ICT Audits in Intelligent Buildings

(Cabling Side)

Nelson Farfán RCDD
Regional Technical Manager, SIEMON Co.
Bicsi CALA District Vice Chair
TIA TR 42 Att.
ISO SC25 WG3 Att.
Uptime ATS Certified

Audits in Intelligent Buildings

- Importance
- Guidelines & Criticality
- Standards
- Preventive Maintenance

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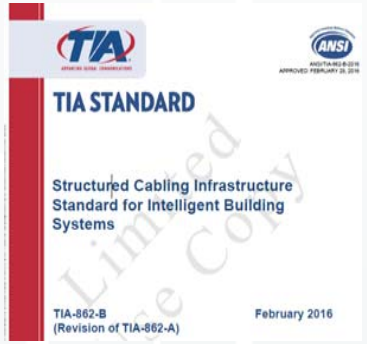
Most used standards for I.B. cabling.

- ISO/IEC 11801-6 2017 Part 6: Distributed building services.
- ANSI/TIA-862-B “Structured Cabling Infrastructure Standard for Intelligent Building Systems ”
- TIA TSB-184-A 2017 ISO29125 Supporting Power DeliveryOver Balanced Twisted-Pair Cabling
- IEEE802.3bt DTE Power via MDI over 4-Pair 2018 D
- **ANSI/BICSI-ANSI/BICSI 007-2017**, Information Communication Technology Design and Implementation Practices for Intelligent Buildings and Premises

By using the above standards, the design and audit of smart buildings will be successful.



International and American Standards

ISO 11801-6

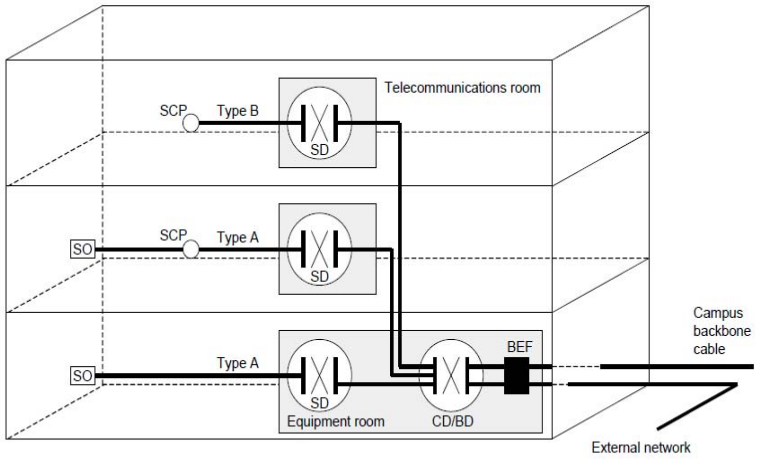
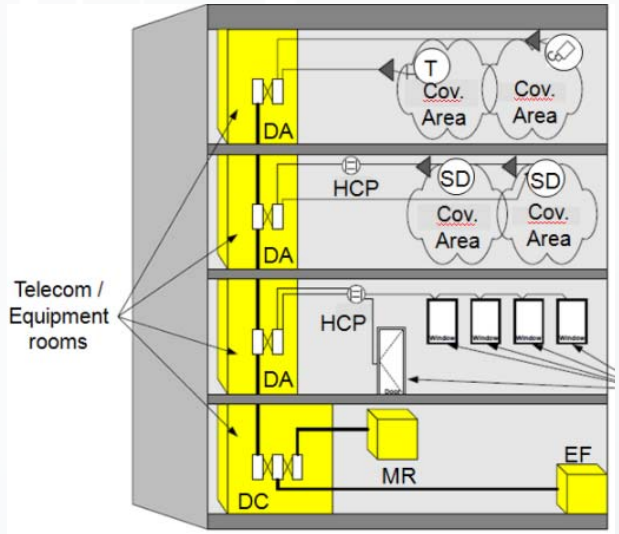


Figure 6 — Accommodation of functional elements

1) service distributor (SD);
2) service distribution cable;
3) service concentration point (SCP);
4) service concentration point cable (SCP cable)
5) service outlet (SO).

TIA 862-B



EF Entrance Facility
DA Distributor A
DC Distributor C
HCP Horizontal Conn. Point
MR Mechanical Room
T Thermostat
Camera
Equipment Outlet
SD Smoke Detector

Total Convergence for I.B.

Traditional – Multiple systems, multiple proprietary cabling types

Converge – Multiple systems, one structured cabling infrastructure

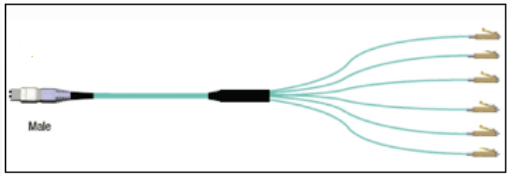
- Multiple building systems can be run over a single IT cabling infrastructure
- These systems can include:
  - voice/data
  - video surveillance
  - access control
  - audio/video
  - fire alarms/safety
  - energy management
  - HVAC
  - digital signage
  - Smart lighting
  - DAS

Traditional intelligent building platforms

- Current building communication systems use a vast array of different protocols and cabling.

- In a traditional building you can find more than six different types of cables, including many separate raceways.

The Goal is:



-Copper cable category 6A or higher.
-Multimode or single-mode fiber mainly in the backbone

Why do we need an Audit and how to do it?

- "A system that is properly tested and commissioned will provide the designer, installer, and client with a system that works correctly and meets the client's requirements"
- We must do a plan including :
  - Training.
    - Using and troubleshooting
  - Testing Procedures,
    - Certification for 100% of copper and fiber links
  - Acceptance of testing
    - Limits, standards to use (ISO/TIA/EN..)
  - Documentation
    - Operation and maintenance manuals, Labeling and Drawings

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New accepted topology in I.B.

MPTL Modular Plug Terminated Link. (Terminated in field)

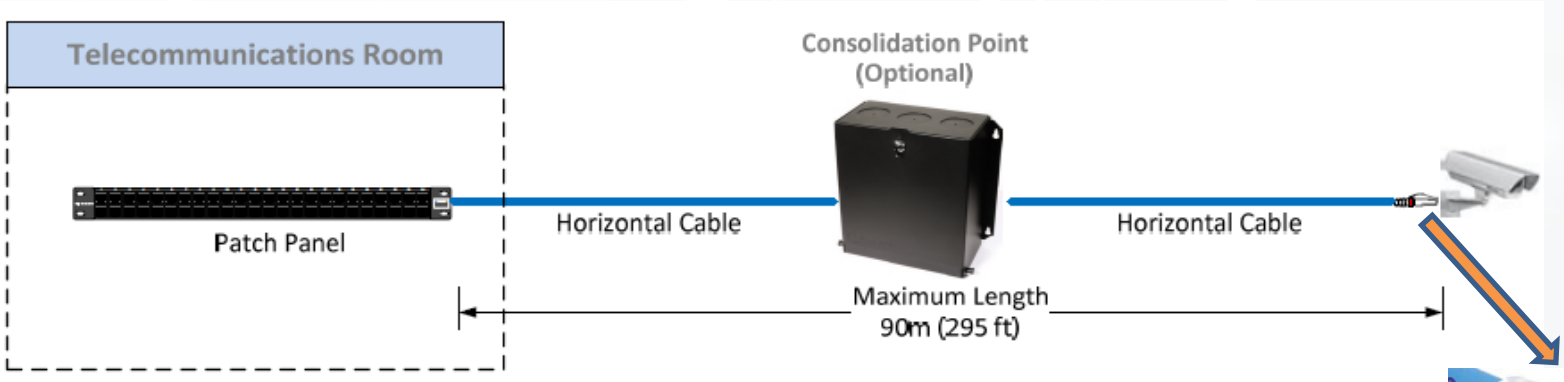


Figure 1: Modular Plug Terminated Link (MPTL) Topology

What to audit:

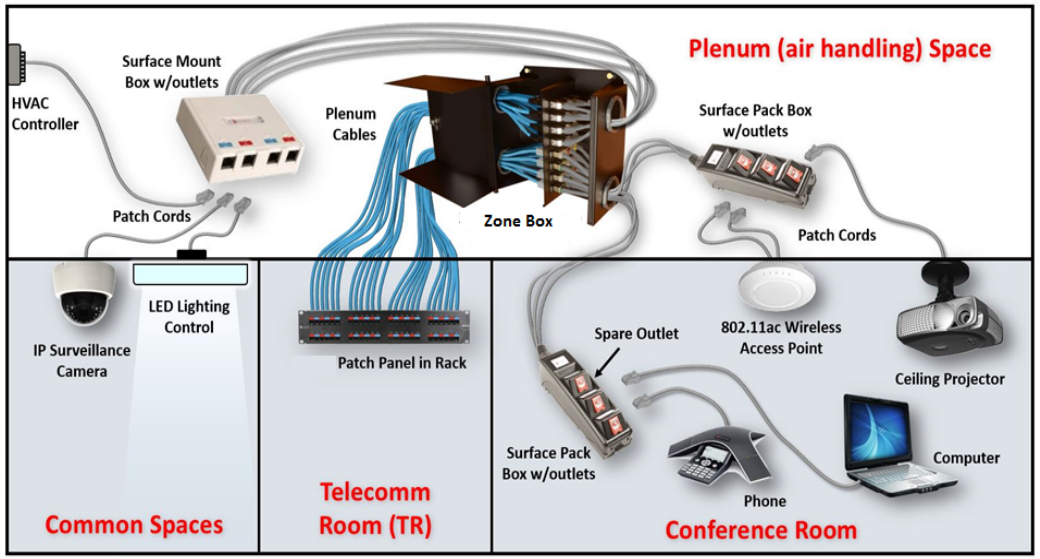
-Channel lenght: 95 mts

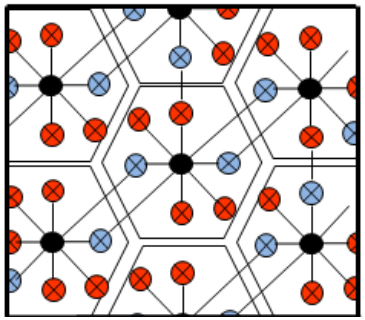
-Connected to fixed devices (LED Lighting, CCTV cameras, Wireless Access Points, BAS devices) .

-Link Certified with appropiate Plug Test Adapter.

Zone cabling. New design consideration for I.B.

- As per IEEE802.11ac, two links Cat6A are recommended for WAPs.
- Verify use of solid conductor cable in non-temperature controlled área, if stranded is used, not to exceed 5 mts.
- LED lighting can use centralized or distributed PoE from a switch.





-Not to exceed 22.5 mts length in hexagonal pattern
-No more than 96 outlets served from a zone área.
-Allowance of 25% capacity of spare port for future.

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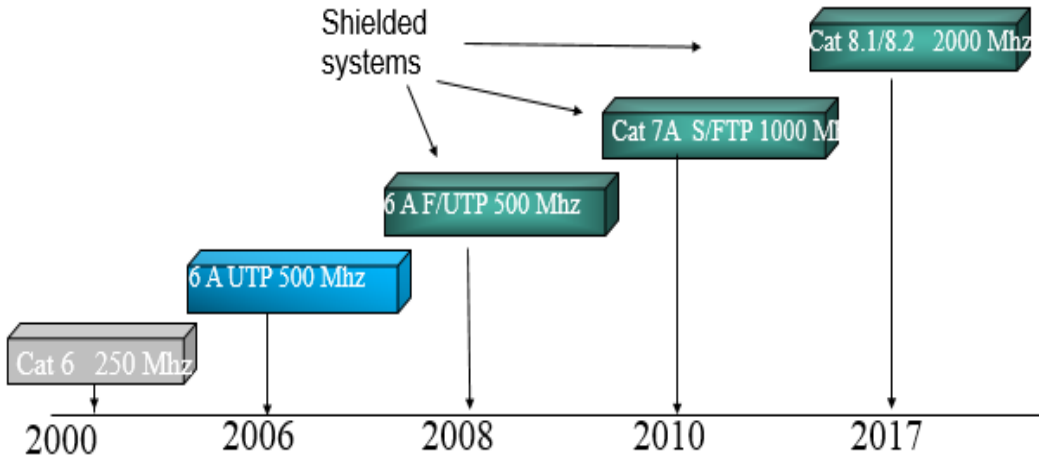
Cabling Components

Review compliance standards :
ISO/IEC recommends configuration of links with a Class EA minimum performance for Service Distribution.
- Category 6A components or Category 8.1 components provide Class EA balanced cabling
performance,
--Category 7A components or Category 8.2 components provide Class FA balanced cabling
performance,
-Category 8.1 components cannot be used to provide Class F or Class FA cabling performance.



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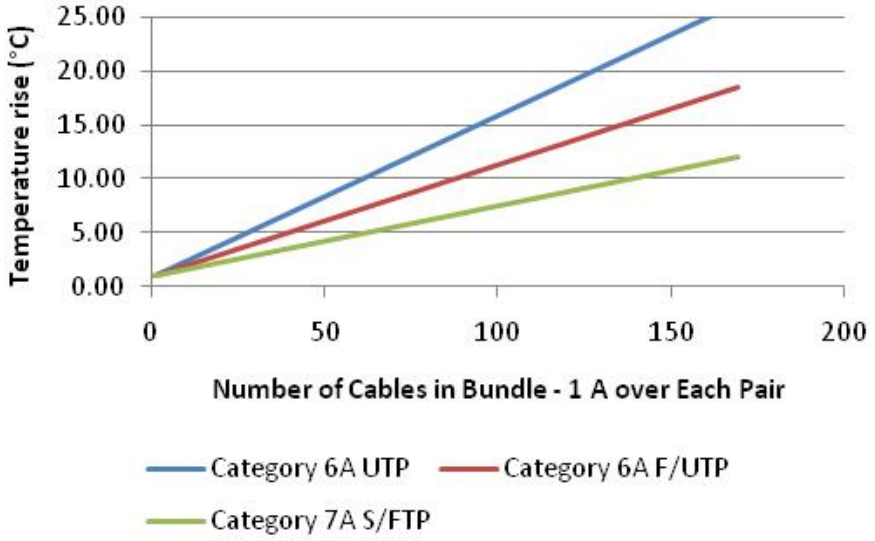
Fiber:
OM3 2000 Mhz
OM4 4700 Mhz
OS1 1.0 dB/km
OS2 0.5 dB/Km

Control the increase in power delivered

- PoE Plus Plus project under discussion .Target 2018
- Objective: 100W over 4-pairs
- Joint project supported by HDBASE-T Alliance to provide remote power to devices.
- Verify the de-rating channel length because the operation temperature.

Category 6A U/UTP – Loss of 18mt at 60ºC
Category 6A F/UTP – Loss of 7mt at 60ºC



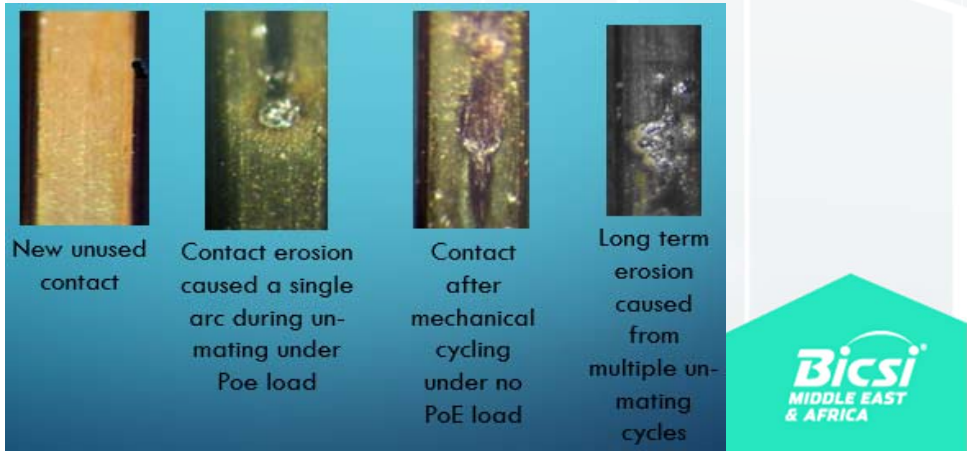
	Number of cables in Bundle (1A over Each Pair) Worst Case Temperature Rise of 10°C
Category 5e	22
Category 6A UTP	44
Category 6A F/UTP	63
Category 7A S/FTP	100

Class and Type of PoE

Class Number	PSE Output Power [W]	PD Input Power [W]	PD Type	Notes
0	15.4	12.95	1	IEEE802.3af
1	4	3.84	1	
2	7	6.49	1	
3	15.4	12.95	1	
4	30	25.5	2	IEEE802.3at
5	45	40	3	IEEE802.3bt
6	60	51	3	
7	75	62	4	
8	90	73	4	

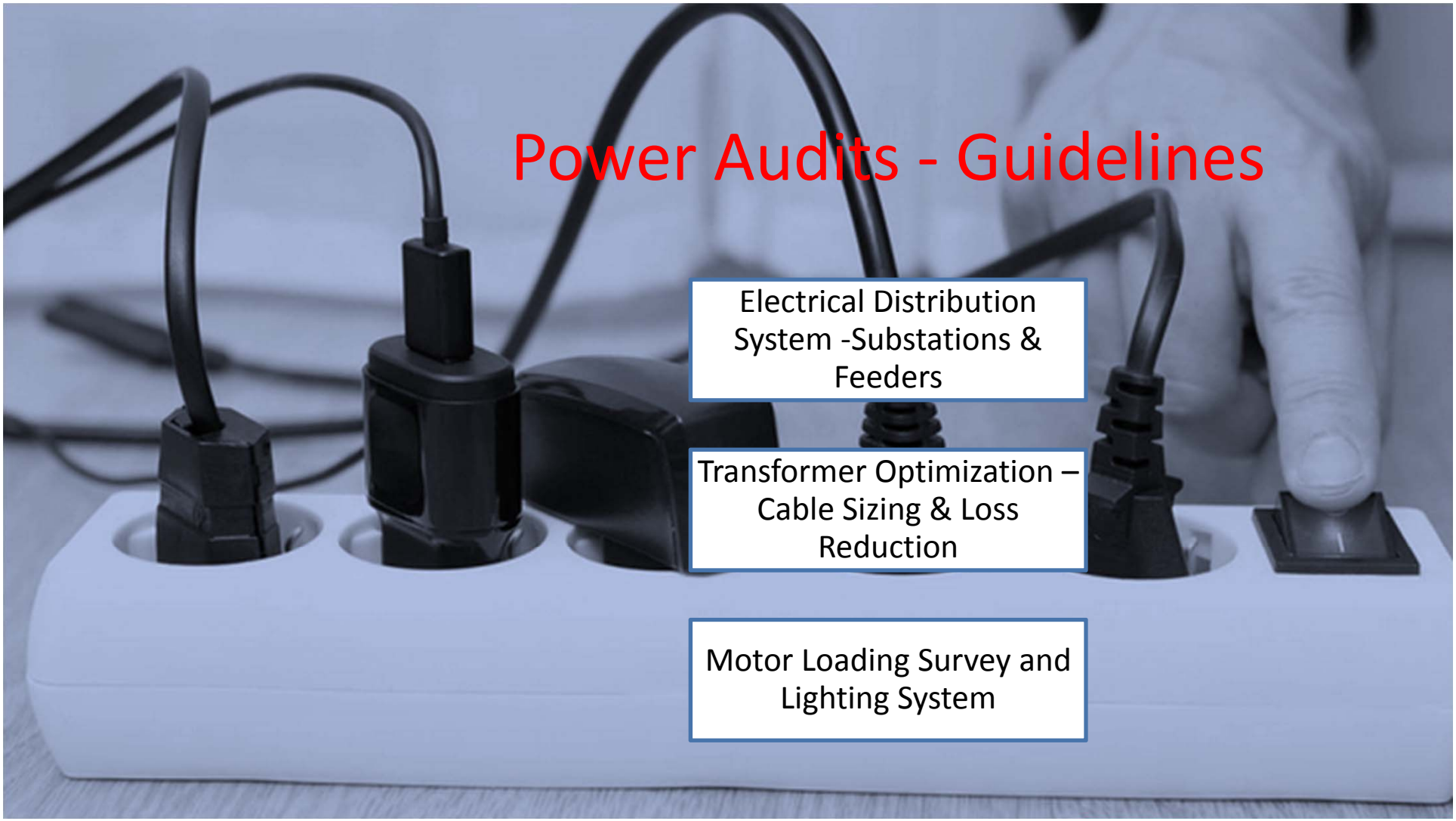
New Types and clases Will permit the use of more equipment with higher power requirement as LED lighting , Pan/Till/zoom Cameras

Un-mating a PD equipment while the current is applied causes an arc that can damage the Jack or plug, therefore it must be demanded compliance with the ISO/IEC 60512-99-001 standard that requires 100 mated/unmated tests under load with 55 volts and currents of 600mA,-



Verify pathways to comply with separations and maximum filling.

- Use the tables of ISO 14763-2 that take into account the different categories of cable, the type of receways and the electrical current circulating, to determine the separation space between Data cables and electrical ones.
- Maintain a minimum bend radius of 4 times its diameter for copper and 10 times for fiber,
- Do not fill Pathways more than 60%
- Use labels for links, raceways, spaces, grounding. Guide ISO-14763.1 TIA606B



Power Audits - Guidelines

Electrical Distribution System -Substations & Feeders

Transformer Optimization – Cable Sizing & Loss Reduction

Motor Loading Survey and Lighting System

HVAC

Centralized HVAC monitoring

Chillers

AHUs

VAV Equipment

HVAC Checklist - Long Form

uilding: _____ File Number: _____

ompleted by: _____ Title: _____ Date Checked: _____

Component	OK	Needs Attention	Not Applicable	Comments
Actuators operational?				
Outdoor Air (O.A.) Quantity ***(Check against applicable codes and ASHRAE 62-1989.)***				
Minimum % O.A. _____				
Measured % O.A. _____ *Note day, time, HVAC operating mode under "Comments"*				
Maximum % O.A. _____				
Is minimum O.A. a separate damper?				
For VAV systems: is O.A. increased as total system air-flow is reduced?				
Mixing Plenum				
Clean?				

Audits

We have always had methods to audit different systems

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Conclusions

-By auditing the physical level in an I.B. We can be sure of achieving the client's objectives and a successful result within the economic and technical parameters.

-A good audit prevents installation problems with equipment and improves the users safety.

-The IoT is demanding the implementation of new technologies in buildings and we must ensure they are well applied to obtain low operational costs while offering comfort to users.

Thanks

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