

## Hollow pyramidal broadband radio absorbers

ECCOSORB HPY is a series of pyramidal microwave absorbers, extending premium performance to mid range of VHF region. These absorbers are intended principally for use in anechoic chambers. The material of the absorber is lightweight polyurethane foam. Light weight is enhanced by the fact that the pyramids are partially hollow. These pyramids are mounted on a solid flexible foam base of the same material. color is light blue. All materials are self extinguishing in accordance with ASTM-D1692-74 also meet UL94HBF. ECCOSORB HPY conforms fully to the non-flammable requirements and essentially to toxic-gas generation is limited as much as possible.

The excellent performance of ECCOSORB HPY is due to many design features:

- (1) The pyramidal shape produces scattering of the energy which is reflected from the front faces; both this effect and, as well, the actual absorption of energy contribute to reduction of specular reflection;
- (2) The pyramidal shape provides geometric impedance matching at the longer wave lengths;
- (3) The thick wall material of the pyramids is graded electrically in depth to provide additional impedance matching more than (2) at all wave lengths;
- (4) The dielectric properties of the material change with frequency in a direction which compensates for the fact that the thickness-to wave length ratio of the absorber becomes smaller at the lower frequencies.

As a result, ECCOSORB HPY is the basic absorbing material in many high-quality anechoic chambers, in the worldwide. Large rectangular and funnel chambers in many parts of the world are lined with ECCOSORB HPY.

ECCOSORB HPY is effective with linear, circular, or elliptical polarization. Reflectivity performance versus frequency is given in the tabulation on the following page.



**ECCOSORB® HPY**

ECCOSORB HPY is now available in thicknesses which are multiples of one-half meter. The tabulation gives nominal weights and reflectivity versus frequency for all those members of the series that are currently available as standard products.

ECCOSORB HPY is produced in 61cm x 61cm (24" x 24" ) panels. The foam pyramids are sufficiently flexible and resilient to make the absorber highly resistant to mechanical damage. For the longer pyramids, special lightweight supports are installed inside the hollow pyramids in order to prevent drooping with time on wall installations.

Installation is straightforward. ECCOSORB HPY can be cut with an ordinary household knife. Chloroprene adhesive is sprayed or brushed on both surfaces to be adhered.

When sprayed, it covers about 15 square meters (160 square feet) per gallon.

When brushed, it covers about 10 square meters (100 square feet) per gallon.

After application of adhesive, the surfaces are allowed to dry until tacky before attachment is made. A pressure-type pot spray gun is recommended for spraying.

ECCOSORB HPY is also available at slight increase in cost with Velcro zipper fasteners for quick and easy mounting and demounting on almost any surface.

Table 1 gives nominal thickness, weight, and reflectivity for standard ECCOSORB HPY.

While Table 1 gives maximum (worst) reflectivity to be expected at near-normal incidence.

Table 2 gives actual measured reflectivity at 55° incidence as determined in the free space wall tests for four of the most popular members of the standard ECCOSORB HPY series.

The thickness to wave length ratio is given for each material at each frequency, and

measured reflectivity is entered in the table for both parallel and perpendicular polarization.

The designation is ECCOSORB HPY-XX, where XX is the thickness in inches.

ECCOSORB HPY is also available with vent holes. These vent holes do not affect the electrical performance. The absorber with the vent holes is designated ECCOSORB HPY-XX-VH, where XX is the thickness of the absorber in inches.

**TABLE 1**  
**MAXIMUM NEAR NORMAL REFLECTIVITY OF ECCOSORB HPY**

	Height of Pyramid m (Inch)	Weight per Pieces 0.37 sq m. kg (Lb)	VHF 120 MHz	VHF 200 MHz	UHF 300 MHz	UHF 500 MHz	L UHF 1GHz	S SHF 3GHz	C SHF 5GHz	X SHF 10GHz	Ku SHF 15GHz	K SHF 24GHz
HPY-80	2.0(80)	9.0(20)	25	30	35	45	50	50	50	50	50	50
HPY-60	1.5(60)	6.5(14)	25	30	30	40	50	50	50	50	50	50
HPY-40	1.0(40)	3.6(8)	20	25	25	35	40	50	50	50	50	50

**TABLE 2**  
**TYPICAL REFLECTIVITY OF ECCOSORB HPY AT 55° INCIDENCE ANGLE**  
**MEASURED ON 3.66 M x 6.71 M WALL**

Frequency Reflectivity

TYPE OF HPY	1 GHz			2 GHz			3 GHz			5.5 GHz			10 GHz		
	dB			dB			dB			dB			dB		
	D/λ	//	/	D/λ	//	/	D/λ	//	/	D/λ	//	/	D/λ	//	/
HPY-80	6.8	--	40	14	40	55	20	55	65	37	60	60	68	65	65
HPY-60	5.1	--	--	10	--	55	15	50	60	28	60	70	51	70	65
HPY-40	3.4	30	35	6.8	40	40	10	40	40	19	55	55	34	55	50

**NOTE:**

- 1) Polarization parallel (//) or perpendicular (/).
- 2) D/λ is thickness-to-wavelength ratio rounded to two significant figures.
- 3) As a rough rule of thumb, reflectivity may be expected to increase (smaller dB-down values) or decrease (larger dB-down values) as incidence angle increases or decreases respectively in the range 45° to 70° by the following amounts: 0.5dB per degree at D/λ =1, 1.0dB per degree at D/λ =10; 2.0 dB per degree at D/λ =100.

Performance values in Table 1.2 are typical values and are not a guaranteed value. Thicknesses equal to the former values of 9, 12, 18, 24, 30, 54, 72 inches will be available as special non-standard products to satisfy established specifications and the requirements of customers.

This information, while believed to be completely reliable, is not to be taken as warranty for which we assume legal responsibility nor as permission or recommendation to practice any patented invention without license. It is offered for consideration, investigation, and verification.