Living with Electromagnetic Fields.

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Materials for Space Age Consumer Products and Living Space.

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Background to Concept

- Growing need for construction materials capable of blocking microwave based communications, including:
  - Mobile Phone Signals.
  - Wireless Networks.
  - Bluetooth Devices.

- Applications Include:
  - Shielding for Improved Health / Wellbeing.
  - Shielding Against Unauthorised Communication.
  - Shielding for Enhanced Security.

- Buildings where this technology is required include:
  - Military structures, civilian airports, financial institutions, prisons, hospitals and schools.

Our Shielding Material

- A Patented Cementitious Composition.
  - Patent No. EP 0759017

- Benefits Over Existing Solutions.
  - Can be incorporated into Existing Construction products *(Blocks, Tiles, Screeds & Mortars)*
  - Harder to damage / compromise than foils.
  - Appears to operate by signal absorption rather than simply by reflection – work is continuing to investigate this behaviour.

What are EM Fields?

- Propagating energy in the form of Electromagnetic (EM) waves covering the frequency range (1 Hz to 400 GHz)

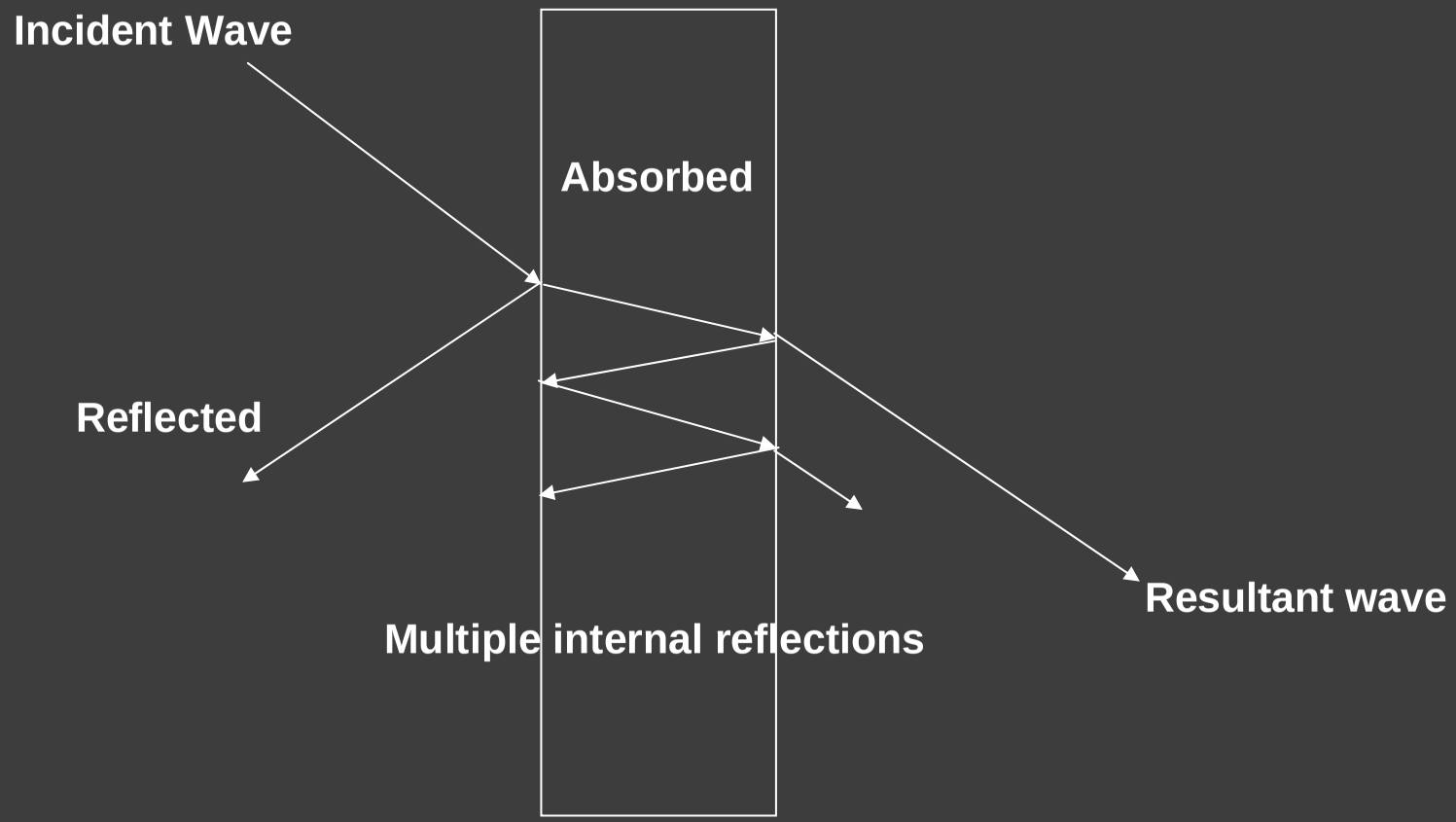
- Made up of two field components:
  - Magnetic field (H-Field) predominates at low frequencies
  - Electric field (E-Field) predominates at higher frequencies
  - Transition from H to E field dominance usually occurs around 30 MHz

- For H-field - Materials of high relative permeability are required to attenuate fields

- For E-field – Materials of high conductivity are required to attenuate fields

What is EM Shielding?

- The ability of a material to reduce the resultant EM field from one side of the material to the other.



Initial Lab Based Shielding Measurement

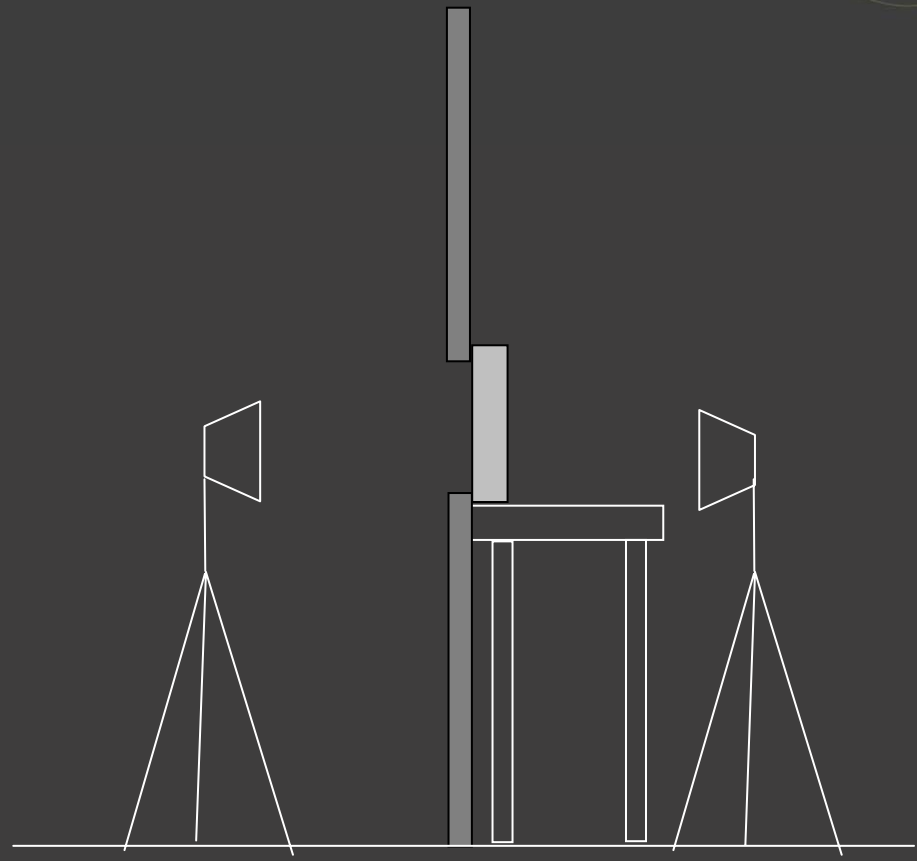
- Laboratory based Quick-Look-See measurements to highlight indicative E-field Shielding Effectiveness of
  - Standard Concrete Block
  - Typical Absorber RAM material
  - Conductive Concrete Block

- Pushed up against a window in a screened room

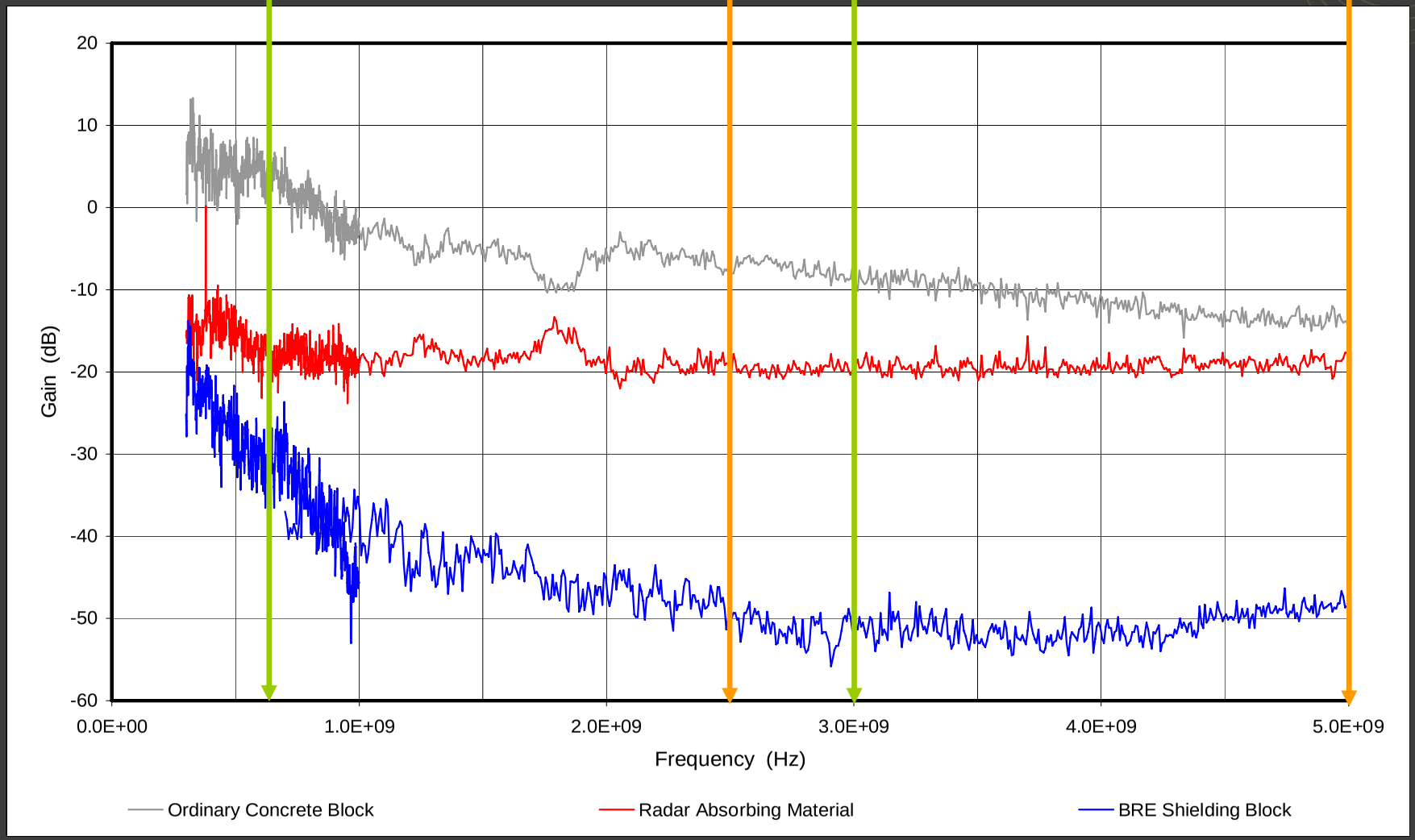
- Some leakage would occur around the blocks especially at high frequencies

- Measurements made over the entire swept frequency range 300 MHz to 5 GHz

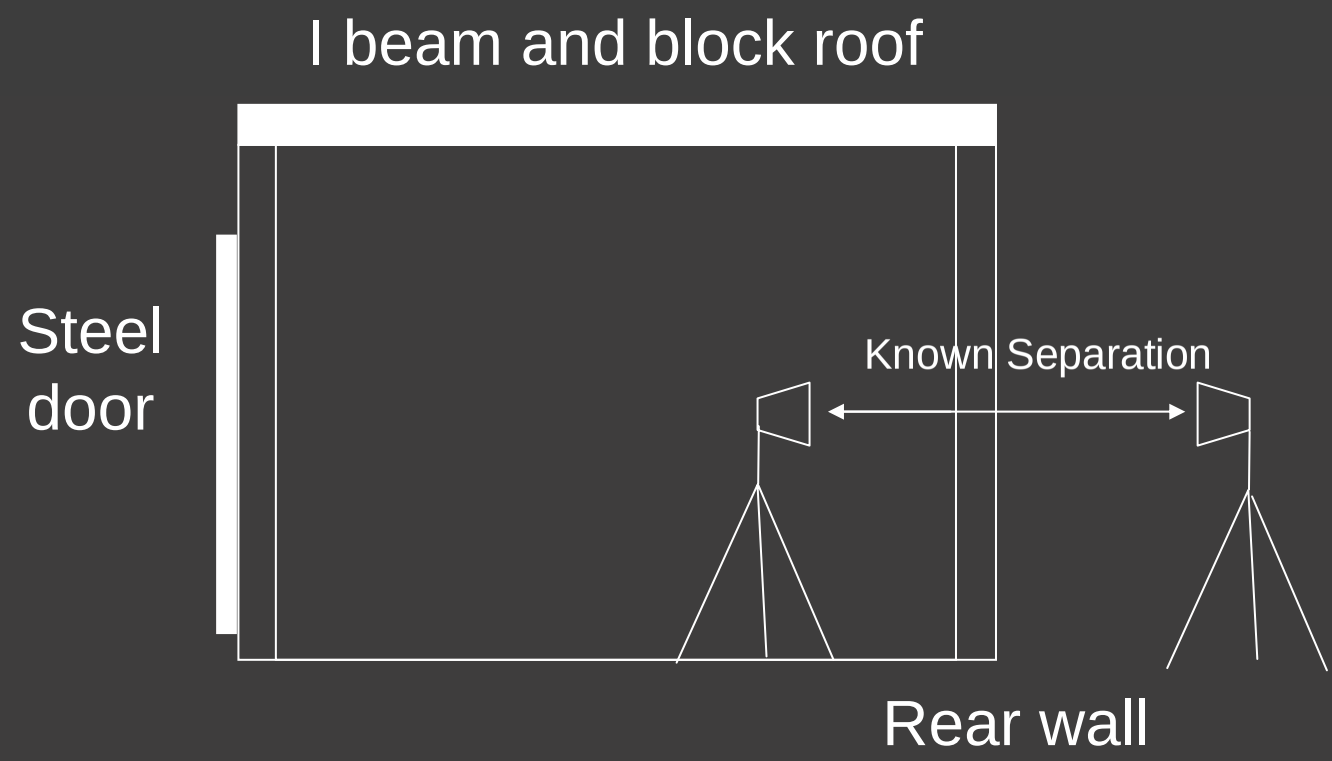
Lab-Based Measurement Setup



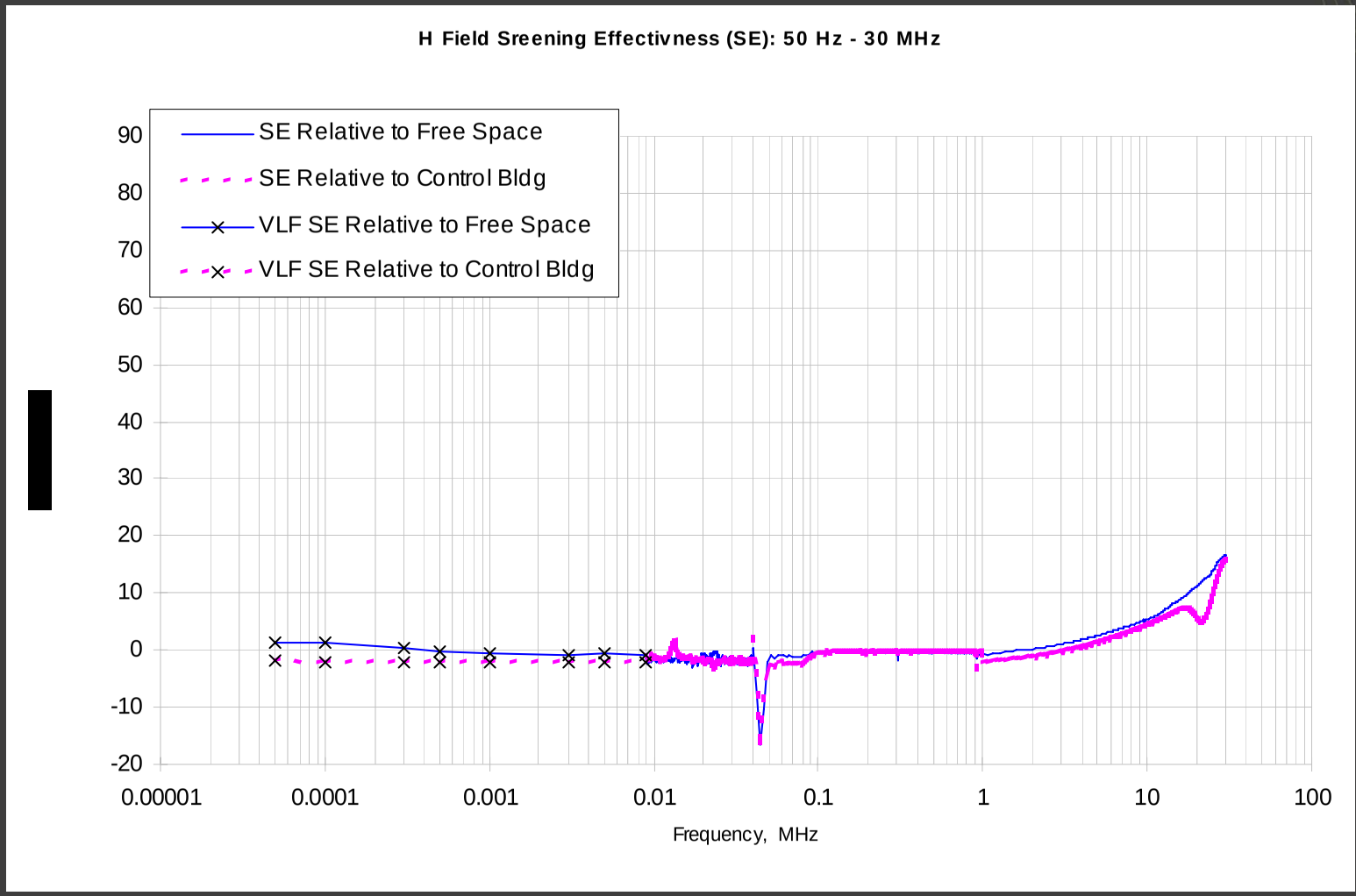
Lab Based Measurements (E-Field)



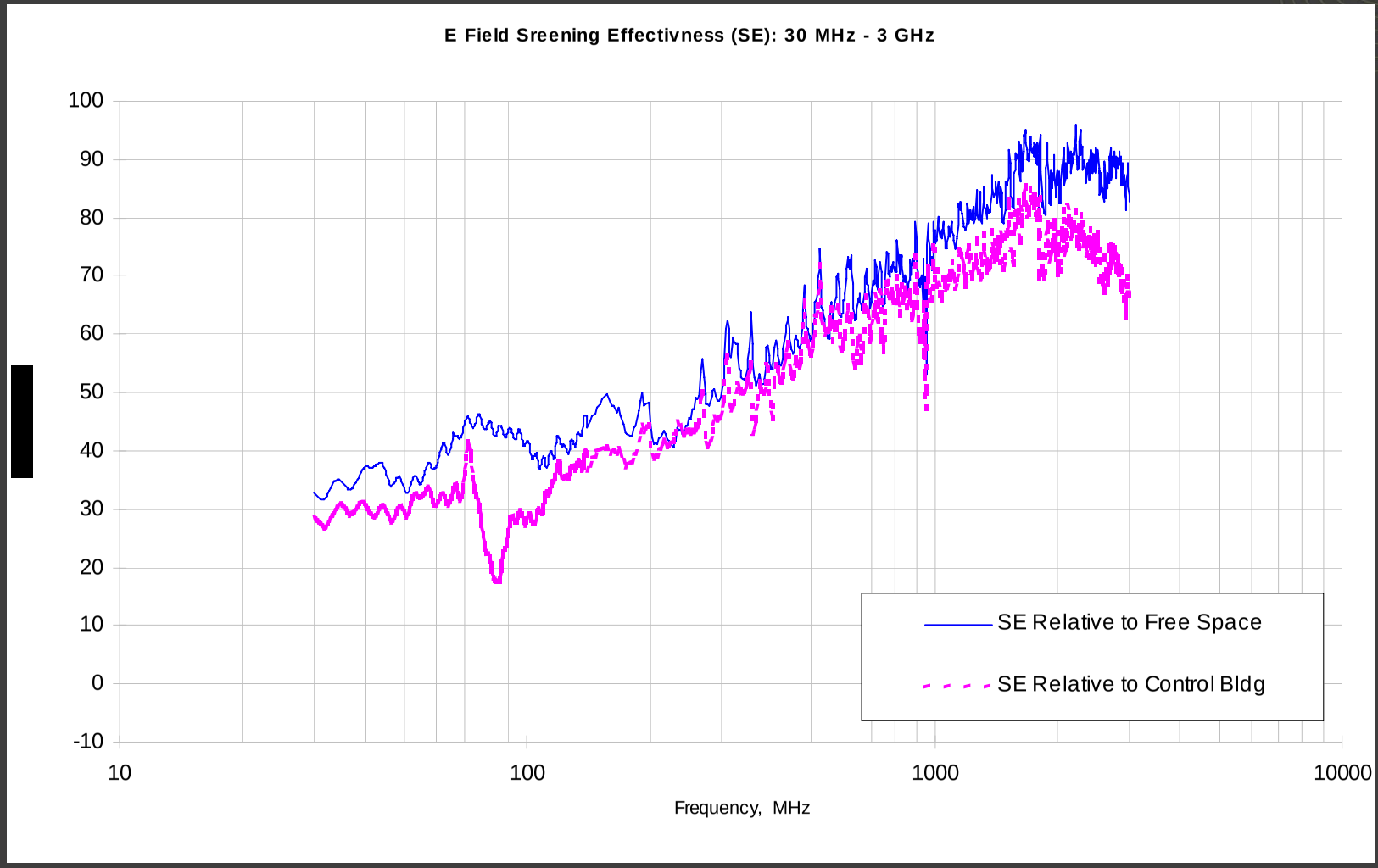
Field Based Measurements (E & H Fields)



Building Measurements : H-Field



Building Measurements : E-Field



Concluding comments

- Typical Shielding Effectiveness (SE) for standard concrete block building varied between 6 and 20 dB across the frequency range (30 MHz to 3 GHz).
- The conductive concrete block building had very good Shielding Effectiveness against electric fields from 32 dB at 30 MHz to 90 dB at 3 GHz – This is expected to provide effective shielding.
- Currently negligible shielding performance for low frequency magnetic fields – But we are working on this!
- Little difference between Horizontal and Vertical Polarisations of electric fields

Thank you for Listening.

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