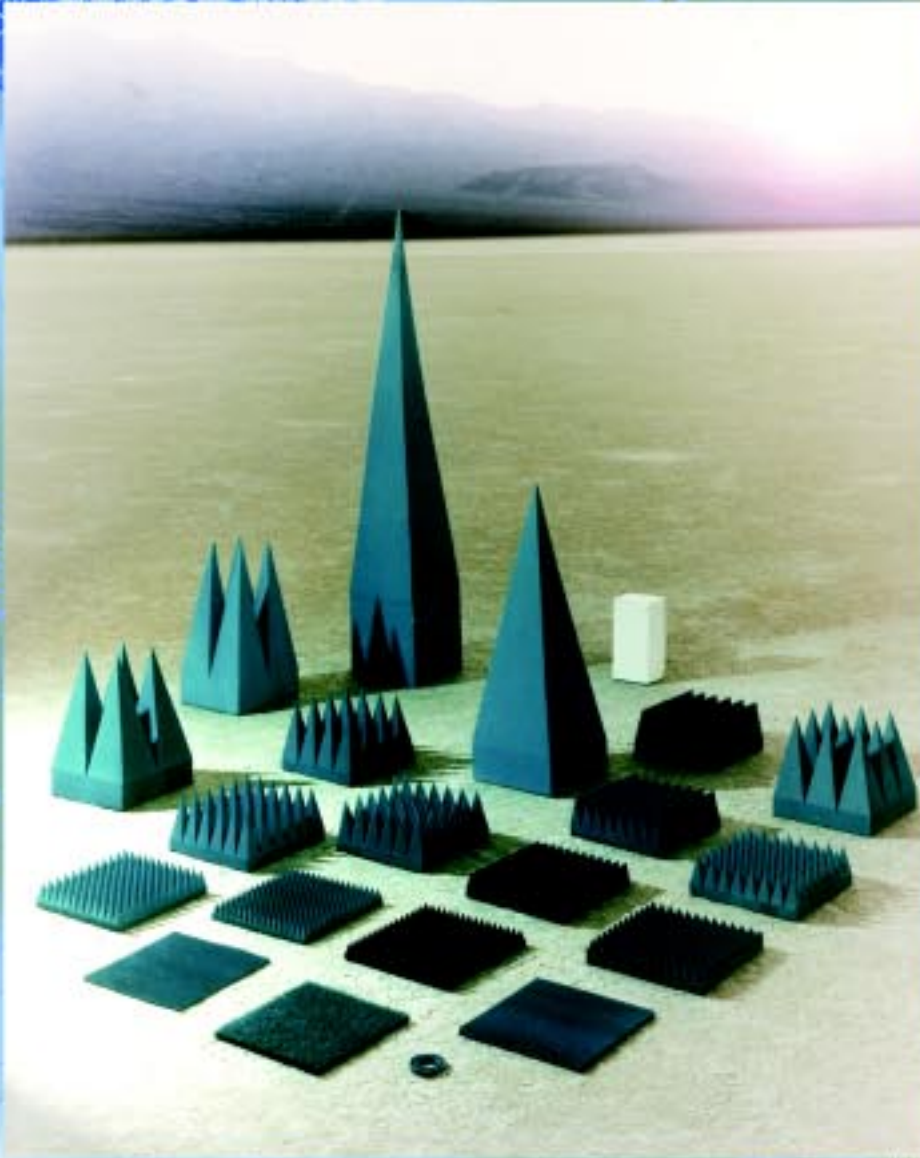


Microwave Absorber Selection Guide



Convolute

200 V/μsec Power Handling Capability

High Power

Numerically Optimized Design

 **ETS-LINDGREN**TM
RANTEC MICROWAVE ABSORBER

Why ETS-Lindgren Should be your Choice for Microwave Absorber

Superior Design Capability

With a wide range of products, our standard microwave absorbers will fit most needs. However, some applications have special requirements that can only be met with a custom product. That's where ETS-Lindgren excels. Instead of "cut-and-try" experimentation, our engineering staff uses powerful workstations running advanced numerical modeling programs to develop the right solution. Next, prototypes are made and the design is tested. Results become part of a valuable feedback loop for refining our designs further.

We also work with universities having strong electromagnetic programs to develop new absorber technology. For example, a number of collaborations with

Ohio State University resulted in the development of high performance 153 cm (60 in) curvilinear pyramidal absorber for NASA. Subsequently, ETS-Lindgren developed several varieties of curvilinear absorber for defense related applications.

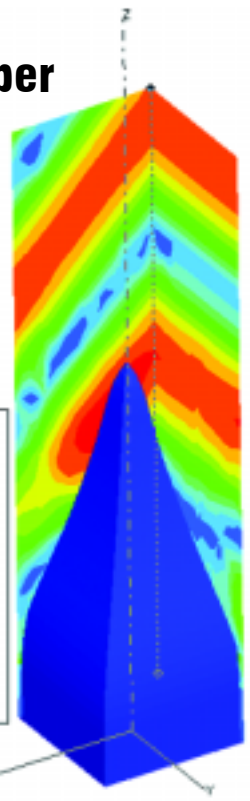
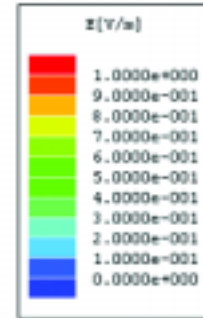
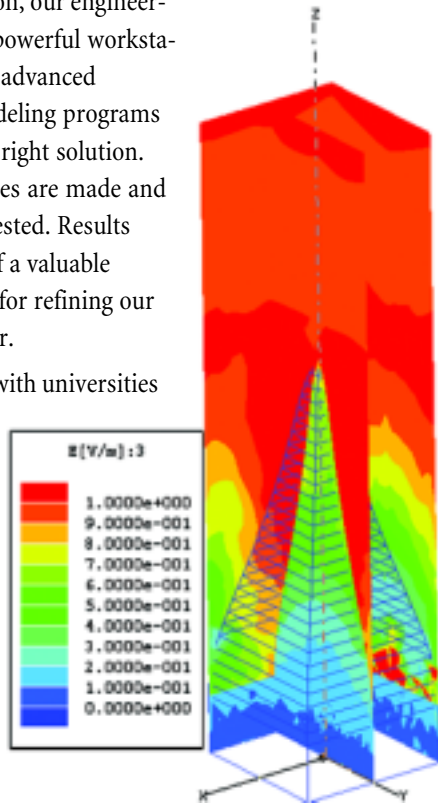
Not everyone needs a custom solution like NASA, but if you do, we have the in-house resources to satisfy your requirements.

Unique Two-Step Manufacturing

Our computer controlled manufacturing process begins with homogeneous blocks of polyurethane foam. The blocks are impregnated with proprietary solution of lossy agents and dried in large ovens. Next, the blocks are impregnated a second time with fire retardant salts and dried again. (Non fire retardant

absorber can be ordered on request). This premium two-step process uniformly distributes both agents and permanently bonds the carbon throughout the foam. The benefit is an absorber that does not release carbon particles which can contaminate delicate electronic equipment in the chamber. In fact, our absorbers can be used in clean room environments requiring a Class 100,000 rating.

After impregnation, the foam is shaped using computer-controlled saws maintaining tolerances of ± 3 mm (.25 in). Cutting the dried foam into its final shape after the impregnation process avoids shrinkage and warping. The benefit is absorbers that install with uniform geometric alignment, reducing backscattering, and improving measurement accuracy.



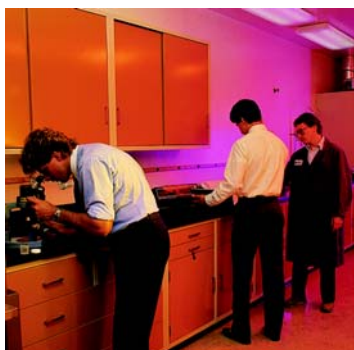
Extensive Testing

RF Consistent Performance

100% of our microwave absorbers are tested for reflectivity performance. The Naval Research Lab (NRL) broadband swept-frequency arch measurement method is used for testing at 750 MHz - 6 GHz, and 6 GHz - 18 GHz. (Testing at higher frequencies can be performed on request.) A coaxial reflectometer is used to test at frequencies between 30 MHz - 500 MHz, according to IEEE Standard 1128. The test procedures are automated and test data is archived electronically and in hardcopy format, for immediate or future retrieval and analysis.



Edwards Airforce Base, California



Production sample testing assures standards are met.

Flammability

ETS-Lindgren's Rantec Brand CL combustion limiting polyurethane absorber sets the standard for material fire retardancy. We meet the following U.S. Government and commercial flammability specifications, as verified by an independent testing laboratory:

- NRL Report 8093 (Tests 1, 2, and 3)
- MIT Lincoln Laboratory Specification MS-8-21 (Tests I, II, and III)
- Raytheon Drawing No. 2693066 (latest revision)
- UL 94-5VA and UL 94-5VB
- UL 94 HBF
- DIN 4102 Class B-2

Strict Quality Control

All ETS-Lindgren microwave absorber products are manufactured in accordance with established quality control and assurance standards. Each piece of absorber is serialized, providing traceability throughout the manufacturing process. Logbooks are also maintained for the impregnation process, solids test results, fire test results, Limiting Oxygen Index (LOI) test results, receiving inspection test results, and final inspection test results.

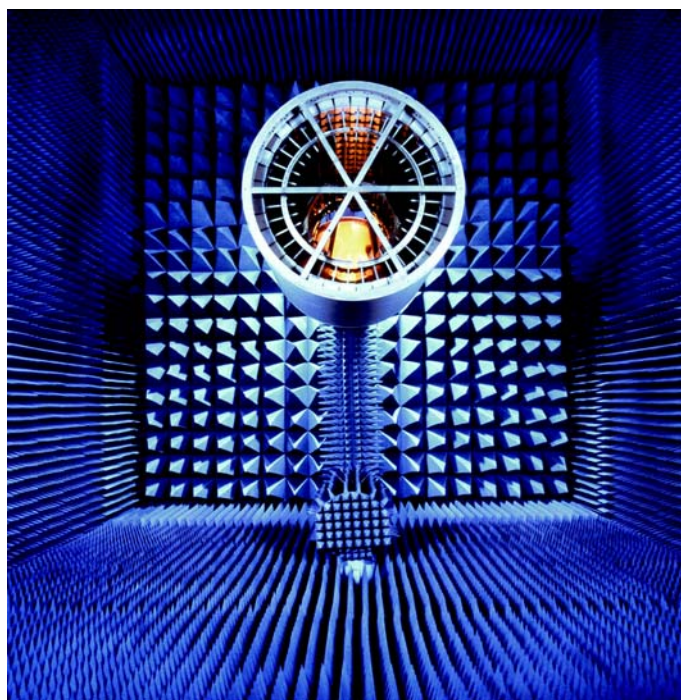
Large Capacity

Our 8,639 m² (93,000 ft²) manufacturing facility in Durant, Oklahoma is the world's largest, capable of producing over 24,777 m³ (10.5 million board feet) of absorber per year. Capacity like this has allowed us to supply absorber for some of the biggest chambers ever constructed including:

- Naval Air Warfare Center in Patuxent River, Maryland, Advanced System Integration Laboratory (ASIL), dimensions of 55 m x 55 m, x 18 m (180 ft x 180 ft x 60 ft), lined with 12,263.2 m² (132,000 ft²) of Rantec microwave absorber.
- Edwards Air Force Base in California, electronic warfare and counter measure test facility, dimensions of 80 m x 76 m x 21 m (265 ft x 250 ft x 70 ft), lined with over 18,952 m² (204,000 ft²) of RF absorber material, built in 1989

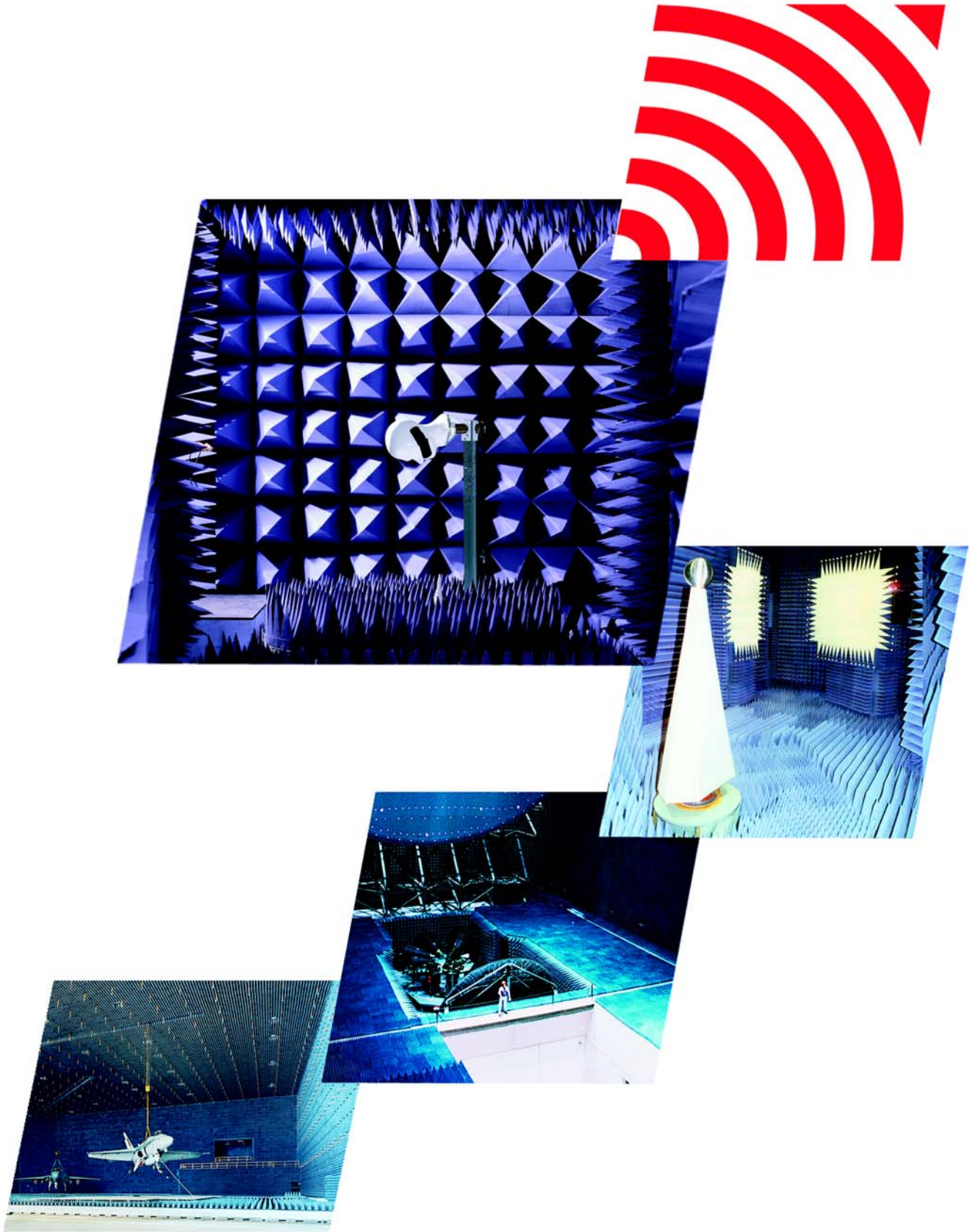
Commitment to Service

Whether you need just a few pieces of absorber or a complete turnkey chamber, we have the experience and resources to help you with the right solution. We can be reached by phone, fax, e-mail, the Internet, or through our worldwide network of independent ETS-Lindgren representatives.



Rantec Microwave and Electronics, California

Absorber Installations



From Top to Bottom: CTIA Authorized Test Laboratory, ETS-Lindgren, Cedar Park, TX; Raytheon, Goleta, CA; Rantec Microwave and Electronics, Calabasas, CA; Naval Air Warfare Center, Patuxent River, MD.

Contents

Microwave Pyramidal Absorber	4
Flat Laminate Absorber	10
Filter Foam Absorber	10
Walkway Absorber	11
EMC-24PCL	12
High Power Absorber	14
Microwave Curvilinear Absorber	17
How to Order	21
Miter Cuts	22
Lossy Foam Corner Treatments	23
The Manufacturing Process	24
The Testing Process	26

Other Specialty Absorber Products

(request separate data sheets)

Outdoor Vinyl covered Microwave Absorber

Convolute Microwave Absorber

EMC Absorber

FerroSorb™

Ferrite Panels

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Microwave Pyramidal Absorber

ETS-Lindgren EHP pyramidal absorber is an ultra broadband microwave absorber recommended for areas where energy is at normal incidence. Generally, pyramidal absorber is preferred for specular treatment on chamber back walls, side walls, floors, and ceilings

Features

- Numerically Optimized Design
- 200 V/m Power Handling Capability
- Fire Retardant

Applications

- Telecom/Wireless
- Satellite
- High-Speed Electronics
- Automotive
- Military

Maximum Reflections at Normal Incidence

MODEL NUMBER	80 MHz	120 MHz	200 MHz	300 MHz	500 MHz	L-BAND 1-2 GHz	S-BAND 2-4 GHz	C-BAND 4-8 GHz	X-BAND 8-12 GHz	KU-BAND 12-18 GHz	K-BAND 18-40 GHz
EHP-3PCL								-30dB	-40dB	-45dB	-45dB
EHP-5PCL							-30dB	-40dB	-45dB	-50dB	-50dB
EHP-8PCL						-30dB	-40dB	-45dB	-50dB	-50dB	-50dB
EHP-12PCL						-35dB	-40dB	-45dB	-50dB	-50dB	-50dB
EHP-18PCL					-30dB	-40dB	-45dB	-50dB	-50dB	-50dB	-50dB
EHP-24PCL			-20dB	-30dB	-35dB	-40dB	-50dB	-50dB	-50dB	-50dB	-50dB
EHP-36PCL	-11dB	-13dB	-25dB	-30dB	-40dB	-45dB	-50dB	-50dB	-50dB	-50dB	-50dB
EHP-48PCL	-15dB	-20dB	-30dB	-35dB	-40dB	-45dB	-50dB	-50dB	-50dB	-50dB	-50dB
EHP-72PCL	-20dB	-30dB	-40dB	-40dB	-45dB	-50dB	-50dB	-50dB	-50dB	-50dB	-50dB
EMC-24PCL	-6dB	-6dB	-7dB	-30dB	-35dB	-45dB	-50dB	-50dB	-50dB	-50dB	-45dB

Specifications

MODEL NUMBER	ABSORBER HEIGHT			PYRAMID	NOMINAL WEIGHT	PYRAMIDS PER ABSORBER	ABSORBERS PER CARTON	CARTON DIMENSIONS L x W x H
	OVERALL	BASE	PYRAMID	BASE DIMENSION				
EHP-3PCL	8.25 cm (3.25 in)	1.9 cm (.75 in)	6.4 cm (2.5 in)	3.8 cm x 3.8 cm (1.5 in x 1.5 in)	1 kg (2 lb)	256	22	63.5 cm x 63.5 cm x 132 cm (25 in x 25 in x 52 in)
EHP-5PCL	12.7 cm (5 in)	2.5 cm (1 in)	10.2 cm (4 in)	5.1 cm x 5.1 cm (2 in x 2 in)	1.6 kg (3.6 lb)	144	14	63.5 cm x 63.5 cm x 132 cm (25 in x 25 in x 52 in)
EHP-8PCL	26.1 cm (8.5 in)	5.1 cm (2 in)	16.5 cm (6.5 in)	7.6 cm x 7.6 cm (3 in x 3 in)	2.8 kg (6.25 lb)	64	8	63.5 cm x 63.5 cm x 132.0 cm (25 in x 25 in x 52 in)
EHP-12PCL	31.1 cm (12.25 in)	5.7 cm (2.25 in)	25.4 cm (10 in)	10.2 cm x 10.2 cm (4 in x 4 in)	3.8 kg (8.4 lb)	36	6	63.5 cm x 63.5 cm x 132 cm (25 in x 25 in x 52 in)
EHP-18PCL	46.4 cm (18.25 in)	5.7 cm (2.25 in)	40.6 cm (16 in)	15.2 cm x 15.2 cm (6 in x 6 in)	4.6 kg (10.25 lb)	16	4	63.5 cm x 68.5 cm x 124.5 cm (25 in x 27 in x 49 in)
EHP-24PCL	61 cm (24 in)	10.2 cm (4 in)	50.8 cm (20 in)	20.3 cm x 20.3 cm (8 in x 8 in)	6.1 kg (13.5 lb)	9	4	63.5 cm x 76 cm x 158 cm (25 in x 30 in x 62 in)
EHP-36PCL	91.4 cm (36 in)	15.2 cm (6 in)	76.2 cm (30 in)	30.5 cm x 30.5 cm (12 in x 12 in)	9.5 kg (21 lb)	4	2	63.5 cm x 63.5 cm x 132 cm (25 in x 25 in x 52 in)
EHP-48PCL	121.9 cm (48 in)	20.3 cm (8 in)	101.6 cm (40 in)	30.5 cm x 30.5 cm (12 in x 12 in)	11.3 kg (25 lb)	4	2	63.5 cm x 76 cm x 158 cm (25 in x 30 in x 62 in)
EHP-72PCL	182.9 cm (72 in)	30.5 cm (12 in)	152.4 cm (60 in)	61 cm x 61 cm (24 in x 24 in)	15.9 kg (35 lb)	1	1	(2)210 cm x 63.5 cm x 63.5 cm (83 in x 25 in x 25 in)
EMC-24PCL	61 cm (24 in)	15.2 cm (6 in)	45.7 cm (18 in)	20.3 cm x 20.3 cm (8 in x 8 in)	4.6 kg (10.1 lb)	9	4	63.5 cm x 76 cm x 158 cm (25 in x 30 in x 62 in)

1) All absorbers are factory tested to verify rated reflection characteristics.
 2) We will custom fabricate microwave absorbers to any special size, shape, or modified impregnation formulation: a) Absorber for millimeter wave applications b) Absorber with monolithic construction up to 1.8 m (6 ft) height c) Absorber up to 3.7 m (12 ft) height for low frequency (80MHz) applications d) Non-fire retardant absorber formulation.
 3) Due to the characteristics of polyurethane foam, some settling may occur during shipment, resulting in dimensional tolerances of ±6 mm (0.25 in).

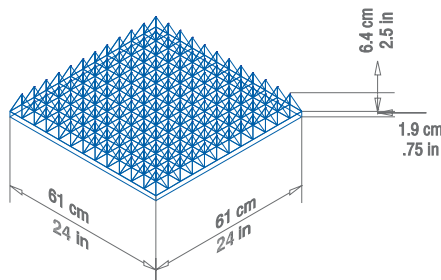
MODEL NUMBER	MAX POWER DENSITY	MAX SERVICE TEMP	FIRE RETARDANCY	ADHESIVE	VELCRO	CLIP & RAIL	ENVIRONMENTAL TEMPERATURE	ENVIRONMENTAL SPECIFICATIONS RELATIVE HUMIDITY	COLOR
EHP-3PCL EHP-5PCL EHP-8PCL EHP-12PCL EHP-18PCL EHP-24PCL EHP-36PCL EHP-48PCL EHP-72PCL EMC-24PCL	775W/m ² 77.5mW/cm ² 0.5W/in ²	90° C 190° F	NRL8093 Tests 1,2,3 Raytheon#2693066 MIT MS-8-21 UL94 DIN4102B2	Y	Y Upto18" N	Y	22° C ±10° C 70° F ±20° F	50% ±20%	Rantec Blue

Note: The charts on the following pages contain measured data for our standard absorber sizes. This data is a statistical representation of thousands of measurements, which have been recorded during final inspection at our factory. Each performance chart includes three legends: *Guaranteed Performance*-this equals the QC Pass/Fail limit, *Typical Performance*-this is the statistical average of each measurement point, *Worst Case*-this equals the lowest performance at each measurement point.

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EHP-3PCL Microwave Absorber

PYRAMIDAL, HI-PERFORMANCE



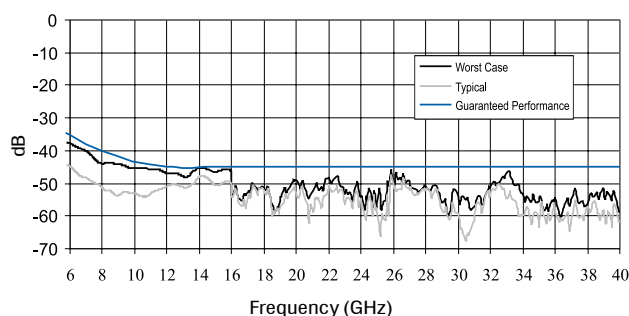
Features

- Numerically Optimized Design
- 200 V/m Power Handling Capability
- Fire Retardant

Physical Specifications

MODEL	EHP-3 PCL	
Absorber Footprint	61 cm x 61 cm (24 in x 24 in)	
Absorber Height	Overall	8.25 cm (3.25 in)
	Base	1.9 cm (.75 in)
	Pyramid	6.4 cm (2.5 in)
Pyramid Base Dimension	3.8 cm x 3.8 cm (1.5 in x 1.5 in)	
Pyramids per Absorber	256	
Weight (1 piece)	1 kg (2 lb)	
Absorbers per Carton	22	
Carton Dim. L x W x H	63.5 cm x 63.5 cm x 132 cm (25 in x 25 in x 52 in)	

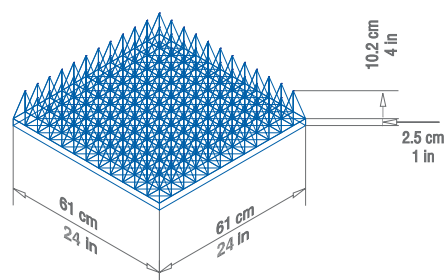
Measured Reflections at Normal Incidence



FREQUENCY/BAND	TYPICAL REFLECTIVITY	GUARANTEED REFLECTIVITY
4-8 GHz C-Band	-35 dB	-30 dB
8-12 GHz X-Band	-45 dB	-40 dB
12-18 GHz Ku-Band	< -45 dB	-45 dB
18-40 GHz K-Band	< -45 dB	-45 dB

EHP-5PCL Microwave Absorber

PYRAMIDAL, HI-PERFORMANCE



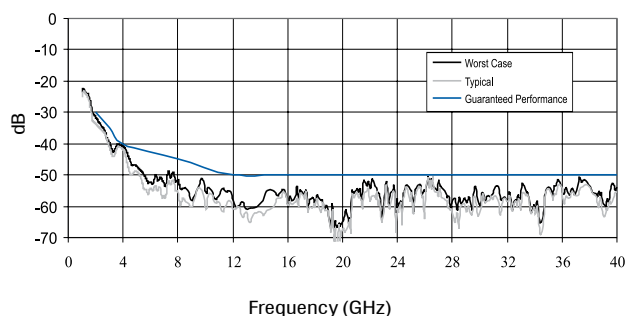
Features

- Numerically Optimized Design
- 200 V/m Power Handling Capability
- Fire Retardant

Physical Specifications

MODEL	EHP-5 PCL	
Absorber Footprint	61 cm x 61 cm (24 in x 24 in)	
Absorber Height	Overall	12.7 cm (5 in)
	Base	2.5 cm (1 in)
	Pyramid	10.2 cm (4 in)
Pyramid Base Dimension	5.1 cm x 5.1 cm (2 in x 2 in)	
Pyramids per Absorber	144	
Weight (1 piece)	1.6 kg (3.6 lb)	
Absorbers per Carton	14	
Carton Dim. L x W x H	63.5 cm x 63.5 cm x 132 cm (25 in x 25 in x 52 in)	

Measured Reflections at Normal Incidence



FREQUENCY/BAND	TYPICAL REFLECTIVITY	GUARANTEED REFLECTIVITY
2-4 GHz S-Band	-32 dB	-30 dB
4-8 GHz C-Band	-42 dB	-40 dB
8-12 GHz X-Band	< -50 dB	-45 dB
12-18 GHz Ku-Band	< -55 dB	-50 dB
18-40 GHz K-Band	< -50 dB	-50 dB

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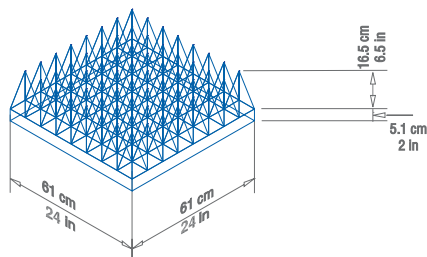
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EHP-8PCL Microwave Absorber

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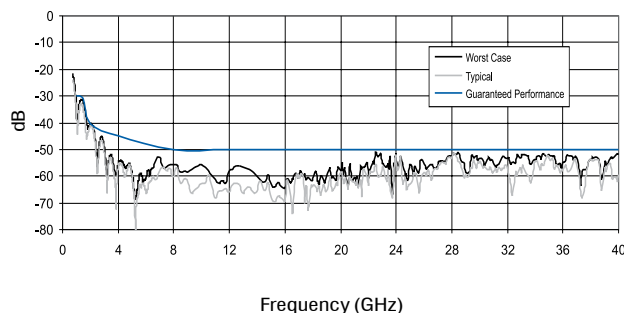
Features

- Numerically Optimized Design
- 200 V/m Power Handling Capability
- Fire Retardant

Physical Specifications

MODEL	EHP-8 PCL
Absorber Footprint	61 cm x 61 cm (24 in x 24 in)
Absorber Height	Overall: 21.6 cm (8.5 in)
	Base: 5.1 cm (2 in)
	Pyramid: 16.5 cm (6.5 in)
Pyramid Base Dimension	7.6 cm x 7.6 cm (3 in x 3 in)
Pyramids per Absorber	64
Weight (1 piece)	2.8 kg (6.25 lb)
Absorbers per Carton	8
Carton Dim. L x W x H	63.5 cm x 63.5 cm x 132 cm (25 in x 25 in x 52 in)

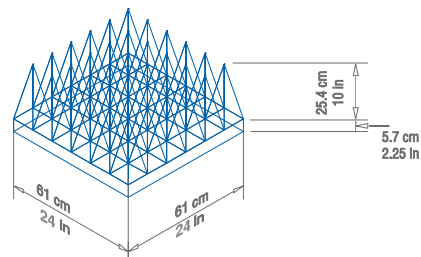
Measured Reflections at Normal Incidence



FREQUENCY/BAND	TYPICAL REFLECTIVITY	GUARANTEED REFLECTIVITY
1-2 GHz L-Band	< -30 dB	-30 dB
2-4 GHz S-Band	< -40 dB	-40 dB
4-8 GHz C-Band	< -52 dB	-45 dB
8-12 GHz X-Band	< -55 dB	-50 dB
12-18 GHz Ku-Band	< -55 dB	-50 dB
18-40 GHz K-Band	< -50 dB	-50 dB

EHP-12PCL Microwave Absorber

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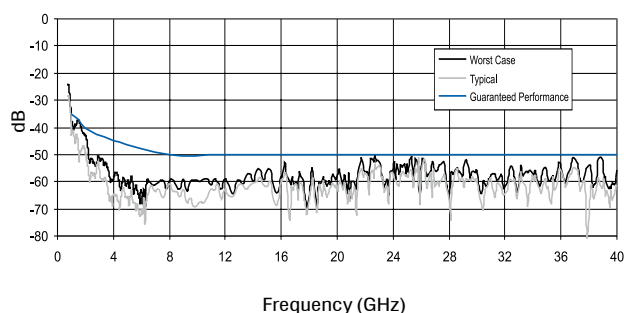
Features

- Numerically Optimized Design
- 200 V/m Power Handling Capability
- Fire Retardant

Physical Specifications

MODEL	EHP-12 PCL
Absorber Footprint	61 cm x 61 cm (24 in x 24 in)
Absorber Height	Overall: 31.1 cm (12.25 in)
	Base: 5.7 cm (2.25 in)
	Pyramid: 25.4 cm (10 in)
Pyramid Base Dimension	10.2 cm x 10.2 cm (4 in x 4 in)
Pyramids per Absorber	36
Weight (1 piece)	3.8 kg (8.4 lb)
Absorbers per Carton	6
Carton Dim. L x W x H	63.5 cm x 63.5 cm x 132 cm (25 in x 25 in x 52 in)

Measured Reflections at Normal Incidence



FREQUENCY/BAND	TYPICAL REFLECTIVITY	GUARANTEED REFLECTIVITY
1-2 GHz L-Band	< -35 dB	-35 dB
2-4 GHz S-Band	< -45 dB	-40 dB
4-8 GHz C-Band	< -55 dB	-45 dB
8-12 GHz X-Band	< -55 dB	-50 dB
12-18 GHz Ku-Band	< -55 dB	-50 dB
18-40 GHz K-Band	< -50 dB	-50 dB

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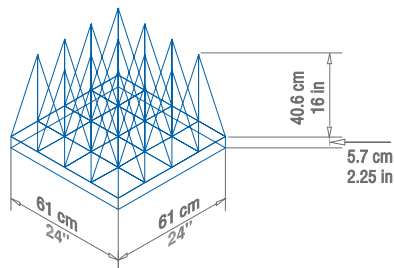
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EHP-18PCL Microwave Absorber

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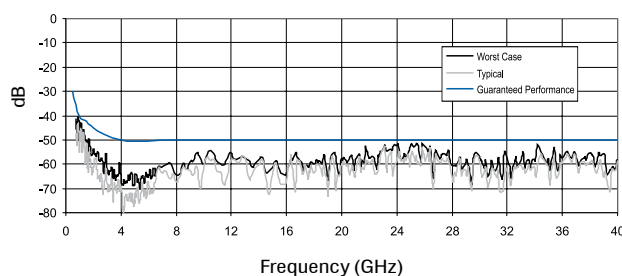
Features

- Numerically Optimized Design
- 200 V/m Power Handling Capability
- Fire Retardant

Physical Specifications

MODEL	EHP-18 PCL
Absorber Footprint	61 cm x 61 cm (24 in x 24 in)
Absorber Height	Overall: 46.4 cm (18.25 in)
	Base: 5.7 cm (2.25 in)
	Pyramid: 40.6 cm (16 in)
Pyramid Base Dimension	15.2 cm x 15.2 cm (6 in x 6 in)
Pyramids per Absorber	16
Weight (1 piece)	4.6 kg (10.25 lb)
Absorbers per Carton	4
Carton Dim. L x W x H	63.5 cm x 68.5 cm x 124.5 cm (25 in x 27 in x 49 in)

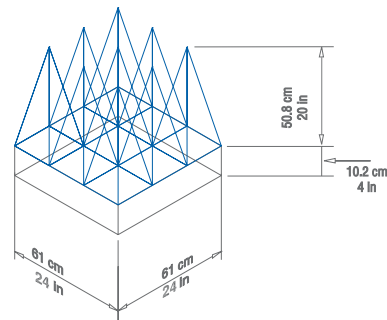
Measured Reflections at Normal Incidence



FREQUENCY/BAND	TYPICAL REFLECTIVITY	GUARANTEED REFLECTIVITY
500MHz	-33 dB	-30 dB
1-2 GHz L-Band	-40 dB	-35 dB
2-4 GHz S-Band	-50 dB	-40 dB
4-8 GHz C-Band	<-55 dB	-45 dB
8-12 GHz X-Band	<-55 dB	-50 dB
12-18 GHz Ku-Band	<-55 dB	-50 dB
18-40 GHz K-Band	<-50 dB	-50 dB

EHP-24PCL Microwave Absorber

PYRAMIDAL, HI-PERFORMANCE



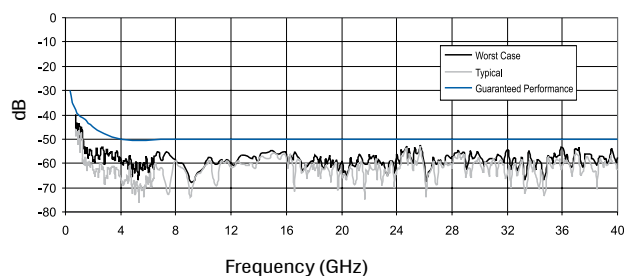
Features

- Numerically Optimized Design
- 200 V/m Power Handling Capability
- Fire Retardant

Physical Specifications

MODEL	EHP-24PCL
Absorber Footprint	61 cm x 61 cm (24 in x 24 in)
Absorber Height	Overall: 61 cm (24 in)
	Base: 10.2 cm (4 in)
	Pyramid: 50.8 cm (20 in)
Pyramid Base Dimension	20.3 cm x 20.3 cm (8 in x 8 in)
Pyramids per Absorber	9
Weight (1 piece)	6.1 kg (13.5 lb)
Absorbers per Carton	4
Carton Dim. L x W x H	63.5 cm x 76 cm x 158 cm (25 in x 30 in x 62 in)

Measured Reflections at Normal Incidence



FREQUENCY/BAND	TYPICAL REFLECTIVITY	GUARANTEED REFLECTIVITY
300MHz	-32 dB	-30 dB
500MHz	-37 dB	-35 dB
1-2 GHz L-Band	-43 dB	-40 dB
2-4 GHz S-Band	<-55 dB	-45 dB
4-8 GHz C-Band	<-55 dB	-50 dB
8-12 GHz X-Band	<-55 dB	-50 dB
12-18 GHz Ku-Band	<-55 dB	-50 dB
18-40 GHz K-Band	<-50 dB	-50 dB

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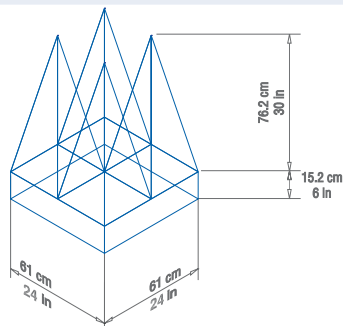
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EHP-36PCL Microwave Absorber

PYRAMIDAL, HI-PERFORMANCE



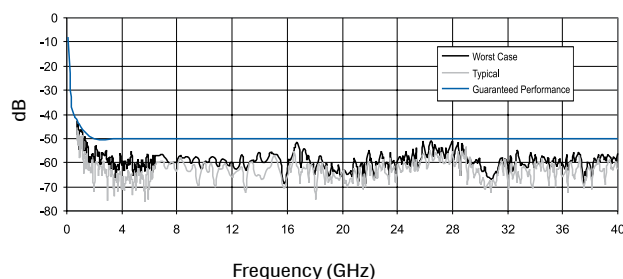
Features

- Numerically Optimized Design
- 200 V/m Power Handling Capability
- Fire Retardant

Physical Specifications

MODEL	EHP-36 PCL
Absorber Footprint	61 cm x 61 cm (24 in x 24 in)
Absorber Height	Overall: 91.4 cm (36 in)
	Base: 15.2 cm (6 in)
	Pyramid: 76.2 cm (30 in)
Pyramid Base Dimension	30.5 cm x 30.5 cm (12 in x 12 in)
Pyramids per Absorber	4
Weight (1 piece)	9.5 kg (21 lb)
Absorbers per Carton	2
Carton Dim. L x W x H	63.5 cm x 63.5 cm x 132 cm (25 in x 25 in x 52 in)

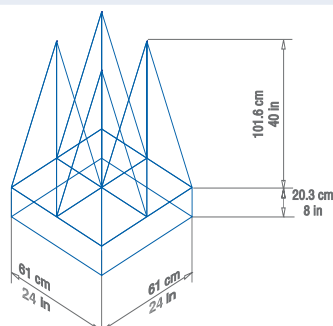
Measured Reflections at Normal Incidence



FREQUENCY/BAND	TYPICAL REFLECTIVITY	GUARANTEED REFLECTIVITY
80MHz	< -11 dB	-11 dB
120MHz	< -13 dB	-13 dB
200MHz	< -25 dB	-25 dB
300MHz	-32 dB	-30 dB
500MHz	-44 dB	-40 dB
1-2 GHz L-Band	< -45 dB	-45 dB
2-4 GHz S Band	< -55 dB	-50 dB
4-8 GHz C Band	< -55 dB	-50 dB
8-12 GHz X Band	< -55 dB	-50 dB
12-18 GHz Ku Band	< -55 dB	-50 dB
18-40 GHz K-Band	< -50 dB	-50 dB

EHP-48PCL Microwave Absorber

PYRAMIDAL, HI-PERFORMANCE



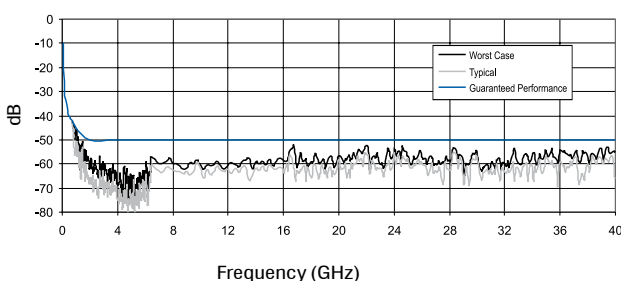
Features

- Numerically Optimized Design
- 200 V/m Power Handling Capability
- Fire Retardant

Physical Specifications

MODEL	EHP-48 PCL
Absorber Footprint	61 cm x 61 cm (24 in x 24 in)
Absorber Height	Overall: 121.9 cm (48 in)
	Base: 20.3 cm (8 in)
	Pyramid: 101.6 cm (40 in)
Pyramid Base Dimension	30.5 cm x 30.5 cm (12 in x 12 in)
Pyramids per Absorber	4
Weight (1 piece)	11.3 kg (25 lb)
Absorbers per Carton	2
Carton Dim. L x W x H	63.5 cm x 76 cm x 158 cm (25 in x 30 in x 62 in)

Measured Reflections at Normal Incidence



FREQUENCY/BAND	TYPICAL REFLECTIVITY	GUARANTEED REFLECTIVITY
80MHz	< -15 dB	-15 dB
120MHz	< -20 dB	-20 dB
200MHz	< -30 dB	-30 dB
300MHz	-40 dB	-35 dB
500MHz	-43 dB	-40 dB
1-2 GHz L-Band	-47 dB	-45 dB
2-4 GHz S Band	< -55 dB	-50 dB
4-8 GHz C Band	< -55 dB	-50 dB
8-12 GHz X Band	< -55 dB	-50 dB
12-18 GHz Ku Band	< -55 dB	-50 dB
18-40 GHz K-Band	< -50 dB	-50 dB

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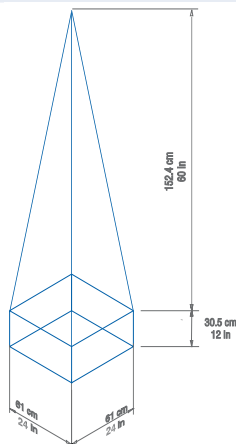
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EHP-72PCL Microwave Absorber

PYRAMIDAL, HI-PERFORMANCE



Features

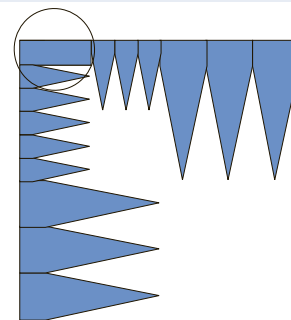
- Numerically Optimized Design
- 200 V/m Power Handling Capability
- Fire Retardant

Physical Specifications

MODEL	EHP-72 PCL	
Absorber Footprint	61 cm x 61 cm (24 in x 24 in)	
Absorber Height	Overall	182.9 cm (72 in)
	Base	30.5 cm (12 in)
	Pyramid	152.4 cm (60 in)
Pyramid Base Dimension	61 cm x 61 cm (24 in x 24 in)	
Pyramids per Absorber	1	
Weight (1 piece)	15.9 kg (35 lb)	
Absorbers per Carton	1	
Carton Dim. L x W x H	(2) 210 cm x 63.5 cm x 63.5 cm (83 in x 25 in x 25 in)	

FREQUENCY/BAND	TYPICAL REFLECTIVITY	GUARANTEED REFLECTIVITY
80 MHz	< -20 dB	-25 dB
120 MHz	< -30 dB	-30 dB
200 MHz	< -35 dB	-35 dB
300 MHz	< -40 dB	-40 dB
500 MHz	< -45 dB	-45 dB
1-2 GHz L-Band	< -50 dB	-50 dB
2-4 GHz S Band	< -50 dB	-50 dB
4-8 GHz C Band	< -50 dB	-50 dB
8-12 GHz X Band	< -50 dB	-50 dB
12-18 GHz Ku Band	< -50 dB	-50 dB
18-40 GHz K-Band	< -50 dB	-50 dB

EHP-LFBCL Lossy Foam Absorber

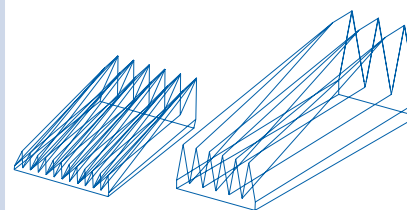


Description

ETS-Lindgren Extra High Performance Lossy Foam Block Combustion Limiting broadband absorber is part of a line of combustion limiting polyurethane absorber made from urethane foam impregnated with a dielectrically matched conductive carbon, and cut into blocks. LFB material is a flat multi-purpose absorber typically used as corner treatment or for covering positioning equipment and can be cut into any thickness and dimensions to suit the application. LFB absorber effectively reduces reflections between 30 MHz and 100 GHz. ETS-Lindgren guarantees its EHP series absorber to absorb 1/2 Watt per square inch without material damage.

*See page 21 for Lossy Foam Block Corner Treatments

EHP-WGCL Transitional Absorber Wedge



Description

ETS-Lindgren Extra High Performance Transitioning broadband absorber is part of a line of combustion limiting polyurethane absorber made from urethane foam impregnated with a dielectrically matched conductive carbon. Transitional absorber is typically used when smooth transition between 2 different geometric configurations is necessary, i.e. EHP-6PCL and EHP-12 PCL. It can be cut into lengths up to 1.8 m (6 ft) and effectively reduces reflections between 30 MHz and 100 GHz.

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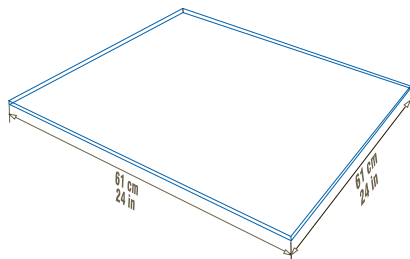
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FL

Flat Laminate Absorber



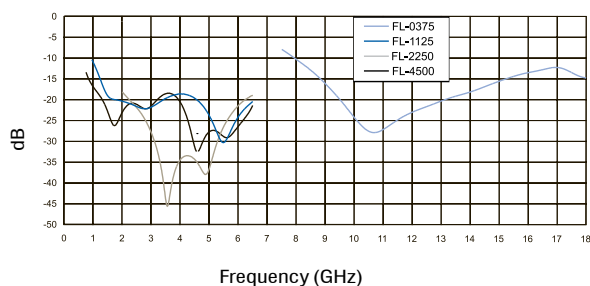
Description

The ETS-Lindgren Flat Laminate Absorber is a thin broadband microwave absorber with a graded dielectric material that has been widely accepted in the microwave and antenna fields. The absorber is typically fabricated using three layers of carbon impregnated foam. By using a front layer with a small loss tangent, a center layer with a median loss tangent, and a bottom layer with a large loss tangent, an electrical taper is achieved that yields a material with an average reflection coefficient of -20 dB over a wide frequency range.

A 100 percent inspection of the FL series material is performed by measuring the reflection coefficient at the frequencies shown below. The reflection coefficient is guaranteed to be -20 dB (1 percent) or less at the test frequencies.

ETS-Lindgren FL is flexible and easily cut using a bandsaw or a knife with a serrated edge. Best performance is achieved when the absorber is mounted in intimate contact with a metal surface. The front surface of FL series absorber is painted a light blue color.

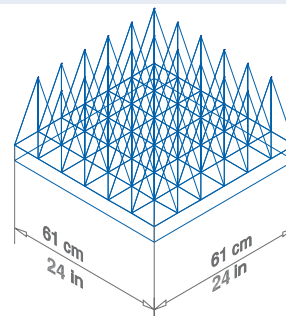
Measured Reflections at Normal Incidence



MODEL	FREQ. (LB/FT ²)	TEST FREQ.	THICKNESS	BASE SIZE	WEIGHT
FL-0375CL	7.5 GHz & above	12 GHz	1 cm (.375 in)	61 cm x 61 cm (24 in x 24 in)	0.1 kg (0.2 lb)
FL-0750CL	3.5 GHz & above	6 GHz	1.9 cm (0.75 in)	61 cm x 61 cm (24 in x 24 in)	0.1 kg (0.3 lb)
FL-1125CL	2.4 GHz & above	3 GHz	2.9 cm (1.125 in)	61 cm x 61 cm (24 in x 24 in)	0.2 kg (0.5 lb)
FL-2250CL	940 MHz & above	1.7 GHz	5.7 cm (2.25 in)	61 cm x 61 cm (24 in x 24 in)	0.4 kg (0.9 lb)
FL-4500CL	455 MHz & above	800 MHz	11.4 cm (4.5 in)	61 cm x 61 cm (24 in x 24 in)	0.9 kg (2.0 lb)

FF

Filter Foam



Description

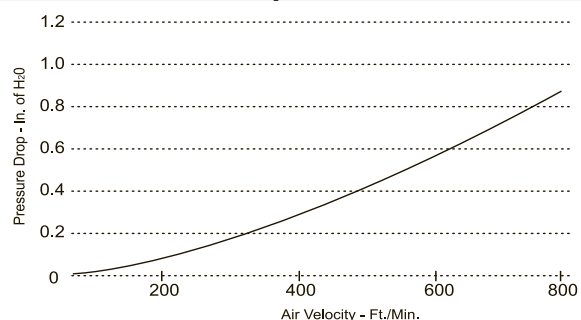
ETS-Lindgren Filter Foam/Vent Absorber is similar in appearance and geometry to conventional ETS-Lindgren pyramidal and wedge type materials, and is tested to the same rigid specifications. Normal incidence and wide-angle performance guarantees are the same for conventional EHP series absorbers.

An added feature of the Filter Foam/Vent Absorber is that it handles approximately 10 times more RF power than conventional absorbers. Additional information on power handling capability vs. forced airflow through the material can be supplied upon request.

Physical Specifications

MODEL	OVERALL HEIGHT
FF-3PCL	7.6 cm (3 in)
FF-5PCL	12.7 cm (5 in)
FF-8PCL	21.6 cm (8 in)
FF-12PCL	31.1 cm (12 in)
FF-18PCL	46.4 cm (18 in)
FF-24PCL	61 cm (24 in)
FF-26PCL	66 cm (26 in)
FF-36PCL	91.4 cm (36 in)

Series FF Pressure Drop

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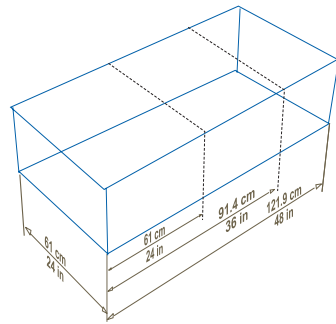
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WW Walkway Absorber



Description

ETS-Lindgren High Performance Walkway Absorber is a special absorbent material that is compatible with anechoic chamber reflection requirements yet provides a walking surface for personnel. Low-density rigid polystyrene foam is used to encapsulate a standard pyramidal or wedge absorber. A thin sheet of semi-rigid polyvinyl chloride foam is adhered to the top to provide a walking surface, which is smooth and impervious to water, and dirt. The Walkway Absorber fabricated in this manner will support up to 90.7 kg per .3 meter (200 pounds per square foot) and is durable and easily maintained.

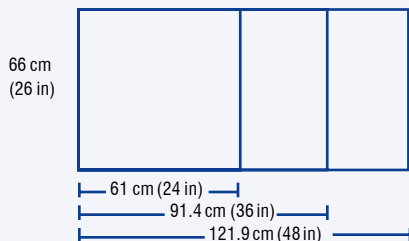
Reflections will occur at any foam surface, the magnitude of the reflection being dependent on the density of the material. The ETS-Lindgren Walkway Absorber utilizes the lowest possible foam density consistent with stability and load requirements.

Physical Specifications

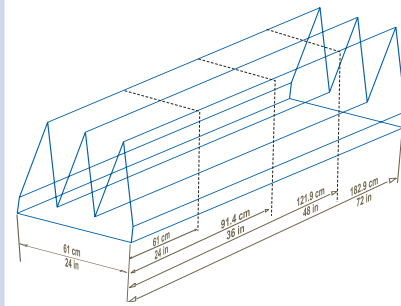
MODEL	ABSORBER THICKNESS	WALKWAY THICKNESS
EHP-3WW	8.3 cm (3.25 in)	13.6 cm (5.5 in)
EHP-5WW	12.7 cm (5 in)	19 cm (7.5 in)
EHP-8WW	21.5 cm (8.5 in)	27.9 cm (11 in)
EHP-12WW	31.1 cm (12.3 in)	38.1 cm (15 in)
EHP-18WW	46.3 cm (18.25 in)	53.3 cm (21 in)
EHP-24WW	61 cm (24 in)	69.8 cm (27.5 in)
EHP-26WW	66 cm (26 in)	77.4 cm (30.5 in)

Note: All Walkway Absorber models available in three footprint dimensions:

- 61 cm x 61 cm (24 in x 24 in)
- 61 cm x 91.4 cm (24 in x 36 in)
- 61 cm x 121.9 cm (24 in x 48 in)



EHP-WGCL Wedge Absorber



Description

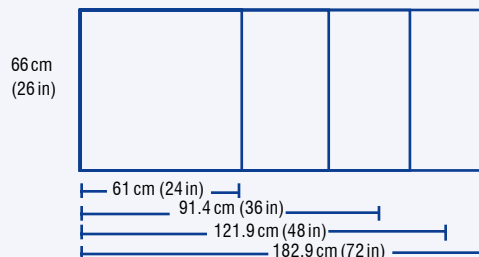
Wedge absorber effectively reduces reflections between 30 MHz and 100 GHz and its RF reflectivity levels are the same as its equivalent sized pyramidal absorber. Wedge absorbers are used in areas of chambers where pyramidal absorbers would provide too much backscatter under specific configurations. ETS-Lindgren guarantees its EHP absorbent material meets specified standards for material fire retardancy. Wedge absorber can also be provided in transitional parts from one size to another providing a continuous line in the absorber, i.e. a 5 in (12.7 cm) wedge to a 12.3 in (31.1 cm) wedge. These parts are typically 2 ft x 4 ft (61 cm x 121.9 cm) or 2 ft x 6 ft (61 cm x 182.9 cm) long and used in tapered or compact range chambers.

Physical Specifications

MODEL	ABSORBER THICKNESS	MODEL	ABSORBER THICKNESS
EHP-1WGCL	2.5 cm (1 in)	EHP-18WGCL	46.3 cm (18.25 in)
EHP-3WGCL	8.3 cm (3.25 in)	EHP-24WGCL	61 cm (24 in)
EHP-5WGCL	12.7 cm (5 in)	EHP-26WGCL	66 cm (26 in)
EHP-8WGCL	21.5 cm (8.5 in)	EHP-36WGCL	91.4 cm (36 in)
EHP-12WGCL	31.1 cm (12.3 in)	EHP-48WGCL	121.9 cm (48 in)

Note: All Wedge Absorber models available in 4 footprint dimensions:

- 61 cm x 61 cm (24 in x 24 in)
- 61 cm x 121.9 cm (24 in x 48 in)
- 61 cm x 91.4 cm (24 in x 36 in)
- 61 cm x 182.9 cm (24 in x 72 in)



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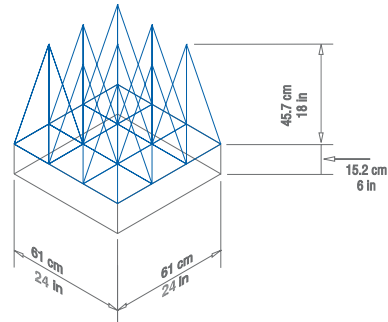
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EMC-24PCL Microwave Absorber

PYRAMIDAL, HI-PERFORMANCE



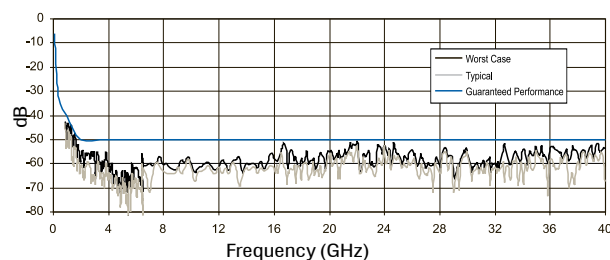
Features:

- Numerically Optimized Design
- 200 V/m Power Handling Capability
- Fire Retardant

Physical Specifications

MODEL	EMC-24PCL
Absorber Footprint	61 cm x 61 cm (24 in x 24 in)
Absorber Height	Overall: 61 cm (24 in)
	Base: 15.2 cm (6 in)
	Pyramid: 45.7 cm (18 in)
Pyramid Base Dimension	20.3 cm x 20.3 cm (8 in x 8 in)
Pyramids per Absorber	9
Weight (1 piece)	4.6 kg (10.1 lb)
Absorbers per Carton	4
Carton Dim. L x W x H	63.5 cm x 76 cm x 158 cm (25 in x 30 in x 62 in)

Measured Reflections at Normal Incidence:



FREQUENCY/BAND	GUARANTEED REFLECTIVITY
60MHz	-3 dB
80MHz	-6 dB
100MHz	-7 dB
200MHz	-15 dB
250MHz	-20 dB
300MHz	-30 dB
500MHz	-35 dB
1 GHz	-40 dB
2 GHz	-50 dB
3 GHz	-50 dB
6 GHz	-50 dB
10 GHz	-50 dB
18 GHz	-50 dB
40 GHz	-50 dB

Absorption Performance

The EMC-24PCL is a special type of RF absorber designed to meet the minimum RF absorption requirement specified in MIL-STD-461E in the following table.

FREQUENCY	MINIMUM ABSORPTION
80 - 250 MHz	6 dB
> 250 MHz	10 dB

ETS-Lindgren conducts actual RF absorption test per IEEE-1128 recommended test procedure in the critical frequency range to ensure our absorber product meets or exceeds the above absorption performance requirement. All absorber units carry individual identification and are factory tested and serialized to verify rated reflection characteristics.

ETS-Lindgren can custom fabricate microwave absorbers to a special size, shape, or modified impregnation formulation. The EMC-24PCL absorbers meet the fire retardant standards of NRL 8093 Tests 1, 2 & 3, Raytheon Drawing #2693066, MIT MS-8-21, UL 94, and DIN 4102-B2: Tests for Flammability.

Applications: Chambers

ETS-Lindgren's MIL-STD-461E high performance semi-anechoic chamber is designed primarily for radiated emissions (RE) and radiated immunity (RI) testing of electronic components in accordance with MIL-STD-461E. By adding required accessories and RF instrumentation, this RF shielded anechoic chamber is ready for testing. It can also be used to support conducted emissions (CE) and conducted susceptibility (CS) testing per MIL-STD specifications.

As the leading manufacturer of EMI/RFI/EMC test and measurement facilities and equipment, ETS-Lindgren combines unparalleled technical knowledge and broad capabilities to provide our clients with the best services and products available. We will design and construct your facility using the highest quality components and the most stringent quality control procedures possible.

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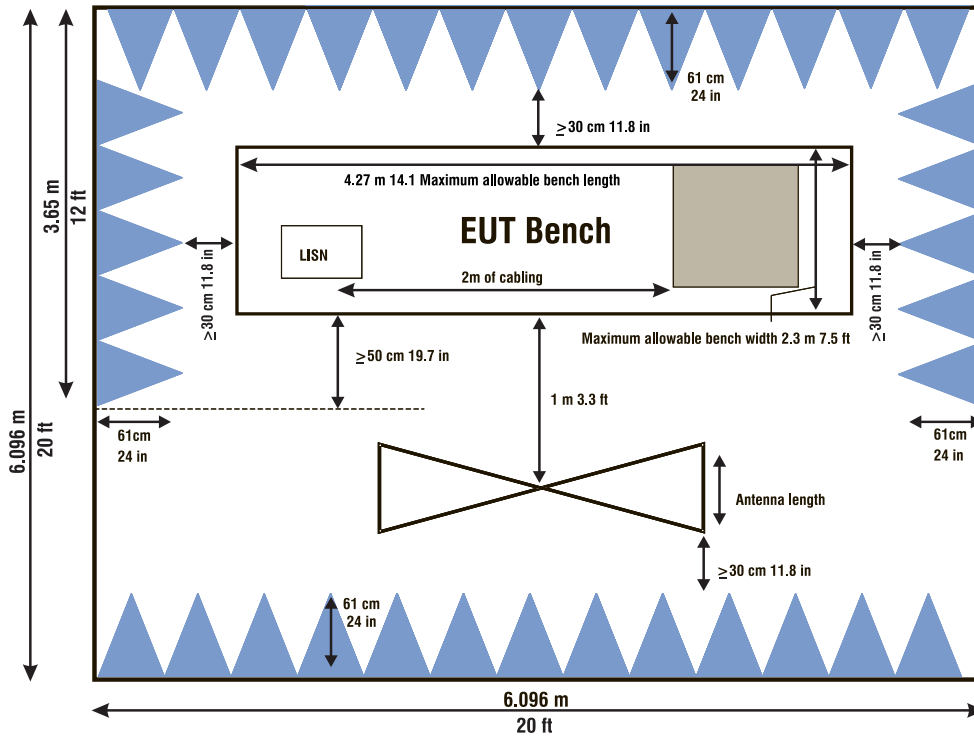
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Standard semi-anechoic chamber configuration with EMC-24PCL absorber treatment for MIL-STD-461E testing

Turnkey Systems

ETS-Lindgren is an integrated manufacturer producing such well-known brands as Rantec absorber, RayProof Series 81 and Euroshield shielding and RF doors, EMCO antennas, towers, turntables, and test accessories, and Elmag brand filter products. All of our products are designed to work together for maximum efficiency and performance.

In addition to providing performance, our “Total Solution, Single Source”™ approach simplifies complex decisions and gives you peace of mind with a single source of responsibility.

Performance

Reliable system performance is achieved by using ETS-Lindgren’s Series 81 modular shielded room lined with EMC-24PCL absorber on both end walls and on partial areas of the sidewalls and ceiling, as specified in MIL-STD-461E. The Series 81 modular shielded rooms have been proven to demonstrate superior shielding effectiveness to provide better than the required ambient level. They also contain the RF radiation energy within the enclosure when radiated susceptibility tests are conducted within the enclosure. The EMC-24PCL is especially designed to meet the RF absorption requirements defined in MIL-STD-461E.

80 MHz - 40 GHz Frequency Range

Testing per MIL-STD-461E Specifications:

- Radiated Emissions Tests
 - RE 103 (chamber required)
 - RE 101 and RE 105 (chamber recommended)
- Radiated Susceptibility Tests
 - RS 103 (chamber required)
 - RS 101 and RS 105 (chamber recommended)
- Conducted Emissions Tests
 - CE 101, CE 102, and CE 103
- Conducted Susceptibility Tests
 - CS 101, CS 103, CS 104, CS 105, CS 109, CS 114, CS 115 and CS 116

Absorber Configuration is in Accordance to

- MIL-STD-461E

Available as a Turnkey Package:

- Chamber, Antennas, Tripods, etc.

Allows for Benchtop Testing of EUT as large as 1 m Sq.

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High Power Absorber

ETS-Lindgren's High Power Absorber is designed for applications where excessive temperatures may result during the generation of high field strength levels. The absorber withstands high temperatures, and is honeycombed for passive or forced airflow cooling.

Features

- Withstands short term exposures to 482.2° C (900° F)
- Withstand up to 2.5 W/in² ambient power density without airflow
- Recommended continuous service temperature <200 degrees C

Applications

- Telecom/Wireless
- Satellite
- High-Speed Electronics
- Automotive
- Military

Maximum Reflections at Normal Incidence

MODEL NUMBER	200 MHz	300 MHz	500 MHz	L-BAND 1-2 GHz	S-BAND 2-4 GHz	C-BAND 4-8 GHz	X-BAND 8-12 GHz	KU-BAND 12-18 GHz	K-BAND 18-40 GHz
HP-3PCL						-30dB	-40dB	-45dB	-45dB
HP-5PCL					-30dB	-40dB	-45dB	-50dB	-50dB
HP-8PCL				-30dB	-40dB	-45dB	-50dB	-50dB	-50dB
HP-12PCL				-35dB	-40dB	-45dB	-50dB	-50dB	-50dB
HP-18PCL			-30dB	-40dB	-45dB	-50dB	-50dB	-50dB	-50dB
HP-24PCL	-20dB	-30dB	-35dB	-40dB	-50dB	-50dB	-50dB	-50dB	-50dB

Specifications

MODEL NUMBER	ABSORBER HEIGHT			PYRAMID BASE DIMENSION	NOMINAL WEIGHT	PYRAMIDS PER ABSORBER	ABSORBERS PER CARTON	CARTON DIMENSIONS L x W x H
	OVERALL	BASE	PYRAMID					
HP-3PCL	8.25 cm (3.25 in)	1.9 cm (.75 in)	6.4 cm (2.5 in)	3.8 cm x 3.8 cm (1.5 in x 1.5 in)	1 kg (2 lb)	256	22	63.5 cm x 63.5 cm x 132 cm (25 in x 25 in x 52 in)
HP-5PCL	12.7 cm (5 in)	2.5 cm (1 in)	10.2 cm (4 in)	5.1 cm x 5.1 cm (2 in x 2 in)	1.6 kg (3.6 lb)	144	14	63.5 cm x 63.5 cm x 132 cm (25 in x 25 in x 52 in)
HP-8PCL	26.1 cm (8.5 in)	5.1 cm (2 in)	16.5 cm (6.5 in)	7.6 cm x 7.6 cm (3 in x 3 in)	2.8 kg (6.25 lb)	64	8	63.5 cm x 63.5 cm x 132.0 cm (25 in x 25 in x 52 in)
HP-12PCL	31.1 cm (12.25 in)	5.7 cm (2.25 in)	25.4 cm (10 in)	10.2 cm x 10.2 cm (4 in x 4 in)	3.8 kg (8.4 lb)	36	6	63.5 cm x 63.5 cm x 132 cm (25 in x 25 in x 52 in)
HP-18PCL	46.4 cm (18.25 in)	5.7 cm (2.25 in)	40.6 cm (16 in)	15.2 cm x 15.2 cm (6 in x 6 in)	4.6 kg (10.25 lb)	16	4	63.5 cm x 68.5 cm x 124.5 cm (25 in x 27 in x 49 in)
HP-24PCL	61 cm (24 in)	10.2 cm (4 in)	50.8 cm (20 in)	20.3 cm x 20.3 cm (8 in x 8 in)	6.1 kg (13.5 lb)	9	4	63.5 cm x 76 cm x 158 cm (25 in x 30 in x 62 in)

1) All absorbers are factory tested to verify rated reflection characteristics.

2) We will custom fabricate microwave absorbers to any special size, shape, or modified impregnation formulation; a) Absorber for millimeter wave applications b) Absorber with monolithic construction up to 1.8 m (6 ft) height

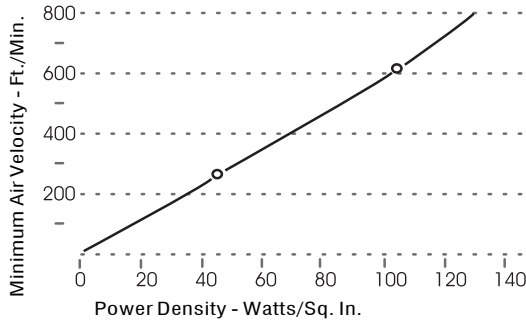
c) Absorber up to 3.7 m (12 ft) height for low frequency (80MHz) applications d) Non-fire retardant absorber formulation.

3) Due to the characteristics of polyurethane foam, some settling may occur during shipment, resulting in dimensional tolerances of ±6 mm (0.25 in).

Note: The charts on the following pages contain measured data for our standard absorber sizes. This data is a statistical representation of thousands of measurements, which have been recorded during final inspection at our factory. Each performance chart includes three legends; *Guaranteed Performance*-this equals the QC Pass/Fail limit, *Typical Performance*-this is the statistical average of each measurement point, *Worst Case*-this equals the lowest performance at each measurement point.

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Cooling Requirements



Description

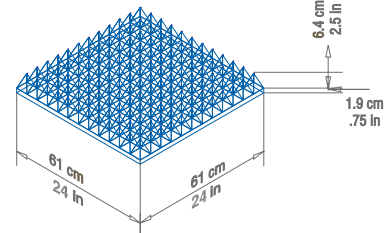
ETS-Lindgren's high-power absorber is a honeycomb substrate made from a phenolic-based material. Lossy films are coated on the walls of the honeycomb for effective absorption of incident electromagnetic waves. The hollow network of honeycombs allows air to be drawn through them while the phenolic-based material withstands high temperatures. The benefit is that electromagnetic energy flux can be loaded to the absorber at much higher power densities than conventional absorbers made with polyurethane material.

Based on a recent high power absorber study, our phenolic-based material can withstand up to 2.5 W/in², and maximum temperatures up to 100 degrees Celsius (212 degrees F) without forced airflow. With forced airflow, this absorber can withstand much higher electromagnetic field power densities and temperatures. The chart shows the minimum design requirements with various airflow speeds depending on the severity of the power density. Our design engineers are ready to bring additional expertise on both RF and mechanical details to make our high power test systems achieve the design goals and safe operation required for your specific needs.



(HP) absorber and special high velocity, thermostat controlled cooling fans to draw air through the honeycombed HP absorber.

HP-3PCL High Power Microwave Absorber

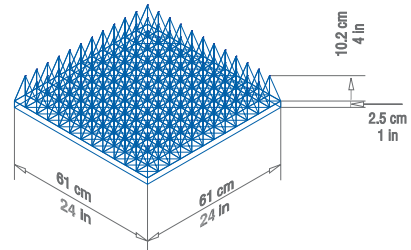


Physical Specifications

MODEL		HP-3 PCL
Absorber Footprint		61 cm x 61 cm (24 in x 24 in)
Absorber Height	Overall	8.25 cm (3.25 in)
	Base	1.9 cm (.75 in)
	Pyramid	6.4 cm (2.5 in)
Pyramid Base Dimension		3.8 cm x 3.8 cm (1.5 in x 1.5 in)
Pyramids per Absorber		256
Weight (1 piece)		1 kg (2 lb)
Absorbers per Carton		22
Carton Dim. L x W x H		63.5 cm x 63.5 cm x 132 cm (25 in x 25 in x 52 in)

FREQUENCY/BAND	TYPICAL REFLECTIVITY	GUARANTEED REFLECTIVITY
4-8 GHz C-Band	-35 dB	-30 dB
8-12 GHz X-Band	-45 dB	-40 dB
12-18 GHz Ku-Band	<-45 dB	-45 dB
18-40 GHz K-Band	<-45 dB	-45 dB

HP-5PCL High Power Microwave Absorber



Physical Specifications

MODEL		HP-5 PCL
Absorber Footprint		61 cm x 61 cm (24 in x 24 in)
Absorber Height	Overall	12.7 cm (5 in)
	Base	2.5 cm (1 in)
	Pyramid	10.2 cm (4 in)
Pyramid Base Dimension		5.1 cm x 5.1 cm (2 in x 2 in)
Pyramids per Absorber		144
Weight (1 piece)		1.6 kg (3.6 lb)
Absorbers per Carton		14
Carton Dim. L x W x H		63.5 cm x 63.5 cm x 132 cm (25 in x 25 in x 52 in)

FREQUENCY/BAND	TYPICAL REFLECTIVITY	GUARANTEED REFLECTIVITY
2-4 GHz S-Band	-32 dB	-30 dB
4-8 GHz C-Band	-42 dB	-40 dB
8-12 GHz X-Band	<-50 dB	-45 dB
12-18 GHz Ku-Band	<-55 dB	-50 dB
18-40 GHz K-Band	<-50 dB	-50 dB

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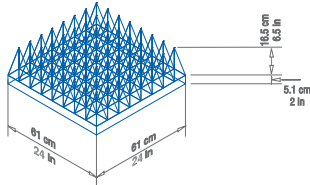
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HP-8PCL High Power Microwave Absorber

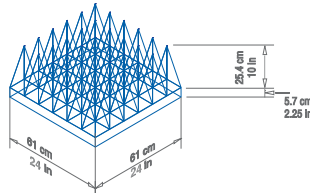


Physical Specifications

MODEL	HP-8 PCL
Absorber Footprint	61 cm x 61 cm (24 in x 24 in)
Absorber Height	Overall 21.6 cm (8.5 in)
	Base 5.1 cm (2 in)
	Pyramid 16.5 cm (6.5 in)
Pyramid Base Dimension	7.6 cm x 7.6 cm (3 in x 3 in)
Pyramids per Absorber	64
Weight (1 piece)	2.8 kg (6.25 lb)
Absorbers per Carton	8
Carton Dim. L x W x H	63.5 cm x 63.5 cm x 132 cm (25 in x 25 in x 52 in)

FREQUENCY/BAND	TYPICAL REFLECTIVITY	GUARANTEED REFLECTIVITY
1-2 GHz L-Band	< -30 dB	-30 dB
2-4 GHz S-Band	< -40 dB	-40 dB
4-8 GHz C-Band	< -52 dB	-45 dB
8-12 GHz X-Band	< -55 dB	-50 dB
12-18 GHz Ku-Band	< -55 dB	-50 dB
18-40 GHz K-Band	< -50 dB	-50 dB

HP-12PCL High Power Microwave Absorber

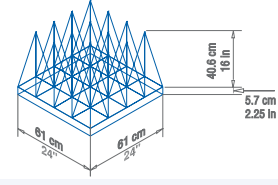


Physical Specifications

MODEL	HP-12 PCL
Absorber Footprint	61 cm x 61 cm (24 in x 24 in)
Absorber Height	Overall 31.1 cm (12.25 in)
	Base 5.7 cm (2.25 in)
	Pyramid 25.4 cm (10 in)
Pyramid Base Dimension	10.2 cm x 10.2 cm (4 in x 4 in)
Pyramids per Absorber	36
Weight (1 piece)	3.8 kg (8.4 lb)
Absorbers per Carton	6
Carton Dim. L x W x H	63.5 cm x 63.5 cm x 132 cm (25 in x 25 in x 52 in)

FREQUENCY/BAND	TYPICAL REFLECTIVITY	GUARANTEED REFLECTIVITY
1-2 GHz L-Band	< -35 dB	-35 dB
2-4 GHz S-Band	< -45 dB	-40 dB
4-8 GHz C-Band	< -55 dB	-45 dB
8-12 GHz X-Band	< -55 dB	-50 dB
12-18 GHz Ku-Band	< -55 dB	-50 dB
18-40 GHz K-Band	< -50 dB	-50 dB

HP-18PCL High Power Microwave Absorber

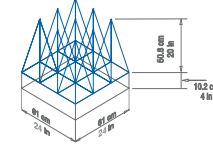


Physical Specifications

MODEL	HP-18 PCL
Absorber Footprint	61 cm x 61 cm (24 in x 24 in)
Absorber Height	Overall 46.4 cm (18.25 in)
	Base 5.7 cm (2.25 in)
	Pyramid 40.6 cm (16 in)
Pyramid Base Dimension	15.2 cm x 15.2 cm (6 in x 6 in)
Pyramids per Absorber	16
Weight (1 piece)	4.6 kg (10.25 lb)
Absorbers per Carton	4
Carton Dim. L x W x H	63.5 cm x 68.5 cm x 124.5 cm (25 in x 27 in x 49 in)

FREQUENCY/BAND	TYPICAL REFLECTIVITY	GUARANTEED REFLECTIVITY
500 MHz	-33 dB	-30 dB
1-2 GHz L-Band	-40 dB	-35 dB
2-4 GHz S-Band	-50 dB	-40 dB
4-8 GHz C-Band	< -55 dB	-45 dB
8-12 GHz X-Band	< -55 dB	-50 dB
12-18 GHz Ku-Band	< -55 dB	-50 dB
18-40 GHz K-Band	< -50 dB	-50 dB

HP-24PCL High Power Microwave Absorber



Physical Specifications

MODEL	HP-24 PCL
Absorber Footprint	61 cm x 61 cm (24 in x 24 in)
Absorber Height	Overall 61 cm (24 in)
	Base 10.2 cm (4 in)
	Pyramid 50.8 cm (20 in)
Pyramid Base Dimension	20.3 cm x 20.3 cm (8 in x 8 in)
Pyramids per Absorber	9
Weight (1 piece)	6.1 kg (13.5 lb)
Absorbers per Carton	4
Carton Dim. L x W x H	63.5 cm x 76 cm x 158 cm (25 in x 30 in x 62 in)

FREQUENCY/BAND	TYPICAL REFLECTIVITY	GUARANTEED REFLECTIVITY
300 MHz	-32 dB	-30 dB
500 MHz	-37 dB	-35 dB
1-2 GHz L-Band	-43 dB	-40 dB
2-4 GHz S-Band	< -55 dB	-45 dB
4-8 GHz C-Band	< -55 dB	-50 dB
8-12 GHz X-Band	< -55 dB	-50 dB
12-18 GHz Ku-Band	< -55 dB	-50 dB
18-40 GHz K-Band	< -50 dB	-50 dB

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Microwave Curvilinear Absorber

ETS-Lindgren's Curvilinear Absorber provides optimal normal incidence reflectivity performance in the designed broadband frequency range. Generally, curvilinear absorber is preferred for chamber back walls and other "hot spots".

Features

- Improved Low Frequency Reflection Suppression Performance
- 500 V/m Power Handling Capability

Applications

- Telecom/Wireless
- Satellite
- High-Speed Electronics
- Automotive
- Military

Maximum Reflections at Normal Incidence

MODEL NUMBER	80 MHz	120 MHz	200 MHz	300 MHz	500 MHz	L-BAND 1-2 GHz	S-BAND 2-4 GHz	C-BAND 4-8 GHz	X-BAND 8-12 GHz	KU-BAND 12-18 GHz	K-BAND 18-40 GHz
CRV-15PCL						-40 dB	-50 dB	-50 dB	-50 dB	-50 dB	-50 dB
CRV-23PCL					-45 dB	-50 dB	-50 dB	-50 dB	-50 dB	-50 dB	-50 dB
CRV-40PCL	-10 dB	-12 dB	-30 dB	-45 dB	-50 dB	-50 dB	-50 dB	-50 dB	-50 dB	-50 dB	-50 dB
CRV-60PCL	-12 dB	-15 dB	-40 dB	-45 dB	-50 dB	-50 dB	-50 dB	-50 dB	-50 dB	-50 dB	-50 dB
CRV-67PCL	-20 dB	-30 dB	-35 dB	-35 dB	-40 dB	-45 dB	-50 dB	-50 dB	-50 dB	-50 dB	-50 dB

Specifications

MODEL NUMBER	ABSORBER HEIGHT		PYRAMID	PYRAMID BASE DIMENSION	NOMINAL WEIGHT	PYRAMIDS PER ABSORBER	ABSORBERS PER CARTON	CARTON DIMENSIONS L x W x H
	OVERALL	BASE						
CRV-15PCL	38.1 cm (15 in)	5.1 cm (2 in)	33.0 cm (13 in)	10.2 cm x 10.2 cm (4 in x 4 in)	4.2 kg (9.2 lb)	36	4	63.5 cm x 63.5 cm x 124.5 cm (25 in x 25 in x 59 in)
CRV-23PCL	58.4 cm (23 in)	13.8 cm (5.45 in)	44.6 cm (17.6 in)	15.2 cm x 15.2 cm (6 in x 6 in)	6 kg (13.2 lb)	16	4	63.5 cm x 63.5 cm x 157.5 cm (25 in x 25 in x 62 in)
CRV-40PCL	101.6 cm (40 in)	20.3 cm (8 in)	81.3 cm (32 in)	20.3 cm x 20.3 cm (8 in x 8 in)	8 kg (1.75 lb)	1	4	63.5 cm x 63.5 cm x 157.5 cm (25 in x 25 in x 62 in)
CRV-60PCL	152.4 cm (60 in)	30.5 cm (12 in)	121.9 cm (48 in)	30.5 cm x 30.5 cm (12 in x 12 in)	2.8 kg (6.1 lb)	1	4	63.5 cm x 63.5 cm x 157.5 cm (25 in x 25 in x 62 in)
CRV-67PCL	170.2 cm (67 in)	12.7 cm (5 in)	157.5 cm (62 in)	30.5 cm x 30.5 cm (12 in x 12 in)	10 (13.6) kg 22 (30) lb	4	1	63.5 cm x 63.5 cm x 210 cm (25 in x 25 in x 83 in)

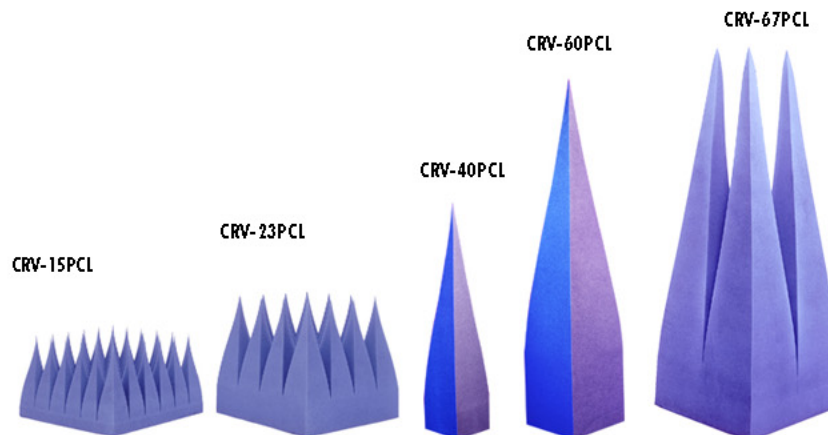
1) All absorbers are factory tested to verify rated reflection characteristics.

2) We will custom fabricate microwave absorbers to any special size, shape, or modified impregnation formulation: a) Absorber for millimeter wave applications; b) Absorber with monolithic construction up to 1.8 m (6 ft) height; c) Absorber up to 3.7 m (12 ft) height for low frequency (80MHz) applications; d) Non-fire retardant absorber formulation.

3) Due to the characteristics of polyurethane foam, some settling may occur during shipment, resulting in dimensional tolerances of ±5 mm (0.25 in).

MODEL NUMBER	MAX POWER DENSITY	MAX SERVICE TEMP	FIRE RETARDANCY	ADHESIVE	VELCRO	CLIP & RAIL	ENVIRONMENTAL TEMPERATURE	SPECIFICATIONS RELATIVE HUMIDITY	COLOR
CRV-15PCL	500 V/m 775 W/m ² 0.5 W/in ²	90° C 190° F	NRL 8093 Tests 1,2,3 Raytheon #2693066 MIT MS-8-21 UL 94 DIN 4102 E2	Y	Y	Y	70° F ± 20° F 22° C ± 10° C	50% ± 20%	Rantec Blue
CRV-23PCL					Upto 15"				
CRV-40PCL					N				
CRV-60PCL									
CRV-67PCL									

Note: The charts on the following pages contain measured data for our standard absorbers. This data is a statistical representation of thousands of measurements, which have been recorded during final inspection at our factory. Each performance chart includes three legends: *Guaranteed Performance*-this equals the QC Pass/Fail limit, *Typical Performance*-this is the statistical average of each measurement point, *Worst Case*-this equals the lowest performance at each measurement point.



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ETS-Lindgren's Curvilinear Absorber optimizes normal incidence reflectivity performance throughout its broadband frequency range. The absorber is ideal for chamber backwalls and other "hot spots" that require high Quiet Zone (QZ) reflectivity performance at normal incidence. In anechoic chambers, curvilinear absorber extends the usable frequency range to as low as 100 MHz, without using expensive ferrite tiles or effecting high frequency performance.

Compared to traditional absorber, our curvilinear absorber delivers similar reflectivity performance in a smaller form factor. The benefit is maximum available workspace for a given chamber shield enclosure.

We offer two types of curvilinear absorber: complimentary and non-complimentary. Complimentary optimizes performance at the higher frequencies (>1 GHz), while non-complimentary is designed for products designed to operate in the VHF (100 MHz and above) frequency range. The benefit is that the pyramidal taper can be used to optimize reflectivity performance in the critical frequency band.

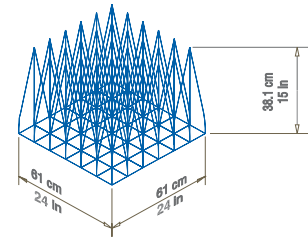
ETS-Lindgren manufactures the curvilinear absorber from high quality, low-density polyurethane foam. A double immersion process evenly impregnates the foam with a proprietary conductive carbon formula and fire retardant salts.

Each individual absorber curve and material complex permittivity is optimized using in-house numerical electromagnetic design packages. This design process enables us to achieve best possible absorber normal incidence reflectivity performance at a given depth. The optimized design is then precision-cut on a computer controlled (CNC) saw with a multi-directional wire. This ensures that the curve is accurate and consistent with the required shape as defined in the optimization.

Fifteen individual quality assurance checks take place during production. The final measured performance data and serial number of each curvilinear absorber unit is recorded and kept on file. The curvilinear absorbers meet the fire retardant standards of NRL 8093 Tests 1, 2 & 3, Raytheon Drawing #2693066, MIT MS-8-21, UL 94, and DIN 4102-B2: Tests for Flammability. They pass the ASTM E84-84 flame-spread index of 35 and a smoke developed index of 450.

CRV-15PCL Microwave Absorber

CURVILINEAR, HI-PERFORMANCE



Features

- Improved Low Frequency Reflection Suppression Performance
- 500 V/m Power Handling Capability

Physical Specifications

MODEL	CRV-15PCL	
Absorber Footprint	61 cm x 61 cm (24 in x 24 in)	
Absorber Height	Overall	38.1 cm (15 in)
	Base	5.1 cm (2 in)
	Pyramid	33.0 cm (13 in)
Pyramid Base Dimension	10.2 cm x 10.2 cm (4 in x 4 in)	
Pyramids per Absorber	36	
Weight (1 piece)	4.2 kg (9.2 lb)	
Absorbers per Carton	4	
Carton Dim. L x W x H	63.5 cm x 63.5 cm x 124.5 cm (25 in x 25 in x 59 in)	

FREQUENCY/BAND	TYPICAL REFLECTIVITY	GUARANTEED REFLECTIVITY
1-2 GHz L-Band	-42 dB	-40 dB
2-4 GHz S-Band	-52 dB	-50 dB
4-8 GHz C-Band	-55 dB	-50 dB
6-12 GHz X-Band	-55 dB	-50 dB
12-18 GHz Ku-Band	-55 dB	-50 dB
12-40 GHz K-Band	-55 dB	-50 dB

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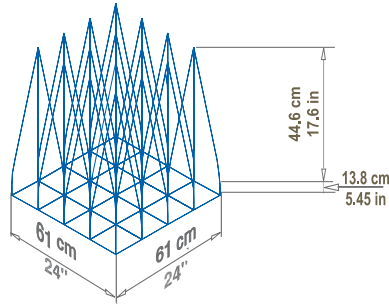
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CRV-23PCL Microwave Absorber

CURVILINEAR, HI-PERFORMANCE



Features

- Improved Low Frequency Reflection Suppression Performance
- 500 V/m Power Handling Capability

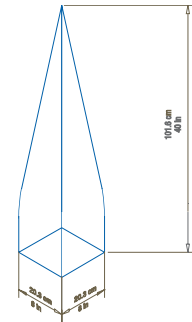
Physical Specifications

MODEL	CRV-23PCL	
Absorber Footprint	61 cm x 61 cm (24 in x 24 in)	
Absorber Height	Overall	58.4 cm (23 in)
	Base	13.8 cm (5.45 in)
	Pyramid	44.6 cm (17.6 in)
Pyramid Base Dimension	15.2 cm x 15.2 cm (6 in x 6 in)	
Pyramids per Absorber	16	
Weight (1 piece)	6 kg (13.2 lb)	
Absorbers per Carton	4	
Carton Dim. L x W x H	63.5 cm x 63.5 cm x 157.5 cm (25 in x 25 in x 62 in)	

FREQUENCY/BAND	TYPICAL REFLECTIVITY	GUARANTEED REFLECTIVITY
500MHz	-47 dB	-45 dB
1-2 GHz L-Band	-55 dB	-50 dB
2-4 GHz S-Band	-55 dB	-50 dB
4-8 GHz C-Band	-55 dB	-50 dB
6-12 GHz X-Band	-55 dB	-50 dB
12-18 GHz Ku-Band	-55 dB	-50 dB
12-40 GHz K-Band	-55 dB	-50 dB

CRV-40PCL Microwave Absorber

CURVILINEAR, HI-PERFORMANCE



Features

- Improved Low Frequency Reflection Suppression Performance
- 500 V/m Power Handling Capability

Physical Specifications

MODEL	CRV-40PCL	
Absorber Footprint	20.3 cm x 20.3 cm (8 in x 8 in)	
Absorber Height	Overall	101.6 cm (40 in)
	Base	20.3 cm (8 in)
	Pyramid	81.3 cm (32 in)
Pyramid Base Dimension	20.3 cm x 20.3 cm (8 in x 8 in)	
Pyramids per Absorber	1	
Weight (1 piece)	0.8 kg (1.75 lb)	
Absorbers per Carton	4	
Carton Dim. L x W x H	63.5 cm x 63.5 cm x 157.5 cm (25 in x 25 in x 62 in)	

FREQUENCY/BAND	TYPICAL REFLECTIVITY	GUARANTEED REFLECTIVITY
80MHz	-12 dB	-10 dB
100MHz	-14 dB	-12 dB
200MHz	-33 dB	-30 dB
300MHz	-47 dB	-45 dB
500MHz	-52 dB	-50 dB
1-2 GHz L-Band	-55 dB	-50 dB
2-4 GHz S-Band	-55 dB	-50 dB
4-8 GHz C-Band	-55 dB	-50 dB
6-12 GHz X-Band	-55 dB	-50 dB
12-18 GHz Ku-Band	-55 dB	-50 dB
12-40 GHz K-Band	-55 dB	-50 dB

USA:

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CHINA:

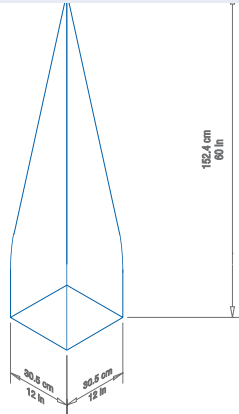
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CRV-60PCL Microwave Absorber

CURVILINEAR, HI-PERFORMANCE



Features:

- Improved Low Frequency Reflection Suppression Performance
- 500 V/m Power Handling Capability

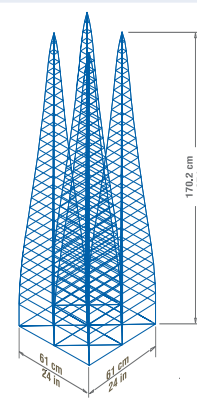
Physical Specifications

MODEL	CRV-60PCL	
Absorber Footprint	30.5 cm x 30.5 cm (12 in x 12 in)	
Absorber Height	Overall	152.4 cm (60 in)
	Base	30.5 cm (12 in)
	Pyramid	121.9 cm (48 in)
Pyramid Base Dimension	30.5 cm x 30.5 cm (12 in x 12 in)	
Pyramids per Absorber	1	
Weight (1 piece)	2.8 kg (6.1 lb)	
Absorbers per Carton	4	
Carton Dim. L x W x H	163.5 cm x 63.5 cm x 157.5 cm (25 in x 25 in x 62 in)	

FREQUENCY/BAND	TYPICAL REFLECTIVITY	GUARANTEED REFLECTIVITY
80 MHz	-14 dB	-12 dB
100 MHz	-16 dB	-15 dB
200 MHz	-43 dB	-40 dB
300 MHz	-48 dB	-45 dB
500 MHz	-53 dB	-50 dB
1-2 GHz L-Band	-53 dB	-50 dB
2-4 GHz S-Band	-55 dB	-50 dB
4-8 GHz C-Band	-55 dB	-50 dB
6-12 GHz X-Band	-55 dB	-50 dB
12-18 GHz Ku-Band	-55 dB	-50 dB
12-40 GHz K-Band	-55 dB	-50 dB

CRV-67PCL Microwave Absorber

CURVILINEAR, HI-PERFORMANCE



Features:

- Improved Low Frequency Reflection Suppression Performance
- 500 V/m Power Handling Capability

Physical Specifications

MODEL	CRV-67PCL	
Absorber Footprint	61 cm x 61 cm (24 in x 24 in)	
Absorber Height	Overall	170.2 cm (67 in)
	Base	12.7 cm (5 in)
	Pyramid	157.5 cm (62 in)
Pyramid Base Dimension	30.5 cm x 30.5 cm (12 in x 12 in)	
Pyramids per Absorber	4	
Weight (1 piece)	13.6 kg (30 lb)	
Absorbers per Carton	4	
Carton Dim. L x W x H	63.5 cm x 63.5 cm x 210 cm (25 in x 25 in x 83 in)	

FREQUENCY/BAND	TYPICAL REFLECTIVITY	GUARANTEED REFLECTIVITY
80 MHz	-22 dB	-20 dB
100 MHz	-33 dB	-30 dB
200 MHz	-38 dB	-35 dB
300 MHz	-39 dB	-35 dB
500 MHz	-43 dB	-40 dB
1-2 GHz L-Band	-49 dB	-45 dB
2-4 GHz S-Band	-55 dB	-50 dB
4-8 GHz C-Band	-55 dB	-50 dB
6-12 GHz X-Band	-55 dB	-50 dB
12-18 GHz Ku-Band	-55 dB	-50 dB
12-40 GHz K-Band	-55 dB	-50 dB

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How to Order

In order to establish consistency in our absorber part numbers and descriptions, we have created a new absorber configuration string. Please use these ordering guidelines to determine the correct absorber part number configuration string.

MANDATORY CONFIGURATION

XXX XX XX XX
Series Depth Type Fire

OPTIONS CONFIGURATION

XX X XX XX
Paint Length Miter Cuts Installation

Mandatory Configuration

SERIES	REFERS TO THE TYPE OF ABSORBER.
EHP	Conventional microwave absorber
FF	Filter foam-a.k.a. "vent" foam-reticulated, open cell
HP	High Power-honeycomb
FL	Flat Laminate
WW	Walkway absorber
CV*	Convoluted-egg crate shape
EMC*	Low frequency optimized microwave absorber
CRV	Curvilinear
FT*	Ferritile
FS*	FerroSorbTM, hybrid material made of ferrite tile panels and microwave absorber
DEPTH	REFERS TO THE OVERALL NOMINAL HEIGHT OF THE ABSORBER
These dimensions are referred to in inches with the exception of the FerroSorbTM family and the ferrite tile family. For walkway, this height refers to the height of the pyramidal absorber used in the walkway material and not the overall height of the walkway material. Please refer to the brochure for the correct overall walkway material height.	
<i>Note:</i> Not all depths are available in all series.	
TYPE	REFERS TO THE SHAPE OR SPECIAL COVERING OF THE MATERIAL
P	Pyramidal
WG	Wedge
OD	Outdoor
LFB	Lossy foam block
FIRE	REFERS TO FIRE RETARDANCY.
CL	Flame-retardant or combustion limiting
NF	Non-flame-retardant

Options Configuration

PAINT	REFERS TO THE OVERALL NOMINAL HEIGHT OF THE ABSORBER
<i>Note:</i> All absorber is painted light blue unless otherwise requested.	
NP	No paint
BT	Black tips. Black tips are not available on 2.5 cm (1 in) and 7.6 cm (3 in) material.
LENGTH	REFERS TO THE BASE SIZE OF THE ABSORBER MATERIAL.
<i>Note:</i> Walkway absorber available in lengths up to 1.8 m (6 ft). Wedge shaped absorber available in lengths up to 1.2 m (4 ft).	
MITER CUTS	REFERS TO SPECIFIC MITER CUTS USED IN CORNER OR SPECULAR REGION TREATMENT.
<i>Note:</i> Refer to pages 19, 20 for miter cut descriptions and ordering codes.	
INSTALLATION	REFERS TO INSTALLATION METHOD OPTIONS
<i>Note:</i> Installation treatment options must be specified	
VL	Velcro. Only the soft loop side is supplied. Hook side must be purchased separately. Available for absorber < 45 cm (18 in) tall.
CR	Clip and rail. <i>Note:</i> Support rails should be ordered as well.

EXAMPLES	
EHP-24PCL	Conventional Microwave Absorber; 60.8 cm (24 in); Pyramid Combustion Limiting
EHP-8WGNF2	Conventional Microwave Absorber; 20.3 cm (8 in); Wedge Non-Fire Retardant
HP-12PCL	High Power Absorber; 30.4 cm (12 in); Pyramid Combustion Limiting
FL-4500CL	Flat Laminate Absorber; 11.4 cm (4.5 in); Combustion Limiting
WW-18 PCL	Walkway Absorber; 45.7 cm (18 in); Pyramid Combustion Limiting
CRV-40PCL	Curvilinear Absorber; 101.6 cm (40 in); Pyramid Combustion Limiting
FF-12PNF	Filter Foam (Vent); 30.4 cm (12 in); Pyramid Non-Fire Retardant

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Miter Cuts

<p>TOP VIEW</p> <p>SIDE VIEW</p> <p>END VIEW</p> <p>MITER ACCESS WEDGE</p> <p>A1</p>	<p>TOP VIEW</p> <p>SIDE VIEW</p> <p>END VIEW</p> <p>MITER PARALLEL TO WEDGE</p> <p>A2</p>	<p>TOP VIEW</p> <p>SIDE VIEW</p> <p>END VIEW</p> <p>DOUBLE MITER RIGHT HAND</p> <p>A3</p>	<p>TOP VIEW</p> <p>SIDE VIEW</p> <p>END VIEW</p> <p>DOUBLE MITER LEFT HAND</p> <p>A4</p>
<p>TOP VIEW</p> <p>SIDE VIEW</p> <p>END VIEW</p> <p>B1</p>	<p>TOP VIEW</p> <p>SIDE VIEW</p> <p>END VIEW</p> <p>B2</p>	<p>TOP VIEW</p> <p>SIDE VIEW</p> <p>END VIEW</p> <p>B3</p>	<p>TOP VIEW</p> <p>SIDE VIEW</p> <p>END VIEW</p> <p>B4</p>
<p>TOP VIEW</p> <p>SIDE VIEW</p> <p>END VIEW</p> <p>B5</p>	<p>TOP VIEW</p> <p>SIDE VIEW</p> <p>END VIEW</p> <p>B6</p>	<p>TOP VIEW</p> <p>SIDE VIEW</p> <p>END VIEW</p> <p>C1</p>	<p>TOP VIEW</p> <p>SIDE VIEW</p> <p>END VIEW</p> <p>C2</p>
<p>TOP VIEW</p> <p>SIDE VIEW</p> <p>END VIEW</p> <p>C3</p>	<p>TOP VIEW</p> <p>SIDE VIEW</p> <p>END VIEW</p> <p>C4</p>	<p>TOP VIEW</p> <p>SIDE VIEW</p> <p>END VIEW</p> <p>D1</p>	<p>TOP VIEW</p> <p>SIDE VIEW</p> <p>END VIEW</p> <p>D2</p>
<p>TOP VIEW</p> <p>SIDE VIEW</p> <p>END VIEW</p> <p>D3</p>	<p>TOP VIEW</p> <p>SIDE VIEW</p> <p>END VIEW</p> <p>E1</p>	<p>TOP VIEW</p> <p>SIDE VIEW</p> <p>END VIEW</p> <p>E2</p>	<p>TOP VIEW</p> <p>SIDE VIEW</p> <p>END VIEW</p> <p>E3</p>

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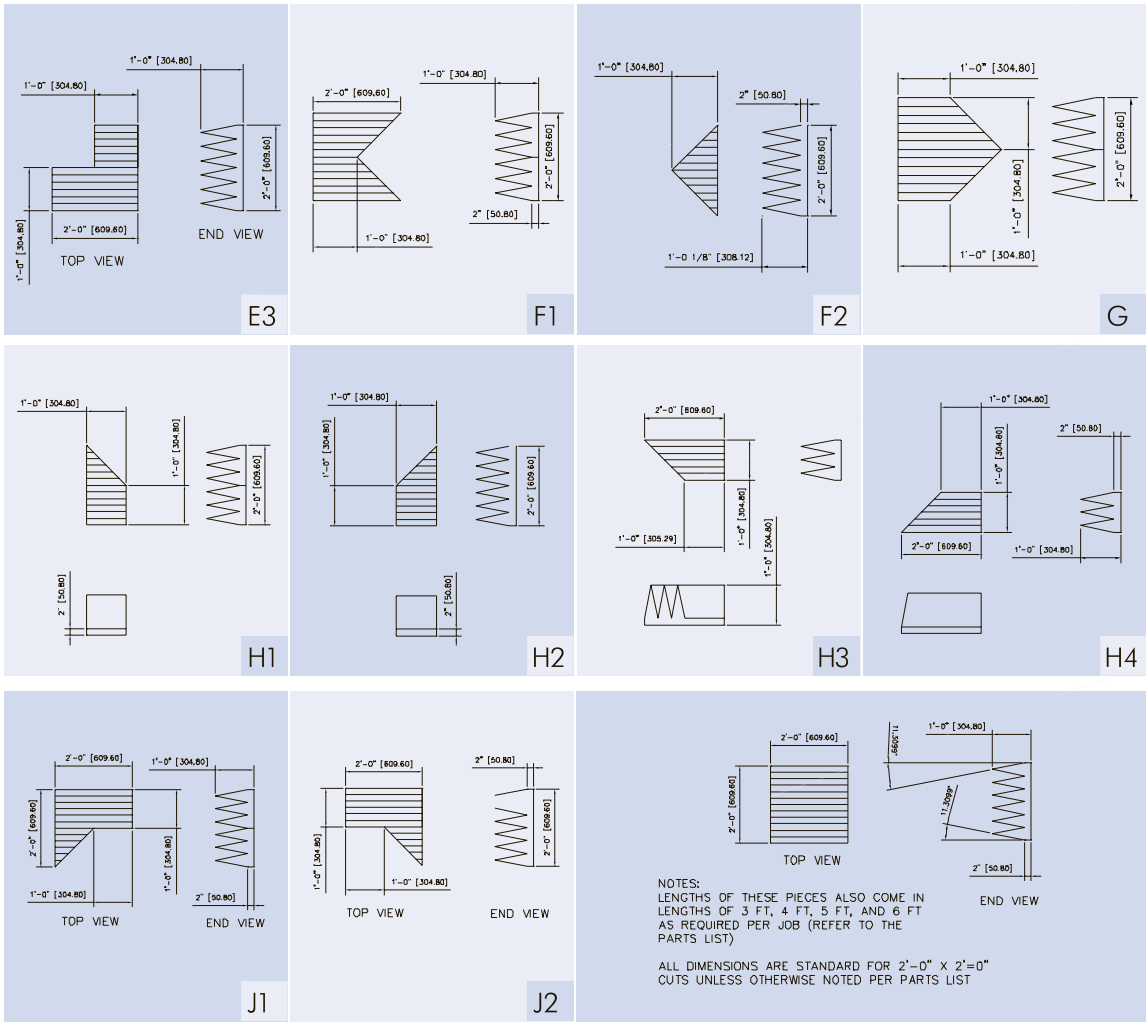
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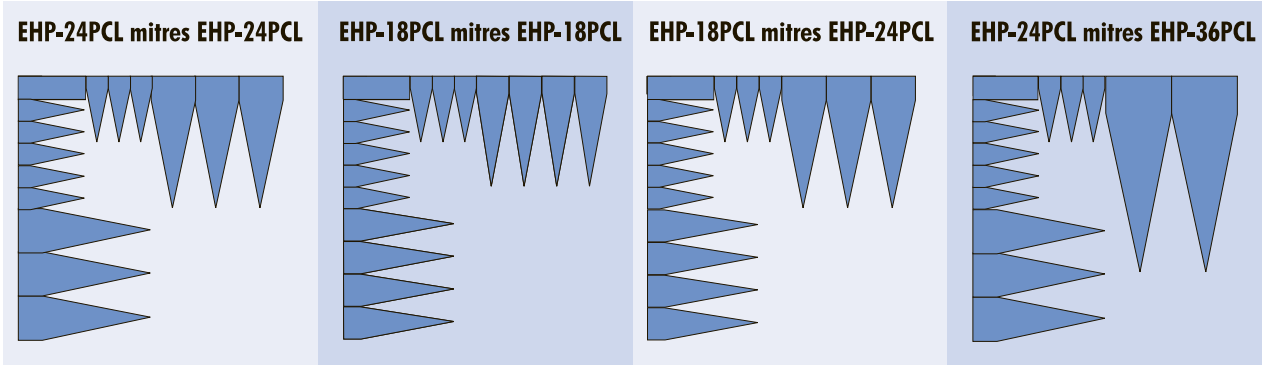
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LFB (Lossy Foam Block) Corner Treatments



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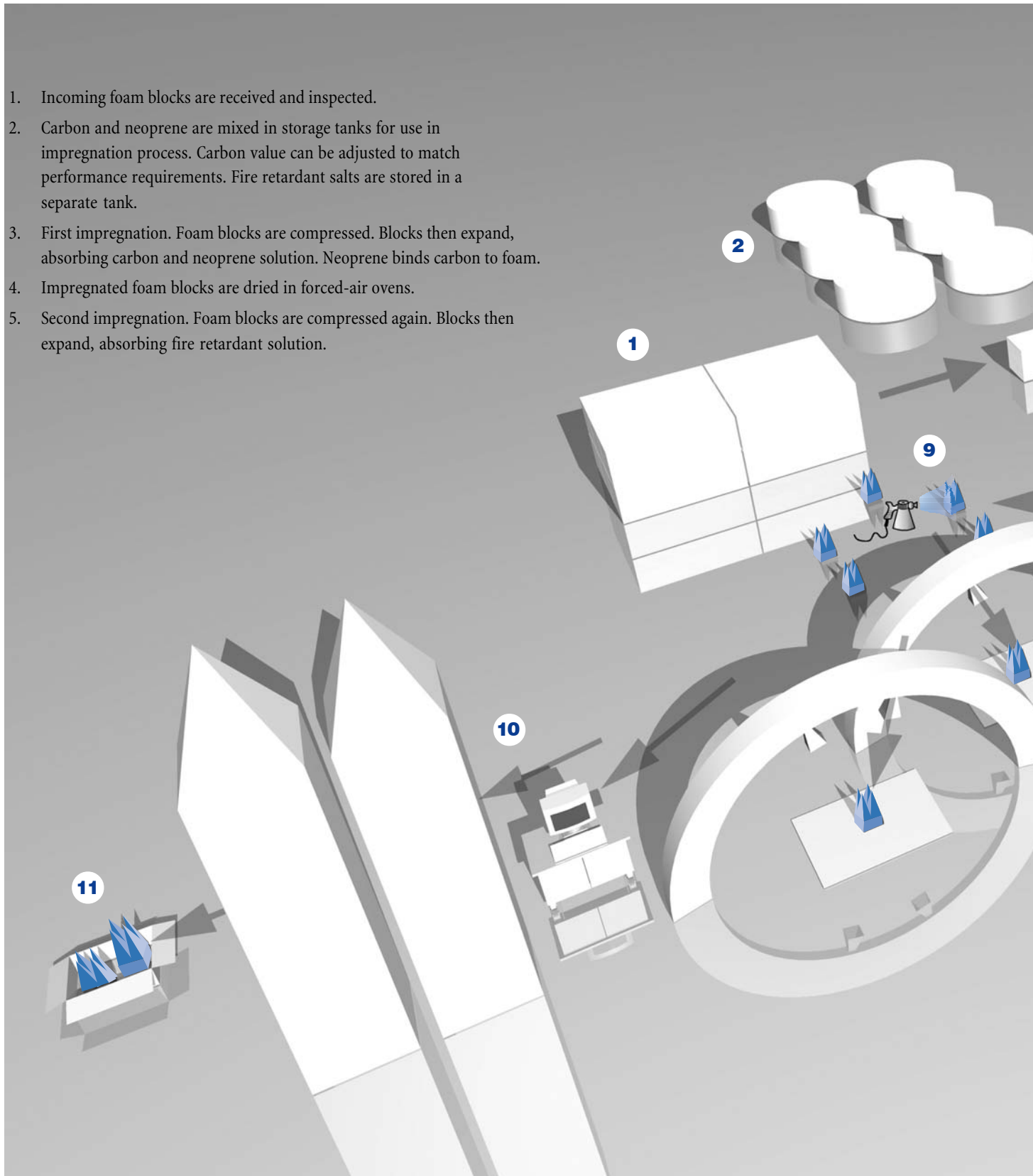
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How Rantec Absorber is Manufactured

1. Incoming foam blocks are received and inspected.
2. Carbon and neoprene are mixed in storage tanks for use in impregnation process. Carbon value can be adjusted to match performance requirements. Fire retardant salts are stored in a separate tank.
3. First impregnation. Foam blocks are compressed. Blocks then expand, absorbing carbon and neoprene solution. Neoprene binds carbon to foam.
4. Impregnated foam blocks are dried in forced-air ovens.
5. Second impregnation. Foam blocks are compressed again. Blocks then expand, absorbing fire retardant solution.



How ETS-Lindgren Rantec Brand Absorber is Tested

Quality Control

All ETS-Lindgren absorber is manufactured in accordance with established quality control standards. Every piece is serialized, providing full tractability from raw foam to the finished absorber. Absorber that fails any of the requirements shown below is rejected.

PARAMETER	LIMIT
Density of raw foam	.48 kg/30.5 cm ³ + .23 kg/30.5 cm ³ (1.05 lbs/ft ³ +0.05 lbs/ft ³)
Dimensional manufacturing tolerances	3mm ± (.125 in)
Limiting Oxygen Index	25%
Foam pores per inch	16 - 24 per cm (40 - 60 per in)
Fire retardant loading	0.5 kg/30.5 cm ³ ±5% (1.1 lbs/ft ³ ±5%)
Carbon compound loading	± 5% tolerance
NRL Report 8093	Must pass tests 1,2,3

Reflectivity is a measurement of reflected power to incident power and is used as a measurement of absorber performance. Reflectivity values are expressed in dB, with a higher dB value indicating better performance than lower dB value.

All absorber reflectivity results are statistically analyzed and recorded to assure a high-performance product. Measurement results are archived in both hardcopy and digital format, and include the measuring equipment and test setups used.

NRL Arch Technique - High Frequency Testing

The swept-frequency Naval Research Labs (NRL) arch method is used by ETS-Lindgren to measure microwave absorber reflectivity performance. The test is conducted at frequencies between 1 and 18 GHz. However, testing can be conducted at higher frequencies if requested.

The NRL test method is performed using a non-reflective arch with two horn antennas. The antennas are mounted on the inside and near the top of the arch. A metal plate is placed on the ground plane under the center of the arch. This is the 0-dB reflectivity reference point. Anechoic absorber is used on the ground plane and backwalls to eliminate unwanted reflections during measurements.

One antenna is source for an RF signal directed at the metal plate. The other antenna receives the reflected signal. The amount of reflected energy is measured both before and after the absorber under test has been placed on the metal plate. The difference in measured values is the reflection coefficient of the absorber. To cover the entire frequency test range, one of two arches are used, depending on the frequency measurement required.

Vertical Coaxial Reflectometer-Low Frequency Testing

In addition to testing at high frequencies with arches, low frequencies are tested using a coaxial reflectometer. This test method is recommended by the IEEE Standards Committee in Part 1128, Section 7.2.3.3, "IEEE recommended practice for RF absorber evaluation in the frequency range of 30 MHz to 5 GHz."

The coaxial reflectometer is a terminated transmission line. The transmission line's outer conductor is flared and expanded into a rectangular form, becoming the reflectometer's outer walls. The center conductor is transformed into smaller rectangular form and the dielectric is air. An RF signal is introduced at the feed, and the amount of reflected energy is measured both before and after the absorber under test has been placed on the removable backwall. Like NRL arch testing, the difference in measured values is the reflection coefficient of the absorber.

Standard test markers are set at 30 MHz, 80 MHz, 250 MHz, and 500 MHz. Using time-domain gating, the absorber response is isolated from the responses due to impedance mismatches in the waveguide at the feedpoint.

Flammability

ETS-Lindgren CL combustion limiting polyurethane absorber sets the standard for material fire retardancy. We meet the following U.S. Government and commercial flammability specifications, as verified by an independent testing laboratory:

- NRL report 8093 (Tests 1, 2, and 3)
- MIT Lincoln Laboratory specification MS-8-21 (Tests I, II, and III)
- Raytheon Drawing No. 2693066 (latest revision)
- UL 94-5VA and UL 94-5VB
- UL 94 HBF
- DIN 4102 Class B-2

NRL Test 1, 2, and 3 are conducted by our in-house laboratory as follows:

NRL TEST 1 - Resistance to Electrical Stress

Test 1 is conducted on three test samples measuring 5.08 cm x 15.24 cm x 15.24 cm (2 in x 6 in x 6 in). Electrodes are inserted 2.54 cm (1 in) into the absorber, at a distance of 2.54 cm (1 in) apart. The absorber is unprotected by painted surfaces. An attempt is made to initiate combustion with a 240-volt, 8-amp (minimum) power supply. Power is applied for 60 seconds.

To pass the test, the absorber sample must fully extinguish (no visible flame, smoke, or smoldering) within 60 seconds after power is turned off. Each sample is weighed before and after the test. Not more than a 20% weight loss is permitted.

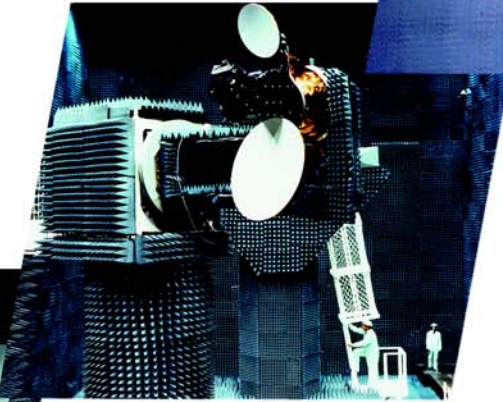
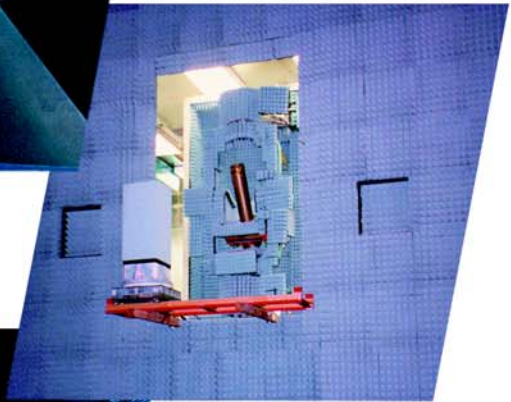
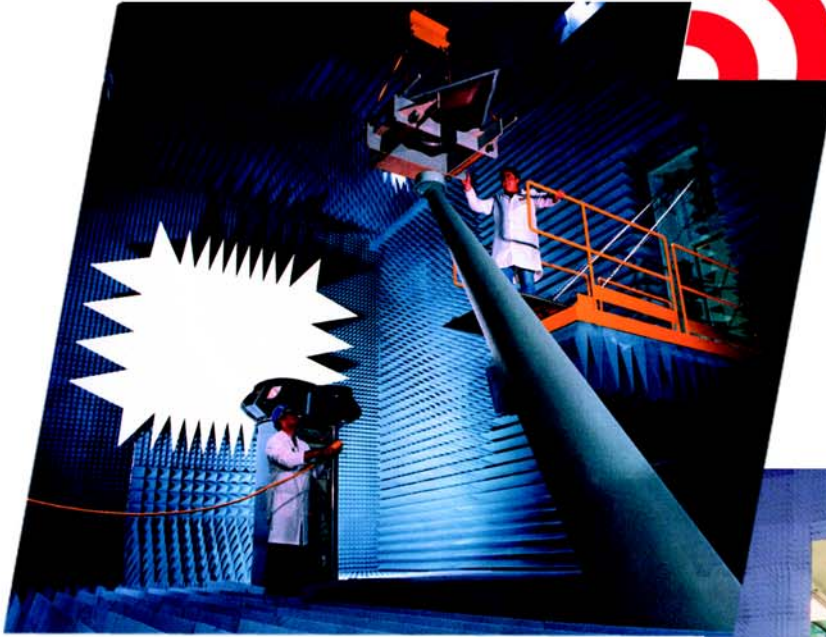
NRL TEST 2 - Ease of Ignition and Flame Propagation

Test 2 is conducted on a minimum of three test samples consisting of 5.08 cm (2 in) cubes, unprotected by painted surfaces. The samples must self-extinguish following a 30-second exposure to flame from a Bunsen burner.

NRL TEST 3 - Modified Smoldering Test

Test 3 is the only recognized test to evaluate solid phase combustion. A cartridge heater is inserted 3.81 cm (1.5 in) into the top-center of a 15.24 (6 in) cube and heated to 600° C (1,112° F). This temperature is maintained for five minutes to initiate solid phase combustion. The heater is then removed. The material must fully self-extinguish within 30 minutes. After the test, each sample is cut open and inspected for evidence of remaining combustion.

Absorber Installations



From Top to Bottom: BAE, Merrimack, NH; Raytheon, Tuscon, AZ; Marconi Space & Defense Systems, Portsmouth, England; Kirtland Air Force Base, Albuquerque, NM



Contact us for information about our other products.

About ETS-Lindgren

ETS-Lindgren is an international manufacturer of components and systems to measure, shield, and control electromagnetic and acoustic energy. The company's products are used for electromagnetic compatibility (EMC), microwave and wireless testing, electromagnetic field (EMF) measurement, radio frequency (RF) personal safety monitoring, and control of acoustic environments. Our product line ranges from simple bench-top diagnostic tools to fully integrated turnkey facilities.

With a heritage that includes the famous Rantec brand of microwave absorber, ETS-Lindgren has been serving RF and microwave engineers for more than a quarter century.

As part of ESCO Technologies Corporation, we have the financial strength to meet our commitments, both today and tomorrow. A leading supplier of engineered products for growing industrial and commercial markets, ESCO is a New York Stock Exchange listed company (symbol ESE) with headquarters in St. Louis, Missouri.

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