AlbatrossProjects

Absorber

Polyurethane foam technology
Carbon for broadband absorption
MLT for hybrid absorbers
Over twenty years of performance

The "hair" absorbers from the early fifties have truly evolved. Today's fire retardant, high performance polyurethane foam absorbers come in a choice of new materials, new processes, and designs with improved reflection coefficients (–20 dB to over –60 dB).

Purpose & Overview

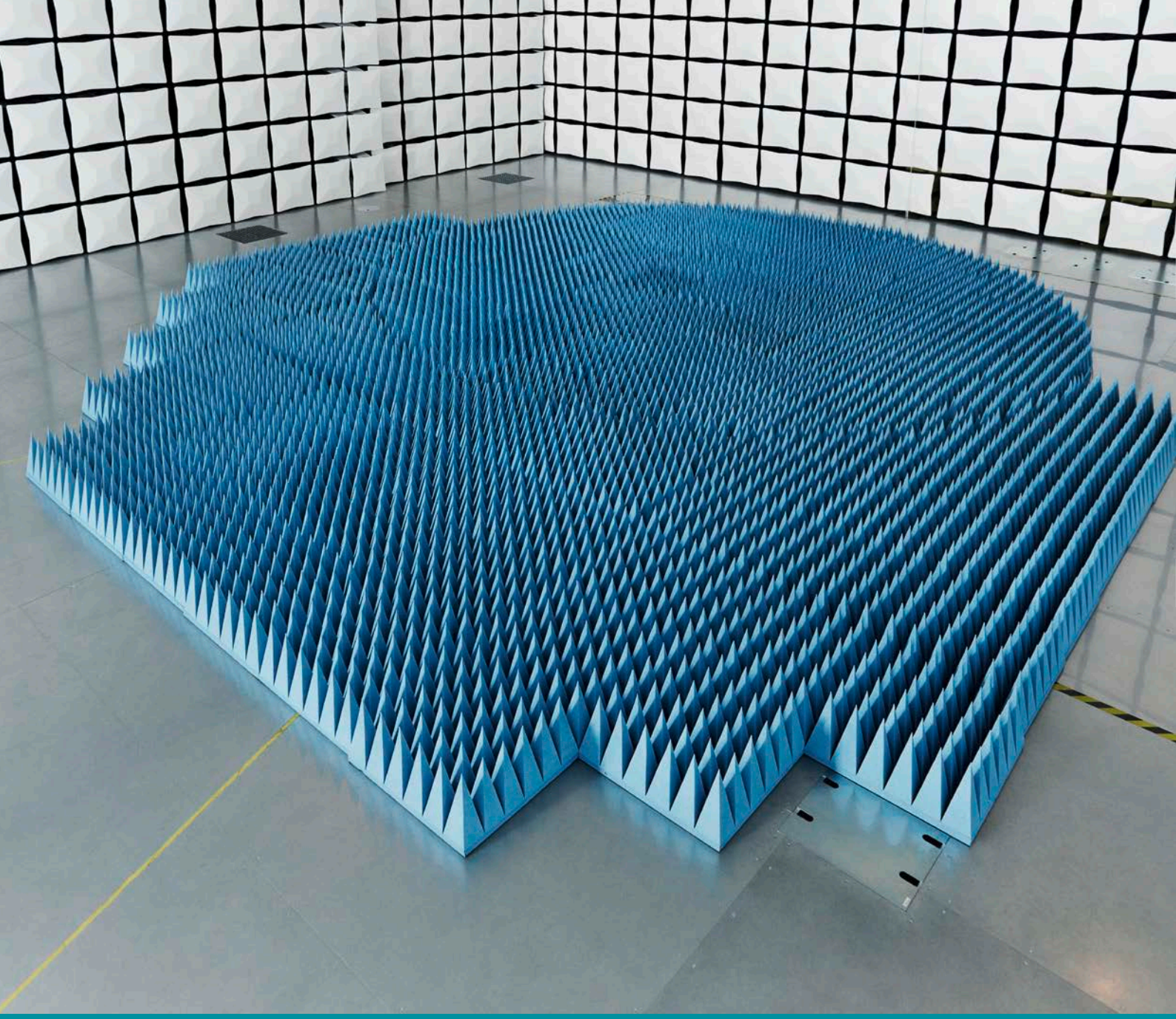
WHAT IS THIS SOLUTION FOR?

Even though the first patented absorber was the result of work in the Netherlands, Germany and the United States were pushing the development of absorbers during World War II. These days, absorbers are one of the key components of any EMC and microwave test site solution. Driven by the break through development in microelectronics and telecommunication, the civil market is now the most important application field.

How an absorber works is very well known. The free space impedance of 377 Ω must be matched to the impedance of the absorber. Maximum power transmission is possible when the requirement Z*absorber = Zsource is fulfilled. Transferred to the incident wave and the absorber this means: the absorber impedance has to be matched to the impedance of the incident wave, 377 Ω.

Today's applications demand "perfect" absorbers which are nearly impossible to produce in consideration of the wide frequency range (9kHz – 100Ghz). We focus on optimizing absorber performance with careful design and choice materials.

The most important characteristics for absorbers used in anechoic chambers are the following: low normal incidence reflection for chamber back walls in EMC applications, low forward and backscatter at wide angles for the specular regions of side walls, floor and ceiling in pattern measurements and RCS applications. To cover this large field of applications, we use several technologies:
– solid/hollow foam absorbers and ferrite absorbers
– solid/hollow matched hybrid foam absorbers in different shapes



Quality Management

QUALITY MEANS DOING IT RIGHT FROM THE VERY FIRST THOUGHT.

Our quality management ensures a most efficient quality control over products, management and organizational systems.

The organization ensures the availability of resources and information necessary to support the operation and monitoring of these processes. All relevant processes are defined in our management system. Through monitoring, analysis, and improvement, the highest quality and customer satisfaction is our target.

In an effort to improve our quality assurance systems, we ask our customers to provide an evaluation of our performance at the conclusion of each project. This feedback, coupled with input from the market and the Standards Committees, gives continuous enhancement to our systems and correction to any non-conformity found.

Product purchasing and sourcing is a priority in our role as system integrator, so much that it encompasses one of sixteen chapters in our quality and environmental management system. Key process figures are:
– audit & approval of suppliers
– evaluation of products by our technical team
– technical reporting on delivered products
– project related factory acceptance by the project manager.

In our commitment to quality solution designs, we work closely with our long time suppliers to ensure that our stringently designed specifications are met.

Quality is not only doing it right from the very beginning, but also delivering the right products in the expected quantity on the scheduled dated at the right place. For a global solutions supplier these aspects are key. Each project is subject to a quarterly review of quality, cost, and delivery specifications.

Our ISO 9001 and ISO 14001 certification guarantees that our designs, products, and solutions will always meet the highest quality standards. It's our goal to provide you the very best of expertise, project management, and products. The main system components like shielding, absorbers, etc. are manufactured by daughter companies or by our shareholders. This ensures a full control with regard to quality and delivery time.

PYRAMIDAL ABSORBERS

Chamber designers choose from many alternatives when selecting absorber shapes and types resulting in greater cost efficiency in design.

Solid foam absorbers

ITS SHAPE IS PROVIDING THE HIGHEST BROADBAND PERFORMANCE.

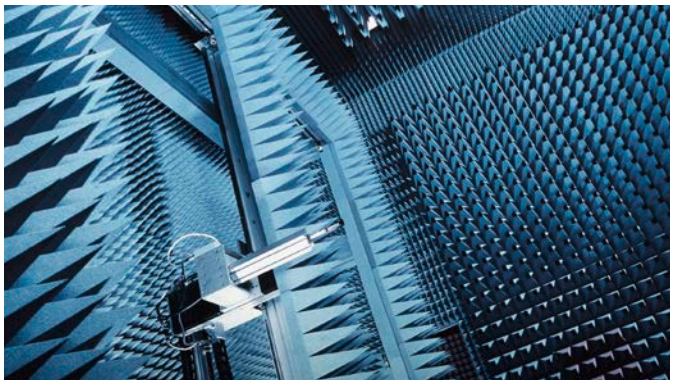
Our high performance pyramidal absorber (WAVASORB VHP) is a solid pyramidal shaped carbon loaded urethane foam absorber. The main application for this material is the construction of anechoic chambers.

Of all known absorbers, the WAVASORB VHP provides the highest broadband performance at both normal and wide incidence angles. These high performance pyramidal absorbers are the preferred solution for antenna, radar cross section, and electronic warfare anechoic chambers because of excellent performance at microwave frequencies.

While primarily designed for low scatter, (i.e. angle of incidence equal to angle of reflection), they offer favorable backscatter properties at off-normal incidence as well. The pyramidal absorbers are well suited for use in all regions of anechoic chambers. Pyramidal absorbers are also available in a variety of thicknesses, giving the chamber designer the opportunity to choose grades appropriate for specific frequencies and incidence angles. The NRL suffix refers to its compliance with the fire retardant properties set in the requirements of the U.S. Naval Research Laboratory (NRL) test.

The end of the 80's brought the first 3 m and 10 m EMC Test Sites equipped with WAVASORB VHP absorbers. Years later, the +4 dB criterion was set in the ANSI C63.4 and in the EN 50147-2 that resulted in the development of the hollow pyramidal and hybrid absorbers.

Further enhancements were made to the WAVASORB VHP's performance in the low frequency range, including a new shape with a flat top. The WAVASORB VX offers excellent performance starting below 80 MHz. With reduced height, it is largely used in chambers which have to comply with MIL-STD 461/462, CISPR 25 and ETSI standards.



Physical properties WAVASORB VHP and VX	
Standard color	Blue
Base size	61 cm x 61 cm (24 in x 24 in)
Max. service temperature	+5 °C to +35 °C
Power handling	800 W/m², 0.52 W/in²
Fire retardant to	NRL 8093 Tests 1, 2, 3; DIN 4102 Class B2 and ISO 11925-2
Available heights in inches	2, 4, 8, 12, 18, 20, 26, 30, 36, 45

HOLLOW PYRAMIDAL ABSORBER

Regardless of the application EMC or MW, when it comes to low frequencies, the hollow technology should be your choice.

Thick wall foam absorber

KEEPING SIZE AND PERFORMANCE BUT REDUCING THE WEIGHT.

Several technical application fields have been driving the development of hollow pyramidal absorbers which are available as EMC and microwave absorbers. The ±4 dB criterion for NSA deviation, made it necessary to enhance the low frequency performance of the solid foam pyramidal absorbers.

Antenna design for multimedia applications requires anechoic chambers for antenna pattern measurements working at 100 MHz with significant absorber reflectivity. The WAVASORB HX and WAVASORB HHP pyramidal absorbers cover the requirements of those application fields, and also offer a weight reduction of up to 40% compared to the solid foam absorbers.

The WAVASORB HX has been developed specifically for radiated emission test chambers at 10 m distance in the frequency range 30 MHz – 18 GHz. This chamber has to meet the volumetric NSA (normalized site attenuation) specification according to ANSI C63.4, CISPR 16 or EN 50147-2. It is also useful in other applications such as radiated susceptibility test according to EN 61000-4-3 and applications at very low frequencies.

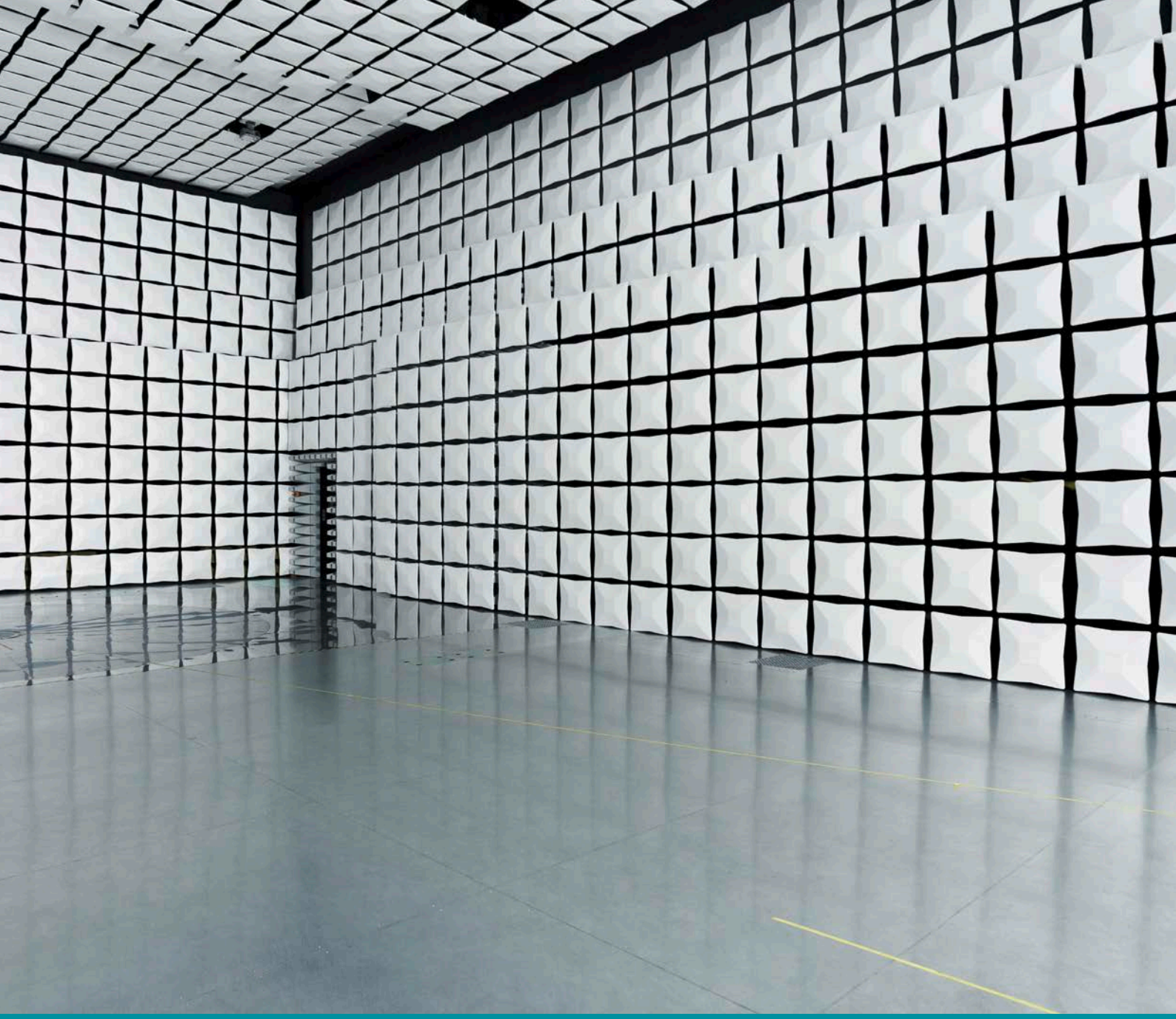
Compared to standard pyramidal absorbers of similar height, WAVASORB HX shows better reflectivity performance in the critical low-frequency range (from 30 MHz up) of EMC/EMI test chambers. However, the absorber still performs at higher frequencies up to at least 18 GHz.

WAVASORB HHP-60 is a preferred solution for anechoic chambers requiring a lightweight absorber with a very good performance at low frequencies (from 100 MHz).

The light weight of this absorber is enhanced because the absorber is hollow. The excellent performance of WAVASORB HHP-60 is due to many design features:

– The hollow design produces scattering of energy which is reflected from the surface. This effect and the actual absorption of energy contribute to the high reduction of specular reflections.
– The thick wall material of the pyramids provides impedance matching at all frequencies.

Physical properties WAVASORB HHP and HX	
Standard color	Blue or black, HX with white caps
Base size	61 cm x 61 cm (24 in x 24 in)
Max. service temperature	+5 °C to +35 °C
Power handling	800 W/m², 0.52 W/in²
Fire retardant to	NRL 8093 Tests 1, 2, 3; DIN 4102 Class B2 and ISO 11925-2
Available heights in inches	60, 80, 100



HYBRID ABSORBER

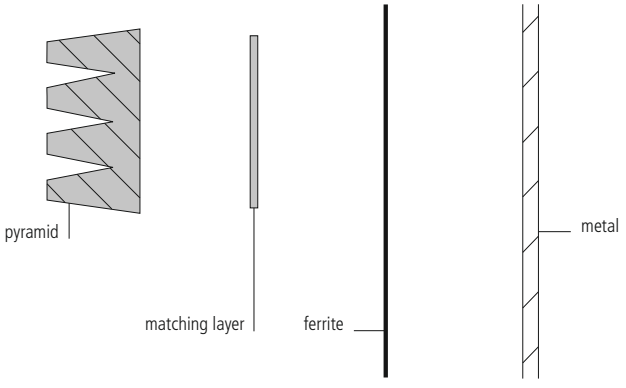
Discovered in the 50's, and implemented in the 90's, the hybrid absorber with its compact size made full compliant measurements at 30 MHz achievable in standard office building.

Solid foam hybrid absorber

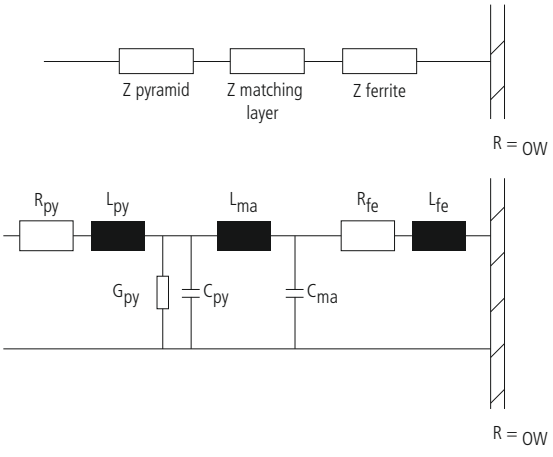
ITS SIZE AND PERFORMANCE MAKE CHAMBERS COMPACT.

Hybrid absorbers have reduced the volume of EMC Test Sites by more than fifty percent. Our hybrid absorber, WAVASORB VHY, consists of many parts, two of which are the ferrite tile and the resistive absorber pyramid. The ferrite tile is made of a sintered material (mainly iron, nickel & zinc) and precisely machined on all six sides to a typical size of 100 mm x 100 mm x 6.0 mm (3.9 in x 3.9 in x 0.24 in). The pyramid is made by a carbon loaded flat tip pyramidal absorber. For a well functioning ferrite absorber, the air gap between individual tiles must be as small as possible.
Thus the typical mechanical accuracy is in the range of 0.05 mm (0.002 in). Started in the early 90's, our matching technology has been continuously improved leading to the shortest matched pyramidal part on the market. This results in extremely compact sized anechoic chambers for full compliant and pre-compliant measurements. The typical construction of our hybrid absorber and its corresponding equivalent circuit diagram is shown below.

One major consideration in designing the hybrid absorbers is the installation method of the ferrite tile. Two principle methods are used today.



Typical construction of hybrid absorber



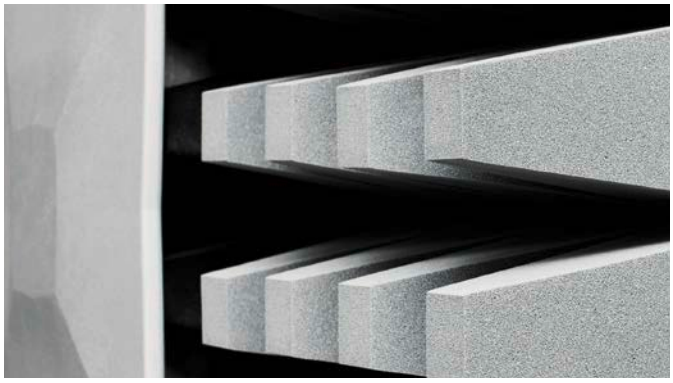
Equivalent circuit diagram of hybrid absorber

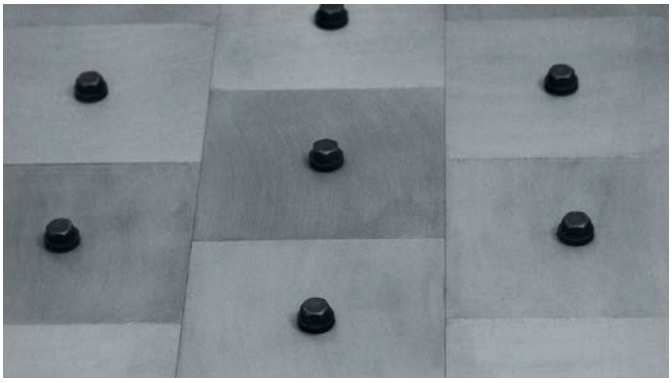
Method 1
Ferrites tile fitted directly onto a metal surface (as shown below;) this method ensures the maximum performance at 30 MHz and an optimized matching in the GHz range.

Method 2
A resistive (dielectric) layer (e.g. wood) fitted between the ferrite tile and metal surface (also referred to as the double layer method). This leads to a shift in the resonance with a better return loss to the frequency range between a few hundreds of MHz and 1 GHz. However, this method reduces the performance at 30 MHz and makes the matching of the ferrite tile to the foam part in the GHz range difficult.

Our matching design is a unique feature; we refer to it as the matching layer technique (MLT). The ferrite tiles and the matched foam absorber are mass produced items, both having tolerances of their intrinsic electrical values. We constantly monitor the band-width of these individual values and define the thickness of the matching layer. The matching layer is then factory bonded to the back of the foam absorber thus optimizing the reflectivity performance. The distance between the ferrite and pyramid absorber is critical in calculating the hybrid absorber performance. Our MLT method ensures conformity when the physical conjunction of the two major components takes place during the installation process. The matched foam absorbers are fitted to the ferrite tiles by 'hanging' them on fixation discs pre-fitted during the ferrite tile installation. This maintains our principle of modular chambers, quick installation, and simple replacement of absorbers items.

Physical properties WAVASORB VHY	
Standard color	Blue
Base size	60 cm x 60 cm (24 in x 24 in)
Max. service temperature	+5 °C to +35 °C
Power handling	800 W/m², 0.52 W/in²
Fire retardant to	NRL 8093 Tests 1, 2, 3; DIN 4102 Class B2 and ISO 11925-2
Available heights in inches	12, 18, 30, 40





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