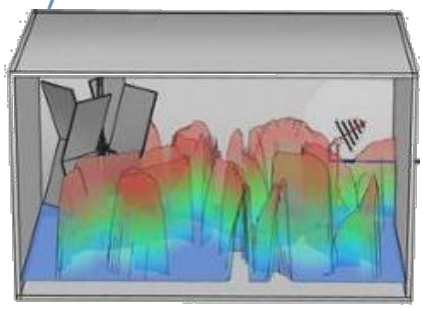
EMC REVERBERATION CHAMBERS

A reverberation chamber (MSRC) is a metallic cavity fitted with a mode stirrer; the resonances of the cavity are modified in a random fashion by mode stirring in order to obtain a field that is considered statistically uniform. Reverberation chambers allow to produce high fields, up to several hundreds or thousands of V/m, with optimized input power. They illuminate the equipment under test (EUT) with isotropic radiation.

OPERATING PRINCIPLE



The **mode stirrer**, as it rotates, **modifies the distribution of the electromagnetic fields**. The stirring can be performed electronically or mechanically by a metallic paddle with a complex shape and large dimensions relatively to the size of the chamber.

The electromagnetic environment created by the mode-stirring is **statistically isotropic and homogeneous** (as defined by the standards) over a full rotation of the stirrer.

As a multi-mode resonant cavity, MSRC allows to obtain **high field strength**.

MAIN FEATURES

Reverberation chambers make it possible to operate **immunity and emission tests** in compliance with all international EMC standards on a wide range of frequencies (from a few MHz to 18/40 GHz).

STANDARD	BUSINESS FIELDS	SIEPEL REVERBERATION CHAMBERS
RTCA DO 160	AERONAUTICS	EOLE 80 / 200 / 400 / 1000
MIL-STD-461	MILITARY	EOLE 80 / 200 / 400 / 1000
IEC EN61000-4-21	AUTOMOTIVE	EOLE 80 / 200 / 400
IEC EN61000-4-21	CIVIL	EOLE 80 / 200 / 400

Depending on the expected performances and the frequency range of operation, the internal walls of an MSRC can be made of steel or aluminium.
Based on its know-how, extensive research and modelling as well as feedback, SIEPEL is in the only supplier capable of modelling, manufacturing the shielded room and the stirrer as well as committing on minimum guaranteed field levels.

MAIN ADVANTAGES

- **High fields** (CW or pulse modulated) can be achieved with a **reduced input power**,
- Isotropic **illumination** of EUT (**from all directions and polarizations)**.
- **Optimized investment cost** as compared with achievable fields: shielded room + stirrer (no electromagnetic absorbers),
- **The modular structure** easily allows to upgrade, dismantle, move and/or rebuild the reverberation chamber without deterioration,
- All components of the reverberation chamber are **designed and manufactured in our production site** (France), this enables us to **react swiftly**,
- **Commitment on field levels**, based on the applicable standard and the equipment under test (EUT),
- A unique mode stirrer, designed to **maximize the dimensions of the working area**,
- **Engineering capabilities for the design of the required test system** and **supply of a global offer** including antennas, amplifiers … as well as software and training.

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EMC REVERBERATION CHAMBERS

DIMENSIONS vs FREQUENCIES

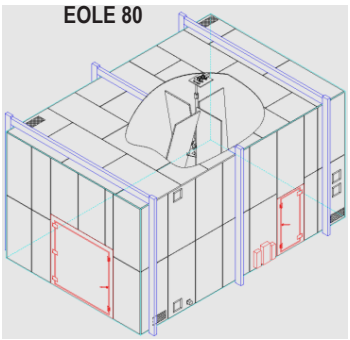
Large reverberation chambers enable to work at low frequencies while ensuring attractive minimum normalized field levels.
Small reverberation chambers are used in full compliance at high frequencies with the highest normalized field levels.
The choice of reverberation chamber will therefore be a trade-off between three main criteria:

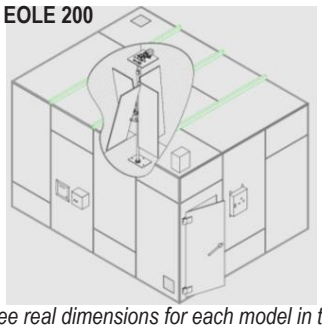
- The Equipment under test (EUT) dimensions,
- Frequency range of operation,
- Power level available and field strength required.

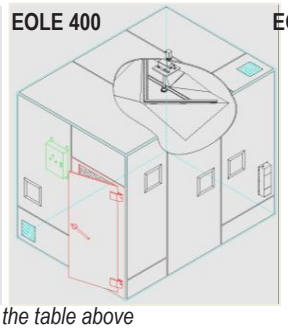
Current standard models of reverberation chambers are characterized by their lowest usable frequency (LUF)

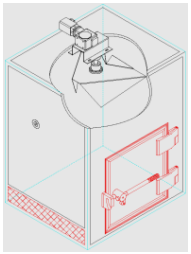
	SIEPEL STANDARD MODELS*			
	EOLE 80	**EOLE 200**	**EOLE 400**	**EOLE 1000**
Lowest Usable Frequency (LUF)	≥ 80 MHz	≥ 200 MHz	≥ 400 MHz	≥ 1000 MHz
Working volume	13.45 x 10.83 x 6.56 ft 4.10 x 3.30 x 2.00 m	8.92 x 5.54 x 6.92 ft 2.72 x 1.69 x 2.11 m	8.73 x 4.1 x 4.46 ft 2.66 x 1.25 x 1.36 m	2.36 x 1.84 x 1.31 ft 0.72 x 0.56 x 0.40 m
External dimensions (incl. stiffeners)	31.2 x 22.31 x 17.71 ft 9.51 x 6.80 x 5.40 m	16 x 12.34 x 10.6 ft 4.88 x 3.76 x 3.23 m	11.32 x 8.27 x 9.5 ft 3.45 x 2.52 x 2.90 m	3.35 x 2.82 x 4.2 ft 1.02 x 0.86 x 1.28 m
Internal dimensions	9.30 x 6.10 x 4.96 m	4.84 x 3.72 x 3.11 m	3.41 x 2.48 x 2.86 m	0.98 x 0.82 x 1.24 m

***Customized models available upon request** (for larger EUT size, other LUF …)









See real dimensions for each model in the table above

EMC REVERBERATION CHAMBERS

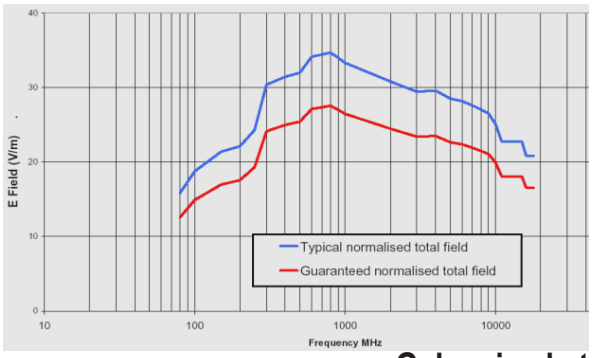
NORMALIZED FIELDS

Following normalized E fields are achievable with 1 watt input power.
These values have to be considered for an empty chamber: coaxial or waveguide loss not included

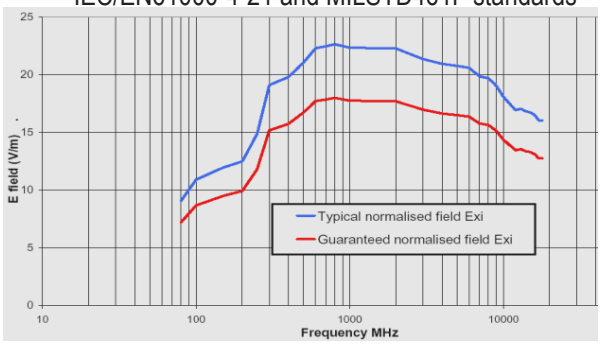
Galvanized steel EOLE 80

According to:

DO160 standard



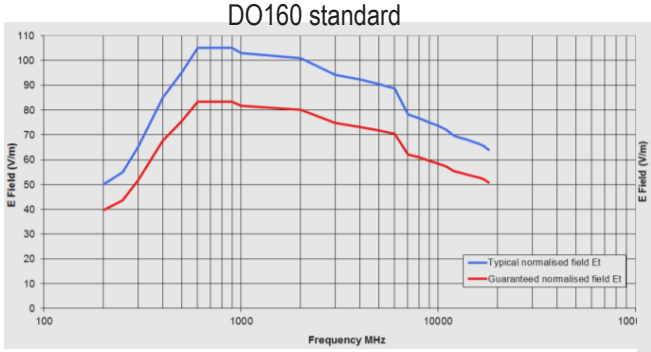
IEC/EN61000-4-21 and MILSTD461F standards



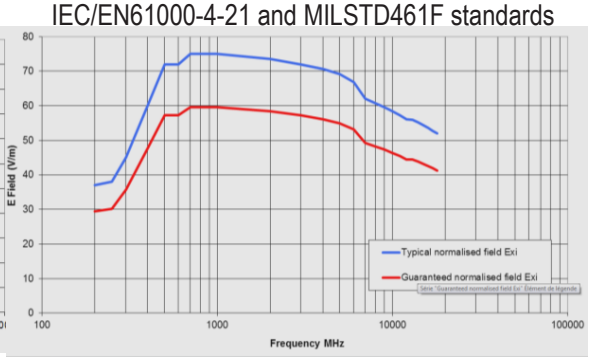
Galvanized steel EOLE 200

According to:

DO160 standard



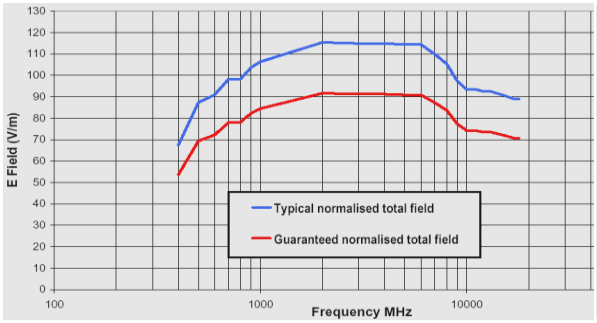
IEC/EN61000-4-21 and MILSTD461F standards



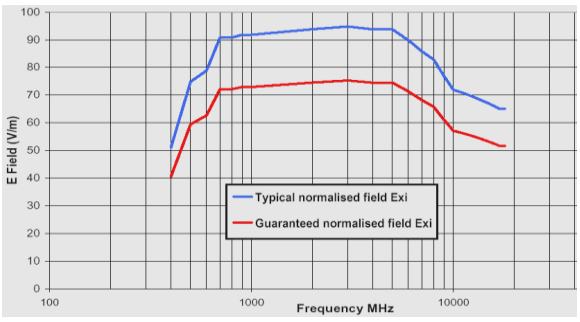
Aluminium EOLE 400

According to:

DO160 standard



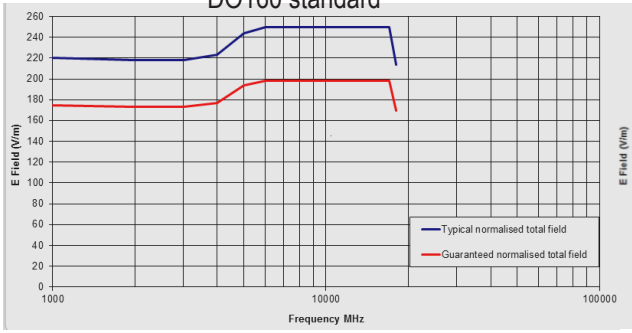
IEC/EN61000-4-21 and MILSTD461F standards



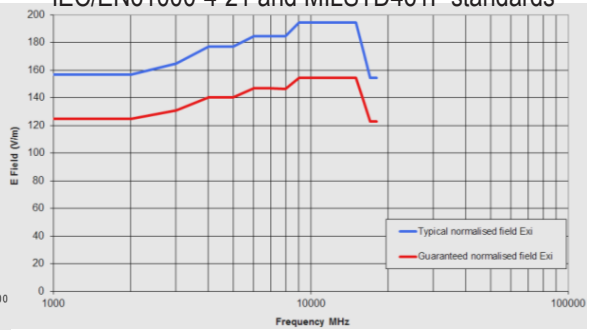
Aluminium EOLE 1000

According to:

DO160 standard



IEC/EN61000-4-21 and MILSTD461F standards



EMC REVERBERATION CHAMBERS

TURNKEY SYSTEM

SIEPEL provides complete test system inclusive of Reverb Chamber, software, RF instrumentation (amplifiers, antennas …), on-site set-up and user training.

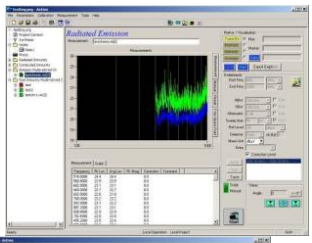
Based on the customer inputs (applicable standard, LUF, EUT dimensions, available instrumentation), SIEPEL can define the **test facility as a whole** and **determine the required output power of the amplifiers**, taking into account the losses from coaxial cables, harmonic filters, etc.

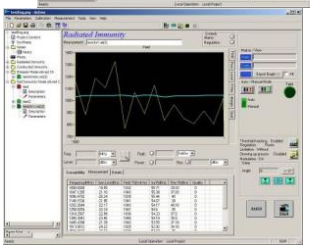
MEASUREMENT SOFTWARE

The key element when performing EMC tests in Reverb Chamber is the use of a **proper software package**.
SIEPEL offers the most user-friendly, comprehensive solution, which has been approved and used by many international labs. It integrates various modules that enable, among other, to perform following tests:

- **Radiated immunity measurements** in reverb chamber (EMS/CHR)
- **Emission measurements** in reverb chamber (EMI)

This software allows to carry out full-compliance measurements in reverb chambers according to EN61000-4-21, RTCA DO 160, MIL STD standards as well as for custom applications.





If you need further information about Reverb Chambers, please do not hesitate to ask for your personal copy of our **"Mode-Stirred Reverberation Chambers reference guide"**
"Everything you ever wanted to know about reverberation chambers but never dared to ask!"

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

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