



ACOUSTICAL SYSTEMS - LLC

Diffractal®

1D Diffusion



*The First Diffusing Fractal
From The Acoustical Industry's Leading Innovator*

In an effort to provide full spectrum sound diffusion in a single integrated diffusor, the self similarity property of fractals was combined with the uniform scattering property of the number theoretic reflection phase grating to produce the Diffractal®, a patented diffusing fractal. Now it is possible to provide diffusion over any desired bandwidth, given the appropriate width and depth, in one integrated surface treatment.

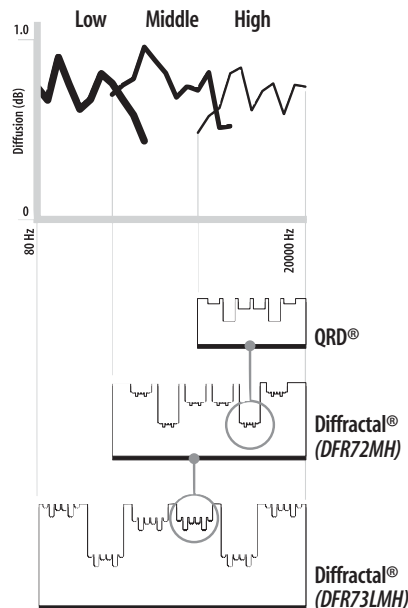
Problem and Solution

Problem

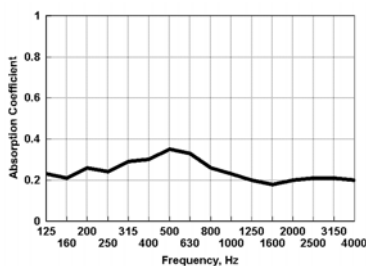
The bandwidth of a QRD® is limited at high frequencies by the well width and at low frequencies by the maximum depth. Additionally, wide area coverage with periodic arrays focuses energy into certain diffraction directions. A full spectrum diffusor offering wide area coverage is needed.

Solution

The Diffraactal® is the first diffusing fractal. It consists of nested self similar scaled diffusors, each of which covers a specific frequency range and offers wide area coverage without lobing effects. A second generation Diffraactal® (DFR72) contains two nested QRD®, thus forming a diffusor within a diffusor. Each diffusor provides uniform scattering over a specific range of frequencies so that the effective bandwidth is extended. The DFR72 can be nested within a larger low frequency diffusor to provide wide area coverage, extended low frequency diffusivity, and also minimum lobing associated with periodic arrays. This third generation Diffraactal® (DFR73) offers low, mid, and high frequency diffusion over an extended bandwidth, limited only by the depth available.

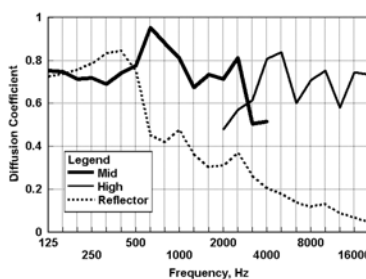


Performance Specifications



Absorption

Diffusors essentially scatter sound, but absorption may occur from wave resonances within the wells when they are narrow and deep and viscous losses due to pressure gradient induced air particle flows between adjacent wells. The Diffraactal® provides high frequency diffusion without adding additional absorption by replacing the mid frequency QRD® wells with nested reduced scale high frequency QRD®s.



Diffusion

The nested diffusors comprising the Diffraactal® extend the high frequency diffusive performance beyond that of the QRD® 734. The graph illustrates how the Diffraactal® mid frequency and high frequency nested components essentially boot strap the uniform diffusion from 500 Hz to 20 kHz. The diffusion coefficient is also compared to a flat reflective panel which exhibits decreasing diffusivity with increasing frequency.

Installation

The Diffraactal® can be flush mounted into an opening or surface mounted on a wall or ceiling.

FEATURES

- Fractal surface
- Amplitude modulated QRD®
- Wide area coverage
- Modularity
- Furniture grade fabrication

BENEFITS

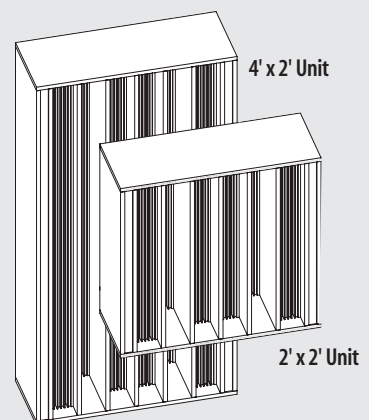
- Fractal surface consisting of nested self similar low, mid, and high frequency QRD®s offers extended bandwidth. Lobing effects due to periodicity are minimized by amplitude modulating the QRD® number theory sequence
- Amplitude modulation also permits wide area coverage without loss of performance due to periodicity effects
- The modular construction allows for fast and easy installation
- The furniture grade quality coupled with the wide variety of wood species and finishes make the Diffraactal® an aesthetically pleasing addition to any space

APPLICATIONS

Auditoriums, Theaters, Performing Arts Facilities, Listening rooms, Home theaters, Recording/Broadcast Studios

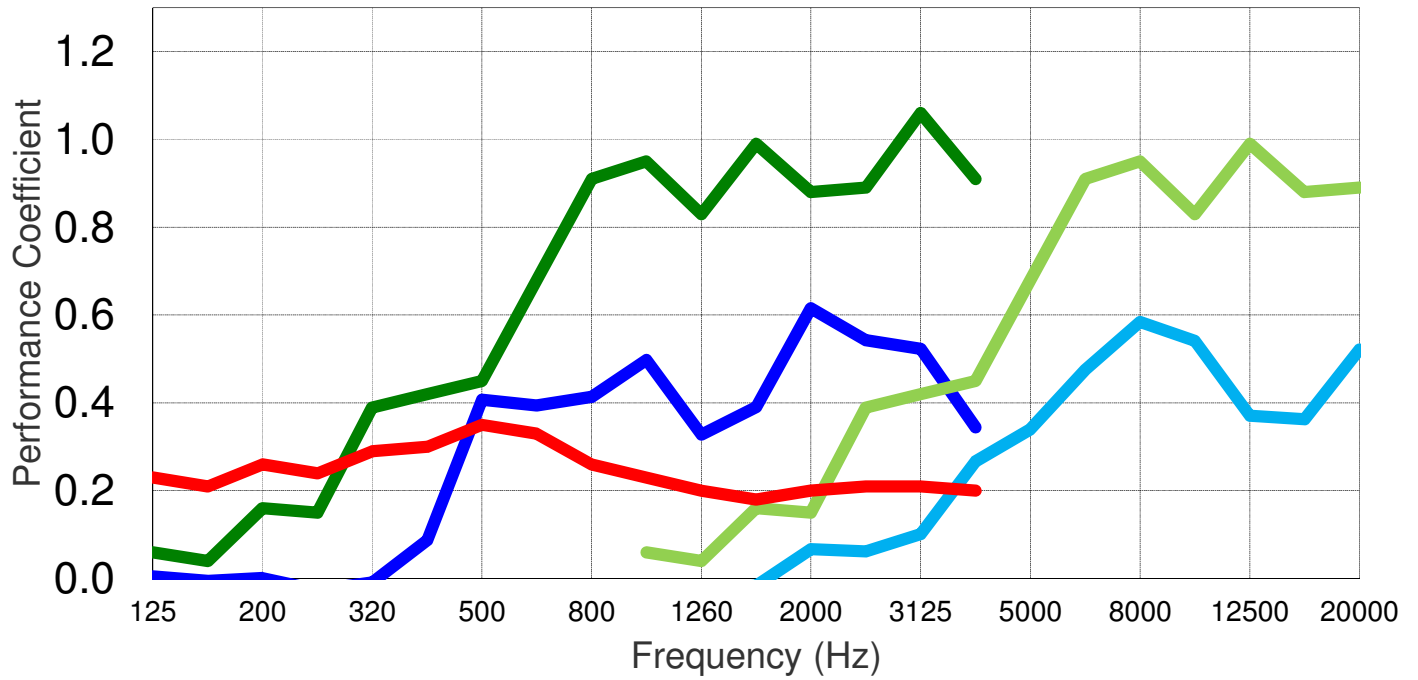
SPECIFICATIONS

- Sizes and weights:
 - 23-5/8" (H) x 23-5/8" (W) x 9-1/8" (D): 26 lbs.
 - 47-1/4" (H) x 23-5/8" (W) x 9-1/8" (D): 50 lbs.
- Custom heights up to 8' are available
- Standard finish: Uniform white birch clear coat
- Custom wood species and finishes available
- The species and finish of the wells and dividers may be different, offering additional design options





Diffractal® Random Incidence Performance Data



— Diffusion (mid) — Diffusion (high) — Scattering (mid)
— Scattering (high) — Absorption

Chesapeake
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FREQ	Diffusion (mid)	Diffusion (high)	Scattering (mid)	Scattering (high)	Absorption
125	0.01		0.06		0.23
160	0.00		0.04		0.21
200	0.00		0.16		0.26
250	-0.03		0.15		0.24
320	-0.01		0.39		0.29
400	0.09		0.42		0.30
500	0.41		0.45		0.35
630	0.39		0.68		0.33
800	0.41		0.91		0.26
1000	0.50	-0.03	0.95	0.06	0.23
1260	0.33	-0.03	0.83	0.04	0.20
1600	0.39	-0.02	0.99	0.16	0.18
2000	0.62	0.07	0.88	0.15	0.20
2500	0.54	0.06	0.89	0.39	0.21
3125	0.52	0.10	1.06	0.42	0.21
4000	0.34	0.27	0.91	0.45	0.20
5000		0.34		0.68	
6300		0.48		0.91	
8000		0.58		0.95	
10000		0.54		0.83	
12500		0.37		0.99	
16000		0.36		0.88	
20000		0.52		0.89	