

# EMI / RF Shielded Acoustic Booths



## Shielding Effectiveness

### EMI Waves Attenuation in audiology shielded booths

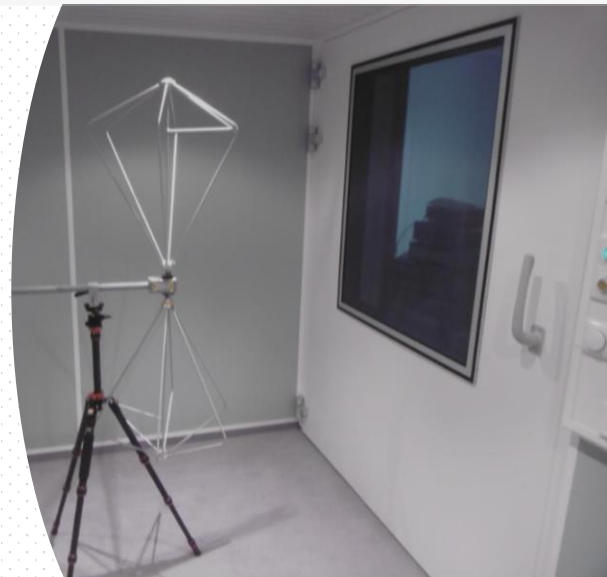
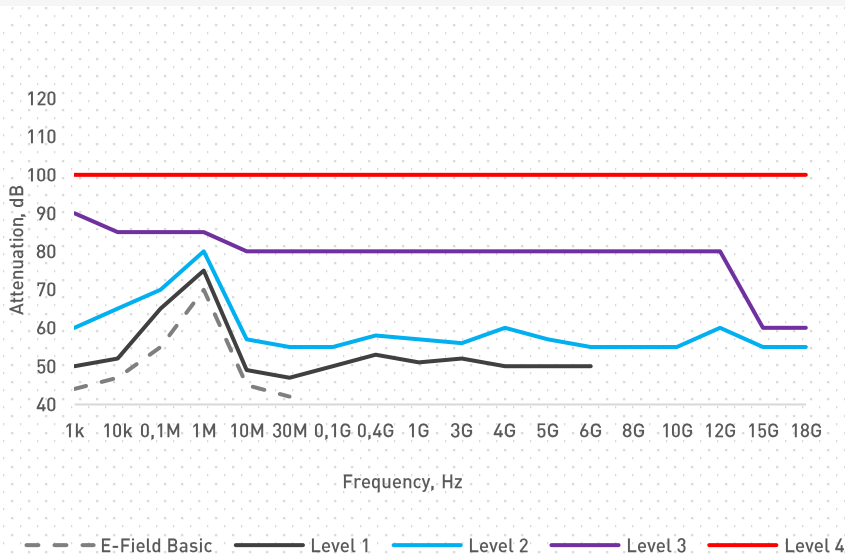
Shielding effectiveness (SE) testing of electromagnetic compatibility (EMC) field shares some similarities with airborne noise reduction measurements.

SE represents the relative attenuation value for different types of electromagnetic wave radiation, including Electric Field (E-Field), Magnetic Field (H-Field), and Plane Waves. The standard EN 50147-1 outlines the typical method for shield attenuation testing. However, challenges arise when dealing with a variety of audiometric and screening testing such as ERA / BERA or animal brain testing. These specialized applications require an extended frequency range for shielded chamber, compliance with hospital regulations, consideration of acquisition system sensors, and other related issues. Drawing upon our extensive expertise of over 50 years in designing shielded rooms for audiometry, we offer our esteemed customers a range of standard and customized options for shielding effectiveness, as shown in Graph 1a and Graph 1b.

### Electromagnetic environment

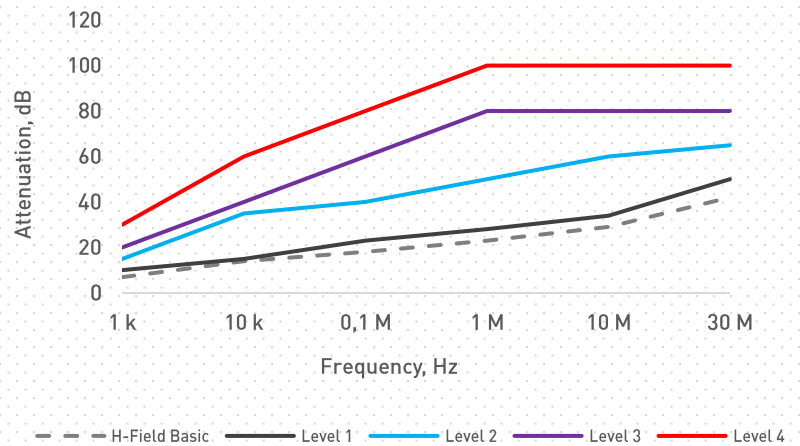
Consideration of environmental EMI conditions is crucial, particularly when it comes to ensuring effective magnetic H - Field protection. For shielded EEG rooms focused on different human body measurements, the inclusion of shielded windows is required. A substantial open area poses challenges in terms of shielded enclosure orientation during installation at hospital or university sites. Transparent materials such as copper mesh, stainless steel mesh, or shielding foil exhibit inadequate magnetic low-frequency attenuation compared to the superior performance offered by classic IAC Moduline Noiselock® galvanized panels. The larger the surface area covered by the mesh entails the higher the risk of unwanted radiation infiltration, which can significantly impact measurement accuracy and bring unwanted artifacts. Thus, careful consideration should be given to the choice of RF / EMI shielding materials and their impact on the overall effectiveness of magnetic H - Field shielding in diverse EMI conditions.

Graph 1a. Typical shielding effectiveness [E - Field and Plane wave]\*



### \*NOTES AND REFERENCES

- all measurements were carried out on the basis and in the essential points in accordance with the following international and national standards: EN 50147-1 and IEEE 299.
- shielding attenuation is defined as the ratio, expressed in decibels [dB], of two magnetic or electric field strengths measured on opposite sides of a shielded enclosure. These field strengths are determined by means of two measurements (M0 – reference measurement without shielding, M1 - measurement with shielding), which are subsequently used to calculate the shielding attenuation with  $\pm 3$  dB instrument accuracy.
- measurement was carried out by an independent accredited test company for shielding effectiveness measurements in the laboratory conditions
- our customers can choose test report type, required attenuation values as well as test points location
- low frequency extension option is available below 1 kHz or even for DC electric and magnetic fields
- microwave frequency extension option is available up to 40 GHz



**Graph 1b. Typical shielding effectiveness (H – Field)\***

#### Typical applications for IAC shielded cabins

- Brainstem Evoked Response Audiometry (BERA)
- Electrical Response Audiometry (ERA)
- Auditory Brainstem Response (ABR)
- Visual Reinforced Audiometry (VRA)
- Electroencephalography (EEG)
- Electroneurogram (ENG)
- Electrocardiogram (ECG)
- Electromyography (EMG)
- Elevated episcleral venous pressure (EvP)
- Common physiotherapy and neurology
- Test and research for human and animal booth
- EMC / EMI / EMS test and measurement
- R&D and telecom RF and acoustic tests

#### Shielded floor construction

IAC Acousti-flote™ floors shall be 50mm or 90 mm high and structurally reinforced. All floors are carpeted. Average weights are no less than 90kg/m<sup>2</sup>. Floors float on properly loaded vibration isolators rated for a natural frequency of 6.5Hz for maximum elimination of structural noise. Discover our flexible solutions tailored to meet our clients' needs. With the ability to combine and utilize various types of shielding materials and false floors, we ensure the achievement of your desired level of shielding.

#### Soundproof shielded doors and gates

IAC Acoustics offers a comprehensive range of products designed for architectural, industrial, medical and security applications. IAC Acoustics Noise-Lock® and Noishield doors feature:

- Performance ratings up to STC-64/Rw63
- Real flexibility with custom sizes or designs
- Manual or automatic versions are available
- UL, BS and EN fire ratings and blast-resistance
- Single / double leaf swing doors and sliding doors
- Radio frequency shielding up to 100dB

#### Most common standards for medical rooms in hospitals

- Interference threshold limits according to IRPA 1990 - For wearers of implants (hearing aids and other)
- Rooms used for medical purposes, patient rooms, in accordance with DIN/VDE 0100-710
- Power installations in hospitals and medically used rooms outside hospitals ÖNORM E8007
- Low-voltage electrical installations - Part 7-710: Requirements for special installations or locations - Medical locations IEC 60364-7-710:2021
- Occupational health and safety, BGV B11
- Plant limit value AGW according to NISV
- Reference values for public exposure to alternating electric and magnetic fields. Public Health (ICNIRP)

#### EMI filters and shielded penetration panels

IAC Acoustics offers wide range of EMI and RF filters for AC and DC power supply, special shielded penetrations (water, liquids, gas or high- pressure air and etc.) A variety of signal cable penetrations (fiber optic, BNC, N-type, DIN, USB and other shielded connectors). If you don't know how to arrange suitable shielded I/O panel our experts help you to find an optimal solution.

#### Silenced Circulating Air System

Our RF shielded cabins are equipped with a shielded silenced ventilation air system integrated into the panel. All medical facilities with a circulating air system should be installed in adequately ventilated rooms.

#### ...and no more compromise

With IAC's shielded acoustic booths, our customers no longer have to compromise between noise reduction, sound isolation, sound absorption or EMI RF shielding. Our reliable technical solutions, proven for decades, are today the "gold standard" of any clinic or university. We provide unsurpassed quality and comfort for research and are used in many areas of medicine and science.

