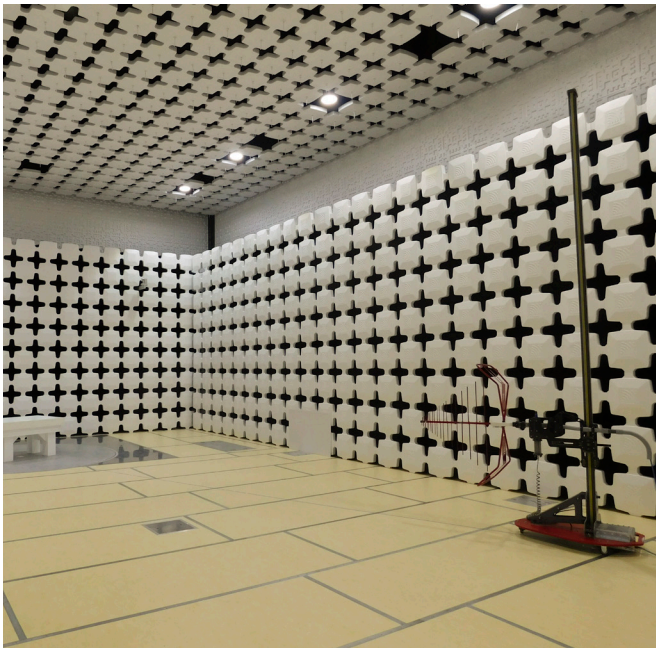
CASE STUDY TÜV RHEINLAND- VIETNAM



New EMC Test System for TÜV Rheinland in Vietnam

TÜV Rheinland in Vietnam was eager to expand their test capabilities to include an environment that supported full certification testing per ANSI C63.4, FCC Part 15 (30 MHz to 40 GHz); CISPR 16-1-4, 22 and 24; ETSI 300 328 and 301 893; as well as the IEC 61000-4 series of EMC test standards. In response, ETS-Lindgren provided a FACT™ 10-3.0 Premium EMC Chamber as the focal point of a new EMC Test System. Now, TUV Rheinland can meet the increased test demands of their customers.

EMC Test System

The system includes one 10 meter semi-anechoic chamber (SAC), with a dedicated shielded control room, one additional shielded room, and one pulse room (non-shielded). The system is designed to perform fully-compliant commercial emission and immunity EMC testing and radiated spurious emission measurements.

Technical Specifications
Semi-Anechoic 10 Meter Chamber

- The RF enclosure is constructed of Series 81 RF shielded panels; the interior shield dimensions are approximately 19.4m (63 ft) x 11.6m (38 ft) x 8.5m (28 ft).
- The personnel door provided is a single-leaf 1.2m (4 ft) x 2.0m (6 ft) fully automatic pneumatic sliding RF shielded door. It includes a micro switch and mechanical ramp (lift) system with a 500 kg (1,102 lbs) load rating for flush chamber access.
- The equipment door is a EuroShield® 2.4m x 2.4m fully automatic pneumatic sliding RF shielded door. It includes a micro switch and automatic ramp (lift) system with a 2,000 kg (4,409 lbs) load rating for flush chamber access.
- The turntable is 4m (13 ft) in diameter with a 4,000 kg (8,800 lbs) distributed load rating.
- All components such as RF filters, antennas, masts, CCTV, waveguide air vents, fire protection, and instrumentation were provided for a complete, turn-key system.

Anechoic Absorber

- Full coverage was provided with ferrite panels on sidewalls, transmit wall, receive wall, and ceiling.
- Partial coverage was provided with 150cm (59 in) hybrid FerroSorb™, Model FAA-1500H, on the transmit wall and receive wall and 150cm (59 in) on sidewalls.
- Full coverage was provided with 150cm (59 in) hybrid FerroSorb, Model FAA-1500H, on the ceiling.
- Sixteen (16) pieces of removable hybrid FlexSorb™ (including bottoms) absorber (includes Models FT-1500 and FAA-300) was provided on floor carts for immunity testing.
- Per CISPR 16-1-4 sVSWR testing, 17 pieces of removable 30.5 cm (12 in) FlexSorb pyramidal microwave absorber was placed in front of the quiet zone and two rolling wooden platforms with integrated casters were provided.

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Emission Measurement System

- The EMI part of the system is designed to make measurements per the CISPR 22 test guidelines and standards, and FCC Part 15, Subpart B. Radiated emission measurements are performed in the frequency range of 30 MHz to 40 GHz, and conducted emission measurements are performed in the frequency range of 150 kHz to 30 MHz.

Immunity Measurement System

- The radiated susceptibility part of the system is designed to meet IEC 61000-4-3 requirements for 10 V/m field with 80% AM with uniformity areas of 1.5m x 1.5m (5 ft x 5 ft) from 80 MHz to 1 GHz with Model 3143B BiConiLog™ antenna, and 1.5m x 1.5 m (5 ft x 5 ft) from 1 GHz to 2.7 GHz with Model 3119 double-ridged waveguide horn antenna.

Radiated Spurious Emission System

- Radiated spurious emission measurements are performed in the frequency range of 30 MHz to 40 GHz per ETSI EN test guidelines.

Performance Testing

Chamber performance was guaranteed and documented to meet the following industry standards:

- An RF shielding verification test was performed in general accordance with the test methods of MIL-STD-285/ IEEE-299 at 100 MHz, 400 MHz and 1 GHz in the plane wave field.

Note: The shielding performance was guaranteed prior to the installation of system components such as the antenna, RF cabling, etc.

- A Normalized Site Attenuation (NSA) test was performed for one 3 m (10 ft) range and one 10m (33 ft) range per ANSI C63.4 from 30 MHz to 1 GHz.
- Field Uniformity calibration was conducted per IEC 61000-4-3 from 80 MHz to 3 GHz.
- A site VSWR test was performed per CISPR 16-1-4 from 1 to 18 GHz at the 3 m (10 ft) range.

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

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