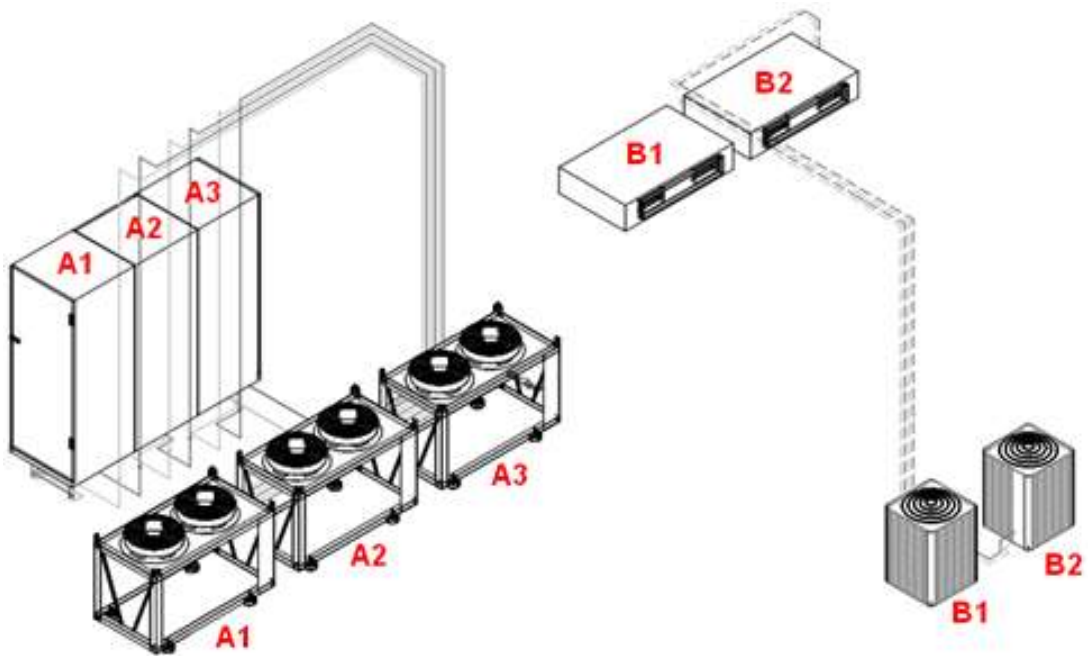


Fig. A2-02

Precision climate labels should be identified and separated by groups. Since normally the evaporators are not all on the same side of the Safe Room, the recommendation is that receive IDs that separate into groups (**Fig.A2-03**).

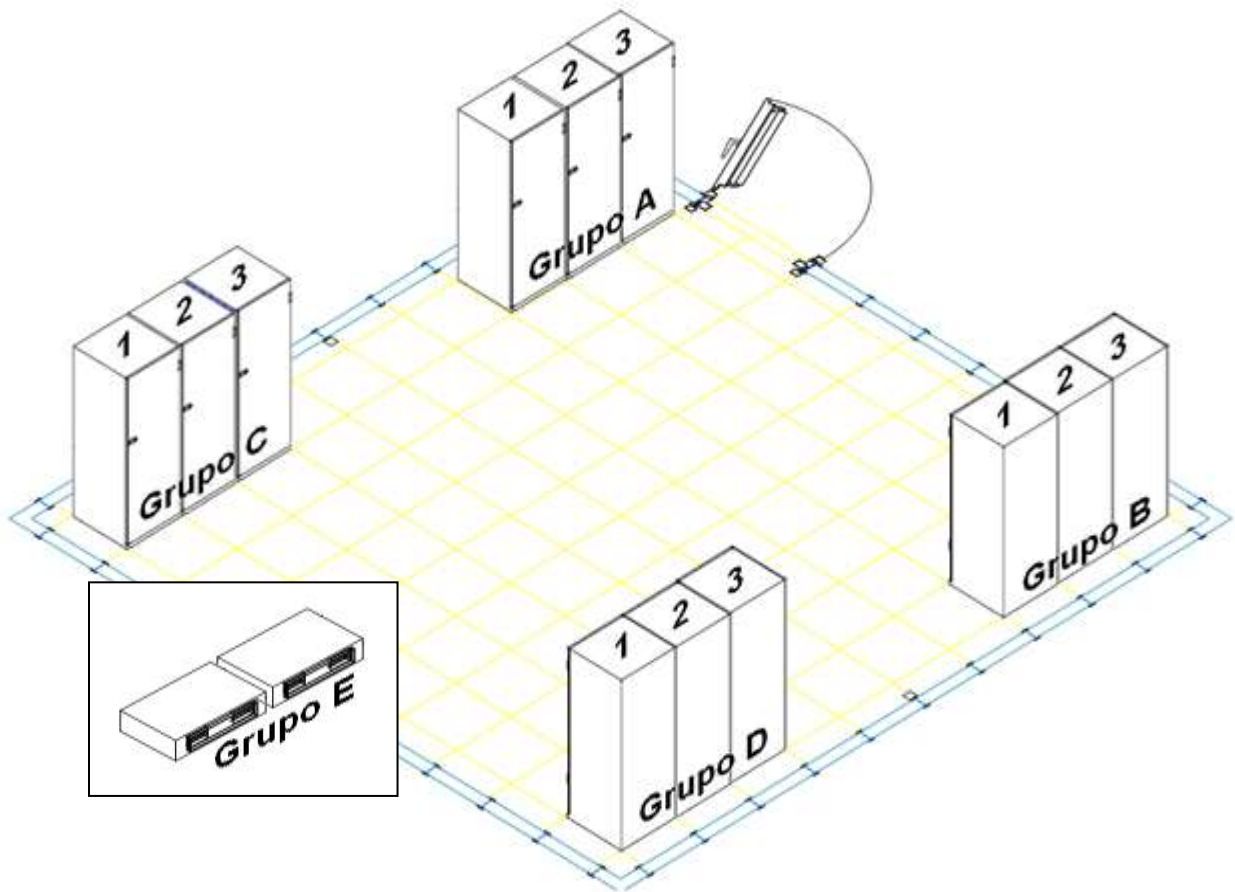


Fig. A2-03

In the example, the UPS Room comfort equipment, were identified as a result of precision, that is, from the letter E as seen highlighted.

In some cases, there may be comfort equipment in most environments beyond the UPS Room. When this occurs, there must be a different letter and start numbering again (**Fig. A2-04**).

Example:

- Precision climates in Safe Room: A1, A2, A3, A4 ...
- Comfort climates in the UPS room: B1, B2, B3 ...
- Climates of comfort in the Telecom Room *: C1, C2 ...
- Climates of comfort in the NOC Room *: D1, D2, D3 ...
- Comfort climates in the Sales Room *: E1, E2 ...

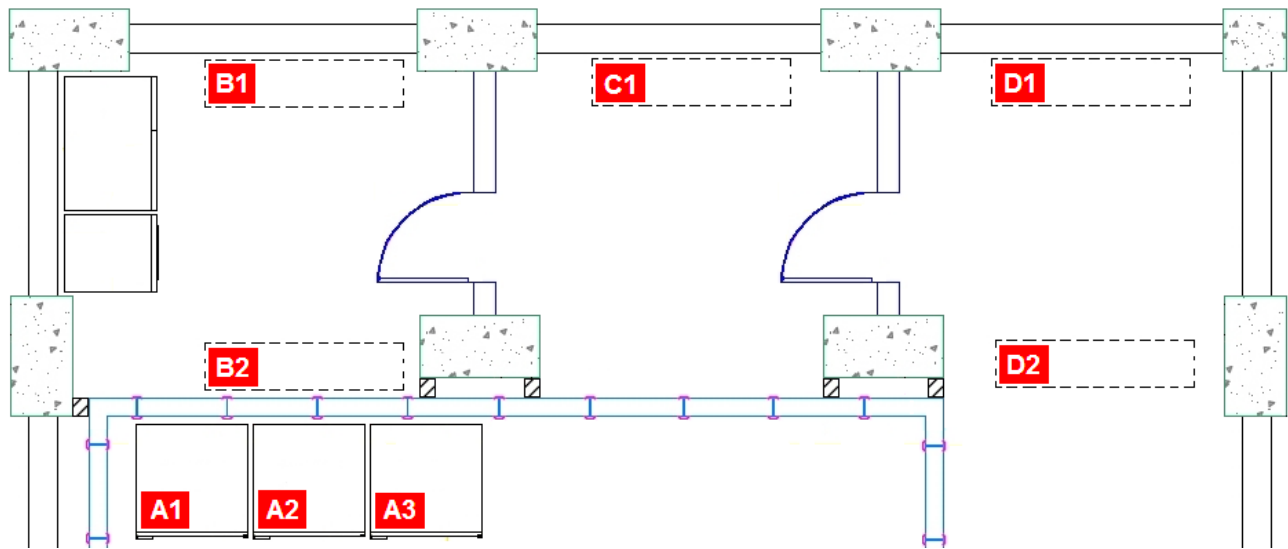


Fig. A2-04

- The room names are only examples of different environments.

3. *Red Cushion-Logos:*

Example: ACECO TI



The red cushion-logo tags should be used only in Electric Boards and Control Boards of FM-200 Gas. When used in electrical panels must be positioned preferably at the top, as shown in (Fig. A3-01, A3-02 and A3-03) for easy viewing. The same rule applies to the other frames (Fig. A3-04).

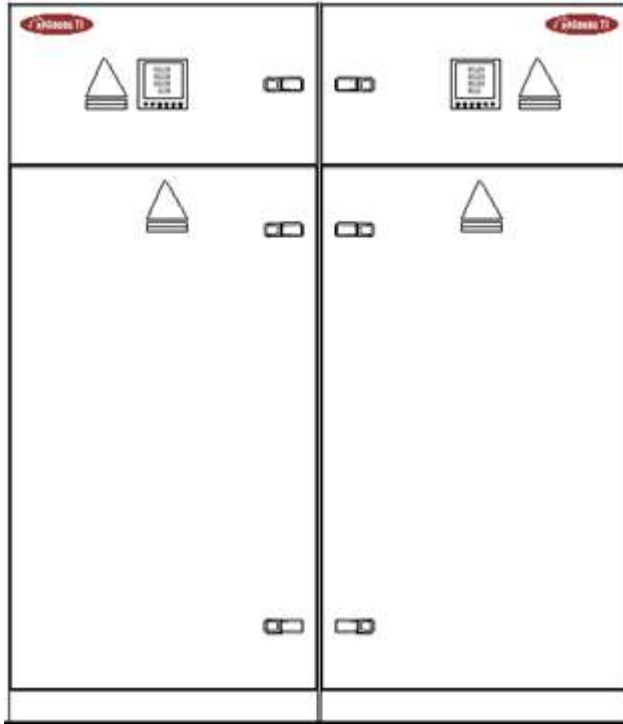


Fig. A3-01



Fig. A3-02



Fig. A3-03



Fig. A3-04

In General Distribution Boards, the positioning of the red cushion-logos must be done as shown in the picture below (Fig. A3-05).



Fig. A3-05

In a Control Panel of the UPS Room the red cushion-logos should be glued in the center, at the top (Fig. A3-06).



Fig. A3-06

When placed on a frame as the FM-200 combat system, the preferred location is the top of the cap, in the center of the frame (Fig. A3-07, A3-08, A3-09 and A3-10).

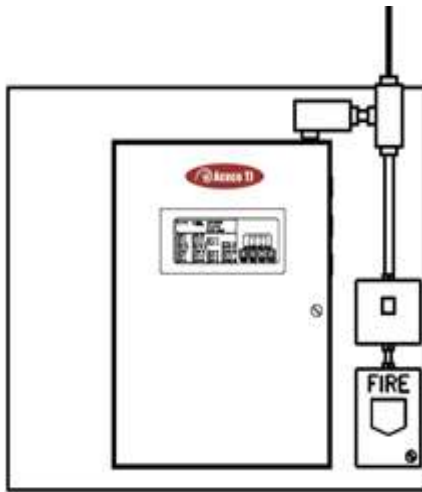


Fig. A3-07

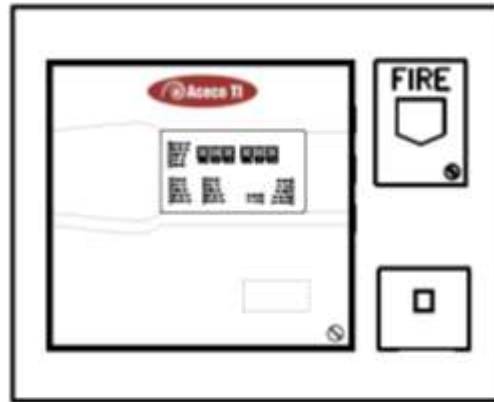


Fig. A3-08



Fig. A3-09



Fig. A3-10

4. *Gray Cushion-Logos:*

Example: ACECO TI



The gray cushion-logo labels should be only used in Air Conditioning Equipment (such as, Evaporators) and No breaks.

The gray cushion-logo labels for Evaporator should be positioned in the upper right corner (**Fig. A4-01**) as opposed to the alphanumeric identification (**Fig. A4-02**).

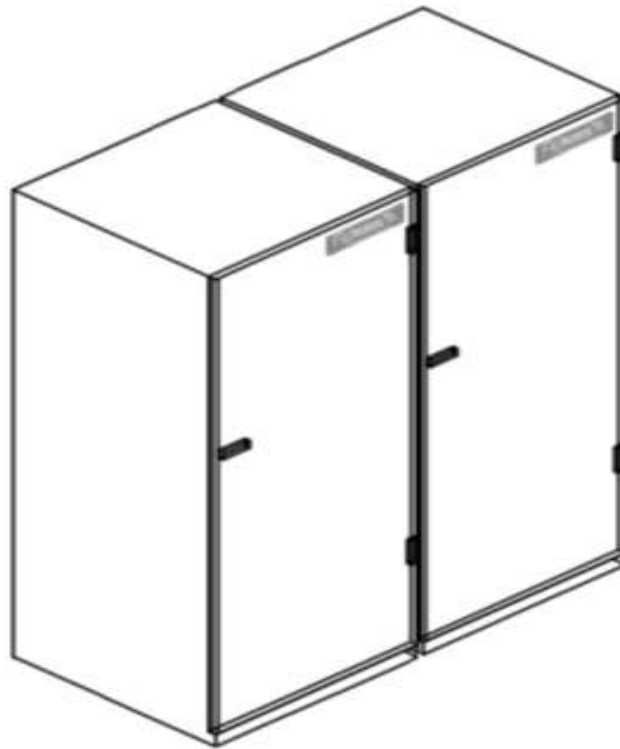


Fig. A4-01



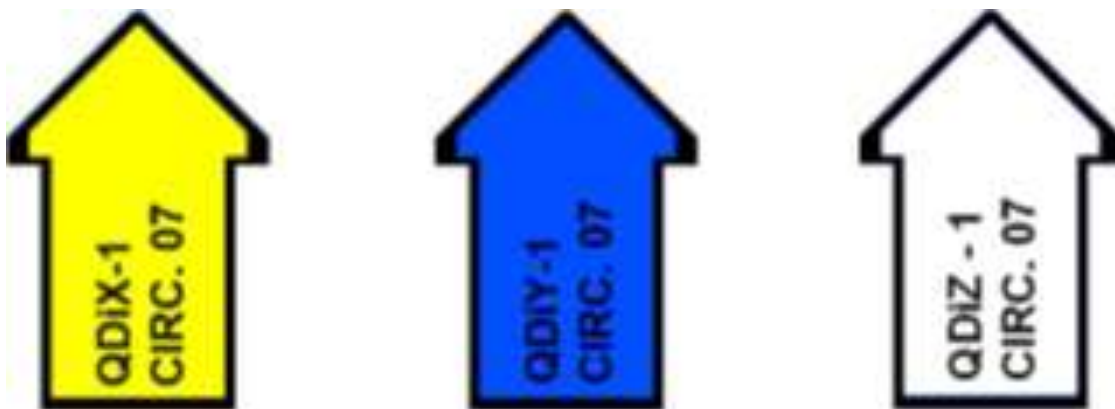
Fig. A4-02

For No Breaks, gray cushion-logo identification must be placed on the upper left corner (**Fig. A4-01**), opposed to the alphanumeric identification.



Fig. A4-03

5. Side Exit Arrows:



The arrow labels side exit for electrical circuit identification must be glued on the exit sides, installed along the wired bed (**Fig. A5-01**), as shown below:

Each side output should contain two indicative arrows, one of a circuit of the internal X Distribution Frame (QDiX) and another indicating the same numbering circuit, as above, relating to the internal distribution board Y (QDiY) (**Fig. A5-03**) and in some cases, the internal distribution frame Z (QDiZ).

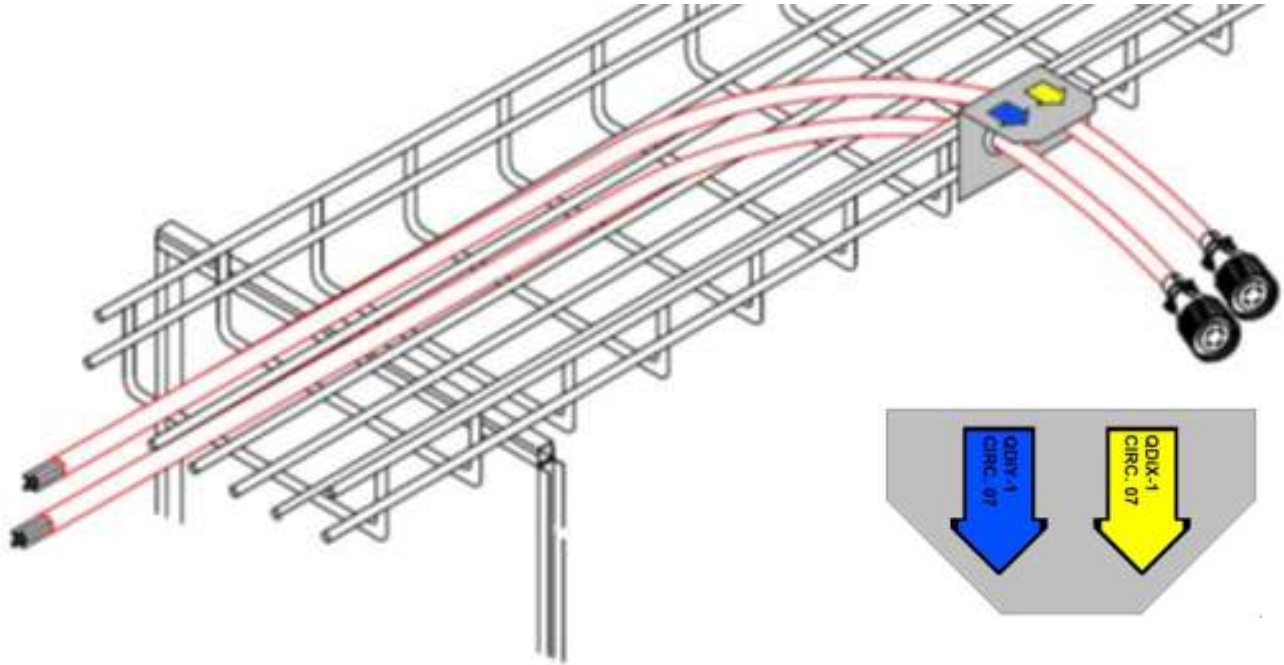


Fig. A5-01

Fig. A5-01

The identification must meet the following rule:

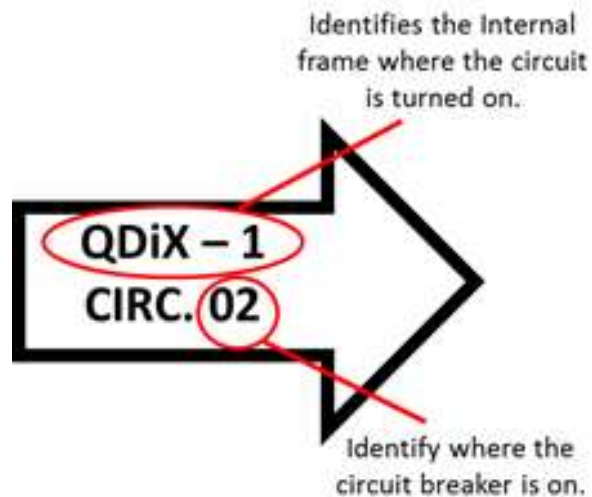


Fig. A5-02

Examples:

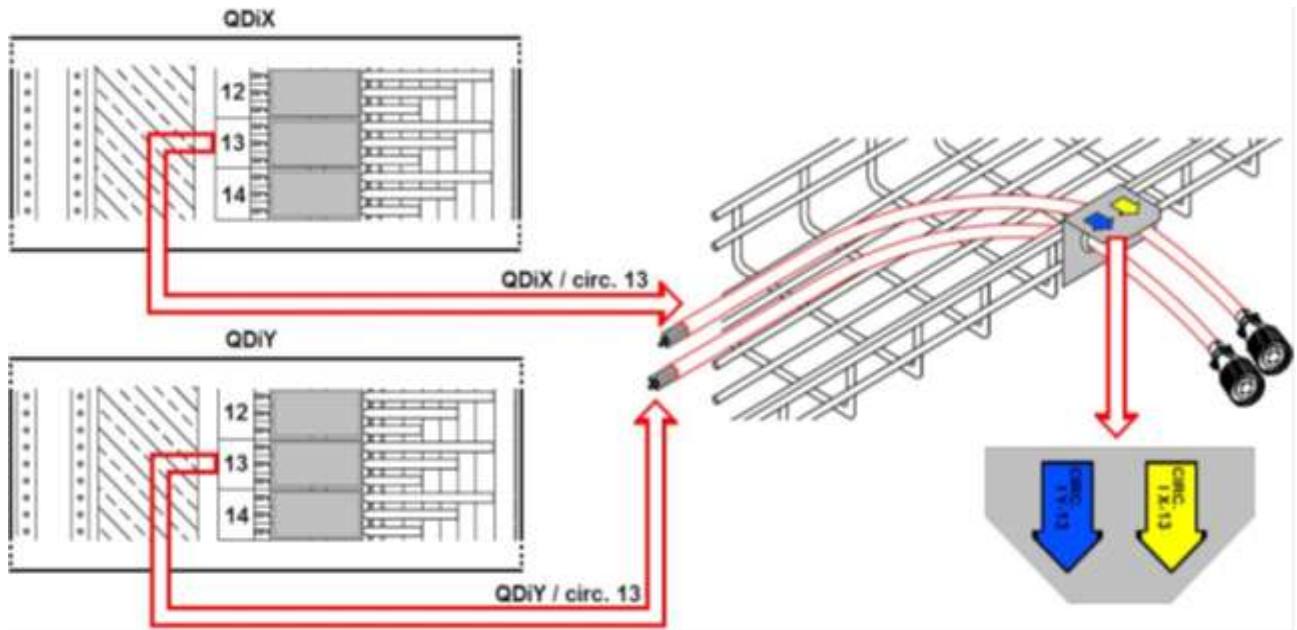


Fig. A5-03



Fig. A5-04



Fig. A5-05

6. Surface Labels:

The surface labels of the identification tags (**Fig.A6-01**) must be glued on the top head of the passage boxes, which are fixed on the sides outputs over wired bed (**Fig. A6-02**).

B05CP42

Example: **ACECO TI**

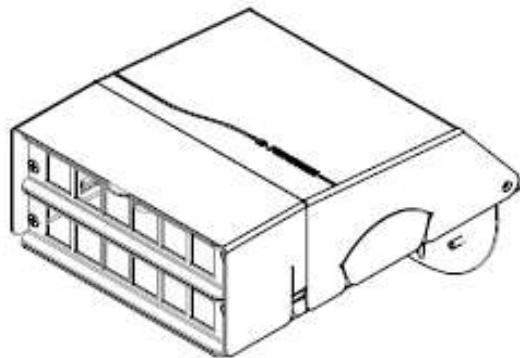


Fig. A6-01



Fig. A6-02

Each surface to be marked with a label, containing the coordinate location and the surface number (Fig. A6-03) and identification of the logical points (Fig. A6-03 to Fig. A6-08).



Fig. A6-03

In this label information, all surfaces must be second (Fig. A6-04), which will inform the location of the point in the patch panel (Fig. A6-05 to Fig. A6-07).

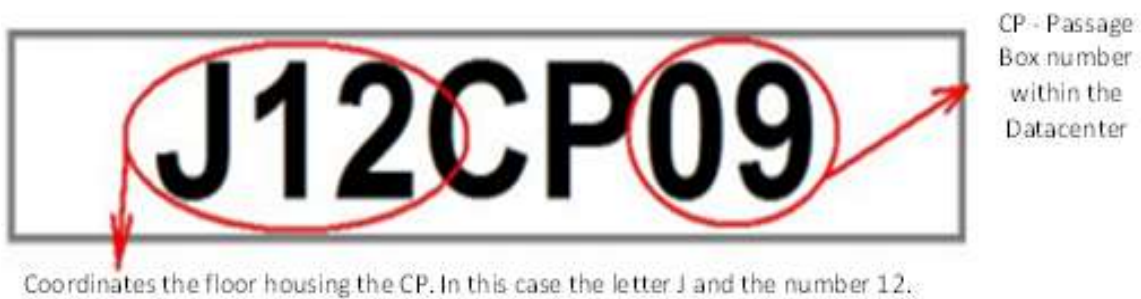


Fig. A6-04



Fig. A6-05



Fig. A6-06

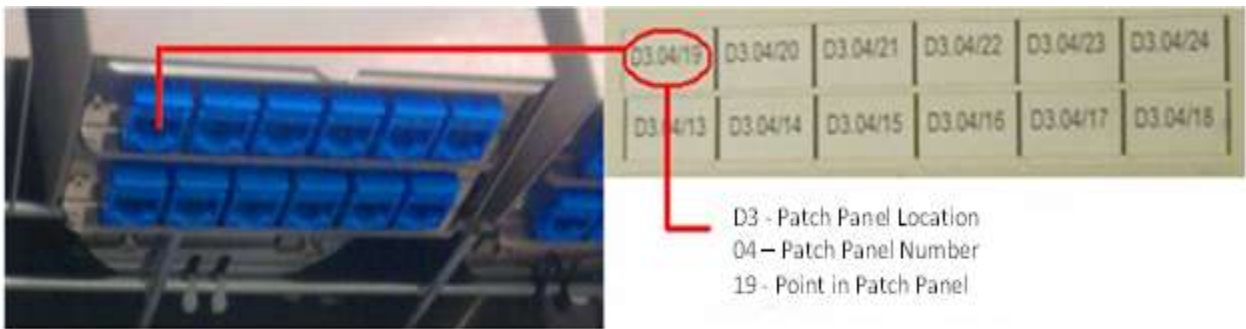


Fig. A6-07



Fig. A6-08

7. IHM Panel (Alplac):

The Alplac label should be placed in front of the IHM panel (**Fig. A7-01**). Therefore, it is necessary to remove the LCD display before.

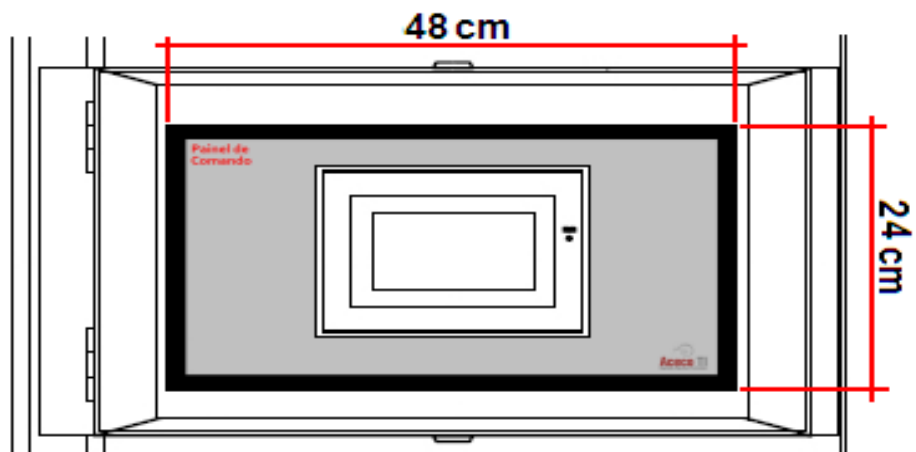


Fig. A7-01

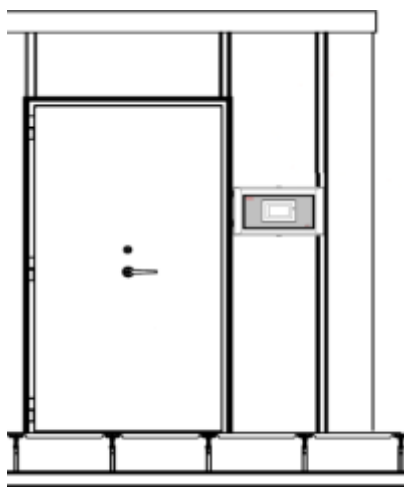


Fig. A7-02



Fig. A7-03

8. Photoluminescent Exit Labels:

The photoluminescent exit label should be placed on the door top, the inside of the Security Room (Fig. A8-01 to Fig. A8-03) and UPS Room (Fig. A8-04). Before application, one must wipe the surface removing dirt, thus allowing a better label adhesion.

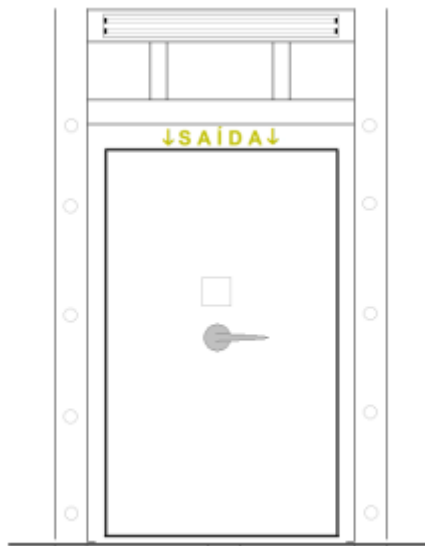


Fig. A8-01



Fig. A8-02



Fig. A8-03

9. Humidity Sensors:

The temperature and humidity sensor Labels may be located on the sensors. When an original label, it must be removed and the new pasted below (Fig. A9-01 to Fig. A9-03).

Example: ACECO TI

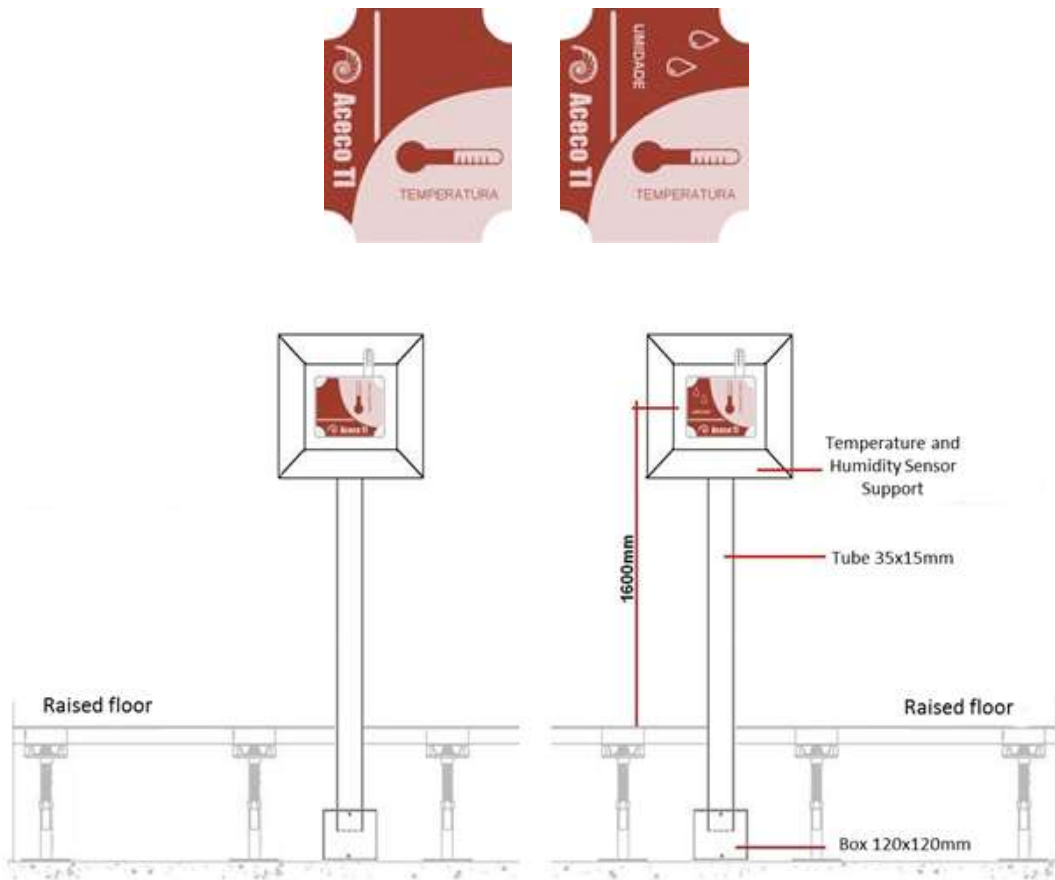


Fig. A9-01

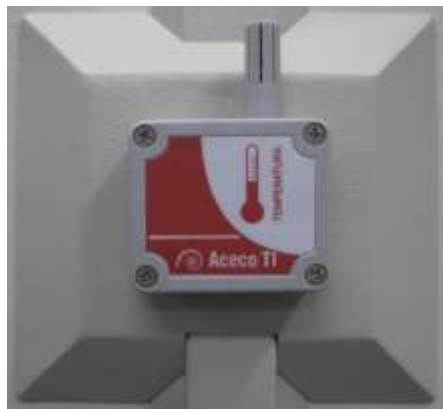


Fig. A9-02

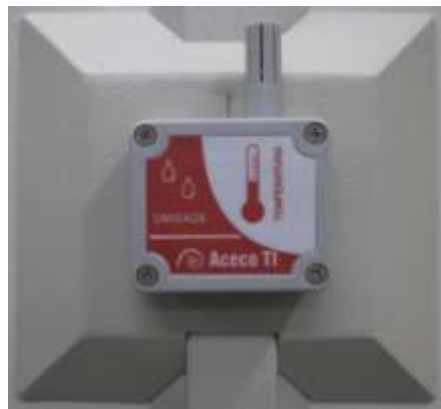


Fig. A9-03

10. Temperature Sensors:

The temperature and humidity sensor Labels may be located on the sensors. When an original label, it must be removed and the new pasted below (Fig. A10-01 to A10-03).

Example: ACECO TI

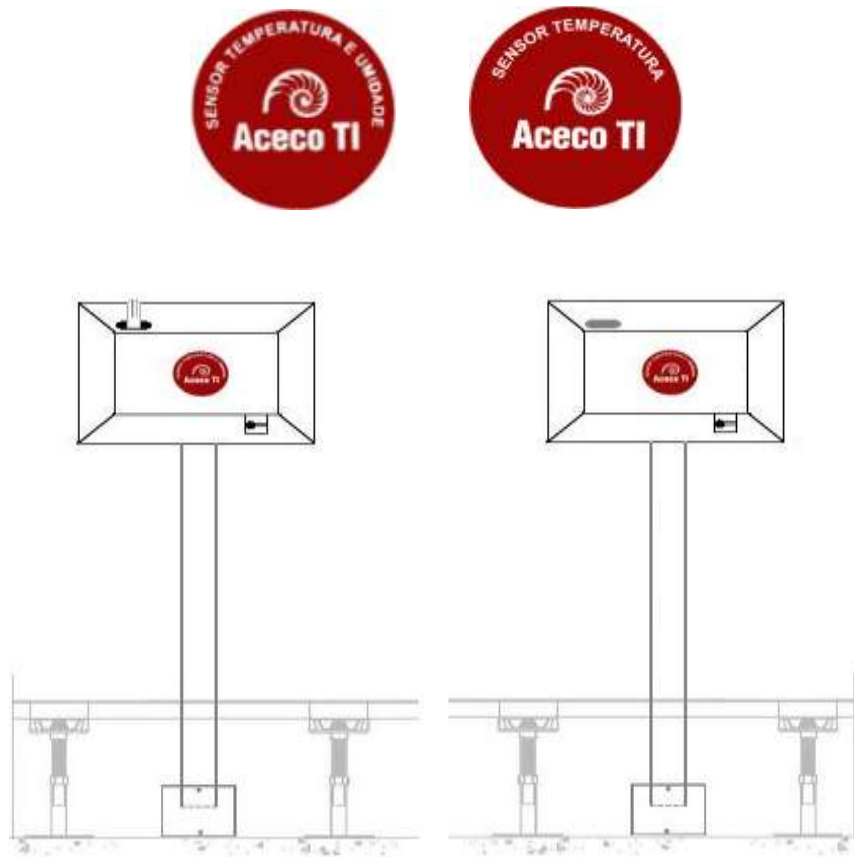


Fig. A10-01



Fig. A10-02



Fig. A10-03

11. Smoke Detectors:

The smoke detector labels should be placed on the raised floor plate surface, just above the sensor installed between the floors (**Fig. A11-01** to **Fig. A11-03**), the exact location of the sensor.

Example: ACECO TI

Before application, should clean the surface by removing the dirt and thus allowing a better label adhesion.

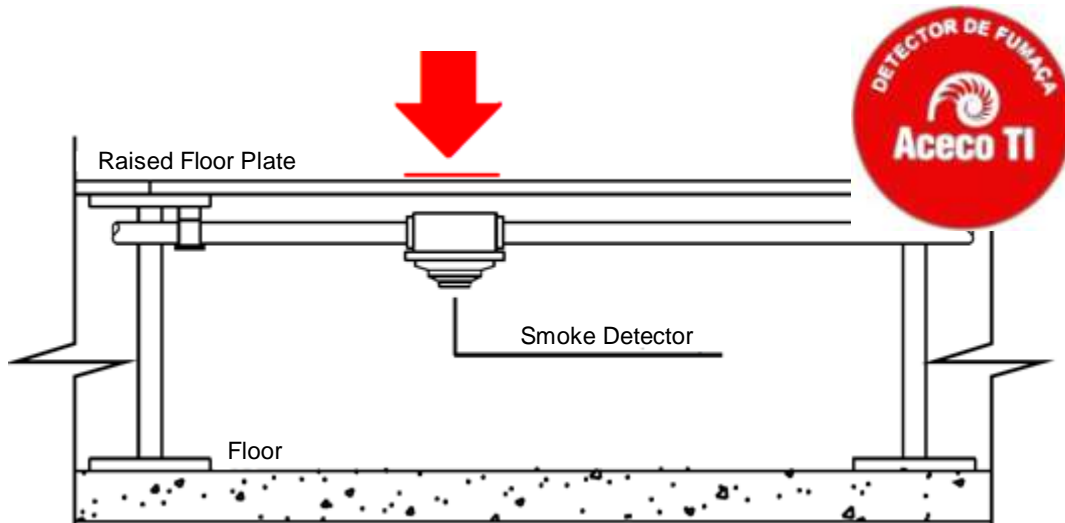


Fig. A11-01



Fig. A11-02



Fig. A11-03

12. Preventing Detection of Fire:

The labels for preventing detection of fire should be placed along the copper pipe (**Fig. A12-01**), on the return pipe of the climate equipment (e.g. evaporators, etc.) (**Fig.A12-02**).

Example: ACECO TI

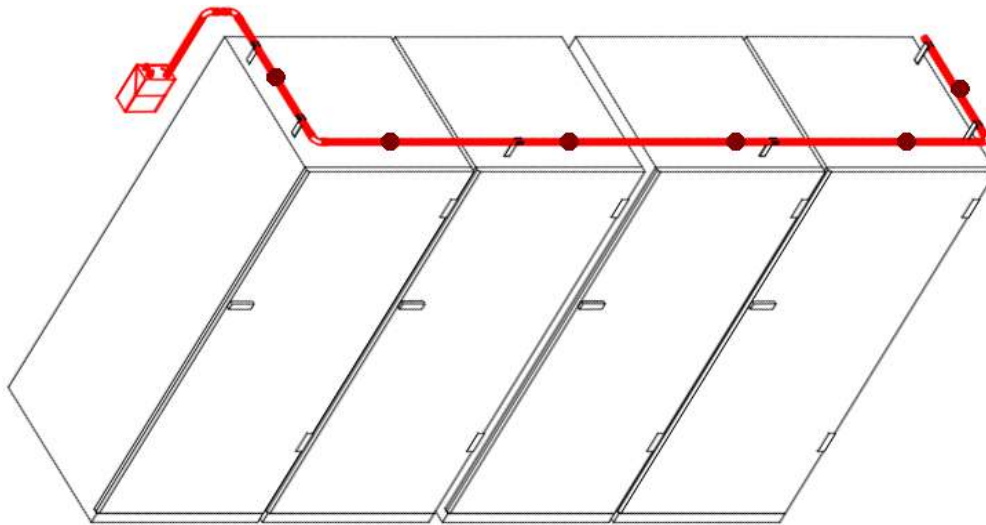


Fig. A12-01



Fig. A12-02

The label preventing detection of fire should be placed on the upper right corner of the Equipment (**Fig. A12-03** and **Fig. A12-04**).

The copper pipe must be identified as a pipe of the fire detection system and therefore should be placed identification red tapes along the same (**Fig. A12-05**).



Fig. A12-03



Fig. A12-04

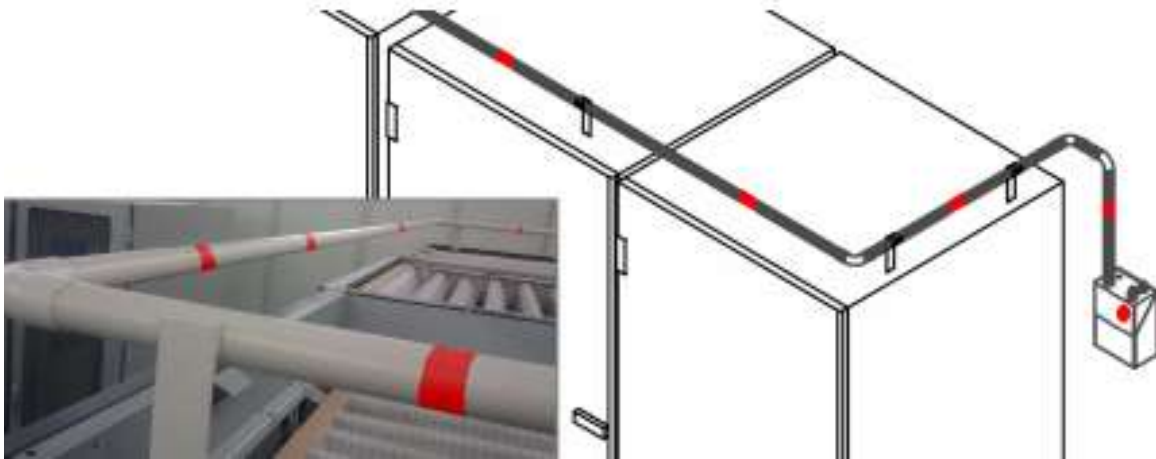


Fig. A12-05

13. Liquid Detection:

The liquid detection label should be pasted on the box cover. This should be set below the raised floor with silicone (Fig. A13-01). The label should be right in the middle of the lid, as detailed below:

Example: ACECO TI



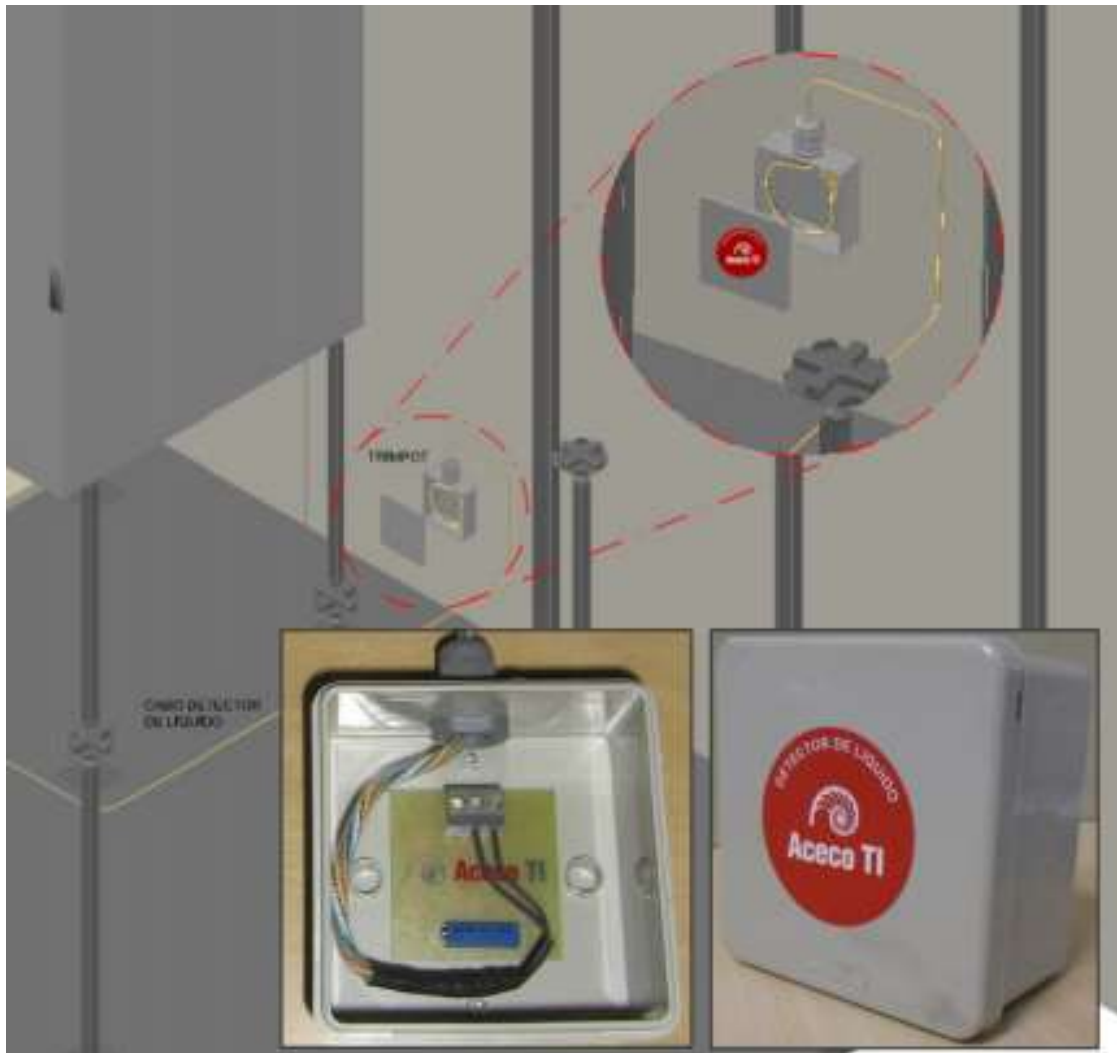


Fig. A13-01

14. Water Flow:

The water flow label (**Fig. A14-01**) should be stuck in the pipe, allowing a quick view of the direction of water flow in the pipe (**Fig. A14-02**). Piping for dry coolers are painted green, the arrows should be white (**Fig. A14-03**). Already in lines with fan-coil and chillers, the arrows should be green color and pasted on top of the coating / insulation.



The nomenclatures with the arrow indicating the direction of flow, are:

- PCW = Power Cold Water
- CWR = Cold Water Return

These classifications are already printed on the label. Before application, should clean the surface by removing the dirt and thus allowing a better label adhesion.

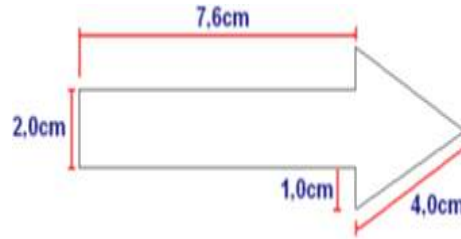


Fig. A14-01



Fig. A14-02



Fig. A14-03

15. Glass Plates Labels:

Example: **ACECO TI**

The glass plate labels should be placed on the inner surface of the data center glass floor (**Fig. A15-01**), avoiding chafe with people who circulate in the room, at the lower right corner (**Fig. A15-02** and **Fig. A15-03**).



Even with 2, 3, 4 or more glass sheets together, each of them must have its label positioned in the same configuration.

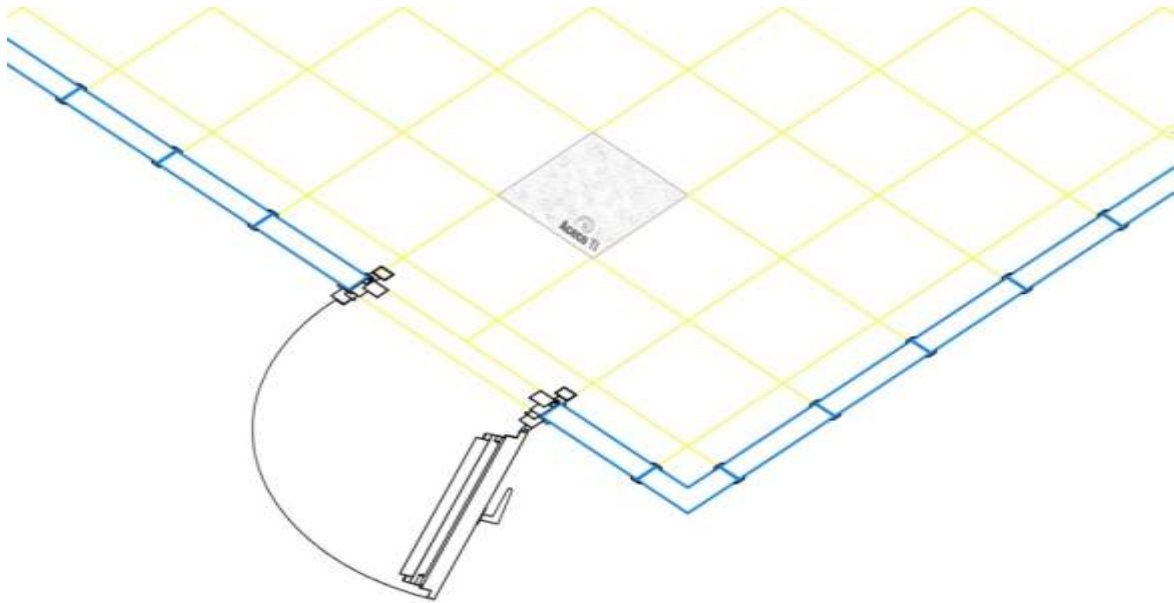


Fig. A15-01



Fig. A15-02



Fig. A15-03

16. Escape Route_Labels:

The escape route indication label must be pasted following the project (**Fig.16-01**), directly on the floor plate, preferably in the center thereof (**Fig. A16-02**).

The identification is made of the same material Photoluminescent Exit (has A-8) thus also glows in the dark (**Fig. A16-03**), facilitating the escape route preview in case of an emergency.

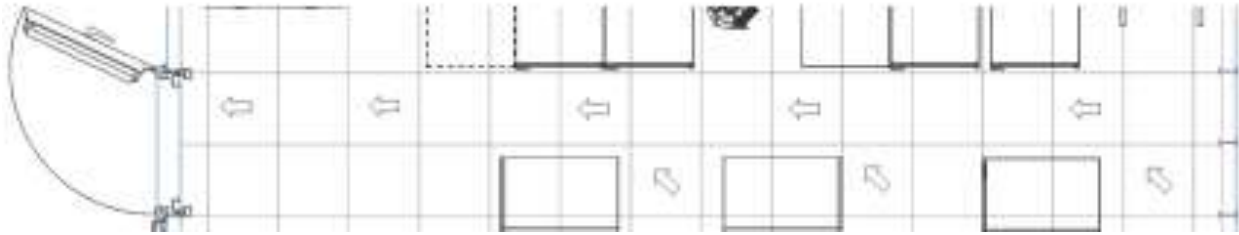


Fig. A16-01



Fig. A16-02



Fig. A16-03

B. VELCRO LABELS:

1. Gray Velcros:

The gray color velcros should be used in mooring UTP cables (**Fig. B1-02** and **Fig. B1-03**). Must respect the distance of approximately 30 cm between each lashing the cable harness (**Fig. B1-01**).

Example: ACECO TI



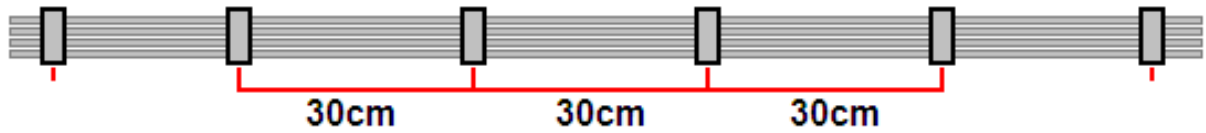


Fig. B1-01



Fig. B1-02



Fig. B1-03

2. Blue Velcros:

The blue color velcros should be used in mooring UTP cables (**Fig. B2-02** and **Fig. B2-03**). Must respect the distance of approximately 30 cm between each lashing the cable harness (**Fig. B2-01**).

Example: ACECO TI



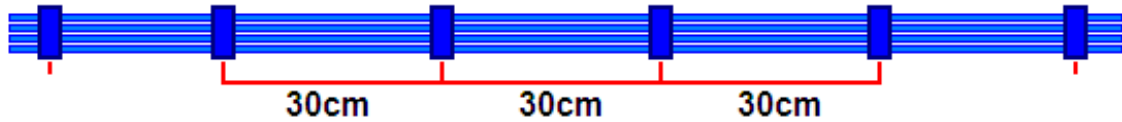


Fig. B2-01



Fig. B2-02



Fig. B2-03

3. Red Velcros:

The red color velcros should be used for mooring optical fibers (Fig. B3-02 and Fig. B3-03). Must respect the distance of approximately 30 cm between each lashing the cable harness (Fig. B3-01).

Example: ACECO TI



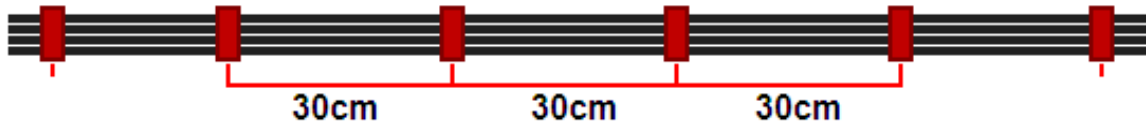


Fig. B3-01



Fig. B3-02



Fig. B3-03

4. Orange Velcros:

The orange velcros should be used in optical fiber anchoring (Fig. B4-02). Must respect the distance of approximately 30 cm between each lashing the cable harness (Fig. B4-01).

Example: ACECO TI



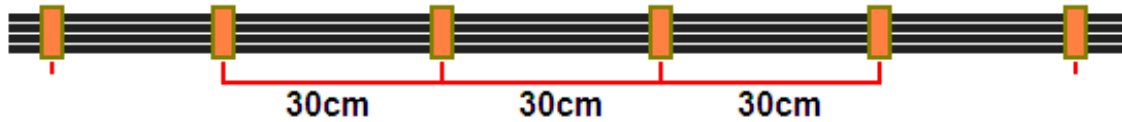


Fig. B4-01



Fig. B4-02

C. SIGNALING:

1. Banner Construction Labels:

The banner construction labels should be placed in an easily visible location (**Fig. C1-01**, **Fig. C1-02** and **Fig. C1-03**), whose function is to inform the workplace and give a brief explanation of what is being done. It is extremely important to obtain customer consent for the installation of banners.

Example: **ACECO TI**

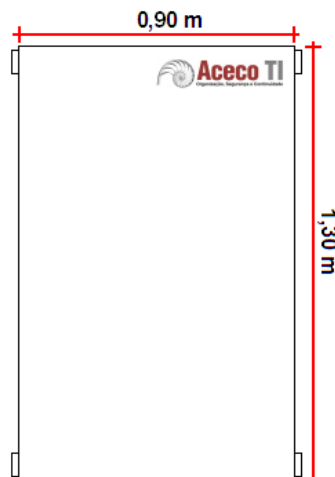


Fig. C1-01



Fig. C1-02



Fig. C1-03

2. PVC Logo Plates:

The PVC logo plates should be placed on visible locations in the work (Fig. C2-01), whose function is to inform the workplace.

Example: ACECO TI



Fig. C2-01



Fig. C2-02

3. Equipotential Bar Labels:

The indicator equipotential bar label must be placed on the side member, between the data center raised floor and the alpha-numerical coordinates labels (**Fig. C3-01**), as shown below. Should be placed in all environments where there are ground wires.

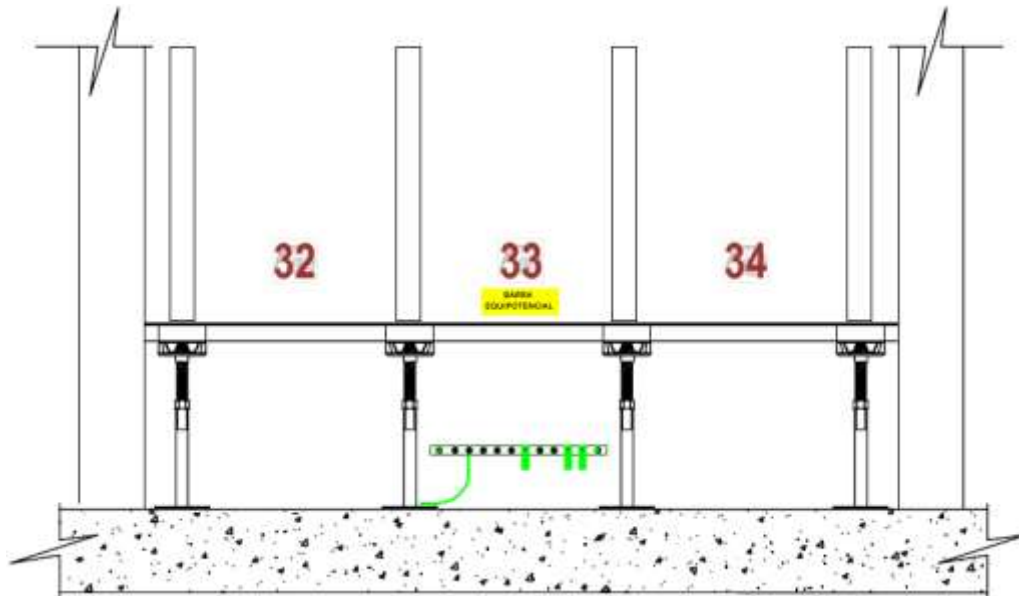


Fig. C3-01



Fig. C3-02

4. Vinyl Carpets:

The vinyl carpets should to be placed always on the outside of the security room, in front of the door (**Fig. C4-01**). During installation, must be considered the thickness of the vinyl carpets (decrease by 1 cm), so that it does not interfere with opening and closing the door (**Fig. C4-02**). Thus, should be also avoided placing it inside, because the carpet material is flammable.

Example: ACECO TI



Before the manufacturing of the carpet, it is very important to have the authorization of the use of "brand" by the customer. Many marketing departments do not accept the idea of stepping on the company logo (**Fig. C4-03**).



Fig. C4-01

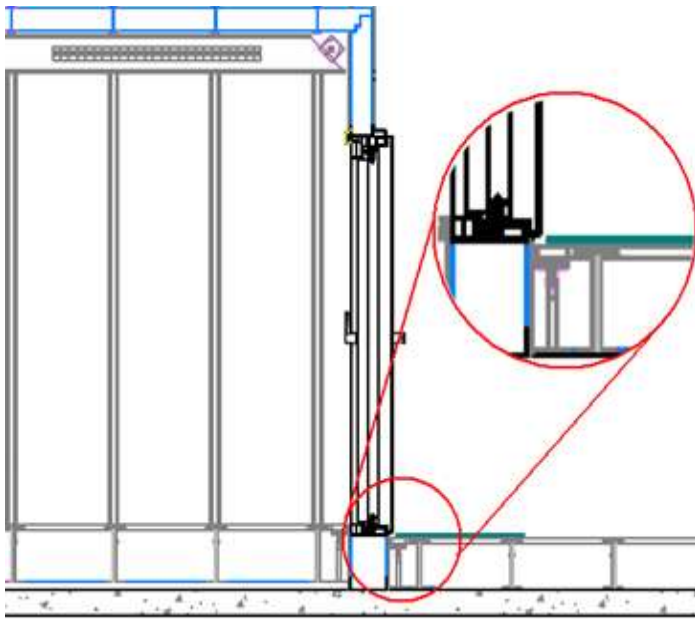


Fig. C4-02



Fig. C4-03

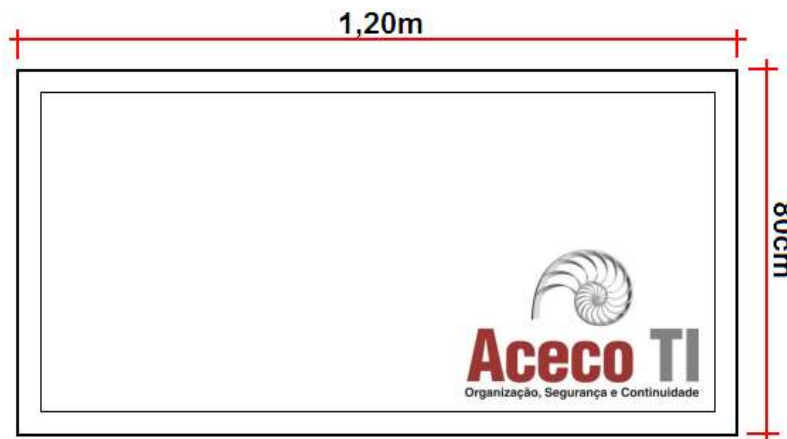


Fig. C5-04

D. ELECTRICAL IDENTIFICATION

1. TAG-Plugs:

The TAG-Plugs for identification of electrical circuits, model ETA-209-G, should be placed at the ends of the cables, close to plugs (Fig. D1-01).



Each point should contain an electric circuit of the tag with the information and inner frame to which it is connected (Fig. D1-02). This identification is the same used on the label side exit arrows.

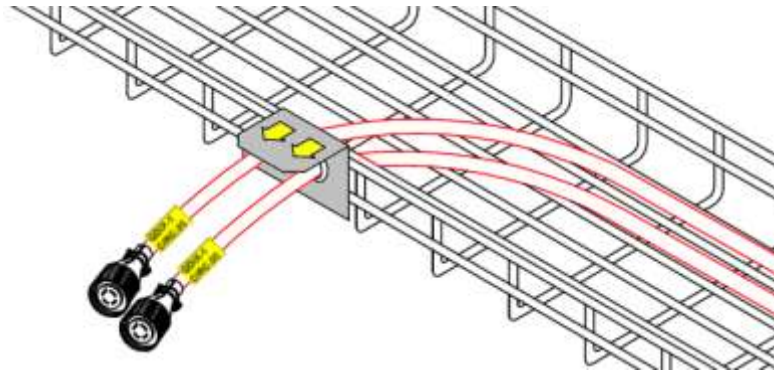
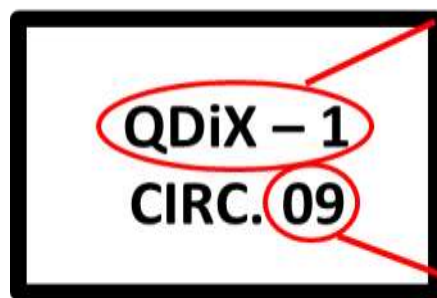


Fig. D1-01



Identifies the internal frame where the circuit is turned on

Identify where the circuit breaker is on

Fig. D1-02

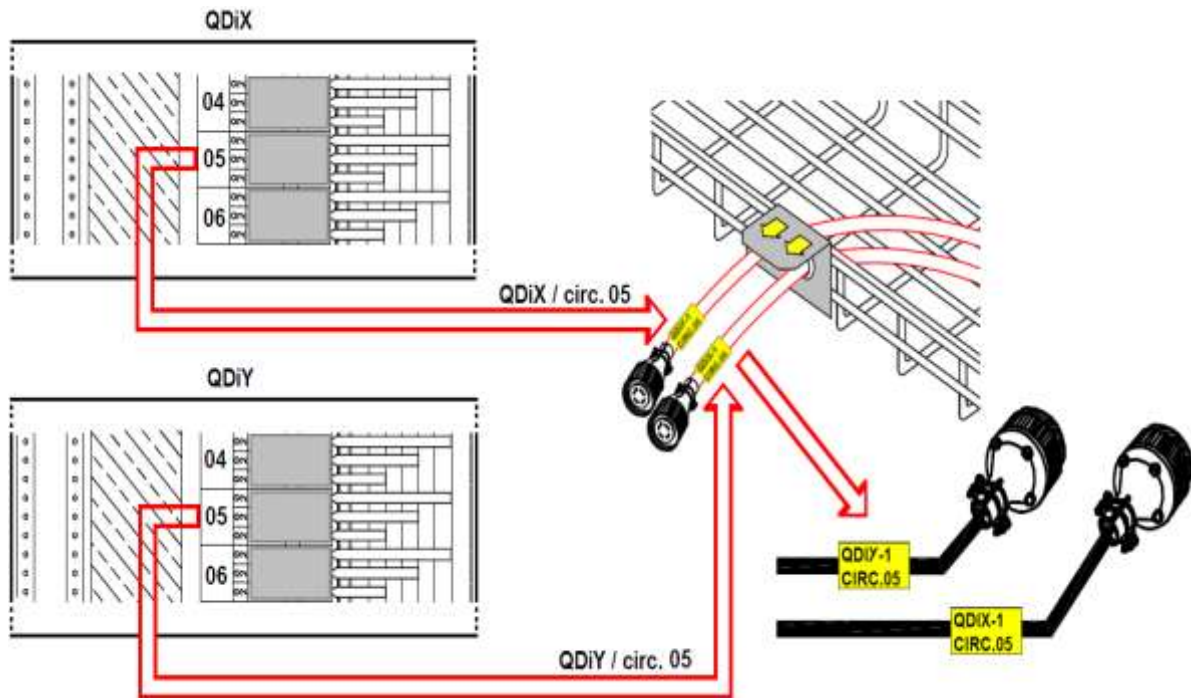


Fig. D1-03



Fig. D1-05



Fig. D1-06



Fig. D1-04

2. TAG-QDi:

The TAG-QDi helps in identifying circuits in internal switchboards. Are provided by manufacturers of frames and must be placed inside the frame X, Y or Z (QDiX, QDiY or QDiZ) on the polycarbonate plate that protects the bus (**Fig. D2-01**) close to respective circuit breaker plug-in. These IDs are glued with double-sided tape and should arrive in the work along with the pictures.



Each tag contains a number that indicates which frame the circuit is connected each installed circuit breaker (**Fig. D2-02**).

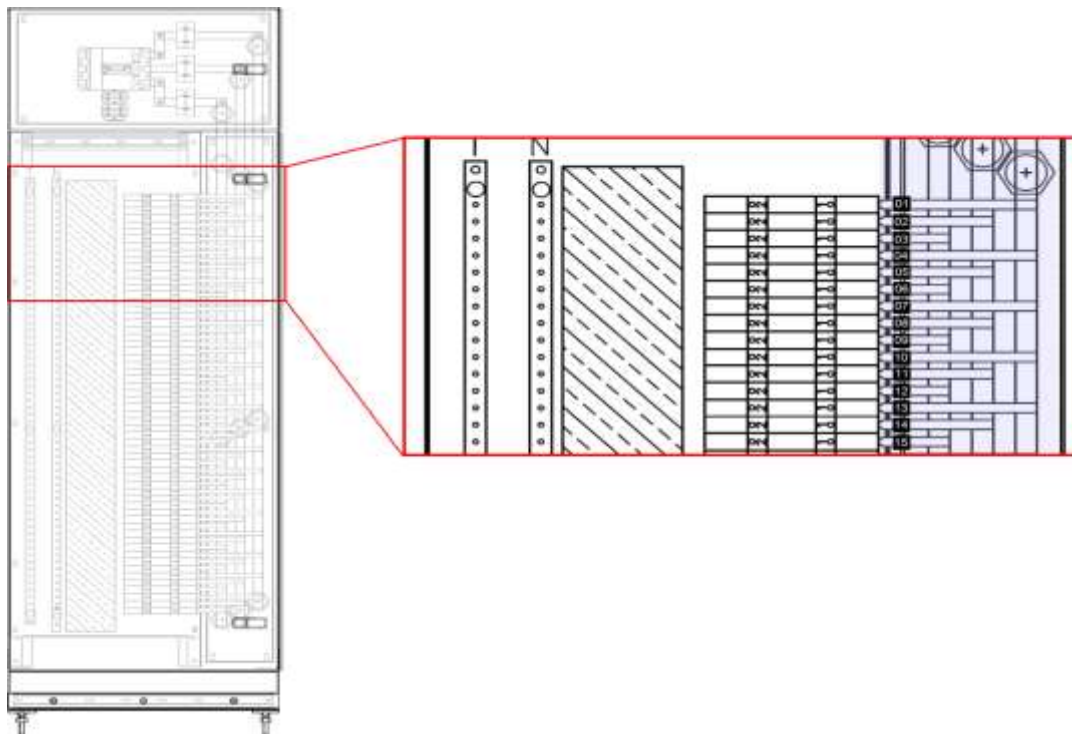


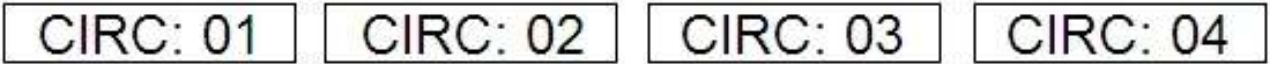
Fig. D2-01



Fig. D2-02

3. TAG-Circuit:

The TAG-circuits provides identification of the electrical circuits shall be placed inside the inner frames X, Y or Z (QDiX, QDiY or QDiZ), the input circuit breaker (**Fig. D3-01**).



Each identification has the inscription "CIRC" followed by the number of the loop (**Fig. D3-02** and **Fig. D3-04**) and should identify phase, neutral and ground to each circuit (**Fig D3-03**).



Fig. D3-01

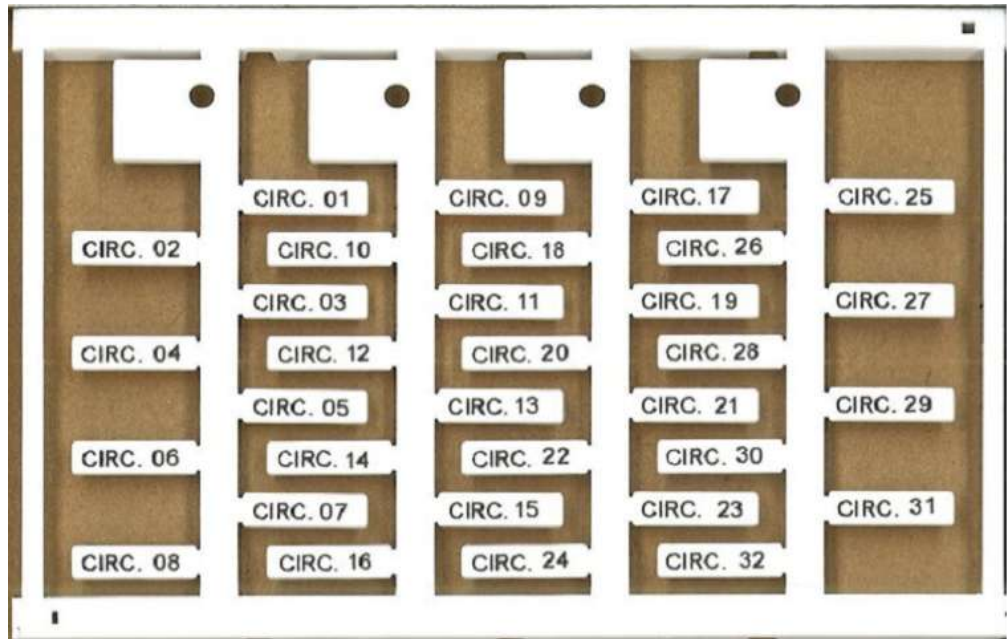


Fig. D3-02



Fig. D3-03



Fig. D3-04

4. TAG-Phases:

TAG-Phase of IDs in QDI should be placed inside the frames X, Y or Z (QDiX, QDiY or QDiZ) (**Fig. D4-01**), the UPS, the GMG, QTA among others, indicating the where does the cable, and then where you go.



Fig. D4-01



Fig. D4-02



Fig. D4-03

5. Electrical Service Outlets:

The service outlet voltage of tags should be placed just below the outlet (**Fig. D5-01** and **Fig. D5-02**). It must be remembered that are placed by two shots point, a 110V and 220V another.



Each tag contains a number that indicates which frame is connected each installed circuit breaker (**Fig. D5-03**).

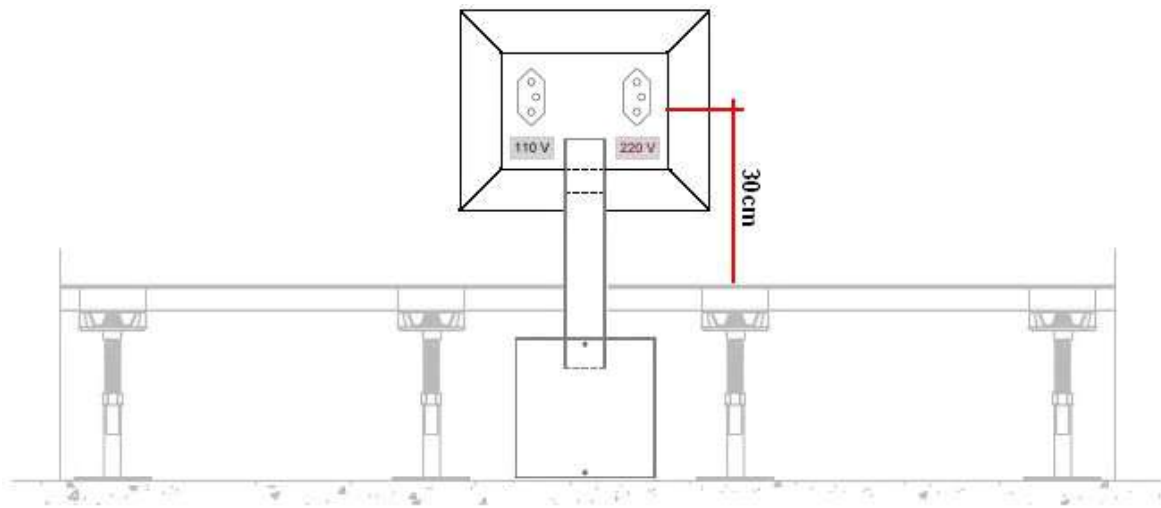


Fig. D5-01



Fig. D5-02



Fig. D5-03

E. CERTIFICATION

The certification boards Room safe should be placed above the IHM panel and must always respect the standard installation measurements (**Fig. E1-01**).



Fig. E1-01

F. STANDARD

TIA-942 – Telecommunications Infrastructure Standard for Data Centers

This standard covers the detailed design and installation requirements of data center infrastructure. Labeling and administration are not a part of the standard. The user of the standard is referred to TIA-606-B for guidance on this subject.

TIA-606-B – Administration of Telecommunications Infrastructure

This standard specifies the administration for a generic cabling system to be deployed in data center computer rooms and equipment rooms by providing a scalable infrastructure identification scheme based on the grid coordinates of the computer room.

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

This standard provides a guideline for establishing and maintaining a safe working area for employees relative to the hazards arising from the use of electricity.

The following sections of this application guide combine information from the above standards with industry best practices to provide specific guidance on the proper identification and labeling of critical data center infrastructure components.



Fig. F1-01



Fig. F1-02

G. REFERENCES AND LINKS

REFERENCES

ASHRAE: The American Society of Heating Air Conditioning and Refrigeration
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

LINKS

<http://www.engineeringtoolbox.com>
<http://www.trane.com>
<http://www.epa.gov>
<http://www.smacna.org>