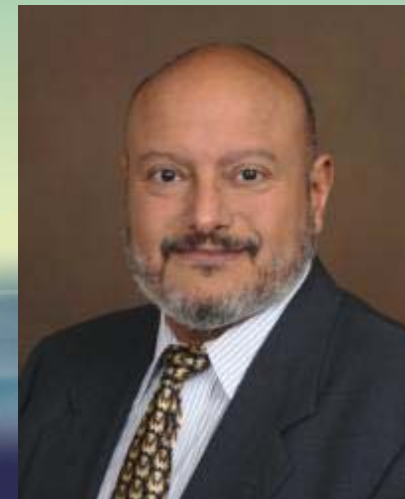


Classified Facility Communications Cabling Infrastructure Design Basics

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What is a Classified Network?

- United States (US) Government defines and assigns one of 3 levels of secrecy:

Top Secret – Highest Level

Secret – 2nd Highest Level

Confidential - Lowest Level



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Classified Info – Keeping it Secret!

- Federal and military facilities require safeguarding Classified electronic information and infrastructure.
 - Eliminating emanation of signals associated with structured communications cabling systems.
 - Countermeasures designed to reduce the risk of exploitation of information by adversaries using sophisticated electronic devices.
 - Facility and/or equipment shielding may also be required.



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What are we protecting?



- **TEMPEST**

- Study of the security of telecommunications devices that emit electromagnetic radiation.
- TEMPEST originated as a code name of a classified study by the US Military in the late 1960's.
- Later the term became an Acronym for Telecommunications Electronics Material Protected from Emanating Spurious Transmissions.



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- **TEMPEST** TEMPEST cont.

- Today the term also encompasses sound and mechanical vibrations.
- Basically any “signal” that could be exploited to compromise information. (including unintentional radio or electrical signals, sounds, and vibrations)



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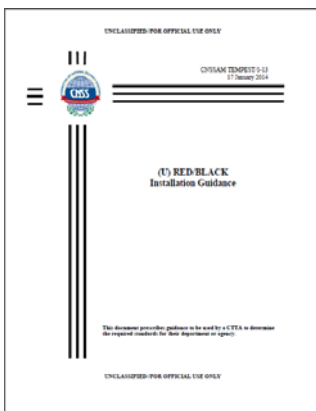
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Who provides Guidance?

Committee on National Security Systems (CNSS)

- Sets policy for security of the US security systems.
- CNSSAM TEMPEST/1-13 (CNSS Advisory Memorandum), the RED/BLACK Installation Guidance. [Supersedes NSTISSAM TEMPEST/2-95 and TEMPEST/2-95 Addendum February 2000]
- The primary standard for structured cabling.
- Measures are also known as emissions security (EMSEC) which is a subset of communications security (COMSEC).



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Who Approves?



- **Certified TEMPEST Technical Authority (CTTA)**
 - Experienced, technically qualified US Gov't employee providing guidance/solutions for facilities, system and equipment identified as requiring TEMPEST countermeasures.



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RED/BLACK Installation Guidance - Concept ^{AECOM}

- **RED/BLACK** Installation Guidance (CNSSAM TEMPEST/1-13)
 - Separating electrical and electronics circuits, components, equipment, and systems into:
 - **RED** - handles unencrypted Classified or what is called National Security Information (NSI).
 - **BLACK** - handles non-national security and properly encrypted NSI.



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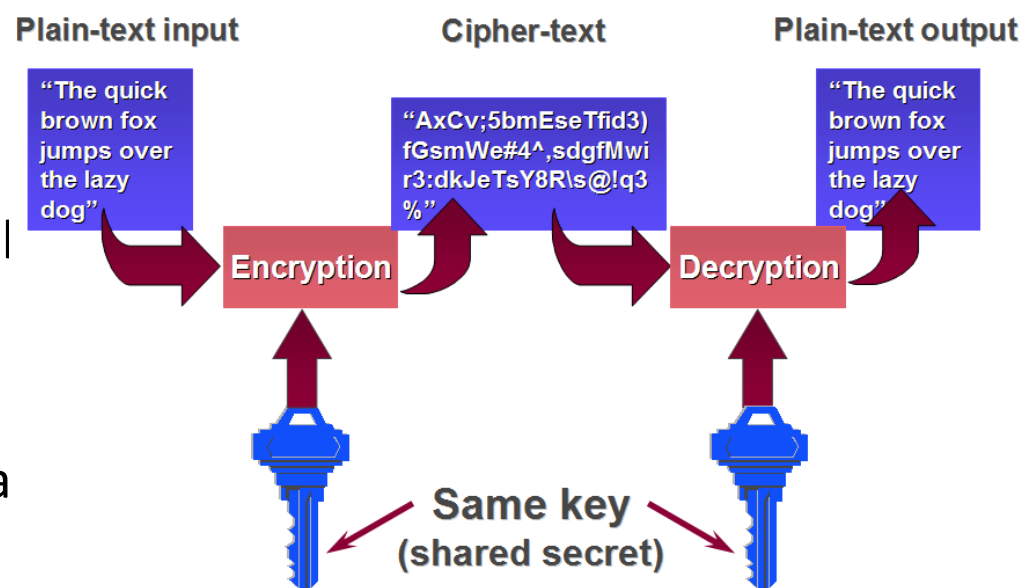
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RED/BLACK - Separation

- Separation is composed of 2 parts:

- Physical Separation - RED/BLACK physical separation to decrease probability of EMI/EMR between RED and BLACK.
- Electrical Separation - Addresses signal distribution, power distribution, a grounding. Port-to-port isolation of switches is also applied.



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RED/BLACK - Facility Considerations

- First steps in selection of proper RED/BLACK controls for the facility is:
 - Identify geographic location.
 - Level and type of Classified data processed.
 - Inspectable Space.



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RED/BLACK – Physical Considerations

- Physical security is a key element in deciding which RED/BLACK countermeasures will be implemented.
- “Inspectable Space” is an important factor in determining necessary safeguards for equipment and systems that process NSI.
- Security officials, the CTTA, and/or others responsible for certifying the building should be involved in facility planning.



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Inspectable Space

- **Definition-** amount of three dimensional space surrounding equipment that processes classified and/or sensitive information within which TEMPEST exploitation is not considered practical or where legal authority to identify and remove a potential TEMPEST exploitation exists and is exercised. This space is determined by the Certified TEMPEST Technical Authority(CTTA). **Often times the CTTA may require exceeding the minimum requirements due to specific threats.**



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Inspectable Space

- Often times CTTA's are overly cautious about required countermeasures. Countermeasures required are in CNSSI No. 7000 which is classified Confidential.



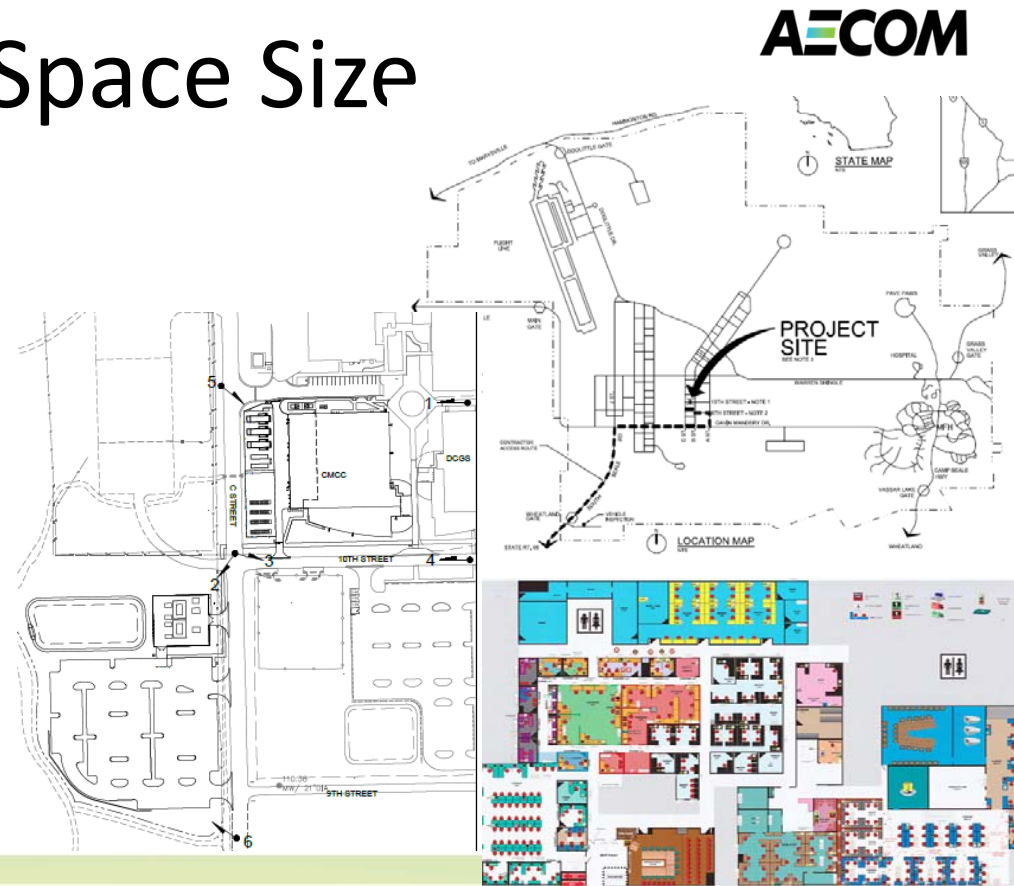
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Inspectable Space Size

- Inspectable space is defined by the cognizant CTTA.
- Categorized by distance:
 - Less than 20 meters (m).
 - Greater than or equal to 20m, but less than 100m.
 - Equal to or greater than 100m.



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Required 3 Levels of RED/BLACK Isolation ^{AECOM}

- 3 levels of RED/BLACK isolation Levels.
 - Level I - most stringent
 - Level II - less stringent
 - Level III – least stringent
- Levels correspond to the level of protection need to contain compromising emanations within inspectable space.



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RED/BLACK Requirements Level Matrix **AECOM**

This table is random sample of Requirement Level Matrix.

Location	Classification Level	Inspectable Space (IS)	Level
Within the US	Collateral Secret and below	< 20 meters	Table 4
Within the US	Special Category and Top Secret	>/= 100 meters	Table 4
Outside the US	Special Category and Top Secret	< 20 meters	Table 4
Outside the US	Collateral Secret and below	>/= 20 meters but < 100 meters	Table 4
Outside the US	Special Category and Top Secret	>/= 100 meters	Table 4

Table 4 is U//FOUO so levels are not shown.



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Facility RED/BLACK Physical Isolation

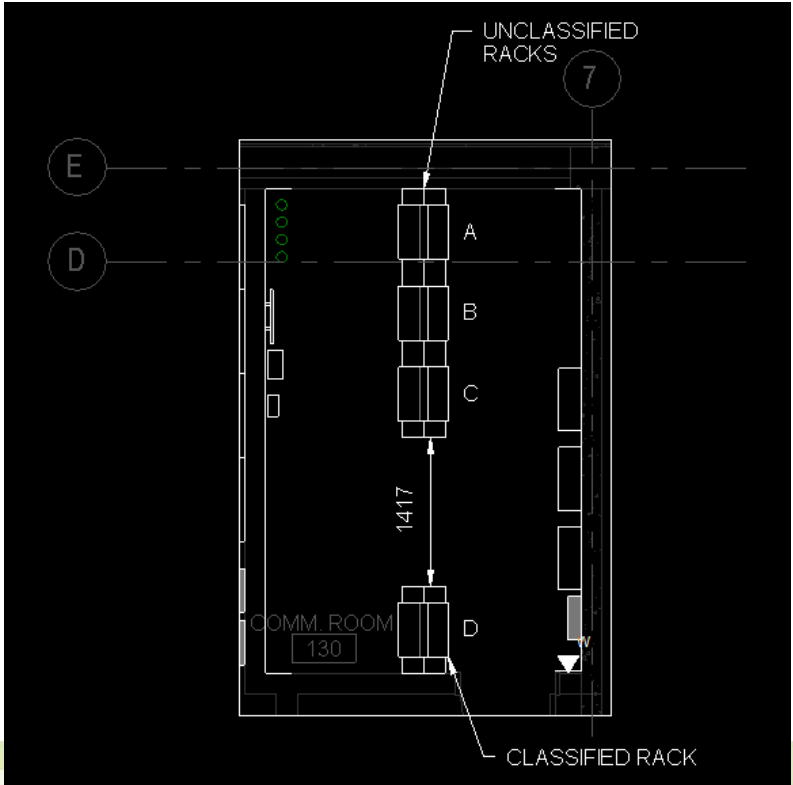
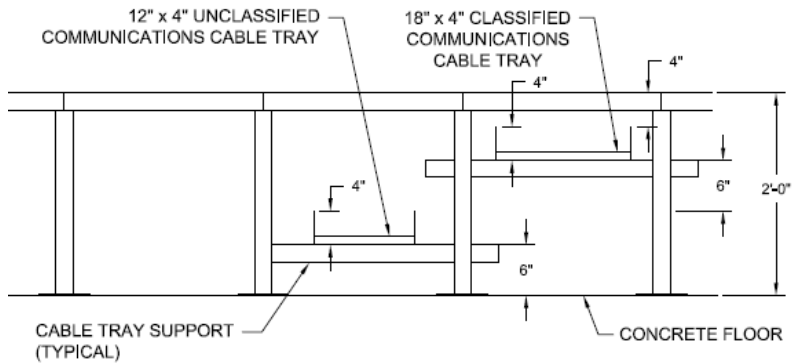


Requirement	Common Criteria
RED equipment to BLACK wires that connect to a transmitter.	1 m
RED equipment to BLACK wires that directly leave Inspectable Space (IS).	1 m
RED equipment to BLACK equipment with lines that leave IS.	1 m
RED equipment to BLACK wires that leave IS through digital switch.	50 cm
RED equipment to BLACK equipment with lines that connect to RF transmitter.	50 cm
RED wires to Black wires that leave the IS or connect to RF transmitter.	5 cm /15cm*
RED wires are shielded.	Yes
RED lines have distinguishing marking or color coding for identification.	Yes
RF wires such as CATV and satellite TV isolated within the IS.	Yes

- * RED Parallel runs up to 30m to be separated by a minimum of 5 cm (2"). Runs with over 30m separation shall be 15 cm (6"). Cables crossing at 90deg shall be separated by 5 cm.
- Connectors to be a minimum of 5cm apart.

Equipment Separation – Telecommunications Room

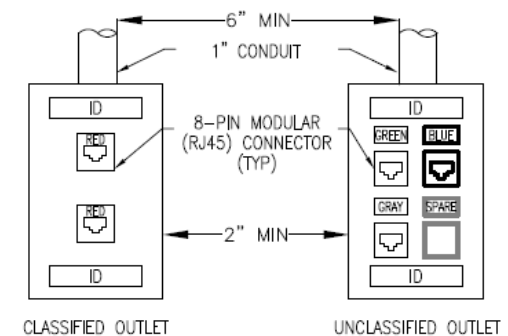
- Equipment - **RED** Black Separation.
- Cabling - All levels of classified Red cabling can be run together. Red must be separated from Black.



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RED Systems – Distribution & Patching

- Separate **RED** and Black Distribution panels.
- Separate distribution panels for each classification level of NSI and for each Special Category of NSI.
- Separate outlet boxes for **RED** and Black.
- Keyed connectors at both outlet and distribution panels, should be used for different classifications levels, unclassified levels and compartments of data, but is not mandatory.



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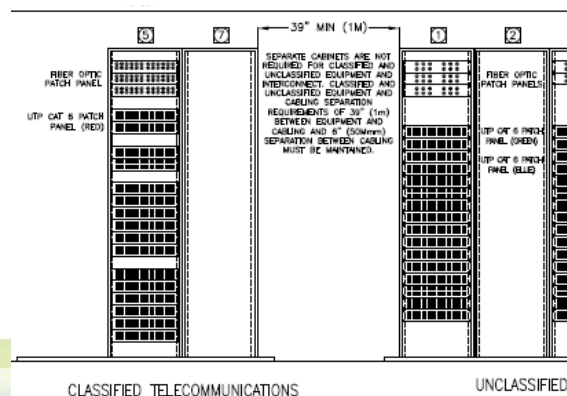
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RED Systems – Distributing & Patching – cont.

- Non-Keyed Fiber connectors require separation at the patch panels and outlet boxes for differing Classified systems.

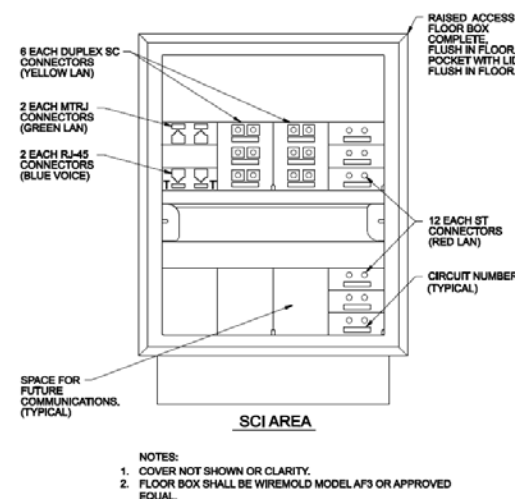


- Keyed/Dissimilar Connectors are required if combination Outlets or Patch Panels are used.



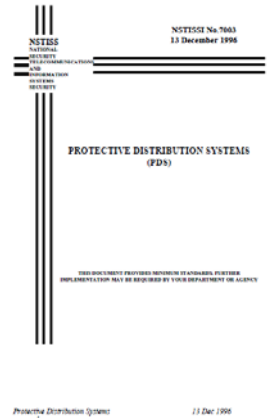
Exceptions

- Fiber Cable
 - No Separation required. But outlet and Patch Panels may require separation if Dissimilar connectors are not used.
 - Some agencies will still require Red/Black Separation
- Shielded
 - No separation required.
 - Most agencies will still require Separation.
 - When shielded cable is required, the wireline pairs or wireline bundles shall be individually shielded or shall have a minimum of one overall shield, and the cable shall have an outside non-conductive sheath. Screened cable is another term used for a cable with one overall shield. The shield shall be a non-ferrous metallic foil shield with an uninsulated and tinned drain wire or shall be a braided metallic shield with a minimum of 85 percent coverage. Except for coaxial cables, the shield shall not be used as a signal return or a signal carrying conductor.



RED Systems – Protected Distribution System

- RED cables traversing an area controlled to a lower level of classification or access control shall be in a Protected Distribution System (PDS) in accordance with NSTISSI No 7003 (not CNSSI No 7003, typo in Red/Black Reference).
- Request site specific requirements from CTTA. DOCUMENT
ALL Direction provided.
- PDS Types:
 - Simple - constructed of wood, PVC or EMT.
 - Hardened - EMT, ferrous conduit or pipe, or rigid-sheet steel ducting



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Protected Distribution System (PDS) - Example

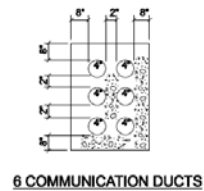
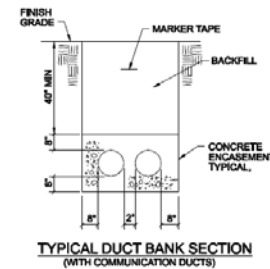
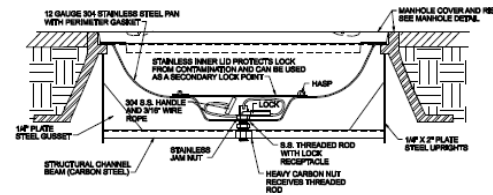
Underground Special Requirements

- CONUS –Concrete encasement encouraged but not required
- OCONUS- 8 inches of concrete or steel container
- 1 meter deep minimum but greater depth may be required by CTTA
- MH's with GSA Approved Lock or alarm.



Special Requirements

- Manhole covers Welded shut
- Since 9/11 some bases lock all manholes
- 8' deep duct bank
- Common to apply OCONUS requirement in US.



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Access Areas and Threat Areas



- 3 levels of access areas are:
 - Controlled Access Area (CAA) - direct physical control within which unauthorized persons are denied access. Even with granted access they must be escorted by authorized persons or under continuous surveillance.
 - Special Type CAA - Open Storage is a secure room or vault that has met certain construction standards and PDS is not required inside.



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Access Areas and Threat Areas – cont.



- Limited Controlled Area (LCA) - The space surrounding a PDS within which exploitation is not considered likely or legal authority to identify or remove a potential exploitation exists. .
- Uncontrolled Access Area - An area open to the public. PDS required.



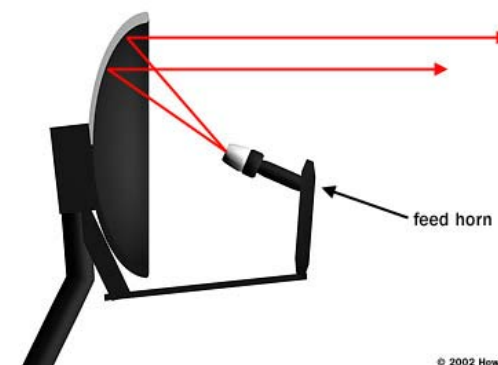
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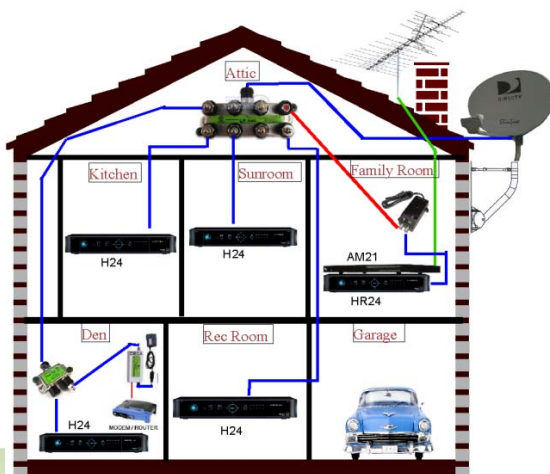
CATV and Satellite TV Isolation

- Cables shall be isolated before the cables leave the inspectable space.
- For SCIFs and SAPFs, the isolation must be within boundary of the SCIF or SAPF.
- May be achieved by:
 - convert copper wireline to fiber optic.
 - A 12 dB minimum gain one-way RF amplifier and a 12 dB min. loss RF attenuator inline with the cable.



CATV and Satellite TV Isolation

- Not required for receive-only systems entirely contained within inspectable space



- Cables that connect to audio/visual systems that also display NSI must meet electrical isolation requirements.



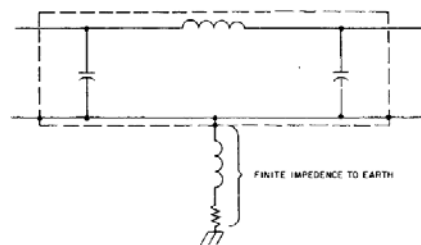
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Power Considerations

- Requirement for **RED** power (power filter) determined by a CTTA.
- RF transmitters shall not be powered from same circuit as **RED** equipment.
- **RED** power distribution must be designed such that neither BLACK equipment nor utility equipment is connected to it.
- Need is dependent
 - On size Inspectable Space.
 - Location and size of transformer.
 - Presence of foreign nationals
 - Specific Threat
- Typical Power Filter application
 - Inside large Military Base in CONUS- None
 - Commercial Tenant Space- Filter
 - Overseas Base share with allies- Filter



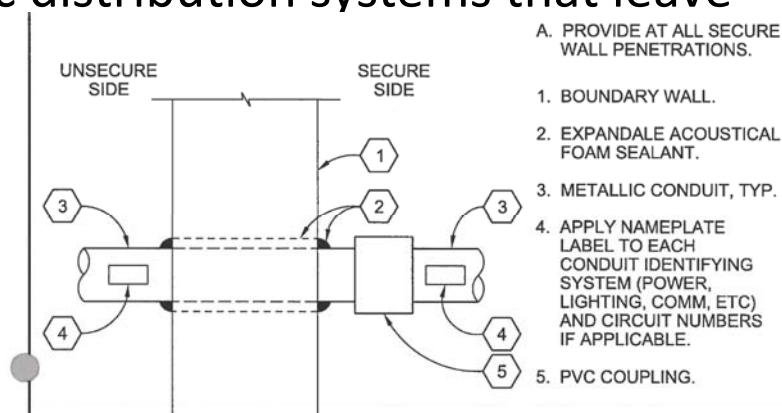
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Fortuitous Conductors

- CTTA may require isolation of fortuitous conductors.
- All pipes, conduits, ducts, and other metallic distribution systems that leave the inspectable space
 - Ground within inspectable space.
 - Or
 - Non-conductive sections to be inserted
 - Electrical isolation
 - Acoustic isolation
- Unused cables that leave the inspectable space are to be removed or shortened to be contained within the inspectable space.



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Practical Applications Slide



Requirement	Typical Practice
Red-Black separation only Required if Black exits IS	Red Black always separate.
Dielectric Breaks may be required by CTTA but no specific criteria is provided	Many CTTAs will require, though the effectiveness is questionable if shielded walls are not applied as well.
Alarmed Exterior PDS	Alarms rarely employed due to nuisance alarm.



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Conclusion



Any questions?

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