

SHIELDING SOLUTIONS FOR SECURE FACILITIES AND CRITICAL INFRASTRUCTURE

COMMITTED TO A SMARTER, MORE SECURE FUTURE

ETS·LINDGREN®
An ESCO Technologies Company

BUILDING SECURITY INTO THE DESIGN

CONSIDER THE TOTAL PROJECT COST:

– The lowest initial material cost may not deliver the best long-term value. Construction compatibility, installation quality, maintainability, and verified performance all influence project cost and risk.

Designing and constructing a secure facility requires more than specifying Radio Frequency (RF) shielding materials. Effective electromagnetic protection depends on integrating shielding design, building construction, utility penetrations, installation, and performance verification.

ETS-Lindgren works with architects, engineers, general contractors, and facility owners to address these requirements throughout the project lifecycle. From Sensitive Compartmented Information Facilities (SCIFs) and TEMPEST applications to critical infrastructure and electromagnetic pulse (EMP) protection, we combine decades of RF engineering expertise with practical construction knowledge and measurable performance objectives.

RF shielding can be incorporated into new construction, integrated into existing buildings, or provided through purpose-built enclosures. The appropriate solution depends on the facility's mission, security requirements, physical environment, and operational needs.

Addressing shielding requirements early helps minimize construction delays, avoid costly modifications, and establish a clear path to achieving protection objectives.

EXPERIENCE MATTERS

U.S. MANUFACTURING AND COMPLIANCE:

– ETS-Lindgren's HEMP/IEMI filters and shielding systems are manufactured in the United States with performance verified by an independent third party, Little Mountain Test Facility operated by The Boeing Company.

Successful projects require coordination among RF engineers, architects, building trades, fabricators, and installation personnel. Government, diplomatic, defense, and commercial facilities present distinct construction, security, and operational challenges.

ETS-Lindgren's experienced project management team and technical specialists help anticipate these challenges and develop practical solutions that support mission success.





DESIGN SPECIFICATIONS VERSUS PERFORMANCE SPECIFICATIONS

An important early decision is whether to prescribe a specific shielding construction method or establish measurable performance requirements.

- **Design-based specifications** define materials, panel construction, seams, and installation details.
- **Performance-based specifications** establish shielding effectiveness requirements, frequency ranges, test methods, and acceptance criteria while allowing qualified specialists to recommend appropriate construction solutions.

For EMP-hardened applications, requirements must also address the applicable electromagnetic threat environment and protection of critical electrical and communications interfaces. A performance-based approach can help avoid unnecessary overdesign while reducing the risk of selecting construction methods that fail to achieve the required protection.

WHAT CAN COMPROMISE SHIELDING PERFORMANCE?

COMMON CONCERNS INCLUDE:

- Discontinuities at seams, corners, and joints
- Improperly installed or maintained shielded doors
- Unprotected electrical, mechanical, and communications penetrations
- Inadequate power filtering or improper bonding
- Unreviewed field modifications
- Installation practices that compromise electrical continuity
- Insufficient access for inspection, maintenance, and testing

PLAN PENETRATIONS EARLY:

– Establish a coordinated shield penetration schedule for power, ventilation, communications, and mechanical services before construction. Late additions or unreviewed modifications can compromise performance, delay completion, and increase costs.

SCIF AND TEMPEST RF SHIELDED ENCLOSURES

PROTECTION FOR SENSITIVE ELECTROMAGNETIC ENVIRONMENTS

EVALUATE THE COMPLETE SYSTEM:

– An RF-shielded enclosure must perform as an integrated engineered system—not simply as a collection of shielded panels.

Sensitive Compartmented Information Facilities (SCIFs) present specialized security and construction challenges. In addition to physical security, access control, and acoustic protection, certain facilities require RF shielding to address electromagnetic security concerns.

Under the ICD/ICS 705 framework, RF protection requirements are determined through the applicable security evaluation, including consultation with the Certified TEMPEST Technical Authority (CTTA). Not every SCIF requires the same level of RF protection.

For TEMPEST and electromagnetic security (EMSEC) applications, shielded enclosures provide electromagnetic separation to help protect sensitive information from compromising emanations.

SELECTING THE APPROPRIATE CONSTRUCTION METHOD

- **From Conceptual Design to Verified Performance**
  - Systems such as ETS-Lindgren's Series 81 offer flexible, panelized construction that accommodates various enclosure configurations, future modifications, and expansion.
- **Welded Steel Shielded Enclosures**
  - Welded steel construction provides a continuous conductive structure for permanent installations. Structural integration, fabrication quality, and access requirements are important design considerations.
- **Room-In-Room Construction**
  - A shielded enclosure installed within an existing building establishes a dedicated electromagnetic protection boundary while accommodating the surrounding structure and building services.
- **Custom Hardened Facilities**
  - Purpose-built facilities may integrate conductive shielding, filtered electrical services, and protected communications interfaces to support critical operations. Construction methods should be selected according to defined protection objectives, facility requirements, and measurable performance criteria.





SCALABLE AND ALTERNATIVE SECURE SHIELDING SOLUTIONS

- **The Right Level of Protection for the Application**
  - Not every application requires a conventional room-sized shielded enclosure. Depending on mission requirements, available space, deployment schedules, and equipment congurations, modular or localized shielding may provide practical alternatives.
- **Modular and Containerized Facilities**
  - Prefabricated and transportable shielded enclosures support remote locations, temporary operations, facility expansions, and applications requiring repeatable congurations.
- **Shielded Equipment Racks, Cabinets, Test Boxes, and Specialized Enclosures**
  - Shielded racks and cabinets provide localized electromagnetic protection when a full-sized room is unnecessary. Compact test boxes and specialized enclosures support equipment testing and engineering evaluations within limited spaces.
- **Retrofit Shielding Solutions**
  - Existing facilities can be upgraded using conductive shielding materials, engineered penetrations, filtered electrical interfaces, and other protective measures. Retrofit projects require evaluation of existing construction, utilities, access requirements, and achievable shielding performance.

WORK WITH

TRUSTED PARTNERS:

– Special projects may require complementary engineering and construction capabilities. With ETS-Lindgren's trusted partners, requirements for customized modular, transportable, and mission-specific secure facilities are expertly addressed.

PROTECTING CRITICAL INFRASTRUCTURE AGAINST ELECTROMAGNETIC THREATS

A SYSTEM LEVEL APPROACH:

– Effective EMP protection begins with a defined threat environment and coordinated engineering strategy—not simply a shielding effectiveness target.

Government agencies, defense organizations, utilities, and critical infrastructure operators depend on electronic systems that must remain operational under challenging conditions. High-altitude electromagnetic pulse (HEMP) and intentional electromagnetic interference (IEMI) present distinct threats to electronic equipment and critical operations. Although their characteristics differ, both require coordinated system-level protection. Integrating shielding, filtering, and system-level protective measures helps organizations address electromagnetic vulnerabilities within a broader continuity-of-operations strategy.

Effective electromagnetic resilience extends beyond the shielded enclosure. Power distribution, communications lines, grounding and bonding, ventilation, and equipment interfaces must be evaluated for potential electromagnetic vulnerabilities. Electromagnetic protection solutions support defense facilities, secure communications systems, data centers, utility control rooms, emergency operations centers, and other mission-critical installations. Shielding originally designed for electromagnetic security may contribute to broader EMP resilience objectives.

HEMP PROTECTION AND EMP FILTERS

HEMP protection may require specialized filtering and EMP surge protection at electrical interfaces, depending on the threat environment and system requirements. Filter selection must account for transient characteristics, electrical safety, equipment operating requirements, and specified performance criteria. RF attenuation alone does not establish HEMP protection capability.





SERVICES AND LIFECYCLE SUPPORT

- Coordinated engineering, installation, testing, and maintenance support RF shielding performance throughout the facility lifecycle.
- Design consultation and BIM coordination help integrate shielding into facility plans and reduce costly modifications.
- Specialized installation teams coordinate with building trades to maintain shielding integrity.
- Testing verifies shielding performance and EMP protective components against specified requirements.
- Modifications, relocation, and maintenance support changing facility needs and long-term shielding reliability.

CONSIDERATIONS TO REDUCE RISK

- Can your supplier demonstrate experience with comparable shielding requirements?
- Who coordinates interfaces with other building trades?
- How are construction modifications reviewed and documented?
- What testing methods and acceptance criteria will be used?
- What installation, maintenance, and post-construction support is available?
- Are products manufactured in the United States?

EXPERTISE THROUGHOUT THE LIFECYCLE:

– Integrated design, installation, testing, and service capabilities simplify coordination, strengthen accountability, and reduce long-term performance risks.

PROTECT MORE THAN JUST YOUR FACILITY. PROTECT YOUR MISSION.

Engage ETS-Lindgren early in the design process to discuss your facility's RF shielding requirements, construction considerations, and performance objectives. Contact your local representative for more information.

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