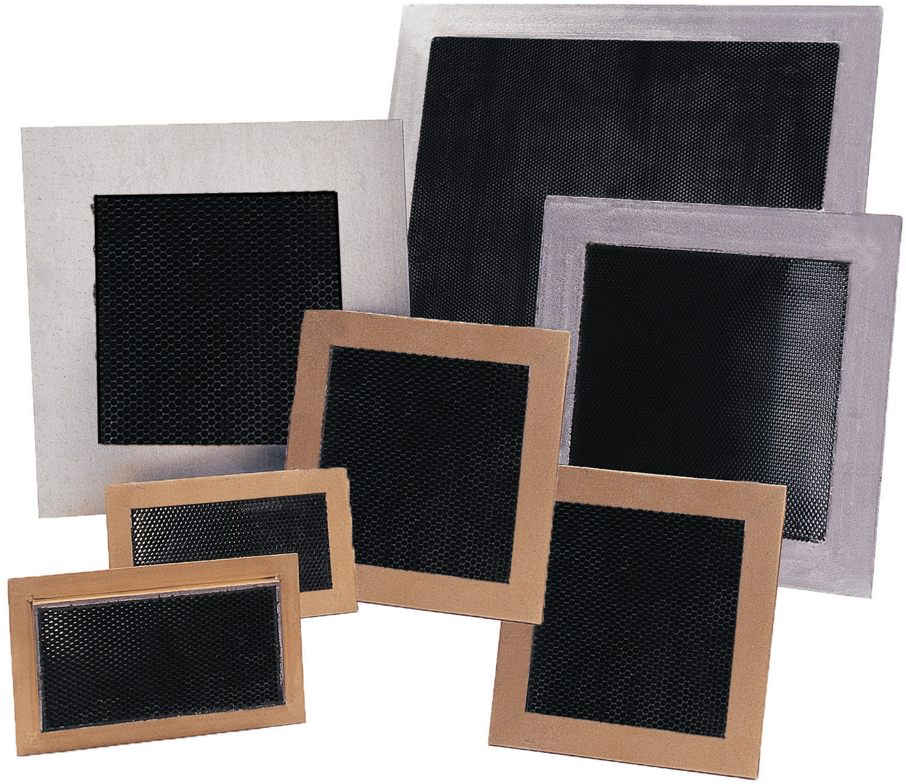
EMI/RFI Shielded Waveguide Air Vents

Features:

- Available in 1/8 inch steel and 3/16 inch brass and steel honeycomb cell geometry
- Adaptable to a variety of mounting flanges and gasket techniques
- Brass or steel core material with tin coating for superior RF performance and corrosion resistance
- Minimal air flow resistance and pressure drop
- Continuously solder fused for superior strength and RF performance
- Available in a wide variety of special sizes and shapes
- Ease of installation and mounting



Shielding effectiveness and air flow performance are improved with durable waveguide air vents produced by ETS-Lindgren's exclusive solder fusion process. This proprietary manufacturing process ensures absolute performance by completely fusing all contact surfaces in the honeycomb matrix to create a continuous, solid electrical and mechanical bond that will not separate or permit RF leakage.

Choosing Steel or Brass

The electric field, planewave, and microwave shielding effectiveness of the brass or steel honeycomb is virtually identical because of the consistency of the solder fusion process. Steel provides higher low-end magnetic field shielding effectiveness. However, brass can satisfy non-ferrous requirements and is favored in areas of high humidity.

Typical Mounting Methods

ETS-Lindgren waveguide air vents are manufactured to meet a variety of customer requirements. Since the vent-to-shield seal is normally the limiting factor in shielding performance, the following waveguide-to-shield seals are recommended:

Soldering and Brazing

Whenever possible, enclosure walls should be fabricated in a horizontal position to allow soldering or brazing in a lightweight (26 gauge copper or galvanized steel) frame to the shield wall. This will produce excellent RF seals that perform reliably for long periods of time.

Welding

If the shielding material in the walls and ceilings is heavy enough to weld, vents with an angle iron frame should be specified. Since the waveguides are soldered into the frames using 60/40 solder, care should be taken to keep the honeycomb-to-frame joint under 150 degrees Celsius. The preferred installation method is to use a skip welding technique around the frame until the weld line is completely closed.

Gasket Seals

Where soldering and welding are not practical, RF gasket seals can be used. Monel or tin coated gaskets provide the best RF seal. The mounting surface can be tin-lead plated or plasma spray tinned. A light cleaning of contact surfaces before assembly will insure maximum seal performance by removing unwanted metal oxides before the seal is formed.

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Contact surfaces of mating surfaces should be rigid enough to carry even pressure along the gasket for maximum shielding performance.

Maximum enclosure-to-vent shield performance can be achieved by observing the precautions of compatible metals and by spacing the fasteners at no more than 4" on center.

Whenever metal ducts are connected to the waveguide air vents on a shielded wall, a dielectric spacing collar is needed to create a non-conducting break on the duct. The purpose of this break is to keep RF currents on the surface of metal ducts from transferring to the shield wall and lowering shielding effectiveness. The dielectric break may take the form of a rubber or canvas boot, a wooden spacing collar, or other dielectric medium.

Minimum Resistance to Air Flow

The honeycomb (or hex-tube) design combines the highest shielding performance with the lowest resistance to air flow. Cell geometry allows the maximum amount of open space while uniformity and depth of the honeycomb tubes reduces air turbulence.

Steel Honeycomb- 3/16"

Magnetic		*Electric*		*Planewave*		*Microwave*	
1 KHz	20 KHz	100 KHz	10 MHz	100 MHz	1 GHz	10 GHz	18GHz
25 dB	120 dB	120 dB	120 dB	120 dB	120 dB	120 dB	120dB

Steel Honeycomb- 1/8"

Magnetic		*Electric*		*Planewave*		*Microwave*		
1 KHz	20 KHz	100 KHz	10 MHz	100 MHz	1 GHz	10 GHz	18GHz	40 GHz*
25 dB	120 dB	120 dB	120 dB	120 dB	120 dB	120 dB	120 dB	100 dB

Brass Honeycomb

Magnetic		*Electric*		*Planewave*	
1 KHz	20 KHz	100 KHz	10 MHz	100 MHz	1 GHz
25 dB	70 dB	120 dB	120 dB	120 dB	120 dB

The Maximum Static Pressure Drop

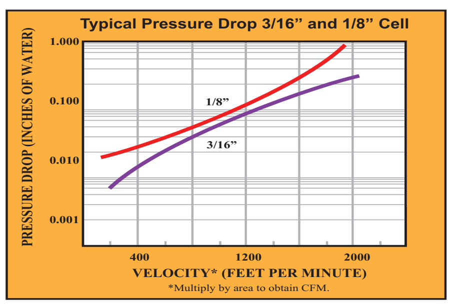
3/16" Hex Cell:

Inches of Water:	0.015	0.025	0.042	0.065
At Feet per Minute:	400	600	800	1,000

1/8" Hex Cell:

Inches of Water:	0.025	0.035	0.045	0.060
At Feet per Minute:	400	600	800	1,000

*For applications above 40 GHz a supplemental RF Labyrinth can be provided



A properly designed waveguide-beyond-cutoff opening will act like a high-pass filter. The cutoff frequency is a function of the cross-section of the waveguide. For a cylindrical waveguide, the cutoff frequency of the dominant TE mode is:

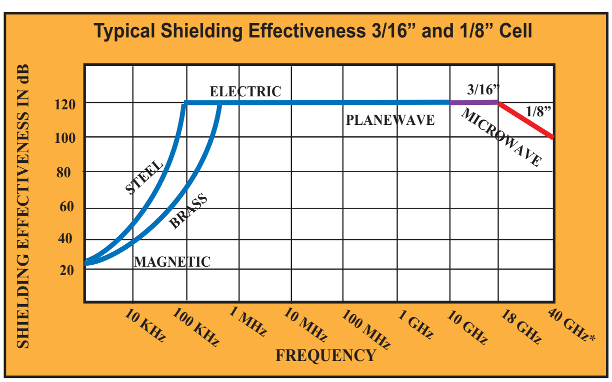
$$f_c = 6.92/d \text{ GHz}$$

The cutoff frequency for the TE mode of rectangular waveguides is:

$$f_c = 5.90/b \text{ GHz}$$

In these equations,

f_c = cutoff frequency for the dominant mode in gigahertz
d = inside diameter of a cylindrical waveguide in inches
b = greatest dimension of rectangular waveguide in inches



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