

# EMC HYBRID PYRAMIDAL ABSORBER

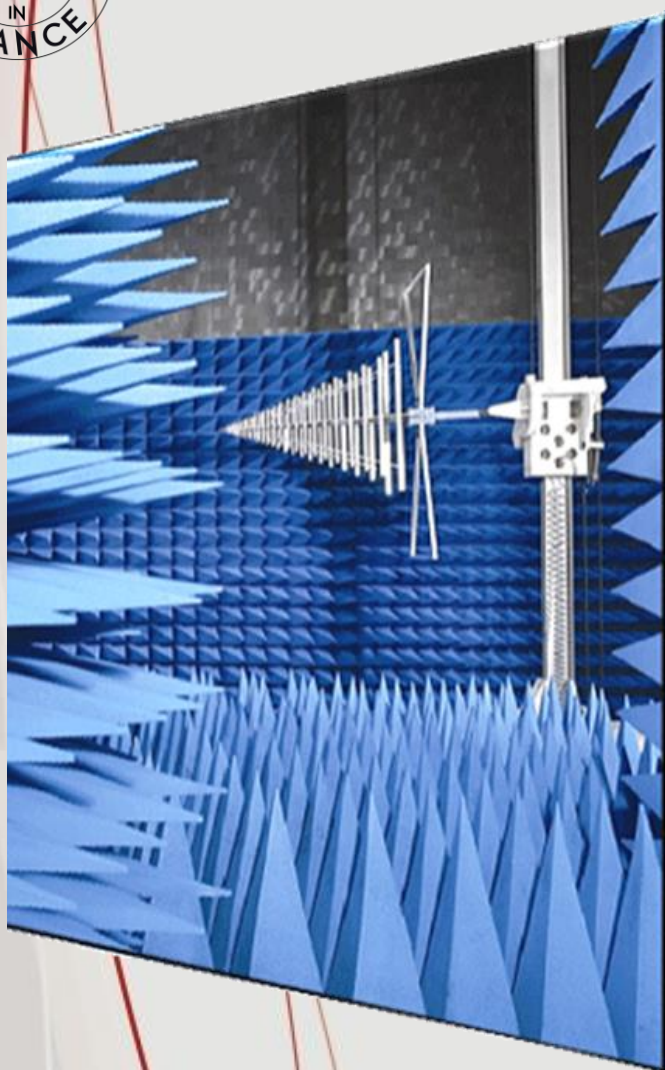
## HY & HYT

HY hybrid absorbers provides broadband performances (30 MHz to 40 GHz). They are made of a combination of ferrite tiles performant in the upper frequency range (for frequency up to 1 GHz) and specific pyramidal absorbers (for frequencies from 1GHz).

HY absorbers are used in EMC anechoic chambers for EMI and EMS testing according to both commercial and military standards.

### MAIN FEATURES

- Suitable for EMC anechoic chambers
- Broadband frequency range 30 MHz – 40 GHz
- Performance levels guaranteed for 20 years
- Unique plastic paint for pyramidal foam absorbers
- Innovative, flexible installation system for ferrite panels
- Can be installed to upgrade existing shielded rooms
- It also exist a HY truncated version ( Ref : HYT)



# EMC HYBRID PYRAMIDAL ABSORBER

## HY & HYT

### DESCRIPTION

The key design advantage of HY hybrid absorbers is the **impedance matching** between the ferrite tiles and the pyramidal-shaped absorbers glued over the ferrite.

SIEPEL ferrite panels provide optimized reflectivity performances in the frequency range 30 MHz–1 GHz\* and in order to extend the performances up to 40 GHz, an immediate and simple idea would be to glue a regular pyramidal absorber on top of the ferrite. However, some care should be taken so that the pyramidal absorber doesn't "hide" the ferrite.

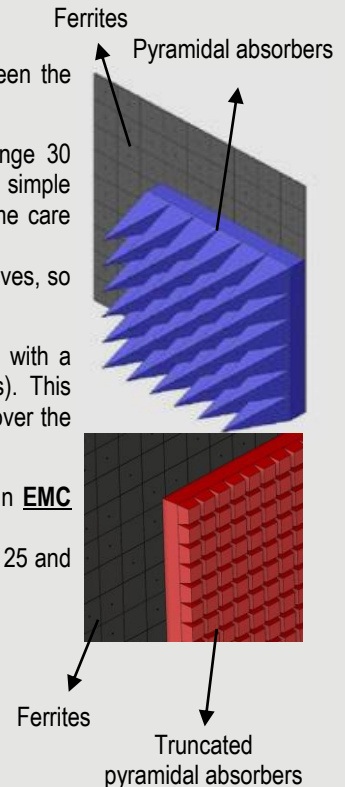
In other words the pyramidal absorber must be "transparent" enough to low frequency waves, so that they can be absorbed by the ferrite in an efficient way.

Thus, SIEPEL have developed a **special matched pyramidal absorber**, impregnated with a specially formulated carbon solution (different from regular APM pyramidal absorbers). This provides the combination ferrite + matched pyramidal absorber with **high performance** over the whole frequency range 30 MHz – 40 GHz.

Consequently, the broadband performances of HY absorbers make them ideal for use in **EMC anechoic chambers** to meet the specifications of:

- **EMI** standards, such as CISPR 16-1-4, EN 50147-2, EN 55022, ANSI C63.4, CISPR 25 and similar standards
- **EMS** standards such as EN / IEC 61000-4-3, ISO 11452-2
- **MIL-STD and DO** applications.

\*: more detailed information about ferrite panels in the data sheet *FERRITE ABSORBER - FE*



### GUARANTEED PERFORMANCES

These reflectivity performances are outstanding and **guaranteed for 20 years**. They are based on extensive in electromagnetic absorbers manufacturing. Their reflectivity performances are **factory checked**, using cutting-edge broadband equipment (14 m long coaxial line with a 1.83 x 1.83 m section, fully anechoic chamber with optimised design, VNA). In addition, we offer to perform reflectivity measurements in our factory with SIEPEL engineers, for the customer.

The carbon load of the HYT and HYT+ are slightly different. HYT are used for commercial standard (CISPR16-1-4). HYT+ can be used in Automotive and Military chambers.

**GUARANTEED REFLECTIVITY PERFORMANCES (dB) OF HY ABSORBERS (normal incidence)**  
Combination of ferrite tiles and special matched pyramidal hybrid absorbers

	Type	30 MHZ	50 MHZ	80 MHZ	100 MHZ	150 MHZ	300 MHZ	500 MHZ	1 GHZ	2 GHZ	4 GHZ	8 GHZ	12 GHZ	18 GHZ	40 GHZ
HYBRID	HY 20	-19	-20	-21	-20	-19	-14	-12	-12	-10	-10	-12	-14	-16	-16
	HY 30	-19	-20	-20	-20	-17	-14	-13	-13	-11	-11	-14	-15	-20	-20
	HY 45	-19	-20	-20	-20	-17	-15	-15	-15	-13	-16	-18	-20	-24	-24
HYBRID TRUNCATED	HY 20T	-19	-20	-21	-21	-20	-14	-10	-10	-9	-8	-9	-9	-11	-15
	HY 20T +	-18	-19	-20	-20	-20	-14	-11	-11	-10	-10	-10	-10	-12	-16
	HY 30T	-19	-20	-20	-20	-17	-14	-13	-11	-10	-10	-12	-12	-20	-20
	HY 30T+	-18	-19	-20	-18	-16	-15	-14	-13	-14	-14	-20	-20	-25	-25
	HY 45T	-19	-20	-17	-17	-16	-15	-15	-15	-13	-15	-17	-19	-22	-22
	HY 45T+	-18	-19	-17	-17	-16	-15	-15	-16	-17	-20	-26	-28	-30	-30
	HY 60T	-18	-20	-19	-18	-16	-17	-16	-16	-14	-17	-20	-23	-20	-20
	HY 60T+	-16	-15	-15	-15	-15	-17	-17	-20	-21	-27	-30	-30	-40	-40



# EMC HYBRID PYRAMIDAL ABSORBER HY & HYT

## DIMENSIONS

	Type	Overall Height (mm)*	Absorber Height (mm)	Pyramid Height (mm)	Base Height (mm)*	Base Width (mm)	Weight (kg)*
HYBRID	HY 20	218	210	147	71	605 x 605	17
	HY 30	313	305	245	68	605 x 605	17,5
	HY 45	463	455	380	83	605 x 605	19
HYBRID TRUNCATED	HY 20T/T+	108	100	45	63	605 x 605	17
	HY 30T/T+	208	200	140	68	605 x 605	17,5
	HY 45T/T+	358	350	275	75	605 x 605	18,4
	HY 60T/T+	508	500	400	108	605 x 605	19,5

\*including ferrite tiles

## UNIQUE PLASTIC PAINT

SIEPEL offers **plastic paint coating** was developed to

- optimise carbon binding: no finger marks, no pollution or carbon dust
- **improve aesthetics** (brightness) and **lifetime**.

This coating provides:

- an excellent **shape memory** to absorbers
- an **extreme softness**: absorbers are therefore not easily breakable and highly suitable for heavy duty chambers

This coating comes in a huge range of colours: contact us to customize your chamber!

## RF POWER HANDLING

HY absorbers are designed to handle a power density of up to 2 kW/m<sup>2</sup>.

## COMPLIANCE TO STANDARDS & DIRECTIVES

Hybrid absorbers are tested in SIEPEL's internal fire test lab as well as in independent test laboratories. They are compliant with the following tests and standards:

- ISO 11925-2 Euroclass E
- NRL 8093 – tests 1, 2 & 3
- DIN 4102 – B2
- UL 94 HBF upon request

Both aqueous and plastic paint coating were developed to enable work in **ISO 4** (ISO 14644-1 2015) **clean room conditions**.



# EMC HYBRID PYRAMIDAL ABSORBER HY & HYT

## INNOVATIVE FERRITE INSTALLATION

HY hybrid absorbers can be installed in brand new shielded rooms or to upgrade existing installations. SIEPEL ferrite panels (300 x 300 mm metal backed panels, each with 9 tiles glued over a steel plate) can be either screwed onto wooden boards in existing enclosures, or using a **unique flexible and innovative rail system** when installed in SIEPEL high performance shielded rooms (see following pictures).



Ferrite panels are screwed onto a metallic sub-structure, made of main and secondary steel profiles. Vertical main profiles are directly fixed onto the shielded room, using the joining OMEGA profiles between two shielding panels. Then horizontal secondary profiles are screwed onto these main profiles.

Finally, each ferrite panel is screwed onto the secondary profiles. This flexible installation method, **with no drilling or holes in the shielding**, ensures:

- ✓ Excellent **reliability** of shielding effectiveness performances,
- ✓ Very **easy** and **quick installation** of ferrite panels on the walls and ceiling of the chamber,
- ✓ Easy dismantling of one or more panels anywhere, as needed,
- ✓ Easy **dismantling of the entire chamber** (for relocation or upgrade).

To upgrade the performance levels of the absorbers to 40 GHz and more, special matched pyramidal foam absorbers are directly glued over the ferrite tiles, using Neoprene contact glue (to be applied on both sides).

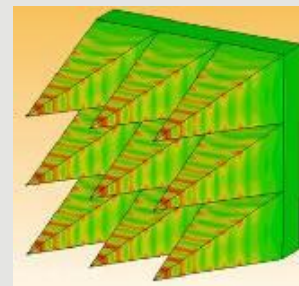
## "OPEN-CELL" STRUCTURE

The percentage of open cells within the foam absorber material is of utmost importance. HY matched pyramidal hybrid absorbers are made from high tech polyurethane foam, with 90% open cells. This configuration allows a far better impregnation of the carbon solution, and therefore an incomparable distribution of the carbon load through the absorber. The carbon is fixed through the use of a polymerised acrylic binder.

All these features lead to unique homogeneity and accurate control of electromagnetic parameters (complex permittivity  $\epsilon^*$ ).

## NUMERICAL SIMULATION

SIEPEL R&D engineers work with state-of-the-art electromagnetic numerical simulation software, in order to continuously optimize both the shape and impregnation agents of the absorbers, over wide frequency ranges.



These data are the result of tests performed in our laboratory. The use of the material and the performance specifications are the entire responsibility of the users who should ensure that the material is suitable for their purposes