LA CCTV Supply
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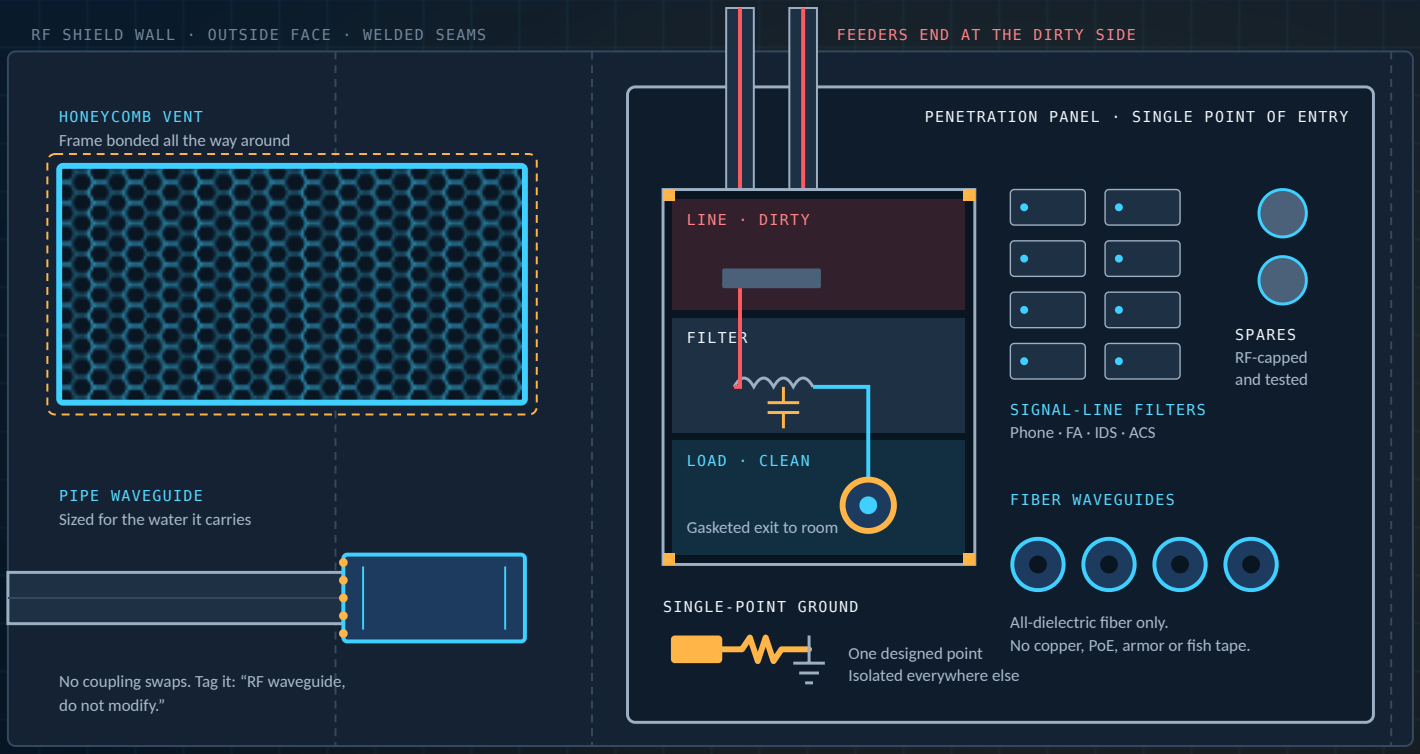
FIELD GUIDE · PUBLIC EDITION
SEPTEMBER 2026

RED / BLACK | EMI / RFI FILTERS | WAVEGUIDES | SHIELD PENETRATIONS

RED/BLACK, Filters & Shield Penetrations

Field Guide for GCs & Installers

Line side versus load side, bonding, stored charge, dielectric breaks, waveguides, fiber entries and the no-fastener rule, explained for the people who actually build the room.



ILLUSTRATIVE · NOT TO SCALE

DIRTY OUTSIDE
Line side stays outside the shield. Load side feeds the room.

BOND THE CASE
Metal-to-metal, paint-free, short and wide.

DISCHARGE FIRST
Lock out, wait, verify, short. Then open.

NOTHING METAL IN A WAVEGUIDE
A wire in a tube is a coax with no cutoff.

NEVER THROUGH THE SHIELD
Surface, raceway or furred wall. Report every hole.

For general contractors · electricians · low-voltage installers · fire protection and mechanical trades · project managers

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01

BASICS · READ FIRST

RED, BLACK and the boundary you are building

Every wire, pipe, duct and fastener that crosses a secure boundary is a possible path out. Here is how common crossings are treated, and who decides what is not yours to decide.

READ THIS FIRST · IMPORTANT NOTICE

Educational, public-level information. Not a design, a specification or legal advice, and not affiliated with or endorsed by ODNI, NCSC, DoD, DCSA, NSA or UL Solutions. Product names are vendor examples, not requirements or endorsements.

- **No RED/BLACK separation distances,** no shielding attenuation requirements and no dielectric-break lengths appear here. Those come only from the CTTA's TEMPEST Countermeasures Review (TCR), the shield designer and the stamped drawings.
- **Your AO, CTTA, shield vendor, electrical engineer of record and AHJ decide.** Where this guide and your project documents differ, the project documents govern.
- **Historical documents are labeled.** Superseded handbooks are quoted to explain the physics, never as current requirements.
- **Do not send classified information, CUI, TEMPEST findings or facility addresses by unencrypted email.** TEMPEST information is "classified at a minimum of CONFIDENTIAL when associated with a physical location" (UFC 4-010-05 §1-16.3).

RED and BLACK in jobsite terms

Term	What it means on a jobsite
RED	Equipment, wires and signals carrying **unencrypted classified** information
BLACK	Equipment and signals carrying only encrypted or unclassified information. That normally includes building power, phones, the unclassified LAN, fire alarm, BMS, IDS, access control and CCTV.
Compromising emanations	Accidental radiated or conducted signals that reveal what equipment is processing
Fortuitous conductor	Metal never meant to carry signals that carries them anyway: conduit, pipe, duct, cable armor, steel strength members

TEMPEST is a covername, not an acronym. NIST's public glossary (citing CNSSI 4009) defines it as the "investigation, study, and control of unintentional compromising emanations." The formal RED/BLACK wording people quote comes from superseded NSTISSAM TEMPEST/2-95 (Historical).

Why an unshielded SCIF still needs discipline

Shielding is threat- and site-driven. The Tech Spec installs RF protection "at the direction of the CTTA when a SCIF utilizes electronic processing and does not provide adequate RF attenuation at the inspectable space boundary" (3.C.4). Conducted leaks do not need a missing shield:

- A BLACK cable that leaves the SCIF can pick up RED signals if it is bundled with RED cable.
- Metal conduit, pipe and duct can carry signals out of the room.
- Poor grounding puts RED return currents on shared paths.

So every job depends on the basics: follow the drawings and CTTA notes, label RED and BLACK, never mix them, use fiber where it is called for, and add no unplanned metallic penetrations.

VERIFY WITH YOUR AO Whether your SCIF gets a shielding recommendation depends on its location, the equipment and the CTTA's review. Do not assume "no shield" or "full shield" before that review is done.

Two kinds of boundary, often opposite logic

Crossing item	RF-shielded enclosure	Non-shielded SCIF perimeter (only where the CTTA directs)
Power	Filter at the shield; bonded case; gasketed clean-side penetration	Power filters per the CTTA; otherwise normal single-point entry (Tech Spec 3.G.4)
Low-speed signal	Signal-line filters at the shield: phone, fire alarm, IDS, ACS	Filters, isolation or separation per the CTTA
Ethernet and data	All-dielectric fiber through a waveguide plus media converters, or a CTTA-accepted data filter	Fiber or separation per the CTTA
Metal conduit, pipe	**Bond it: welded or 360° bonded at the shield; openings sized as waveguides**	**Break it or ground it: dielectric break or grounding (Tech Spec 3.G.2)**
HVAC duct	Bonded honeycomb waveguide vent	Acoustic and bar/grille rules; dielectric duct connection if the CTTA directs
Sprinkler, water, drain	Engineered pipe waveguide, welded or bonded	Dielectric break or grounding if the CTTA directs

SOURCES IC Tech Spec v1.5.1 · UFC 4-010-05 · NIST glossary: TEMPEST · NSA, TEMPEST: A Signal Problem · NSTISSAM TEMPEST/2-95 (historical)

02

POWER-LINE FILTERS

Line side vs load side

Electricians ask it often about shielded rooms, and it has one answer. A filter only works when the unfiltered conductors never enter the protected space.

THE RULE **Dirty side outside. Clean side inside. Case bonded to the shield.**

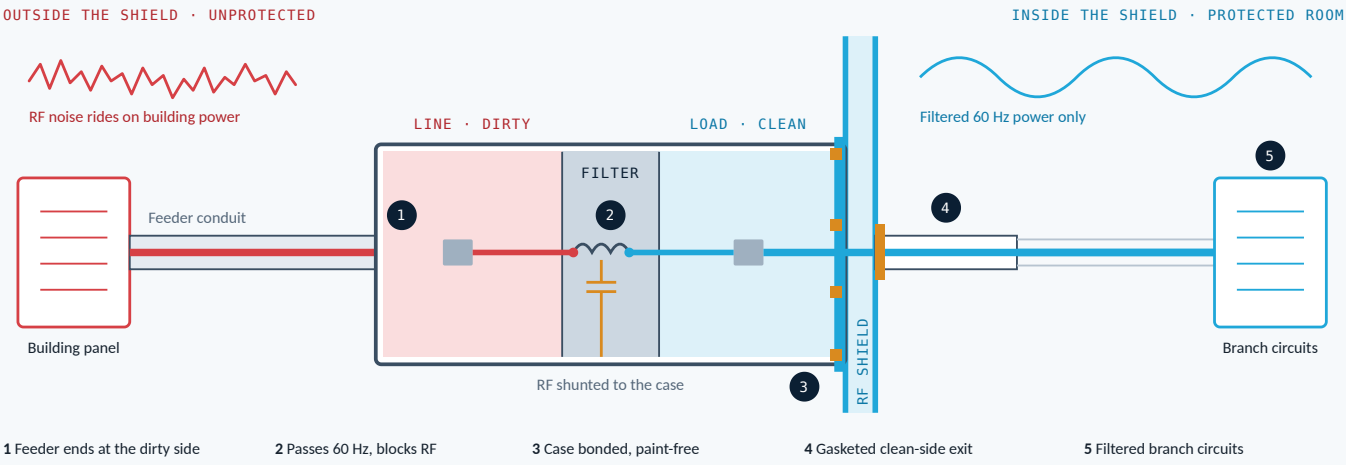
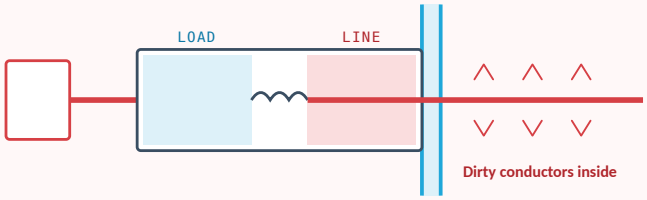


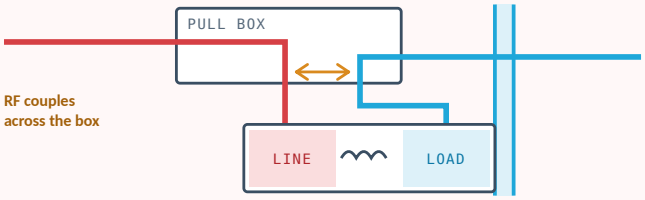
Figure 2.1 · A correct installation. The feeder conduit terminates at the line (dirty) compartment; only filtered conductors leave through the gasketed penetration. ILLUSTRATIVE · NOT TO SCALE

× WRONG: LINE AND LOAD REVERSED



Unfiltered conductors now run inside the protected room. RF radiates inside the shield and RED signals can couple onto them. The filter is in the circuit, but the conductors that matter bypass it.

× WRONG: DIRTY AND CLEAN IN ONE BOX



RF jumps from input to output wiring and bypasses the filter completely. It looks neat, it passes the electrical inspection, and it fails the shield test.

Side	Also called	Carries	Located
LINE	Input · dirty · unfiltered	Building power, including any RF noise	**Outside** the boundary
LOAD	Output · clean · filtered	Filtered power for equipment in the room	**Inside** the boundary

Manufacturers agree. Premier: mount “as close as possible to the entry point” and “maintain physical isolation and separation between filter input and output wires.” ETS-Lindgren: outputs are “EMI isolated from the inputs.”

FIELD NOTE **Trace every conductor before energizing.** If any conductor skips a step, stop.

Panel → Dirty compartment → Filter → Clean compartment → Gasketed penetration → Inside

TRAP An electrician “cleans up” the install by pulling line and load conductors through the same pull box above the ceiling. Fixing it after the shield test means opening the panel and retesting. Rating and range come from the CTTA or shield designer, never a catalog.

SOURCES ETS-Lindgren EMI/EMP filter manual · Astrodyne TDI shielded facility filters · Premier: filter installation best practices · Genisco: how EMI/RFI filters work

BONDING & GROUNDING

03 Bond the filter, ground the shield once

A filter works by dumping RF through its capacitors into its metal case, so the case has to be electrically part of the shield. The shield, in turn, connects to the building ground at one designed point and nowhere else.

THE RULE **Short, wide, paint-free bonds. One ground point. Ask before bonding.**

Bonding the filter case

- **Metal-to-metal.** Premier: bond the housing "via metal-metal connection," with mating surfaces "void of paint or other insulating material."
- **Low impedance.** Holland Shielding: filters should connect "with a low impedance to the body of the shield."
- **Short and flat.** Use a direct flange bond or short flat braid, not long round wire. Historical 2-95: "a long slender ground wire is not an effective RF ground."
- **Gasketed exits.** ETS-Lindgren: "All filter penetrations include attached conductive elastomeric gaskets." Genisco and Premier offer gasketed or threaded-pipe outputs.

Conduit item	Rule
Feeder (line side)	Terminates at the dirty compartment. Never continues through the shield on its own.
Clean-side conduit	Leaves through the gasketed or threaded penetration into the room
Spare or future conduit	Not open. Tech Spec 3.G.6 "acoustic fill and capped" is acoustic only; on an RF shield a spare also needs an RF closure the shield vendor details and the test covers
Hangers and strut	Never touch or pierce the shield except at designed bond points

TRAP Painting the shield or filter flange after installation, or mounting on a surface "because the paint was already there." Paint is an insulator at the bond, and the rated dB is never achieved.

One designed ground point for the shield

The shield connects to the building grounding system at **one designed point** and is isolated from incidental contact everywhere else. That avoids ground loops that drive currents across the shield surface.

- **The safety ground is still required.** Holland Shielding: connect the shield to the building's common ground "only for safety reasons." Filters need a continuous equipment grounding conductor (ETS-Lindgren).
- **No separate "clean" earth rod.** An unbonded electrode is a safety and code problem. The EE of record and AHJ confirm the electrode system.

HISTORICAL NSA 94-106 (1994) called for "a single ground lug connected to the shield surface," with the shield tested for isolation when that lug was disconnected. History only: ground location and isolation criteria now come from the shield vendor, EE of record and AHJ, with CTTA concurrence.

Conduit at a shield: two views, one answer

MIL-HDBK-1195 (Historical) says a penetration that must be metal is "continuously bonded electrically around the periphery … (welded or brazed)." In Compliance Magazine (practitioner) warns that bonding the shield to building conduit, plumbing and ducts "will likely reduce the overall shielding performance." Both reject casual clamp-on bonds. **Build each penetration exactly as the shield designer details it, keep everything else off the skin, and prefer fiber for data.**

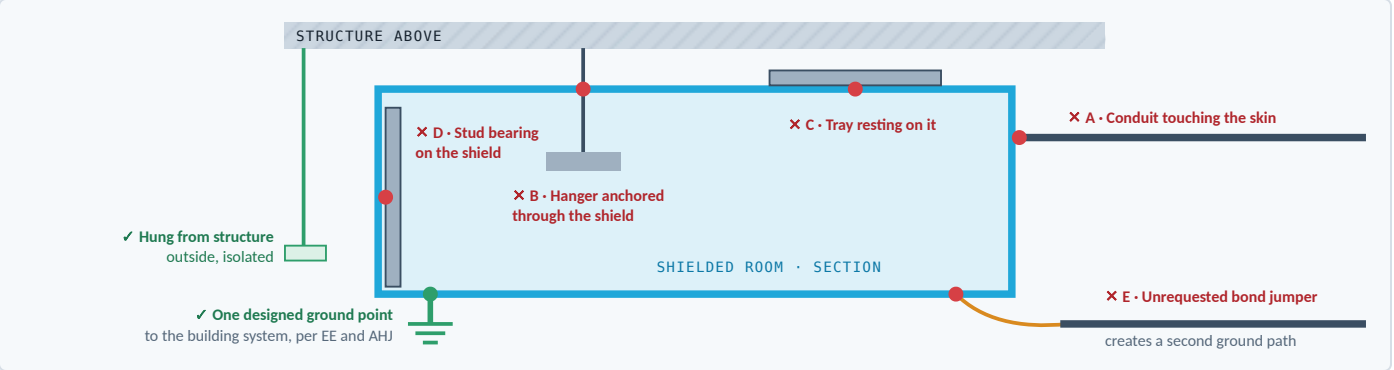


Figure 3.1 · Incidental contacts break single-point grounding. Fix each per the shield detail: isolate, hang from structure outside, or use stand-offs. ILLUSTRATIVE · NOT TO SCALE

SOURCES Premier: installation best practices · Holland Shielding: 101 tips · ETS-Lindgren filter manual · In Compliance, part 2 · MIL-HDBK-1195 §2.6.4 (historical) · NSA 94-106 (historical)

ELECTRICAL SAFETY

04 Stored charge, leakage and generators

Large filter capacitors hold charge after the breaker opens, leak current to ground by design, and draw reactive power that a standby generator may not tolerate. Plan for all three.

THE RULE **A dark room is not a dead filter. Lock out, wait, verify, short.**

1

Lock out & tag out

The feeder and every other source, including any UPS or generator.

2

Wait

At least the discharge time on the filter label. Bleeders take time and can fail silently.

3

Verify zero

Rated meter on every line terminal, to ground and line to line.

4

Short it

Apply a shorting stick per the manufacturer's instructions.

5

Then open

Only now open the compartment or touch terminals.

A de-energized filter can still bite

Manufacturers add bleeder (discharge) resistors, but the drain takes time. Read the label on your unit; these are examples:

Source	Published statement
ETS-Lindgren manual	"AUTOMATIC BLEEDER RESISTORS DISCHARGE THE CAPACITORS TO 50 V FIVE (5) SECONDS AFTER POWER IS REMOVED."
ETS-Lindgren manual	"USE A SHORTING STICK… PRIOR TO TOUCHING THE FILTER."
Captor	"Discharge to less than 30 Volts within the 30s after power removal"
Genisco	"Discharge resistors… eliminate potential shock hazards"

This is a general caution. The detailed procedure comes from the filter manufacturer and your electrical safety program.

TRAP Assuming the filter is dead because the lights in the room went out. Downstream loads can be off while the capacitors are still charged.

Leakage current and GFCIs

A filter's line-to-case capacitors pass a small continuous 60 Hz current to ground. It is not a defect, and it adds up across every filter and phase on a feeder. Captor publishes "5mA maximum @ 120 VAC" for one TEMPEST filter; personnel GFCIs trip at about 5 mA. That leakage can nuisance-trip a GFCI upstream of a filter.

- **Never lose the ground.** ETS-Lindgren: "provide uninterruptible safety earth ground from the main power source to the product input wiring terminals." Without it, the case (bonded to the shield) can carry hazardous voltage.
- **Never lift grounds** to stop nuisance trips, and coordinate any megger or hi-pot test of a filtered feeder with the filter manufacturer.
- One approach engineers evaluate is code-required GFCI protection on load-side branch circuits, coordinated with total filter leakage.

VERIFY WITH YOUR AO GFCI and ground-fault placement around filters is an engineering-review item, not a rule. The filter vendor, the electrical engineer of record and the AHJ decide it together.

Generators, UPS and kVAR

The problem

High-capacitance filters draw reactive power (kVAR) even at idle. Premier documents that they can "Overload generator capacity," "Cause voltage instability" or "Prevent generator startup altogether."

Mitigations

Include total filter kVAR in generator and UPS sizing; consider low-kVAR designs (vendor claims); test start and transfer with filters energized during commissioning.

Who needs to know

EE of record, generator and UPS vendors, filter vendor and commissioning agent. Flag "shielded room + generator" at design development, not at startup.

SOURCES ETS-Lindgren filter manual · Captor shielded-room filters · Captor TEMPEST filters · Genisco power line filters · Premier: filters and generator startup · Residual-current device · UFC 4-010-05

METALLIC PENETRATIONS & LOW-VOLTAGE LINES

05 Dielectric breaks and every other conductor

Metal that crosses a boundary can carry signals picked up inside to the outside. The treatment depends on the boundary, and the logic is often opposite.

THE RULE **Non-shielded wall: break or ground, as directed. Shield: bond it.**

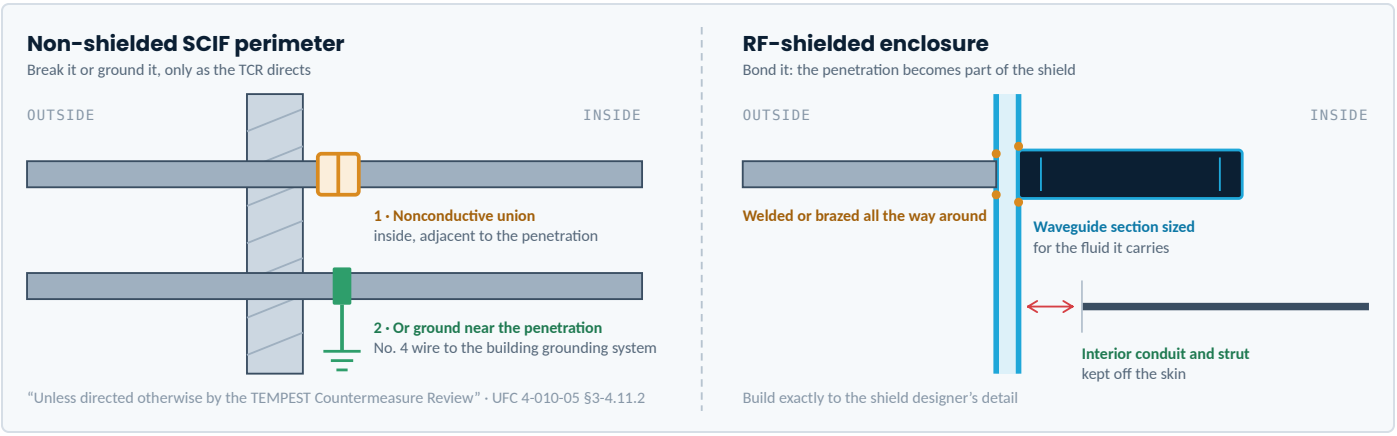


Figure 5.1 · Opposite logic at two kinds of boundary. No break lengths or locations are given here: take them from the TCR, the stamped drawings or the UFC detail your project cites. ILLUSTRATIVE · NOT TO SCALE

Dielectric breaks

A dielectric break is a short non-metallic section spliced into a metal pipe, conduit, duct or tray: a dielectric union, an insulating flange kit or a non-conductive flexible duct connector, listed for the system it is installed in.

- **The requirement:** "Metallic penetrations may require TEMPEST countermeasures, to include dielectric breaks or grounding, when recommended by the CTTA" (Tech Spec 3.G.2).
- **Why:** historical 2-95 warned that a conductive sleeve around lines leaving the inspectable space "can become a fortuitous conductor and could require isolation."
- **DoD treatments** (UFC 4-010-05 §3-4.11.2): non-conductive duct connections, non-conductive conduit unions, and grounding of conduit, sprinkler pipe and refrigerant lines near the penetration.
- **Code:** non-metallic sections in sprinkler, gas or fire-rated assemblies must be listed for that use and firestopped. Coordinate with the fire protection engineer and the AHJ before ordering.

TRAP A plumber replaces a dielectric union with a brass one during a leak repair years after accreditation. Put breaks on the as-builts and tag them in the field.

Signal, phone and data lines

Every telephone pair, fire alarm loop, door contact, reader cable and data line is a path too. A signal-line filter is also low-pass, tuned to pass the wanted signal. That works for phones, fire alarm loops, relays, dry contacts and low-speed serial, and is difficult for high-speed Ethernet.

Device inside a shielded room	Typical treatment (per design and CTTA)
Readers, keypads, REX, door contacts, electrified locks	Signal-line filters at the penetration panel, or fiber
IDS sensors to the PCU	Filtered conductors or fiber; PCU location follows IDS rules
IP cameras, network devices	Fiber and converters on filtered power. No PoE copper through the shield.
Fire alarm and notification	Listed filters, coordinated with the AHJ and the "no audio back feed" rule

VERIFY WITH YOUR AO Whether a filtered copper data path is acceptable instead of fiber is a CTTA call. So is whether BLACK fiber may share pathways with RED equipment.

FIELD NOTE Count every conductor before the shield vendor builds the penetration panel. A missed two-conductor door contact found after the shield test means a new penetration and a retest.

SOURCES IC Tech Spec v1.5.1 · UFC 4-010-05 · NSTISSAM TEMPEST/2-95 (historical) · Captor signal-line filters · Genisco communication filters · Holland Shielding: 101 tips

WAVEGUIDES & WATER

06 Waveguide-beyond-cutoff, in plain English

Radio waves need room to travel down a metal tube. If the tube is narrow compared with the wavelength, the wave cannot "fit" and dies out along the tube, while air, water or light pass freely. That is how vents, pipes and fiber cross a shield.

THE RULE **Air, water and glass may pass a waveguide. Metal never does.**

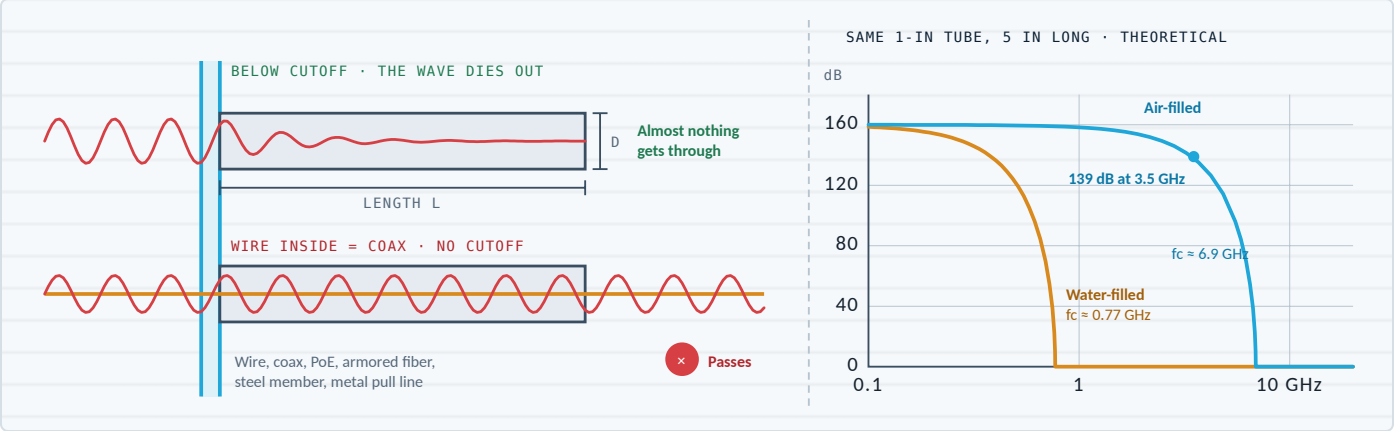


Figure 6.1 · Below cutoff, attenuation grows with every diameter of length; a conductor inside makes a coax with no cutoff. The chart plots the worked example. THEORETICAL · NOT A DESIGN VALUE

The math, for sanity checks only

The opening sets the cutoff frequency (smaller opening, higher cutoff); the length sets the attenuation below cutoff.

```
Circular, diameter D fc ≈ 17.6 / D(cm) GHz
Rectangular, side a fc ≈ 150 / a(mm) GHz
Below cutoff A ≈ 32·L/D dB (rect. 27.3·L/a)
At 0.5 fc ×0.87 · water (εr ≈ 80): fc ÷ 9
```

Worked example · 1-inch tube, 5 inches long, air-filled		
Cutoff	17.6 / 2.54	**fc ≈ 6.9 GHz**
Length in diameters	5 in / 1 in	L/D = 5
Well below cutoff	32 × 5	**≈ 160 dB, theoretical**
At ≈ 3.5 GHz	160 × 0.87	**≈ 139 dB, theoretical**
Above ≈ 6.9 GHz	Propagates	**No protection**
Filled with water	6.9 / √80	**fc ≈ 0.77 GHz**

The math is ideal. Real limits usually come from the weld or bond where the tube meets the shield. **The shield vendor's tested design governs, not a hand calculation.**

HISTORICAL MIL-HDBK-232A described a waveguide for plastic pipe as a metal pipe with a length "five times its diameter," the likely origin of rules of thumb that still circulate. They are not verified current requirements.

Sprinkler, water and drain pipes

A sprinkler main is a metal pipe crossing the shield. The shield-side answer is an **engineered pipe waveguide**: a metal section welded or bonded to the shield, sized so the frequencies of concern stay well below cutoff. **Water lowers the cutoff about nine times**, so a waveguide sized for air can fail badly once the system is charged. Wet-pipe sprinklers are always full. Mains serving other tenants "shall not transit the SCIF unless mitigated with AO approval" (3.G.3).

Discipline	Resolve before fabrication
Fire protection engineer	Listed waveguide fitting; pipe size and flow; hydraulic calculations include it
Shield vendor	Diameter and length for the fluid; weld or bond detail; included in the test
AHJ	Acceptance of the fitting and any non-metallic sections; firestopping
Mechanical / plumbing	Drains, condensate and refrigerant lines get the same review

TRAP A "temporary" copper cable pulled through the fiber waveguide, or a standard coupling swapped for the waveguide section because it "matched the pipe size." Both fail. Tag each waveguide "RF waveguide: do not modify."

SOURCES RF Cafe: waveguide formulas · Cutoff frequency · Waveguide filter · IC Tech Spec v1.5.1 · In Compliance, part 2 · MIL-HDBK-232A (historical)

AIR & DATA

07 Honeycomb vents and fiber entries

An HVAC duct is a large hole in the shield, and every copper data line is an antenna lead. Honeycomb and fiber solve both with the same waveguide physics.

THE RULE **Bond the vent frame all around. Bring data in on all-dielectric fiber.**

Honeycomb vents for HVAC

The problem. A 12-inch-wide rectangular opening has a cutoff near 0.5 GHz (5.9 / 12), so higher frequencies pass straight through it. **The solution** splits the opening into many small hexagonal cells. Each cell is a tiny waveguide with a high cutoff; together they pass enough air. Measured panels fall well short of the ideal math because seams, joints, frame bonds and finish all cost performance.

- **Cross-cell** construction uses a "minimal two layers… stepped and rotated 90 degrees" (Holland) for higher performance.
- **Bond the frame** by solder, braze, weld or "RF gasket seals" with "Monel or tin-coated gaskets" (ETS-Lindgren). An unbonded frame leaks around the honeycomb.
- **Never cut, drill or screw through the honeycomb,** and keep duct insulation pins out of it.

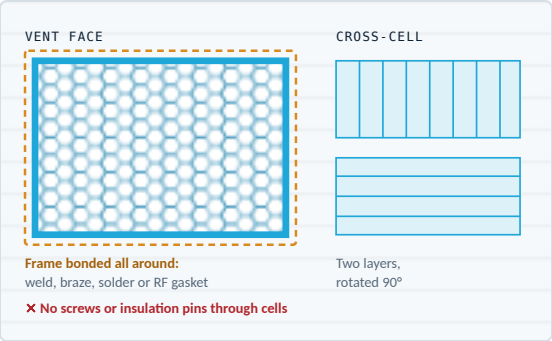


Figure 7.1 · Honeycomb vent concepts. ILLUSTRATIVE

VERIFY WITH YOUR AO Whether a honeycomb vent also satisfies the Tech Spec 3.G.7 bar or grille rule for larger openings is an AO decision. Steel beats brass for magnetic fields; the mechanical engineer owns pressure drop.

Vent example · vendor data, not requirements	Published attenuation
ETS-Lindgren steel, 3/16 in cell	Plane wave "120 dB @ 30 MHz to 1 GHz"; microwave "120 dB @ 1 GHz to 18 GHz"
Tech-Etch 1/8 in cell, 1/2 in panel	40–75 dB (chem-film) and 60–105 dB cross-cell, over 100 kHz–10 GHz
Holland 3.2 mm aluminium	80 dB at 100 MHz single layer; 105 dB cross-cell

Fiber entries and media converters

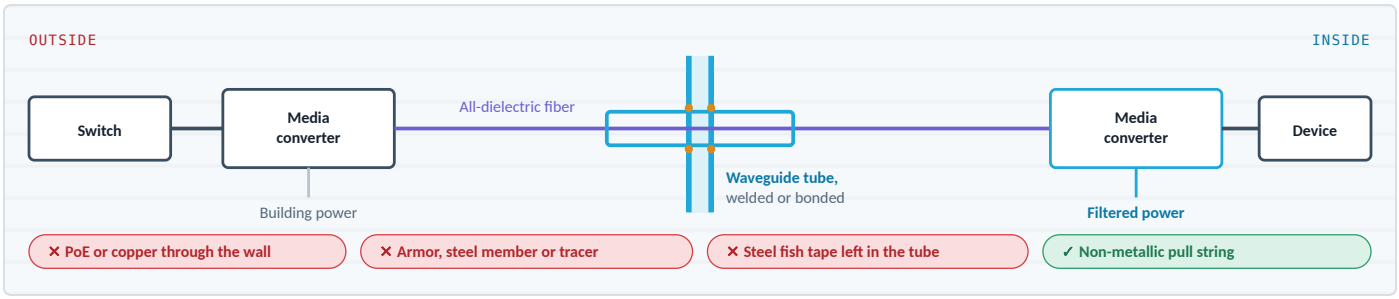


Figure 7.2 · A fiber entry. Converter power is still a conductor, so the inside converter runs on filtered or approved circuits. ILLUSTRATIVE · NOT TO SCALE

Also: strip any metal elements back **outside** the shield per the vendor and CTTA detail, size the waveguide for fiber count plus spares (a tube added later means a retest), and seal the tube per the vendor detail. Converter placement and BLACK fiber near RED equipment are **CTTA calls**.

TRAP Ordering "indoor/outdoor armored" fiber because it was in stock. The armor is a conductor. Order all-dielectric cable, or detail the strip-back outside the shield before the cable arrives.

SOURCES Tech-Etch vents · ETS-Lindgren waveguide vents · Holland honeycomb panels · Holland: 101 tips · In Compliance · IC Tech Spec v1.5.1 · NSTISSAM TEMPEST/2-95 (historical)

MOUNTING & ROUTING

08 Never fasten through the shield

A screw, anchor, powder pin, hanger rod or recessed box that pierces the treated layer is a leak you cannot see. Devices and wiring go in front of the treated layer, never through it.

THE RULE **Surface, raceway or a self-supporting furred wall. Nothing through.**

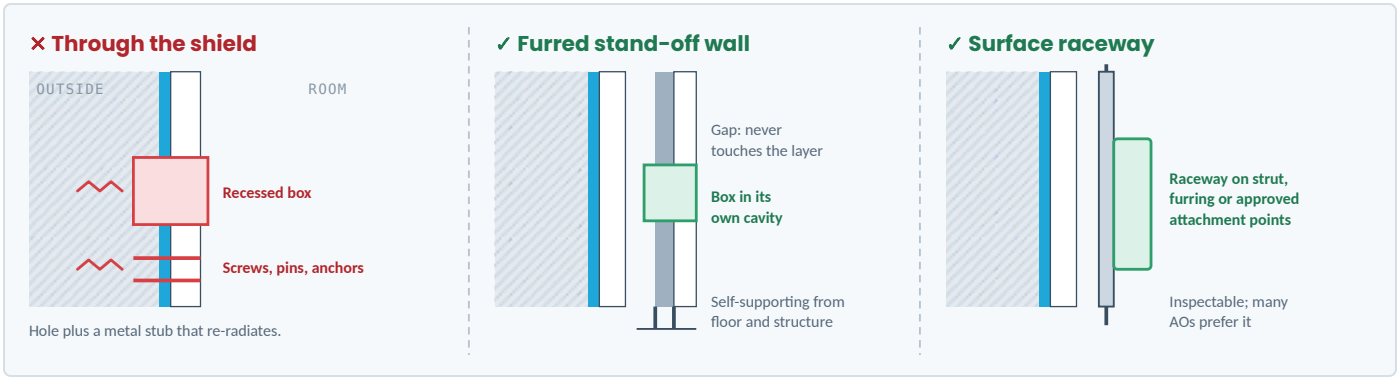


Figure 8.1 · Plan sections through a treated wall (cyan = shield or treated layer). The attachment method comes from the shield vendor's details. ILLUSTRATIVE · NOT TO SCALE

Mounting methods compared

Method	When to use	Watch for
Manufacturer Z- or L-bracket	Out-swing doors, deep acoustic frames, drop-seal housings, knife-edge frames	Flexing changes the switch gap; rigid bracket to factory prep or an inside steel plate
Non-ferrous spacers or shims	Steel doors and frames, seal thickness, uneven faces	Re-check the gap after seals take a set, then retest
Strut or standoff frame inside the shield	Welded or modular shields where nothing may touch the skin	Strut touching the shield creates a ground path; anchor to structure or vendor-approved points
Furred chase or secondary stud wall	Many devices in one area; recessed boxes wanted	Must be self-supporting; hides the boundary, and some AOs dislike it
Surface raceway or surface EMT	Retrofits, and wherever inspectability matters	Fasten to furring, strut or approved points, never through foil or shield panels
Adhesive or epoxy	Raceway clips or tie mounts only, with the shield vendor's written approval	Not documented for a UL 634 Level II switch; tape-mounted contacts drift and defeat the removal tamper. Written maker and AO acceptance first
Concealed switch in the frame	Standard hollow-metal frames	Requires drilling; avoid on RF frames unless factory-prepared

Tech Spec 3.G.5: distribution on a treated perimeter wall "shall be surface mounted, contained in a raceway, or an additional wall shall be constructed using furring strips as stand-off." UFGS 13 49 20.00 10: "Do not use self-tapping screws for attachment of shielding."

HISTORICAL MIL-HDBK-1195: "Penetrations of the shielding by screws, nails, bolts and other items shall be prohibited," and "leaks in a shielded enclosure cannot be detected by visual inspection." The handbook itself says it shall not be used for procurement; it explains the physics.

TRAP Choosing the bracket after the door is hung. By then the only "fast" option is a drill, and the frame may be part of the shield.

FIELD NOTE Ask for a door-head section drawing that shows frame, seal, shield return, bracket, fasteners and raceway together. If nobody can draw it, nobody has checked it.

SOURCES IC Tech Spec v1.5.1 · UFC 4-010-05 · UFGS 13 49 20.00 10 · MIL-HDBK-1195 (historical) · In Compliance, part 2 · Magnasphere HSS L2 accessories · Milham (practitioner)

09

DAMAGE RESPONSE & HOLD POINTS

If the shield gets damaged, and how to avoid it

Mistakes happen: a drill walks, a hanger lands in the wrong place. What turns a mistake into a failed accreditation is hiding it. A shielded room is built outside-in and tested last.

THE RULE **Stop. Report. Never caulk over it. Vendor repair, then retest.**

1 Stop
Leave the fastener in unless the vendor says otherwise.

2 Report
GC, SSM and shield vendor, same day, with a located photo.

3 Don't cover
No caulk, tape or paint. Sealant hides the leak.

4 Repair
The vendor's own method: weld on steel, approved patch on foil.

5 Retest
Area or whole room, as the vendor and CTTA direct.

6 Record
Event, repair and retest in the shield-change log.

7 Notify
If accredited, the SSO and AO decide the review.

Why reporting protects you. During construction the SSM must "Document security violations or deviations from the CSP and notify the AO within 3 business days" (Tech Spec). A reported, repaired and retested hole is a record. A hidden one is a finding.

TRAP Pulling the screw back out and assuming the hole "closed up." The foil is torn, and the test will find it after the finishes are on.

TABLE 9.1 · BUILD SEQUENCE AND HOLD POINTS FOR A SHIELDED ROOM

#	Work	Hold point
1	CTTA recommendations and shield design approved; penetration schedule frozen	**No shield fabrication before this**
2	Parent room prepared: slab, structure, outside rough-in; outside utilities stay outside	Nothing roughed through the future shield line
3	Shield erected; seams, laps or welds completed and inspected	Seam inspection before anything covers it
4	Power and signal filters, waveguides, honeycomb vents and door frames installed and bonded or welded	Bond and gasket inspection
5	Single-point ground installed; isolation verified	Isolation check before other trades connect
6	Interior raceway, furring and finishes installed without penetrating the shield	"No fasteners through the shield" walk-down; photo record before board closes (UFC 4-010-05 §4-7)
7	Door hardware, low-voltage devices and media converters installed; converters on filtered power	No copper through the waveguides; spares closed
8	**Shielding effectiveness test** (the method and edition the contract names) after everything above; repair and retest	**Passing report.** Method, frequencies and pass/fail levels were set by the contract or CTTA before design
9	Turnover: filter, door and gasket maintenance documents; AO and CTTA acceptance	O&M and as-builts delivered through controlled channels
10	After occupancy, any penetration change goes through review, then retest	Shield-change log maintained

TRAP Testing before door hardware, the fiber waveguide or the sprinkler section is installed "to keep the schedule." The result describes a room that no longer exists.

TRAP Scheduling the shield test the day before the accreditation inspection. There is no time to find, fix and retest a leak.

FIELD NOTE Photograph each wall segment with a visible grid line or room reference. A photo without a location is not evidence.

SOURCES IC Tech Spec v1.5.1 · UFC 4-010-05 · ICS 705-1 · IEEE P299 · MIL-HDBK-1195 §4.9 (historical) · CenCore Q&A (practitioner)

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PRINT THIS FOR THE TRAILER WALL

Do and don't checklist

One line per habit that decides whether a shielded room passes its test. Walk it at coordination, at pre-cover and before the shield test.

✓ Do	× Don't
BEFORE ROUGH-IN	
☐ Get the CTTA's written countermeasure recommendations and the shield vendor's penetration, door and ground details	☐ Buy filters, foil board or shielded racks before the TCR arrives
☐ List every crossing system and freeze the penetration schedule	☐ Add "just one more" conduit after the shield test
☐ Count every conductor before the penetration panel is built	☐ Let other trades route over or anchor to the penetration panel
FILTERS, BONDING & ELECTRICAL SAFETY	
☐ Land the feeder at the dirty compartment; the clean side exits through the gasketed penetration	☐ Reverse line and load, or share a box, gutter or raceway between dirty and clean conductors
☐ Bond filter cases metal-to-metal and paint-free, with a direct flange or short flat braid	☐ Paint a bond surface or use a long round "ground wire" as an RF bond
☐ Keep the equipment grounding conductor continuous; one designed shield ground point	☐ Lift grounds, add a separate "clean" earth rod, or add an unrequested bond jumper
☐ Lock out, wait the label discharge time, verify zero, short, then open	☐ Trust that a filter is dead because the room lights are off
☐ Flag filter kVAR and leakage to the EE, generator vendor and AHJ early	☐ Place GFCIs around filters without EE and AHJ review
PENETRATIONS	
☐ Use nonconductive unions or grounding exactly as the TCR directs	☐ Guess dielectric-break lengths or RED/BLACK separation
☐ Use all-dielectric fiber and a non-metallic pull string through waveguides	☐ Pass copper, PoE, armored fiber or steel fish tape through a waveguide
☐ Install engineered, tagged pipe waveguides sized for the water they carry	☐ Swap a waveguide section for a standard coupling
☐ Bond honeycomb vent frames all the way around	☐ Cut, drill, screw or pin through honeycomb
MOUNTING & DOORS	
☐ Mount devices and raceway on brackets, spacers, strut or self-supporting furring	☐ Drive screws, anchors, pins or hanger rod through foil, sheet steel or shield panels
☐ Use the switch maker's brackets and clamps; keep the removal tamper on a 24-hour zone	☐ Adhesive-mount a UL 634 Level II switch without written maker and AO acceptance
☐ Cover and protect finger stock and knife-edges during construction	☐ Paint, overspray or weld near RF door contacts, or field-drill an RF frame
TESTING & RECORDS	
☐ Photograph walls and penetrations with a location reference before board closes	☐ Test the shield before doors, filters and waveguides are all installed
☐ Report accidental holes the same day; vendor repair; retest	☐ Caulk, tape or paint over a shield hole
☐ Control drawings, penetration schedules and test reports	☐ Post TEMPEST findings or shield details in bid portals, open shares or unencrypted email

VERIFY WITH YOUR AO This checklist is a public-level reminder, not an inspection form. Your AO, CTTA, shield vendor, EE of record and AHJ set the actual requirements. Keep any marked-up copy with controlled project records, and never write facility names, addresses or findings on it.

REFERENCE

11 Terms, sources and historical notes

Public sources behind this guide, checked September 2026. Vendor documents are examples of published data, not requirements or endorsements.

Ten terms to know

CTTA	Certified TEMPEST Technical Authority: reviews plans and recommends TEMPEST countermeasures
TCR	TEMPEST Countermeasures Review: the CTTA's documented recommendations for a facility
Line side	A filter's input: dirty, unfiltered, outside the boundary
Load side	A filter's output: clean, filtered, inside the boundary
Insertion loss	How much a filter reduces power at a load, in dB, across a frequency range
Waveguide-beyond-cutoff	A metal tube sized so RF below its cutoff frequency dies out along its length
Dielectric break	A listed non-metallic section that interrupts a metal pipe, conduit or duct
Fortuitous conductor	Metal never meant to carry signals that carries them anyway
Single-point ground	One designed connection between shield and building ground; isolated elsewhere
kVAR	Reactive power drawn by filter capacitance; matters for generators and UPS

HISTORICAL NSTISSAM TEMPEST/2-95, NACSIM 5000, NSA 94-106, MIL-HDBK-1195 and MIL-HDBK-232A are quoted only to explain concepts. No separation tables, attenuation values or break lengths are reproduced from them. Current RED/BLACK installation guidance (CNSSAM TEMPEST/1-13) is not public, and nothing from it is used here. IEEE 299-2006 is listed as Inactive-Reserved (30 Mar 2023) with revision P299 in development; confirm the method your contract names.

GOVERNMENT & STANDARDS

IC Tech Spec for ICD/ICS 705, v1.5.1
exwc.navfac.navy.mil/…/ICD-ICS-705_Tech_Spec.pdf

ICS 705-1
exwc.navfac.navy.mil/…/ICS-705-1.pdf

UFC 4-010-05 (26 May 2023)
exwc.navfac.navy.mil/…/UFC_4-010-05.pdf

UFGS 13 49 20.00 10, RFI/EMI Shielding
wbdg.org/FFC/DOD/UFGS/…13 49 20.00 10.pdf

IEEE 299-2006 and P299
standards.ieee.org/ieee/299/11952/

NIST glossary: TEMPEST
csrc.nist.gov/glossary/term/TEMPEST

MANUFACTURERS & PRACTITIONERS (EXAMPLES)

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media.ets-lindgren.com/…/MANUAL_EMI-EMP-FILTER.pdf

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In Compliance: SCIF and RF secured facility design, parts 1–2
incompliancemag.com/scif-and-radio-frequency-…-part-2/

RF Cafe: waveguide formulas
rfcafe.com/references/electrical/waveguide.htm

Magnasphere HSS L2 installation accessories
magnasphere.com/…/HSS-L2-Installation-Accessories.pdf

HISTORICAL (CONTEXT ONLY)

NSTISSAM TEMPEST/2-95
linas.org/mirrors/…/tempest-2-95.htm

NSA, "TEMPEST: A Signal Problem"
nsa.gov/portals/75/…/tempest.pdf

MIL-HDBK-1195
navalfacilities.tpub.com/1195/

MIL-HDBK-232A
navalfacilities.tpub.com/hdbk232a/

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