

Series 81/71 Shielding Systems

For Medical, Industrial, and Governmental Applications



 **ETS-LINDGREN**[™]
An ESCO Technologies Company

13/16"

1-6"

6"

4'-0"

Shielding for Today's Growing Electronic Noise Environment

The increasing expansion of wireless technology, telecommunications devices, and general electronic equipment is creating new sources of electromagnetic and radio frequency interference (EMI/RFI) within our environment. Such interference can disrupt communications, cause equipment malfunctions, impede test procedures, and affect product performance.

One of the solutions to controlling EMI/RFI interference problems lies in a quality shielded enclosure that is highly reliable, economically priced, and user-friendly to install.

The Lindgren™ and Ray Proof™ Brand Names Provide Solutions You Can Trust

As the world's leading manufacturer of shielded enclosures, we offer two highly reliable shielding systems for containing and controlling EMI/RFI noise sources: the Series 81 Solid Cell Type Construction Enclosure and the Series 71 Screen Room.

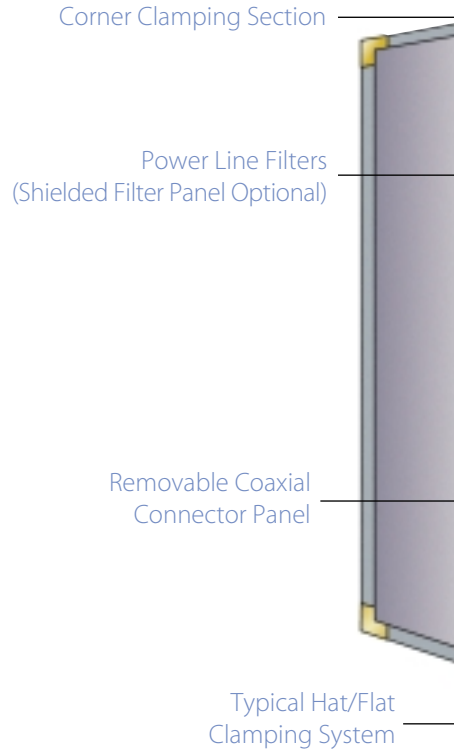
These high quality enclosures are backed by many decades of experience and groundbreaking R&D in the shielding industry, which have enabled us to refine and apply our technology in more than 25,000 applications worldwide. So when you choose the Lindgren and Ray Proof

name, you can be confident that you have a solution you can trust.

Applications

The Series 81 and 71 shielded enclosures can reduce and contain high levels of EMI/RFI interference so that you can perform your operations without concern. These enclosures are designed to help you:

- Prevent malfunction of wireless communications devices and electronic equipment by excluding EMI/RFI signals.
- Contain radiating signals from high-emission devices which can disrupt the operation of other equipment, and which may affect personal safety.
- Prevent sensitive information from being electronically intercepted.
- Maintain systems' survivability from high voltage sources and electromagnetic pulses.

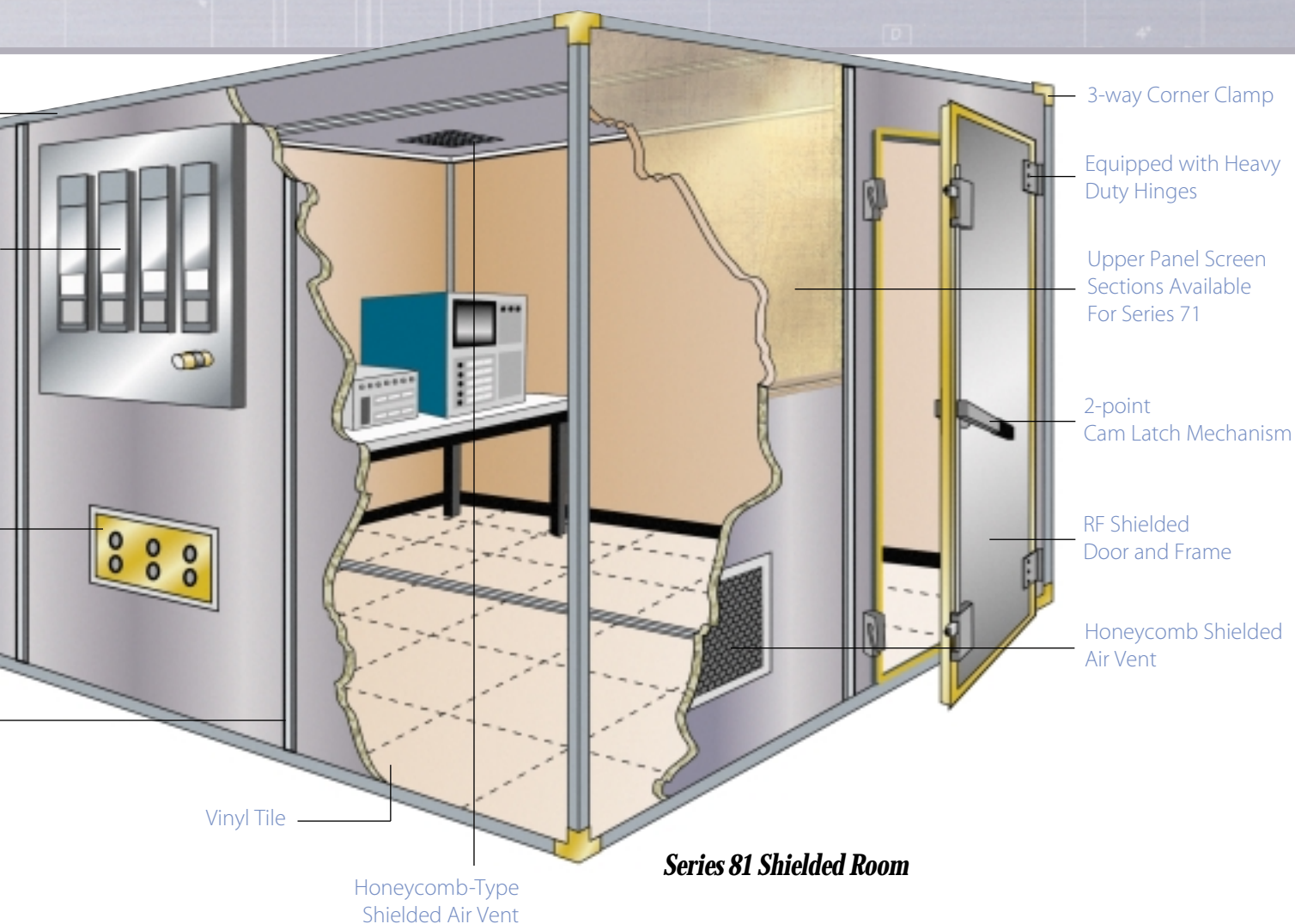


The Series 81 Shielded Room: A Time-Proven and Tested Design

The Series 81 Shielded Room offers a time-proven design that has provided excellent EMI/RFI shielding effectiveness for thousands of users. The Series 81 shielding system is the most commonly specified construction for NSA 65-6/NSA 94-106 and MIL-STD-285/IEEE 299 testing requirements. It delivers high performance attenuation over a broad frequency range. The Series 81 complies with a variety of other specifications including:

Series 81/71 Shielding Applications

- EMC Product Compliance Testing
- Instrumentation Repair and Calibration
- Production and Quality Product Line Testing
- Cellular and Paging Service Centers
- High Voltage Test Labs
- Secure Computer Rooms
- Wireless Product Testing
- Metrology Labs
- Magnetic Resonance Imaging (MRI)
- Medical Equipment and Instrumentation
- Biomedical Engineering Labs
- Embassies and Consulates
- TEMPEST Security Areas



Series 81 Shielded Room

- **Federal Specification SS-A-118B**
Flame Resistance Test
- **ASTM E84-81-A**
Test for Surface Burning Characteristics of Building Materials
- **ASTM E90-99**
Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements

The Series 81 also complies with Universal Building Codes (UBC) and can be assembled in the most stringent seismic zones.

Combining performance and value, the Series 81 meets a wide range of critical testing needs.

The Series 71 Copper Screen Room: Offers Shielding Performance in a See-Through Design

The Series 71 Copper Screen Room shares a common clamping system to that of the Series 81 design. The upper panel section of the room's walls have a double layer of copper screen mesh. The Series 71 Screen Room allows for easy visual and audible communication through the upper panel

section and eliminates a sense of confinement that may occur in solid shielded rooms.

Series 71 Copper Screen Rooms are highly recommended for testing applications below 3 GHz for wireless product testing and communications devices.

The Series 81: Steel-Laminated for Lasting Performance and Durability

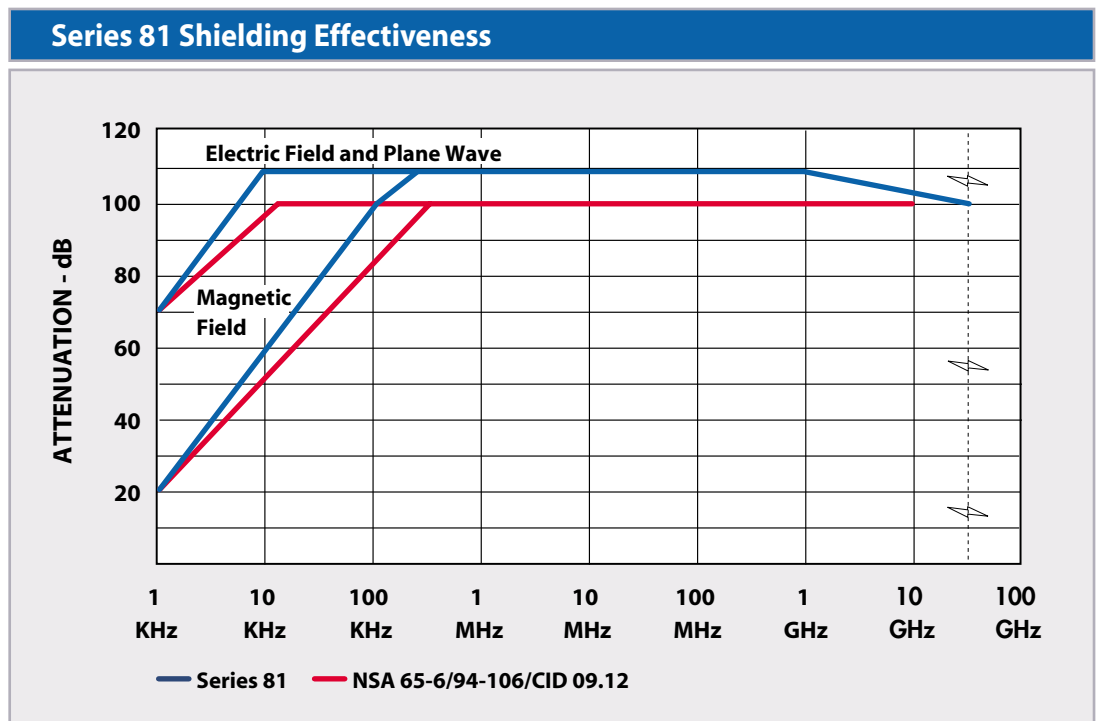
Materials

Our Series 81 Shielded Room features a steel lining because steel is excellent for reflecting and attenuating EMI/RFI signals. The G60 grade, 28-gauge galvanized steel (with optional gauge thicknesses, ranging from 28- to 11-gauge) offers the advantages of high shielding performance, durability, and ideal electrical continuity.

Galvanized steel also provides excellent low frequency AC magnetic field attenuation characteristics.

Construction

The Series 81 Shielded Enclosure consists of shielded modular panel sections that are assembled with a clamping system into a self-supporting room structure. Sheets of 28-gauge galvanized steel are laminated to a 3/4-inch, high-density particle and/or plywood board core. Each panel section provides excellent stability to airborne moisture-induced warping and structure strength that lend to its rugged structural design.



Series 81 panels are joined together with an extruded “hat and flat” and “cove” clamping system to provide uniform and consistent pressure contact against the shielded panel mating surfaces. These structural clamping sections are zinc-plated to resist corrosion and are joined with self-taping zinc-plated fasteners spaced four inches on center to ensure a secure shield. The corners of the shielded room are secured with precision-machined trihedral end cap sections. To maintain electrical isolation, a 6-mil dielectric vapor barrier and 1/8” dielectric underlayment are

placed beneath the shielded floor panels. Counter-sunk floor screws in the clamping system ensure a smooth floor surface. Attractive vinyl floor tiles are applied with adhesives over the exposed steel surface as a durable wearing surface. In addition, the Series 81 enclosure can be converted into a ferrite-lined and/or conventional absorber-lined anechoic chamber. This feature makes it a truly flexible shielding solution.

Series 81 System Performance

Magnetic Field

- 20 dB @ 1 KHz
- 56 dB @ 10 KHz
- 100 dB @ 200 KHz

Electric Field

- 110 dB from 200 KHz thru 50 MHz

Plane Wave

- 110 dB from 50 MHz to 1 GHz

Microwave

- 100 dB @ 10 GHz



Series 71: Delivering “Hear-Through, See-Through” Convenience

Materials

The Series 71 features a double layer of 22" x 22" x .015" copper screen mesh weave to deliver excellent attenuation levels, while allowing for air passage through the screen mesh.

Copper is highly recommended for use in shielded screen rooms due to its conductivity and oxidation properties. At the same time, a copper screen mesh affords “hear-through, see-through” advantages.

Construction

In the Series 71 Screen Room, the lower wall sections are manufactured using solid galvanized steel structural panel sections for long-term durability. The wall, floor, and ceiling clamping sections of a Series 71 room are identical to those in a Series 81 room. The chief construction difference of the Series 71 is the incorporation of copper screen mesh sections on the upper half of the enclosure to allow communication through the screen.



Series 71 Copper Screen Room

Series 71 System Performance

Magnetic Field

- 18 dB @ 1 KHz
- 50 dB @ 14 KHz

Electric Field

- 100 dB from 14 KHz thru 10 MHz

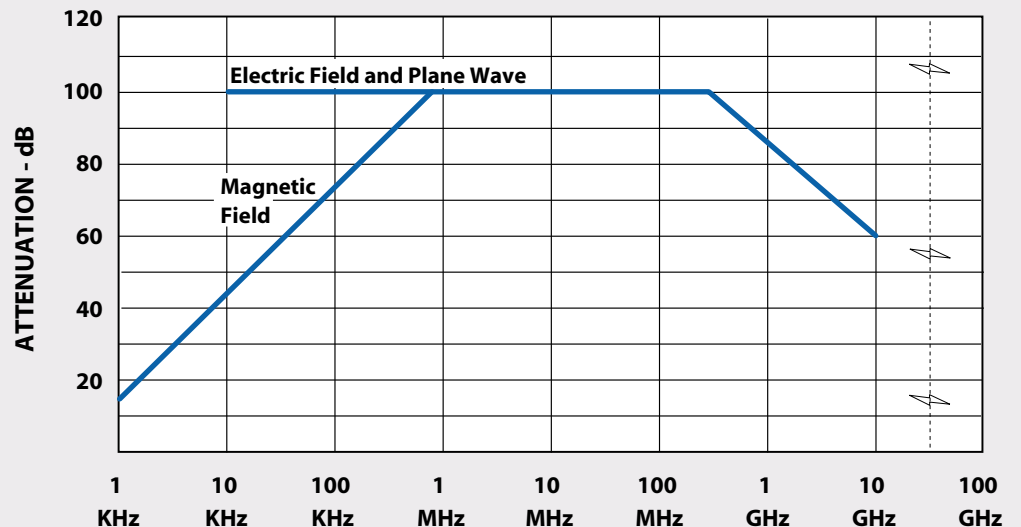
Plane Wave

- 100 dB @ 400 MHz
- 90 dB @ 1 GHz
- 80 dB @ 2 GHz

Microwave

- 60 dB @ 10 GHz

Series 71 Shielding Effectiveness





Shielded Doors

The Series 81 and 71 come with a choice of two door systems. A Single Knife Edge (SKE) door offers a two-point latching system and recessed contact mechanism (RCM) with enclosed beryllium contact fingers. The Double Electrical Contact (DEC) door system employs a three-point cam latching system with heavy gauge phosphor bronze contact fingers. Both door systems can be equipped with fully- or semi-automatic latching devices for areas of high usage, or where



ease of accessibility is a concern. All enclosures can be fitted with a variety of other customized access door systems for personnel and equipment, enabling users to meet a variety of operational, security, and extended shielding performance objectives.



EMI Power and Signal Line Filters

We manufacture a complete line of power and signal line filters which are available to meet the current MIL-STD 220A, MIL-F-15733, and UL 1283 standards. These filters are available for all types of EMI/RFI shielded enclosure requirements and can be supplied in stand-alone filters or mounted within an electrical-style cabinet.

Custom filters are also available in special designs to meet customer specifications. These filters are used with the cus-

tomers' equipment to comply with MIL-STD-461/2/3, FCC, VDE, CSA and other specifications requiring stringent control of RF energy conducted on the power lines of various equipment and systems.

Waveguide Air Vents

A complete line of durable waveguide air vents are available to enhance the shielding effectiveness and air flow performance of the Series 81 and Series 71.

Our air vents are produced by a proprietary solder fusing process which creates a continuous, solid electrical and mechanical bond that will not separate or permit RF leakage, ensuring absolute performance and reliability.

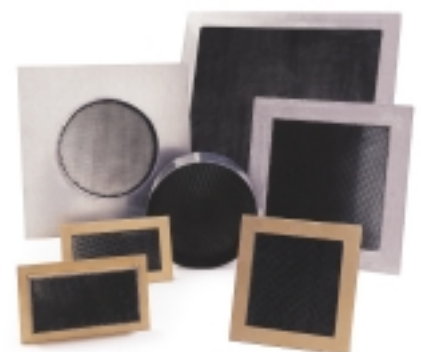
Air vents are available in standard 12" x 12" sizes as well as a range of other sizes. Air vents are solder-fused honeycomb construction with either a solderable flange or screw mounting frame. Air vents are constructed with a tin-plated steel or brass core.



Waveguide Feedthrus

Waveguide feedthrus, which preserve the shielded construction, are available for the introduction of water, gas, or air. Specially designed waveguide feedthrus can transport non-conductive gases or liquids into an enclosure. These assemblies are available in brass or steel, in sizes ranging from 1/4" to 4" in diameter.

Other accessories include door ramps, lights, exhaust fans, and connector panels.



RF Floors

The Series 81 and Series 71 shielded enclosures feature modular floor panels. The floor panels will support a total floor loading of 1,000 lbs. per sq. ft. distributed evenly over the building floor. The floor screws are countersunk so that all floor clamps and floor tiles are flush mounted for a smooth surface.

Easy Assembly and Relocation

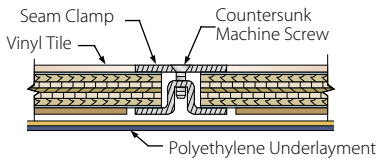
Both the Series 81 and Series 71 are made of modular, easy-to-install panel sections, which reduce field assembly time. Each enclosure can be self-supporting, with no attachments to the parent building. Its panelized design allows it to be easily dismantled and moved to another location if required.

Warranty

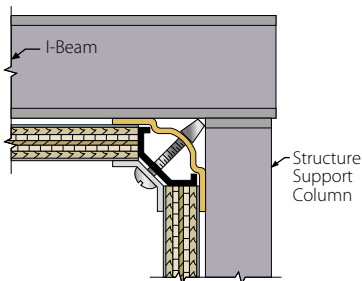
All Series 81 and 71 enclosures are guaranteed against defective materials and workmanship and to retain the specified RF shielded characteristics for a period of one year.

Standard and Custom Sizes

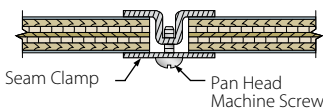
You may choose from a range of standard-sized Series 81 or 71 enclosures, or we can custom-design a room to your exact specifications.



Typical Floor Section



Corner Detail with Ceiling and Wall Stiffener for Larger RF Room



Typical Wall Section

Both the Series 81 and 71 enclosures can be easily assembled with conventional hand power tools. An easy-to-follow assembly manual provides step-by-step instructions.

Installation and Testing

As the industry's most experienced shielding experts, we can provide a ready-to-install standard enclosure, or a custom system for individual needs. Our personnel are fully trained in RF diagnostic testing, application and theory. Our installation team can also perform an RF verification testing of the completed shield to certify its performance and provide you with a written test report.

Enclosure Dimensions

| W | L | H | Metric Dimensions |
|------------|------------|-----------|--------------------------|
| 8' 2 3/8" | 8' 3 1/8" | 8' 2 3/4" | 2.50 m x 2.52 m x 2.51 m |
| 8' 3 1/8" | 10' 2 3/8" | 8' 2 3/4" | 2.52 m x 3.11 m x 2.51 m |
| 8' 2 3/8" | 12' 3 7/8" | 8' 2 3/4" | 2.50 m x 3.76 m x 2.51 m |
| 8' 2 3/8" | 16' 4 5/8" | 8' 2 3/4" | 2.50 m x 4.99 m x 2.51 m |
| 10' 2 3/8" | 10' 3 7/8" | 8' 2 3/4" | 3.11 m x 3.15 m x 2.51 m |
| 10' 2 3/8" | 12' 3 7/8" | 8' 2 3/4" | 3.11 m x 3.76 m x 2.51 m |
| 10' 2 3/8" | 16' 4 5/8" | 8' 2 3/4" | 3.11 m x 4.99 m x 2.51 m |
| 10' 2 3/8" | 20' 5 3/8" | 8' 2 3/4" | 3.11 m x 6.23 m x 2.51 m |
| 12' 3 1/8" | 12' 3 7/8" | 8' 5 7/8" | 3.74 m x 3.76 m x 2.59 m |
| 12' 3 7/8" | 16' 3 1/8" | 8' 5 7/8" | 3.76 m x 4.96 m x 2.59 m |
| 12' 3 1/8" | 20' 5 3/8" | 8' 5 7/8" | 3.74 m x 6.23 m x 2.59 m |
| 12' 3 1/8" | 24' 6 1/8" | 8' 5 7/8" | 3.74 m x 7.47 m x 2.59 m |
| 16' 3 1/8" | 16' 4 5/8" | 8' 5 7/8" | 4.96 m x 4.99 m x 2.59 m |
| 16' 3 1/8" | 20' 5 3/8" | 8' 5 7/8" | 4.96 m x 6.23 m x 2.59 m |
| 16' 3 1/8" | 24' 6 1/8" | 8' 5 7/8" | 4.96 m x 7.47 m x 2.59 m |
| 20' 3 1/8" | 20' 5 3/8" | 8' 6 3/4" | 6.18 m x 6.23 m x 2.61 m |
| 20' 3 1/8" | 24' 6 1/8" | 8' 6 3/4" | 6.18 m x 7.47 m x 2.61 m |
| 24' 3 7/8" | 24' 6 1/8" | 8' 6 3/4" | 7.41 m x 7.47 m x 2.61 m |

Available in 10' 0" (3.05 m) sizes.

Note: Installation requires 2" (50.8 mm) clearance around the enclosure.

1/2" O.D. COPPER
WATER TUBING
(TYPE K) x 1/2" LG.

About ETS-Lindgren

ETS-Lindgren is the world's largest and most experienced supplier of shielding solutions for electromagnetic and radio frequency interference (EMI/RFI).

We have installed over 25,000 successful shielded enclosures within a variety of industrial, governmental, and medical environments around the world.

Call upon ETS-Lindgren for our unequalled understanding of both practical and theoretical shielding principles. ETS-Lindgren is highly skilled at applying these principles with a breadth and depth of technical expertise in architectural, mechanical, structural, acoustical, and security related areas.

Because controlling electromagnetic energy is our core business, you can be assured of our commitment to the highest quality and product reliability that stand the test of time.

Our products, materials, and workmanship are backed by a comprehensive warranty and a commitment to customer satisfaction.

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