CASE STUDY EUROFINS MET LABS, UNITED STATES

Eurofins MET Labs is a trusted provider of product testing, inspection and certification services for electrical, electronics and industrial markets. With over 60 years of experience, Eurofins MET Labs offers a comprehensive range of regulatory compliance services including (but not limited to) product safety certification, electromagnetic compatibility (EMC), environmental simulation, radio and wireless approvals, global market access and on-site field evaluation. To expand their test capabilities, ETS-Lindgren designed and installed a turn-key SMART™ 80 (Statistical Mode Averaging Reverberation Test-Site) chamber. SMART chambers feature a superb electromagnetic environment (EME). Compared to other test methods, SMART chambers are lower cost, have higher field-to-input power ratios, and accept large test objects/systems in comparison to anechoic chambers of similar size. With the SMART 80 chamber, Eurofins MET Labs now offers radiated immunity testing to meet many industry standards, quickly and efficiently.

SMART 80 Chamber Overview

The chamber operates by using its interior surfaces to reflect internally radiated RF fields. Using statistical theory, the field measured at one point can be used to predict the maximum field at any other position. ETS-Lindgren's tuner design ensures fast settling times and maximum throughput during mode tuning tests. The reverberation chamber's intrinsic homogeneity ensures high test result reproducibility while using less power than required by other test environments.

- The chamber's nominal interior dimensions are 14.0m x 6.0m x 4.5m (46 ft x 19 ft x 15 ft).
- Constructed of Series 81 modular RF shielded panels.
- Features Series 201 dual-leaf 2.4m x 2.4m (8 ft x 8 ft) manually operated RF shielded door including RCM and limit switch to accommodate an immunity interlock. The wide doorway allows easy access for large test items, such as full vehicles.
- The chamber is used for both full and pre-compliance testing, including (to name a few):
  - MIL-STD-461E/F
  - SAE J1113-4
  - IEC 61000-4-21
  - RTCA DO-160E/F/G from 80 MHz to 18 GHz
  - FMC 1278 - Edition 3
  - HERO Testing

Chamber Components

- Two (2) Model 6060 Z-Fold Tuners sized at 152.4cm x 152.4cm x 5.79m (60 in x 60 in x 19 ft) and 152.4cm x 152.4cm x 4.57m (60 in x 60 in x 15 ft) positioned horizontally and vertically at opposite ends of the chamber to provide the necessary stirring. The assemblies include motor bases with rotational speeds from 1 to 16 RPM. Key features include robust and lightweight construction, short settling time, cross section based on lowest operating frequency, as well as a synchronous motor for precise control for tuned and stirred mode operation.
- Model 2090 Multi-Device Positioning Controller allows the user to synchronize simultaneous, yet independent, movement of two primary

devices in either manual or remote GPIB modes while controlling the on/off operation. Fiber optic control lines eliminate extraneous RF interference that can normally be conducted through signal cables.

- The transmit and receive antennas installed cover the full 80 MHz to 18 GHz frequency range. These consist of a log periodic antenna (80 MHz to 2 GHz) and double-ridged waveguide horn antenna (1 GHz to 18 GHz).
- Model 4-TR Tripod – Adjustable center post from 0.9m (37 in) to 2m (80 in) with a maximum payload of 11.8kg (26 lb).
- Waveguide air vents, 30.5cm x 61.0cm (12 in x 24 in) located in the chamber ceiling.
- Dual-line UL listed 2x30 amp 50/60 Hz power line filters with a threaded brass ground stud.
- Corner light fixtures with 2x100W Halogen floodlights.
- Connector panel at 15.2cm x 61.0cm (6 in x 24 in) with N-type, FSMA connectors.
- Threaded brass pipe penetrations, 5.1cm (2 in), with flange nuts and caps.
- A 0.3cm (1/8 in) thick dielectric floor underlay with a 6 mil polyethylene vapor barrier.

Automated EMC Test Software

ETS-Lindgren provided its popular Total Integrated Lab Environment (TILE!™) 7.0 software for performing the automated tests required for Eurofins MET Labs customers. TILE!'s unique visual interface offers the necessary environment to create test profiles, eliminating the need for additional programming. Ready-to-use profiles are created in a Microsoft Windows 10 environment with drag and drop simplicity for testing to international test regulations. These include IEC, FCC, SAE and other test standards for radiated emissions and immunity, as well as conducted emissions and immunity. With over 1,600 drivers available for TILE! 7.0, it supports a wide variety of test instrumentation by leading manufacturers. TILE! also supports GPIB, Ethernet, USB and serial instrument communications.

Shielding Performance

The chamber was constructed using Series 81 Shielding which offers time-proven design with over 10,000 installations worldwide. The self-supported enclosure consists of shielded modular panel sections that are assembled with a clamping system, providing uniform and consistent pressure contact against the shielded panel mating surfaces. Additionally, the Series 81 chamber can be converted into a ferrite-lined and/or conventional absorber-lined anechoic chamber should test needs change in the future. A flexible shielding solution, Series 81 Shielding delivers high performance attenuation over a broad frequency range:

- Magnetic Field:
  - 20 dB @ 1 kHz
  - 56 dB @ 10 kHz
  - 100 dB @ 150 kHz
- Electric Field:
  100 dB from 150 kHz to 50 MHz
- Plane Wave:
  100 dB from 50 MHz to 1 GHz
- Microwave:
  100 dB @ 10 GHz

About ETS-Lindgren

ETS-Lindgren is an international manufacturer of components and systems that measure, shield, and control electromagnetic and acoustic energy. The company's products are used for electromagnetic compatibility (EMC), microwave and wireless testing, electromagnetic field (EMF) measurement, radio frequency (RF) personal safety monitoring, magnetic resonance imaging (MRI), and control of acoustic environments.

Headquartered in Cedar Park, Texas, ETS-Lindgren has manufacturing facilities in North America, Europe and Asia. Additional information about ETS-Lindgren is available at ets-lindgren.com.

Additional information about ETS-Lindgren's parent company ESCO and its subsidiaries is available at escotechnologies.com.

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