Shielding Effectiveness Testing

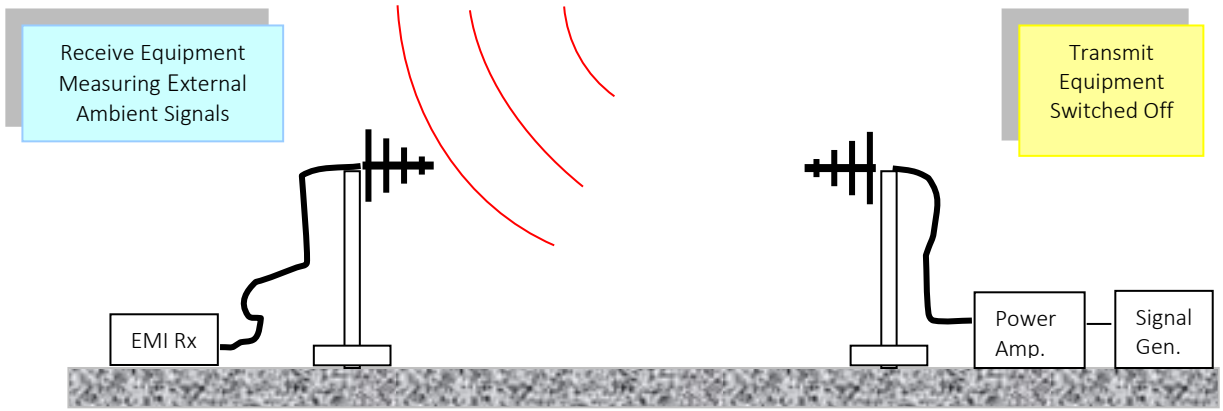
A Shielding Effectiveness Test is a comparative measurement of a signal transmitted at a known frequency and signal strength with, or without, the shield in place. The test comprises of the following parts;

- Checking Ambient Signal Levels: This establishes the background electromagnetic environment and enables frequencies with high background signals which could mask the test signals to be avoided (see para 1).
- Setting Reference Measurement Levels: This is when signals are transmitted at a set frequency. Antenna separation, power level and the actual signal level received is noted. This then becomes the measurement level that the shielding effectiveness is compared with (see para 2).
- Shielding Effectiveness Testing: The reference measurement set up is repeated but with the transmit and receive antennas, and equipment now either side of the shielded enclosure. The difference between the recorded signal and the reference measurement is the SHIELDING EFFECTIVENESS of the enclosure. This process is repeated for the selected frequencies and test positions (see para 3).

1. Ambient Measurements

At each selected test frequency, and OUTSIDE the shielded enclosure a reading of the external electromagnetic environment is taken and noted. During this process the transmit equipment should be switched off in case leakage from the signal generator affects the reading.

If a test frequency coincides with a strong external signal, ie a radio or mobile communications frequency, then it is advisable to move the test frequency to the nearest suitable frequency with a low ambient level.

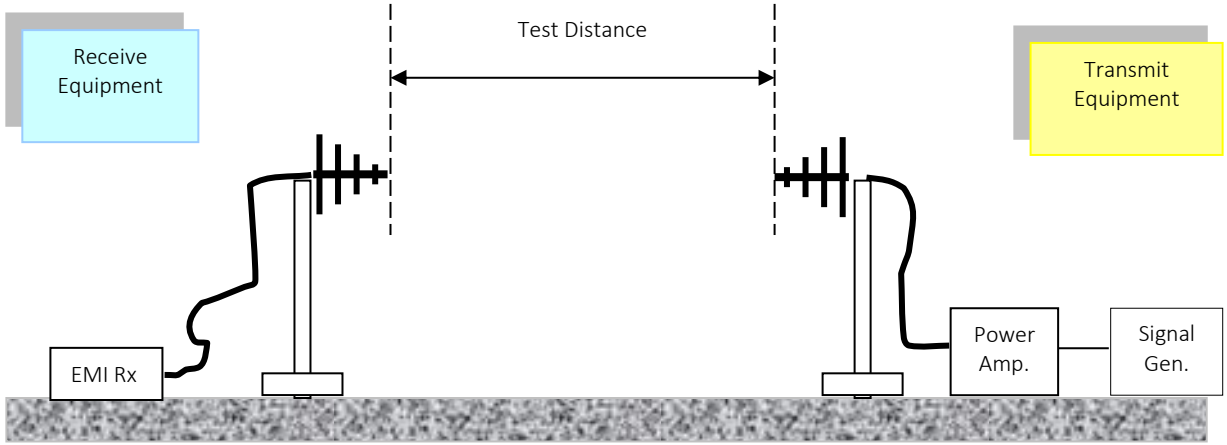


Ambient Measurement Set Up

Shielding Effectiveness Testing

2. Reference Measurements

As shielding effectiveness (SE) measurements are a ratio, prior to testing, a reference level for each test frequency will be established. This confirms the power level being transmitted and the SE reading will be compared with this. The transmit and receive antenna separations (X in sketch below) may vary at different frequencies but will generally be between 600 and 1000 mm.



Measurement Set Up

Reference measurements will be carried out within the main building but away from large metallic objects (ie the RF Shielded Rooms). A separation from metallic objects of at least 5 m should be maintained.

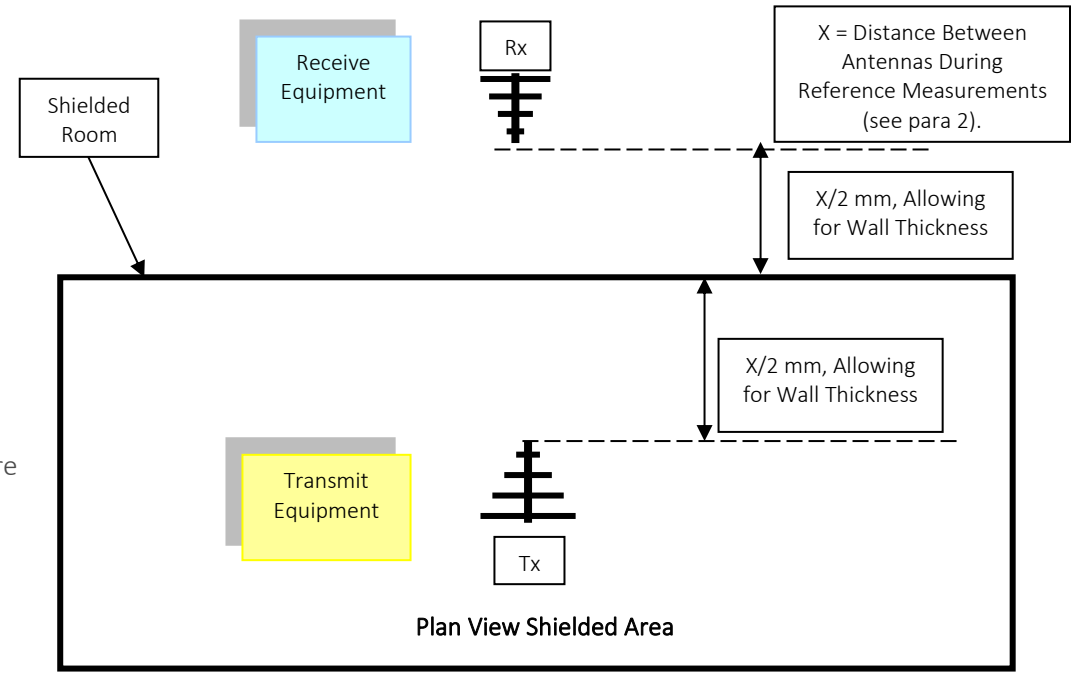
Dynamic Range

The difference between the measured ambient signal level and the reference level is called the DYNAMIC RANGE. For example an ambient signal level of -13 dBµV (A) and a reference measurement of 96 dBµV (B) will give a Dynamic Range of 108 dB (B – A).
The dynamic range MUST exceed the potential shielding effectiveness of the enclosure by at least 6 dB. For example, it is NOT possible to measure a 100 dB room with a dynamic range of 90 dB.

Shielding Effectiveness Testing

3. Shielding Effectiveness Tests

When the reference measurements have been completed the Transmit and Receive Tx/Rx configuration is repeated but this time with the antennas either side of the shielded room. The difference between the Receive (Rx) signal and the reference signal levels is the Shielding Effectiveness (SE). This is repeated at all the test points and all selected frequencies.



Our highly experienced test engineers are externally assessed at regular intervals and carry out shielding effectiveness testing using calibrated transmitters and receivers to accurately define the signal reduced at specific frequencies. All tests are carried out to predetermined international standards to ensure conformity across the industry, and test equipment is calibrated using independent test houses.

About Us

Established in 1996, European EMC Products (EEP) are an established British company whose experience and understanding of the science of shielding makes it an ideal partner in whom you can place your trust with confidence.

The purpose of installing EEP shielding systems is to protect people and equipment against the threats posed by electromagnetic and radio frequency (RF) interference, radiation, magnetic fields and electromagnetic pulses.

Our diverse range of turnkey products and services, including design, project management, testing and consultancy are delivered across multiple sectors to an international client base.

Quality

European EMC Products Limited are registered to BS EN ISO 9001:2015, Certificate Number FS38901.
Registered Scope: The design, assembly, installation, servicing and testing of RF Shielded Structures and equipment including EMI Shielding, Blast Doors, Gas Tight Doors and specialised mobile Electromagnetic Pulse Protection (EMPP) containers.
Radio Frequency, Magnetic Shielding and Quench systems for MRI (Magnetic Resonance Imaging) scanners.
The design, assembly and installation of Ionising Radiation Protection facilities.
The design, manufacture and installation of LED lighting systems for medical applications.
EEP Filters Limited are registered to BS EN ISO 9001:2015, Certificate Number FS38901.
Registered Scope: The design, manufacture, management of installation and testing of high performance EMC and EMP Power and Data Line Filters.

Disclaimer

NB: All the information provided within this datasheet is for reference only. Product specifications are subject to change without notice.