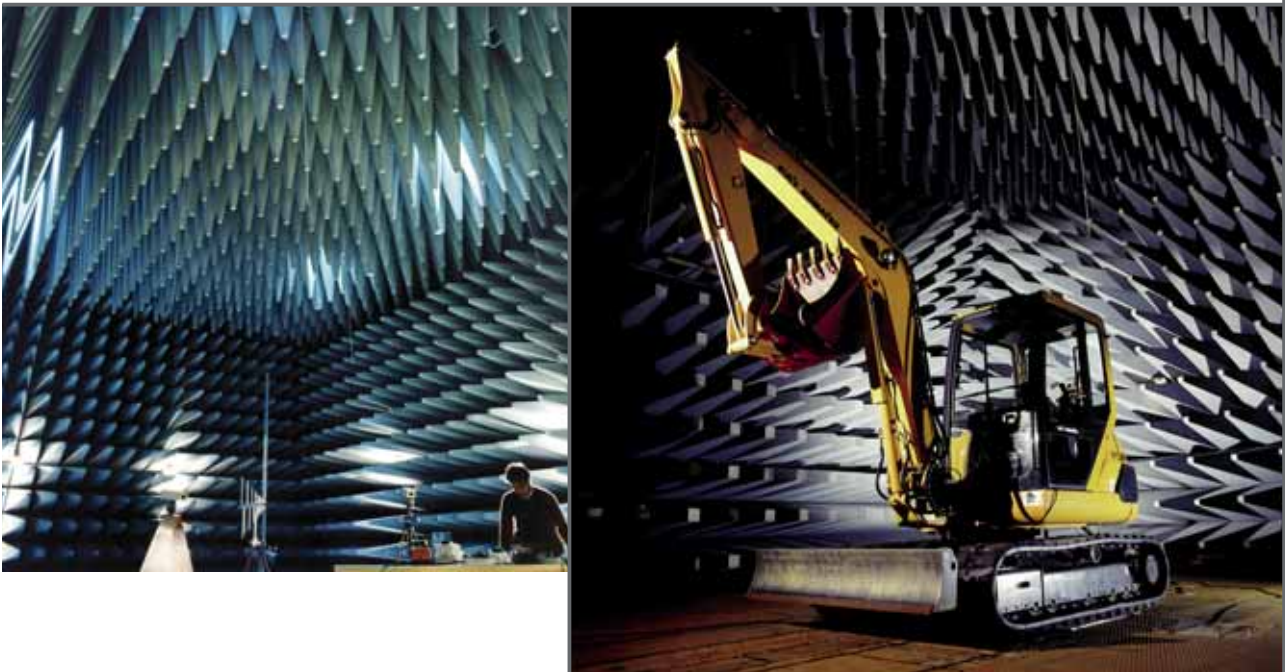


40 Years of experience in EMC testing

Your reference laboratory for tests of **generation, propagation and reception** of electromagnetic energy in **civil, military and industrial** applications.

CESI has been working in the electromagnetic compatibility field (EMC) for many years and employs a staff of more than 25 specialists in the testing and consulting to the design of electronic equipment. CESI laboratories carry out tests according to the major international and national standards such as MIL, CISPR, IEC, CENELEC, VDE and CEI and in compliance with what is set forth in special specifications of procurers.

The experience acquired by working in the avionics (civil and military), aerospace, electric, domestic, information technology, telecommunications, transportation (public and private) and industrial automation sectors allows CESI to efficiently solve the electromagnetic compatibility problems which the industry and users have to face.



CESI is worldwide leader in Testing and Certification of electromechanical components; test certificates and report by CESI are internationally recognized by utilities and electromechanical manufacturers. CESI is a well-recognized Certification Body according to EN45011 and performs Inspections according to ISO/IEC 17020 Standard. CESI, and the subsidiaries IPH and FGH are all accredited in compliance with ISO/IEC 17025.

CESI

Trust the Power of Experience

Testing • Consulting • Engineering • Environment

CESI has been involved in EMC activity for almost 40 years, the first semi-anechoic chamber was built in 1987 for military applications on radiated emission, radiated immunity and radiated power. A set of different test benches covers the whole test requirements and with this facility CESI has supported the military industry, e.g. testing the equipment for the Euro Fighter project. Many devices and subsystems of the most famous European space programs have been tested in our facility like ERS1 GLOBALSTAR, ISO and TSS. In 1992 a second facility was added, where tests on devices for civil and industrial applications, like information technology device, Uninterrupted Power Supply system etc., are performed. Many activities have been done for the automotive sector too, in fact due to a large rotating table it's possible to perform tests on systems like big trucks, buses and earth moving machinery. In 2001 a test facility for indirect lighting effect was introduced to increase the offer on avionic field.

CESI offers a complete range of services, such as:

- Drafting of equipment and system specifications;
- Drafting of test plans and procedures;
- Equipment development tests and related design support;
- Qualification tests;
- Field measurements of electromagnetic disturbances;
- Identification of the sources of the disturbance and assistance in solving the electromagnetic non-compatibility situations in industrial plants;
- Inspection to electromagnetic compatibility tests at manufacturer locations;
- Issue of attestations of conformity to the EC EMC Directive 2004/108 CE.

To meet the increasing demand for electromagnetic compatibility tests, CESI has installed laboratories with the most technologically advanced equipment to meet any and all testing requirements.

Main reference standards

- RTCA DO 160-A/B/C/D/E/F/G;
- MIL-STD 461, 462, 463;
- EN 61000-4-2/3/4/5/6/7/8/9/10/11/12/13 (and the relevant correspondent Standards EN 61000-X-Y and CEI 110, CEI 210);
- CISPR 11, 13, 14, 15, 20, 22 (and relevant correspondent Standards EN 550XX and CEI 110);
- CISPR 12, CISPR 16-1;
- EN61000-6-1, EN61000-6-2, EN61000-6-3, EN61000-6-4;
- VDE 872, 875, 876, 877, 878;
- OIML R76-1, R 117, R 118;
- ENEL (R EMC 01, R EMC 02).

Radiated Emission Tests

- 10 kHz ÷ 18 GHz 1-3-10 m distance from the receiving antenna;
- 18 GHz ÷ 40 GHz 1-3 m distance from the receiving antenna;
- Computer controlled test measurements and automatic analysis of the signals;
- Automatic printing of test results and out-of-limits both in graphic and in tabular form.

Conducted Emission Tests

- Frequency range: 20 Hz ÷ 1 GHz;
- Harmonic distortion measurements at power frequency;
- Computer controlled test measurements and automatic analysis of the signal;
- Automatic printing of test results and out-of-limits both in graphic and in tabular form.

Radiated Susceptibility Tests

- Electric field measured at 1 m from the radiating antenna:
 - 10 kHz ÷ 40 MHz: 30 ÷ 100 V/m;
 - 40 MHz ÷ 40 GHz: 100 ÷ 200 V/m;
- Electric field measured at 3 m from the radiating antenna:
 - 10 kHz ÷ 2 GHz: > 100 V/m;
- Computer controlled test measurements and automatic identification of susceptibility threshold;
- Automatic printing of susceptibility threshold both in graphic and in tabular form.

Electromagnetic Field Immunity Tests

- Power frequency magnetic field;
- Pulse field: 8/20 μ s current wave form;
- Damped oscillatory field: frequency 100 kHz and 1 MHz.

Conducted Susceptibility Tests – Frequency Domain

- Frequency range: 0.1 Hz \div 1 GHz:
 - automatic test execution;
 - fast transient pulses testing capability;
- Harmonic diffusion;
- Computer controlled test measurement and automatic identification of susceptibility threshold;
- Automatic printing of susceptibility threshold both in graphic and in tabular form.

Bulk Current injection susceptibility tests

- Frequency range: 30 kHz \div 400 MHz;
- Computer controlled test measurement and automatic identification of susceptibility threshold;
- Automatic printing of susceptibility threshold both in graphic and in tabular form.

Conducted Susceptibility Tests – Time Domain

- Double exponential pulses generation (spikes):
 - duration: 10 μ s – 5 μ s – 0.15 μ s;
 - 1.2/50 μ s voltage surge;
 - 8/20 μ s current surge;
- Damped sinewaves:
 - frequency range: 100 kHz \div 30 MHz;
- Fast transient: 5/50 ns (burst);
- Ring wave: 0.5 μ s/100 kHz;
- Voltage dips and short interruptions on power lines.

Insulation Tests

Indirect Lighting Tests

The EMC Laboratory by CESI has extended its offer for testing the indirect effects of lightning and is able to perform the following tests:

- Tests according to RTCA DO160 sec. 22:
 - Waveform 1;
 - Waveform 2;
 - Waveform 3;
 - Waveform 4;
 - Waveform 5A and 5B;
 - Multiple burst;
 - Multiple stroke;
- Check on the “transient level”:
 - Waveform A;
 - Waveform H;
- On-site Tests on Demand.

The testing equipment and the coupling devices are supplied by EMC PARTNER.

Testing facilities

Semi-anechoic chamber 3 m/40 GHz

Test chamber

- Size: 14x10x5 m;
- Main door: 4x4 m;
- Anechoic absorbers:
 - ceiling ferrite tiles/absorbers elements (5 and 50 cm long);
 - walls: ferrite tiles/absorbers elements (50 and 200 cm long);
- Electric field attenuation: >100 dB up to 40 GHz;
- Magnetic field attenuation: > 65 dB up to 1 MHz;
- Normalised Site Attenuation: < ± 4 dB in respect of theoretic one from 30 MHz to 1 GHz;
- Field uniformity: < 6 dB in complete compliance with standards EN 61000-4-3 and IEC 1000-4-3;
- Antenna type: automatic for measurements of between 1 and 4 m with horizontal and vertical polarisation;
- Turntable:
 - diameter: 2 m;
 - max. loading capability: 1,000 kg;
- Emissions measuring system: automatic;
- Immunity testing system: automatic.

Shielded control chamber

- Actual size: 10x5x3x m;
- Electric field attenuation: > 100 dB to 10 GHz;
- Magnetic field attenuation: > 52 dB to 1 MHz.

General utilities

- Power outlets (100 dB filtered from 14 kHz to 10 GHz):
 - 220 V single phase – 50 Hz – 22 kVA;
 - 380 V three-phase – 50 Hz – 66 kVA;
 - 115/208 V three-phase – 400 Hz – 40 kVA;
 - 0 ÷ 160 V dc – 25 kW;
- 3 TVCC systems with pan/zoom/tilt;
- Intercommunication system;
- Air conditioning in test and control chambers;
- Smoke and/or discharge gas elimination system;
- Fire detection and extinguishing system.

Semi-anechoic chamber 10 m

Test chamber

- Dimensions: 23x16x12 m;
- Working height: 9.5 m;
- Main access door: 3.7 x 4.2 m;
- Floor load capability: 2,500 ÷ 5,000 kg/m²;
- Absorbers: (walls and ceiling) 244 cm long – arrangement for absorber installation under the floor;
- Electric field attenuation: > 105 dB up to 10 GHz;
- Magnetic field attenuation: > 74 dB up to 1 MHz;
- Normalized site attenuation: < ± 4 dB in respect with the theoretic one from 30 MHz to 1 GHz;
- Field uniformity: 0 ÷ 6 dB from 20 MHz to 1 GHz;
- Turntable:
 - diameter: 7.3 m;
 - loading capability: > 15 t;
 - control: manual/automatic;
- Rolls (for vehicles):
 - length: 850 mm;
 - gauge: 700 mm ÷ 2,400 mm;
 - maximum load: 5,000 kg;
 - adjustable wheelbase: 1,300 ÷ 2,750 mm;
 - roll distance: 400 ÷ 600 mm;
 - arrangement for installation of another rolls set;
- Monitoring and control systems:
 - 8-channel optic fibre transmission system:
 - frequency range dc ÷ 100 kHz;
 - maximum input voltage: 100 V;

- electro-pneumatic control system:
 - N. 3 channels for control of brakers, accelerator and clutch;
 - N. 6 on/off command channels;
 - system for ABS operation verification;
- Antenna system and turntable computer controlled.

Services and control shielded chambers

- Dimensions:
 - control chamber: 5x5x3 m;
 - client apparatus storage chamber: 5x4.5x3.0 m;
 - amplifier chamber: 5x3.5x3.0 m;
- Electric field attenuation: > 105 dB up to 10 GHz;
- Magnetic field attenuation: > 78 dB up to 1 MHz.

General Utilities

- Power outlets (> 105 dB from 14 kHz to 10 GHz):
 - 220 V single phase – 50 Hz – 22 kVA;
 - 380 V three-phase – 50 Hz – 66 kVA;
 - 115/208 V three-phase – 400 Hz – 40 kVA;
 - 0 ÷ 160 V dc – 25 kW;
- 3 TVCC systems with pan/zoom/tilt;
- Intercommunication system;
- Air conditioning in test, services and control chambers;
- Smoke and/or discharge gas elimination system.

Industrial shielded chambers

Chamber 1

- Dimensions: 8x6x3 m;
- Main access door: 2x2.50 m;
- Floor load capability: 5,000 kg/m²;
- Electric field attenuation: > 120 dB up to 10 GHz;
- Magnetic field attenuation: > 60 dB up to 1 MHz.

Chamber 2

- Dimensions: 10.7x5x3 m;
- Main access door: 2x2.80 m;
- Floor load capability: 2,000 kg/m²;
- Electric field attenuation: > 120 dB up to 10 GHz;
- Magnetic field attenuation: > 70 dB up to 1 MHz.

Chamber 3

- Dimensions: 5x5x3 m;
- Main access door: 2x2.80 m;
- Floor load capability: 2,000 kg/m²;
- Electric field attenuation: > 120 dB up to 10 GHz;
- Magnetic field attenuation: > 70 dB up to 1 MHz.



CESI's Business Areas:

- **Testing, Inspection and Certification** services for HV, MV and LV electrical components;
- **Engineering and Consulting** services for power systems and markets, transmission and distribution grids, generation plants, renewable and hydro plants;
- **Environmental Consulting and Structural Engineering** services for Energy, T&D, Industry and Transport sectors;
- Production of **Solar Cells** for Space and Terrestrial (CPV) applications.

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