Systems and Projects

EMC Centre of Belcomlab, Ostend

ROHDE&SCHWARZ

The EMC Centre of Belcomlab at Ostend, Belgium is capable of testing and certifying a diversity of products which have to comply to the European EMC Directive.

Belcomlab carefully analysed the EMC directive and the applicable standards, and defined the configuration of the infrastructure and test systems in order to fulfil the requirements of present and future customers.

At the moment, Belcomlab is able to test according to the following standards :
EN60555-2 & 3, EN55011, EN55014, EN55022, EN50081-1&2, EN50082-1&2, IEC1000-4-2/3/4/5/6/8/11, CISPR14-2, CISPR24, and similar other standards.

The anechoic chamber has been designed to be usable for immunity as well as for emission measurements. With respect to the existing building, a compact diagnostic chamber has been chosen, allowing full compliance radiated immunity tests, and emission tests with reduced antenna scan height.

RFI Emission Tests

Conducted Emission

These tests are done on a wooden table, by connecting the EUT to a single phase LISN ESH3-Z5, or triple phase LISN ESH2-Z5. The ESMI measures the RFI Voltage.
For measurements of RFI Power or shielding effectiveness, an **absorbing clamp MDS21** is placed on the **automatic clamp rail HCA**, controlled by a **HCC**.
All emission measurements are automated by the **EMI Software ES-K1**.

Radiated Emission

The EUT is prescanned in the anechoic chamber with **an EMI Test Receiver ESMI**. It covers the frequency range from 100 Hz to 26.5GHz. The floor of the anechoic chamber is reflective, and antenna scanning is possible between 1 and 2.5m height. In combination with **the EMI Software ES-K1**, fast preview tests can be done in order to determine the critical frequencies on which the interference is doubtful. On these frequencies, further analysis can be done by the ESMI, and if necessary, in depth radiated EMI measurements are done on the **Open Area Test Site (OATS)**. On this groundplane of 6x20m, full compliance EMI measurements can be performed at 3 or 10m distance. **The EMI Test Receiver ESS** measures the fieldstrength of the EUT via a **Bilog antenna CBL6111** mounted on **an automatic mast HCM**. The EUT is placed on the **integrated metallic turntable HCT**. The test equipment is located in a wooden measurement shed, located outside the CISPR ellipse. Special care has been taken to minimise cable losses and to offer maximum flexibility for the future. Magnetic fieldstrength can be measured by using the **active loop antenna HFH2-Z2**, or by the **triple loop antenna system HM020** (Bergervoet-Van Veen).

Fieldstrength measurements above 1 GHz are possible by using the substitution method, **two log.-periodic antennas HL025**, of which one has a built-in microwave preamplifier.

RFI Immunity Tests

Radiated and Conducted Immunity

By placing absorbers on the floor of the anechoic chamber, a homogeneous field can be generated acc. ENV50140.

The **test system TS9982** consists of a signal generator SMT, followed by two power amplifiers.
A **200W amplifier** from 80 to 1000MHz drives a log.-periodic antenna generating (modulated) fields up to 17V/m at 3m distance. For minimum cable attenuation between amplifier and transmitting antenna, the power amplifier is placed outside the shielded enclosure, which also contributes to the heat dissipation.
The **150W amplifier** from 10kHz to 230MHz is used for conducted immunity tests with **different CDNs and injection clamps**. The conducted tests are done on a wooden table with metallic surface. Both power amplifiers are followed by directional couplers for the measurement and control of the output power. The RF power (normal and Peak-Envelope-Power) is measured by the **dual channel power meter URV5**.
The amplifiers, signal paths and power control units are automatically switched by the **System Control Interface Unit SCIU**.

During the illumination of the EUT, a **colour camera system** monitors the EUT.

Transient Immunity Tests

An **ESD simulator** allows electrostatic air discharges up to 18kV, and contact (relay) discharges up to 8kV.

A **Burst generator** generates electric Fast Transients. These bursts are coupled into the EUT via CDNs, or via a **capacitive coupling clamp**.

Surge pulses are produced by two different generators, depending on the pulse type: **the Voltage Current Source** takes care of the 1.2/50µs open circuit and 8/20µs short circuit pulses, whereas **the Telecom Surge Simulator** is generating the so-called CCITT pulses (10/700µs).

For optimum flexibility, all pulse generators are connected to a **coupling matrix**, which allows injection into three-phase powered EUTs.

The test system is integrated into a **19" rack** with special earthing concept.

LF Harmonics & Flicker Tests

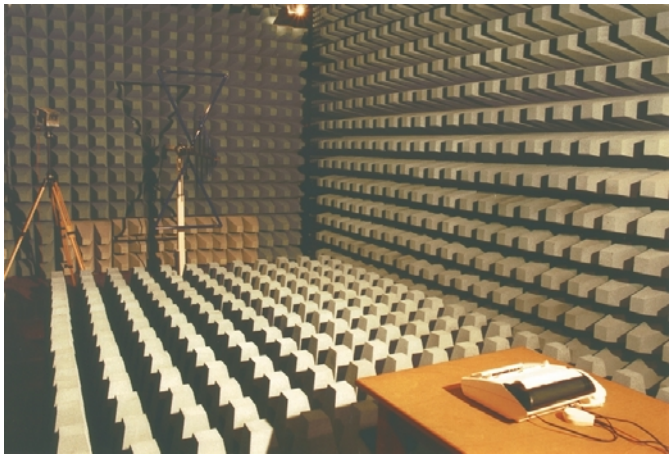
For measurements on the 50Hz power supply line, the standards EN60555-2&3 are applicable. Harmonics are measured by using a **real-time Harmonic Analyser**, which measures the harmonics across a shunt resistance. The AC source consists of **a Variable Oscillator** followed by **a 5000VA Power Amplifier**.
Flicker is measured by means of a **Flickermeter**, which analyses the AC voltage supply to the EUT via a **LISN** (complex impedance).

Since the test system is built up around a variable source with power amplifier, these components can also be used for tests according to :

- IEC1000-4-8 : magnetic immunity,
- IEC1000-4-11 : Voltage dips, variations and interruptions.

The magnetic immunity test requires a **Helmholtz coil** in which the EUT is placed. Fieldstrengths of up to 100A/m can be generated in any of the three axes of the coil (triaxial version)

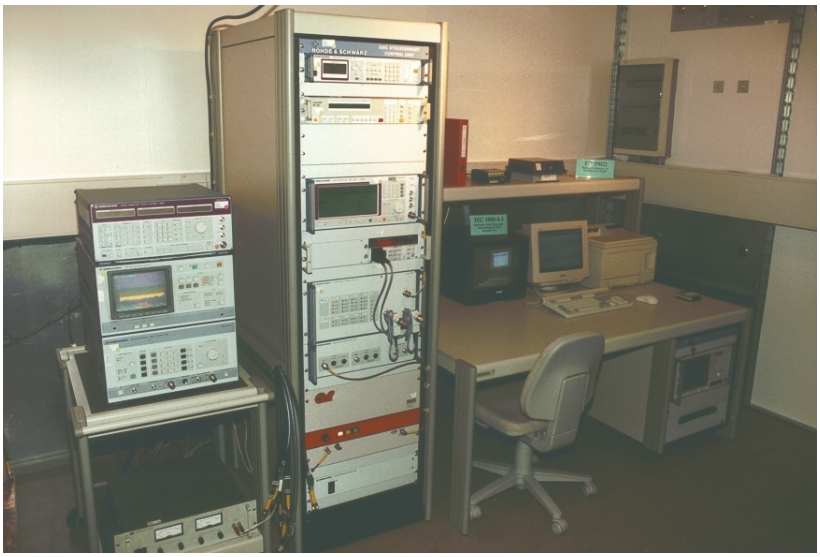
All different tests are done fully automatically using special system software.



System configurations

Adjacent to the anechoic chamber, a shielded control room houses the test systems, which are integrated in 19" racks. The RF and control cabling goes directly from the rack to the connection points via the double floor and the required RF Filters.
Only the best quality of **RF cables** and connections is a guarantee for accurate and repeatable EMC measurements. Therefore the cable sets are very low loss (to obtain maximum sensitivity) and have a high shielding (to avoid interference between the measurement signals and test set-up). They are calibrated by the test systems and their correction values are taken into account by the software.

The fixed measurement equipment is placed in a **19" Rack**, with ventilation, power supply control, slides, etc... A convenient **workbench** is available for the control of the measurement system in which the process controller PSM is integrated.



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