Know Your Standards

Previews of IEC and CISPR standards

The IEC web site is being redesigned, so by the time you read this, things might have changed a bit. If you go to http://webstore.iec.ch/, and search for a standard series (e.g. 61000), a Part (61000-1) or Section (61000-1-1) you can 'preview' a document by clicking on the icon in the left column of the search result page. This allows you to read the Foreword, Scope and Normative References clauses FREE of charge. In some cases, what you can read is different, because some publications don't follow the normal clause plan. Previews are not available for some old (but still current) standards.

Painting the 4th Part

We completed the review of the Sections of Part 4 of IEC 61000 last time, but standards change continuously, so we will need to re-visit in due course. Meanwhile, we have five other Parts to enjoy.

IEC 61000-1 series

The Sections of this Part are Technical Reports and Technical Specifications ('pre-standards').

IEC 61000-1-1

Electromagnetic compatibility (EMC) - Part 1: General - Section 1: Application and interpretation of fundamental definitions and terms

This dates from 1992 and is no longer useful. It should really be withdrawn.

IEC TS 61000-1-2

Electromagnetic compatibility (EMC) - Part 1-2: General - Methodology for the achievement of functional safety of electrical and electronic systems including equipment with regard to electromagnetic phenomena

This is to be converted into a standard. It is very complex, as is the whole subject of functional safety. But it can't be ignored.

IEC TR 61000-1-3

Electromagnetic compatibility (EMC) - Part 1-3: General - The effects of high-altitude EMP (HEMP) on civil equipment and systems

This is informative. Let's hope we never find out whether the information is dependable!

IEC TR 61000-1-4

Electromagnetic compatibility (EMC) - Part 1-4: General - Historical rationale for the limitation of power-frequency conducted harmonic current emissions from equipment, in the frequency range up to 2 kHz

This is an excellent document (because I wrote most of it). (;-) Its only real justification is that the requirements remain complex and controversial, so as each new generation of EMC experts challenges them, they can be directed to the rationale. They can't, of course, be made to believe it.

IEC TR 61000-1-5

Electromagnetic compatibility (EMC) - Part 1-5: General - High power electromagnetic (HPEM) effects on civil systems
This is not only about the effects of things that go bang on a large scale, but also about magnetic storms and other unusual phenomena.

IEC TR 61000-1-6

Electromagnetic compatibility (EMC) - Part 1-6: General - Guide to the assessment of measurement uncertainty

This is another very complex subject that can't be ignored. But do you need to calculate an uncertainty budget when you measure the voltage of a dry cell to see if it is of any more use? There really is pressure to apply uncertainty principles to measurements that really don't need them. Long years ago, before most of the world heard of uncertainty, a sentence was put in an IEC standard that advises the user to consider what the results are to be used for, and use this to determine the required precision and accuracy, and now we would add 'uncertainty'.

IEC 61000-2 series

These are mostly informative documents, and are well worth studying, because they answer some, but not all, of the Frequently Frustrating Questions.

IEC TR 61000-2-1

Electromagnetic compatibility (EMC) - Part 2: Environment - Section 1: Description of the environment - Electromagnetic environment for low-frequency conducted disturbances and signalling in public power supply systems

For electronics engineers, not so familiar with the intricacies of power systems, this is particularly useful. 'Signalling' means 'ripple control' - the injection of audio-frequency tone bursts into a system to control system equipment and loads, such as street lighting. It's not used in Britain, but is widely used on the Continent and in Australia and New Zealand. It can obviously affect zero-crossing detectors.

IEC 61000-2-2

Electromagnetic compatibility (EMC) - Part 2-2: Environment - Compatibility levels for low-frequency conducted disturbances and signalling in public low-voltage power supply systems

This is regarded as a standard, but nothing is expected to conform to it directly. Its purpose is to form the basis for determining limits for the conducted emissions of products.

IEC TR 61000-2-3

Electromagnetic compatibility (EMC) - Part 2: Environment - Section 3: Description of the environment - Radiated and non-network-frequency-related conducted phenomena

This is a large document, practically a textbook on basic EMC principles, but is costly.

IEC TR 61000-2-4

Electromagnetic compatibility (EMC) - Part 2-4: Environment - Compatibility levels in industrial plants for low-frequency conducted disturbances

While this parallels Section 2, it is a Technical Report, because for industrial plants, there is much more emphasis on case-by-case negotiation with the network operator. A disturbance level may be acceptable at one place in a network but not at another.

IEC TR 61000-2-5

Electromagnetic compatibility (EMC) - Part 2-5: Environment - Description and classification of electromagnetic environments

This is an important reference; especially in the context of EMC for functional safety, where the maximum probable exposure to disturbances must be evaluated, down to a very low order of probability.

IEC TR 61000-2-6

Electromagnetic compatibility (EMC) - Part 2: Environment - Section 6: Assessment of the emission levels in the power supply of industrial plants as regards low-frequency conducted disturbances

As for Section 4, this is largely about the terms for negotiation between supplier and user, on a case-by-case basis.

IEC TR 61000-2-7

Electromagnetic compatibility (EMC) - Part 2: Environment - Section 7: Low frequency magnetic fields in various environments

These magnetic fields may affect *anything* electrical or electronic, simply by inducing unwanted currents in circuits.

IEC TR 61000-2-8

Electromagnetic compatibility (EMC) - Part 2-8: Environment - Voltage dips and short interruptions on public electric power supply systems with statistical measurement results

This gives important information that can help to determine the immunity level required for a given product and a given environment.

IEC 61000-2-9

Electromagnetic compatibility (EMC) - Part 2: Environment - Section 9: Description of HEMP environment - Radiated disturbance. Basic EMC publication

Another document that we hope never to have to refer to! But if your work can be said to include 'infrastructure', then these issues are vital.

IEC 61000-2-10

Electromagnetic compatibility (EMC) - Part 2-10: Environment - Description of HEMP environment - Conducted disturbance This one is in the same category as Section 10.

IEC 61000-2-11

Electromagnetic compatibility (EMC) - Part 2-11: Environment - Classification of HEMP environments

And so is this one. (No jokes about the culture of illegal substances, please!)

IEC 61000-2-12

Electromagnetic compatibility (EMC) - Part 2-12: Environment - Compatibility levels for low-frequency conducted disturbances and signalling in public medium-voltage power supply systems

This is a standard because it isn't about case-by-case negotiation.

IEC 61000-2-13

Electromagnetic compatibility (EMC) - Part 2-13: Environment - High-power electromagnetic (HPEM) environments - Radiated and conducted

HPEM is 'High-Power ElectroMagnetic pulse', (which may be of natural origin and at or below ground level), while HEMP is 'High-altitude Electromagnetic Pulse', which might be due to a nuclear event or possibly the descent and disintegration of a large meteor.

IEC TR 61000-2-14

Electromagnetic compatibility (EMC) - Part 2-14: Environment - Overvoltages on public electricity distribution networks

This is obviously an important subject; this has been realised only relatively recently - witness the products only a few years old that do not have any form of surge suppression at the power entry. In the early days, suppression components were prone to explode, due to their characteristics not being fully understood. It is also possible to (expensively) over-design if the threat level is over-estimated

Things to come

Unless a hotter topic intervenes, next time we will look at the IEC 61000-3, -5 and maybe -6 series.

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