

This special ESD edition of the HAEFELY EMC newsletter is particularly focused on ESD testing, following the release of the new edition 2 of IEC61000-4-2.

We will have a closer look at the effects the new standard has on ESD simulators and ESD testing, along with news on brand new products meeting the latest testing requirements and trends.



The new IEC 61000-4-2 Edition 2 standard which replaces IEC 61000-4-2 Edition 1 1995 was initially announced in December 2008.

Based on the revised IEC standard, the identical European standard EN 61000-4-2:2009 was also released.

The new EN standard can already be applied for ESD immunity testing, and testing according to the new standard will be mandatory starting 1st of March 2012.

The page 2 article focuses on the effects the new standard has on ESD simulators and the corresponding calibration procedures of such generators.

To download the latest IEC standard go to www.iec.ch



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EFFECTS OF THE NEW STANDARD ON ESD SIMULATORS.

The new EN standard can already be applied for ESD immunity testing, and testing according to the new standard will be mandatory starting 1st of March 2012.

The following article focuses on the effects the new standard has on ESD simulators and the corresponding calibration procedures of such generators.

MISLEADING FIRST IMPRESSIONS.

While comparing the previous and new standard ESD simulator specifications, one may easily get the wrong impression.

The tolerance levels (table 1) along with the rise time (tr) and current peak values (Ip), are clearly higher in the new standard.

One would assume that the ESD simulator requirements would now be reduced with the new standard, something which is not actually true. On one hand, the enhanced lower tolerance limit of the rise time only takes into account the lower measurement values, which results from the increased bandwidth.

On the other hand, the new standard requires that per measurement level, 5 impulses are recorded at a time and individually evaluated.

Every single measurement (i.e. tr, Ip, I30, I60) of each impulse must meet the required tolerance levels.

It is now not permitted to use average values from several impulses, although the previous standard permitted using averaged measured values, a procedure which is often used.

The values below show the differences in Rise time, Peak value, Current at 30ns and 60ns, between IEC 61000-4-2 edition 1 and edition 2

		Edition 1	Edition 2
Rise time	tr	0,7ns–1,0ns	0,6ns–1,0ns
Peak value	Ip	±10%	±15%
Current at 30ns	I30	±30%	±30%
Current at 60ns	I60	±30%	±30%

Table 1. Permitted ESD impulse tolerances according to previous and new standard.

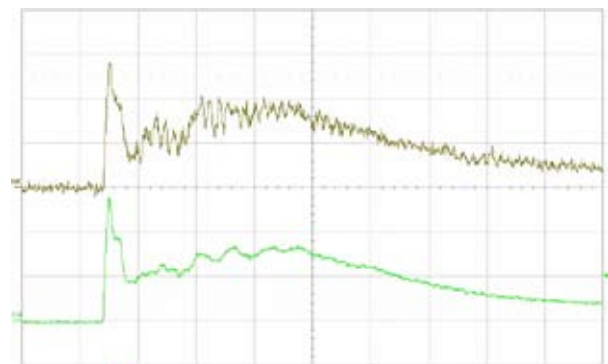
CORRECT MEASUREMENT BECOMES MORE DIFFICULT.

Previously, if random measurement errors (in terms of measurement uncertainty) occurred, it was very likely that they would not appear in the final measurement results. The reason for this is because random measurement errors were averaged.

With the new standard, random measurement errors are no longer averaged, and thus random errors will now clearly be shown in the final measurement results. An important source of random measuring error could be an insufficiently shielded measuring system.

In other words, the reason why the measured ESD impulse does not meet the standard specification could be due to the measurement system itself, and not the actual ESD simulator.

Picture 1. The possible effects of a badly shielded measurement system: non-conforming measurement (top) and correct measurement (bottom). Insufficient shielding can lead to measurement errors of ±20% magnitude or more.



HIGHER MEASUREMENT BANDWIDTH AND DEFINED TEST SETUP.

To calibrate an ESD simulator according to the new standard, the following equipment is necessary:

- Digital Oscilloscope, analogue Bandwidth $\geq 2\text{GHz}$ / Sampling rate $\geq 10\text{GS/s}$
- Measurement target, Bandwidth 4GHz / Impedance $\leq 2,1\ \Omega$
- Attenuator, 20dB typically
- Reference ground plane, dimensions $\geq 1,2\text{m} \times 1,2\text{m}$
- Suitable shielded housing for the measurement system

It is important to note that the new measurement target no longer has the $50\ \Omega$ series resistor. Therefore, the halving of the measurement voltage is no longer required.

While the amplitudes of ESD impulses remain constant, the measured voltage at the oscilloscope is doubled.

The shielded housing has to damp interference frequencies of up to GHz levels.

To go without saying, all wiring leading into the shielded housing must be filtered accordingly.

A possible data transfer should be done via fibre optics. The position of the grounding connections on the ground reference plane is now exactly defined, i.e. 0.5m vertically below the measuring target.

The position of the simulator earth cable is now also defined, something which is very important. This should not be disregarded because it influences the measurement values of I30 and I60.

CONSEQUENCES FOR ESD SIMULATORS.

Experience shows that there are significant differences between various ESD models. Because the new standard demands more from ESD simulators, it is clear that some ESD simulators will no longer be compliant to the new standard.

Testing with such non-compliant ESD simulators can lead to over-testing or under-testing of EUTs. In praxis this is not a desirable result.

A decision on whether an existing ESD simulator meets the new requirements can only be made following calibration to the latest edition of the IEC standard. When purchasing a new ESD simulator, one should ensure that the new simulator meets the exact requirements.

VERIFICATION AND CALIBRATION.

In the previous standard, the term verification and calibration was used incorrectly, while the revised standard now correctly differentiates verification from calibration.

Calibration is the exact measuring technique of the measurement values, and verification means verification of the ESD simulator.

The verification is carried out before the actual testing takes place, whereas calibration period of the ESD simulator needs to be determined by the user, and is typically every 1-2 years.

The new standard suggests that to determine whether the simulator is functioning correctly, the length of the spark should be checked during an air discharge.

However, this is an insufficient method as the length of the spark depends on the geometry of the discharging electrodes, the polarity, and the environmental conditions. Furthermore, a defective discharge relay will not be detected.

This is the reason modern ESD simulators include self test routines, which within seconds can diagnose potential defects.

It can generally be said that the new IEC/EN 61000-4-2 Edition 2 standard demands more from ESD simulators as well as from the measuring equipment used for calibrating the ESD simulator itself.

If the ESD simulator meets the standard can only be determined through proper calibration.

What's new?



ONYX

www.haefely-onyx.com

The ONYX is a state of the art electrostatic discharge simulator available in 16kV or 30kV versions. Released in 2010 and designed according to the latest standard requirements, it is clearly the most ergonomic 30kV ESD gun without an additional base control unit that can be battery or mains operated.

“the most ergonomic 30kV ESD gun without a base control unit that can be battery or mains operated.”

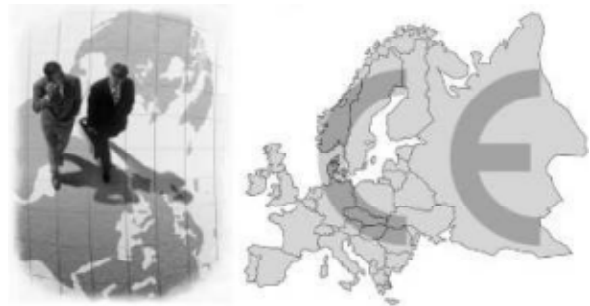
The easy to use touch screen, ergonomic design, modular RC units, multilingual interface, remote control software, built-in LED light and temperature & humidity display allows for trouble-free use of the ONYX in all types of test sites.



Picture 1. above shows the large touch screen display of the brand new ONYX ESD simulators.

FEATURES

- Ergonomic design
- Battery operation 16&30kV
- Touchscreen interface
- Meets all latest standard requirements
- Modular (exchangeable R/C network)
- Smart key function
- Automatic polarity switching
- Remote control
- Multilingual menus
- Self test / verification
- Contact discharge current flow detection



STANDARDS

- IEC/EN 61000-4-2 Edition 2 (2009)
- IEC/EN 61326
- IEC/EN 61000-6-1 & -6-2
- IEC 61340-3-1
- ISO 10605
- GMW 3097
- Ford AB/AC
- ANSI C63.16
- PSA B21 7110
- ISO 14304
- ITU-T K.20
- MIL-STD-331/-464/-750/-883/-1512/-1514/-1541/-1542
- RTCA/DO-160
- JEDEC 22-A114
- GR-78-CORE
- GR-1089-CORE

DISTINCTIVE FEATURES

Ergonomic design

The core advantage of the ONYX ESD simulators is the ergonomic design and operation. Never has 30kV ESD testing been carried out with such comfort and simplicity.

Smart Key operation

The smart key button is integrated at the upper part of the discharge trigger and has various functions which are defined by the user, enabling you to run a sequence of events according to your testing requirements, and simplify test procedures to the minimum.

The functions include user defined discharge voltages steps, sweep voltage, On/Off LED light, counter reset, polarity Switching, camera & report function.

Compliance and modularity

The design is based on the requirements of all latest international standards, including the latest IEC 61000-4-2 edition 2. R/C module values are available from 50-5000 Ohms and 50-1000pF, which enables users to fully test according to many international standards.

Contact discharge current flow detection & Self test

The unique NO CONTACT detection circuit function continuously monitors whether ESD pulses are discharged to the EUT, ensures users the test was successful and prevents incorrect test results.

The self test function is a built-in self test routine which checks the HV supply, the impulse capacitor, the HV discharge relays, and the insulation of the entire HV circuitry.

To find out more, visit www.haefely-onyx.com

ONYX



PIONEER EFFICIENCY

The most ergonomic ESD guns on the market, designed to ensure the highest level of comfort when testing, and provide outstanding performance due to the high quality design by the pioneers of EMC test equipment.

PHOTOVOLTAIC TESTING ACCORDING TO IEC61730.

There are a number of standards involved in covering various aspects of photovoltaic module testing, including: UL 1703, IEC 61215, IEC 61646, and IEC 61730.

The main standards concerning safety and construction of photovoltaic modules that focus on preventing electrical shock and fire hazards, are UL 1703 and IEC 61730.

This short article provides some useful information for the insulation test described in IEC 61730.

The main insulation test in IEC 61730 requests the verification of the capability of the solid insulation of the module to withstand over-voltages of atmospheric origin. It also covers over-voltages due to switching of low-voltage equipment.

The whole module is covered with a copper foil and an impulse voltage according to IEC 60060-1 is applied between the foils and the output terminals of the module.

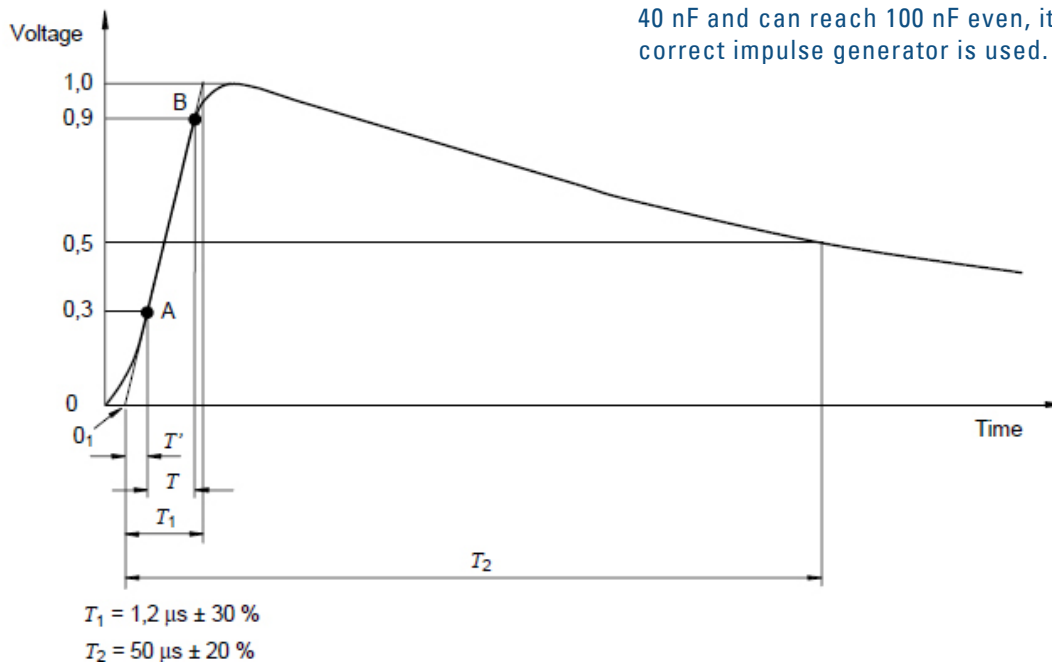


When performing such surge tests, a generator is required that supplies the 1.2/50 wave and the required voltage levels (up to 8kV). By following the simple test procedure suggested in IEC 61730, one may think that the test has been carried out successfully.

What is not clear, although many experienced test engineers are aware of, is the effect of the large capacitance of the foil covered foil. The surge generator used for such tests must have a high enough load capacitance.

When performing such insulation tests on small sized EUT, where EUT capacitance levels are low, the wave-shape (1.2/50) will most certainly remain within tolerance.

As the maximum capacity of a wrapped panel is about 40 nF and can reach 100 nF even, it is important that the correct impulse generator is used.



Picture 1. above shows the 1.2/50 wave required according to IEC 60060-1

Events

Web news



www.electropedia.org

Electropedia ("IEV Online") has been produced by the IEC, and contains all the important terms and definitions in the International Electrotechnical Vocabulary or IEV.

Considered as the world's most comprehensive online electrical and electronic terminology database containing more than 20 000 terms and definitions in English and French organized by subject area, with equivalent terms in various other languages: Arabic, Chinese, German, Italian, Japanese, Portuguese, Polish, Russian, Spanish and Swedish.

www.interferencetechnology.com

The website is the online presence of ITEM Publications. ITEM Publications has been the information source for engineering professionals dealing with interference problems-preventing EMI (electromagnetic interference) and achieving EMC (electromagnetic compatibility). Here, you'll find announcements on EMC products, a listing of professional conferences and events, breaking news on EMC issues, an inclusive directory of EMC products and services, and pragmatic tips from EMC experts, as well as their responses to specific questions. In summer 2010, ITEM will also be publishing their first European publication which will be available in most common European languages.

www.haefely-onyx.com

This mini website has been specially created by Haefely, in order to enable customers interested in the new ONYX ESD generators to have a close up look at the gun and its key features. The website further links you to our home page, the product brochure, and a contact mail address.

Exhibitions

APEMC, Asia-Pacific Symposium & Exhibition on Electromagnetic Compatibility.
Beijing, China, 12-16.04.2010
<http://www.emc-zurich.org/apemc/index.htm>

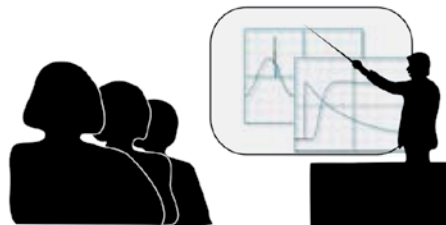
IEEE EMC 2010.
Ft. Lauderdale, Florida July 25-30
<http://www.emc2010.org>

EMC Europe.
Wroclaw, Poland, 13-17 September 2010
<http://www.emceurope.eu/2010/>

EMC UK 2010.
Newbury, UK, 12-13 October 2010
<http://www.emcuk.co.uk/>

9th China International Conference & Exhibition on electromagnetic Compatibility.
Shanghai, 2-4 November 2010
<http://www.emcexpo.com/siteengine.php?do=zh-tw/about>

11th International Conference on Electromagnetic Compatibility.
India, Bangalore, 23-26 November 2010
<http://www.semcei.org/INCEMIC/INCEMIC2010/INCEMIC2010MainPage.htm>



Seminars by Haefely EMC

Milano, Italy, April 2010: EMC testing and conducted immunity standards.

Barcelona/Madrid, Spain, TBA: EMC testing and conducted immunity standards.

for more information on seminars please contact us directly.

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