Know Your Standards

Time to be specific

Having looked in previous issues of the Journal at standards bodies and the ways that standards can be divided into types and classes, it's time to look at specific standards, and for EMC, the two biggies are CISPR 16 and IEC 61000-4, both divided into many Parts and Sections.

CISPR 16

This once was a standard of a modest 50 pages or so, but expanded to well over 100 and now is a multi-part standard with numerous sub-divisions. It is developed by CISPR/A - Radio-interference measurements and statistical methods, except for CISPR TR/16-4-4, which is developed by CISPR/H.

There follows is a list of the current publications *at the time of writing.* The list is continually updated, and is freely available on the public part of the IEC web site. There is little point in citing one of the very long direct URLs, but you can drill down through the structure:

www.iec.ch -> Dashboard Finder -> Technical Committee -> CISPR/CIS/A -> Projects/Publications -> Publications
There you will find all the amendments and corrigenda, as well as details of bilingual (English/French) and monolingual (English, French or Spanish) editions, together with Stability Dates - the date before which no change to the standard is expected.

This search works for **all** IEC and CISPR technical committees and sub-committees, of course, not just for CISPR/A.

Components of CISPR 16

A publication code such as CISPR 16-1-1 indicates:

CISPR - Originating body

16 - Publication number

1 - Part number

1- Section number

Note: Sub-divisions of the text of a standard are *clauses*, not *sections* or even *chapters* (which may be a mistranslation from German). Some standards with a long history still have 'chapters' as *major* divisions of the text.

A package of all of CISPR 16 can be purchased from IEC, but you have to be very rich:

CISPR 16-SER Edition 1.0 (2011-10-13) Specification for radio disturbance and immunity measuring apparatus and methods - ALL PARTS

Most people not in test houses need only selected publications:

CISPR 16-1-1 Edition 3.1 (2010-11-10) Specification for radio disturbance and immunity measuring apparatus and methods - Part 1-1: Radio disturbance and immunity measuring apparatus - Measuring apparatus

CISPR 16-1-2 Edition 1.2 (2006-08-11) Specification for radio disturbance and immunity measuring apparatus and methods - Part 1-2: Radio disturbance and immunity measuring apparatus - Ancillary equipment - Conducted disturbances

CISPR 16-1-3 Edition 2.0 (2004-06-28) Specification for radio disturbance and immunity measuring apparatus and methods - Part 1-3: Radio disturbance and immunity measuring apparatus - Ancillary equipment - Disturbance power

CISPR 16-1-4 Edition 3.0 (2010-04-27) Specification for radio disturbance and immunity measuring apparatus and methods - Part 1-4: Radio disturbance and immunity measuring apparatus - Antennas and test sites for radiated disturbance measurements

CISPR 16-1-5 Edition 1.0 (2003-11-19) Specification for radio disturbance and immunity measuring apparatus and methods - Part 1-5: Radio disturbance and immunity measuring apparatus - Antenna calibration test sites for 30 MHz to 1 000 MHz

CISPR 16-2-1 Edition 2.1 (2010-12-16) Specification for radio disturbance and immunity measuring apparatus and methods - Part 2-1: Methods of measurement of disturbances and immunity - Conducted disturbance measurements

CISPR 16-2-2 Edition 2.0 (2010-07-28) Specification for radio disturbance and immunity measuring apparatus and methods - Part 2-2: Methods of measurement of disturbances and immunity - Measurement of disturbance power

CISPR 16-2-3 Edition 3.1 (2010-08-23) Specification for radio disturbance and immunity measuring apparatus and methods - Part 2-3: Methods of measurement of disturbances and immunity - Radiated disturbance measurements

CISPR 16-2-4 Edition 1.0 (2003-11-20) Specification for radio disturbance and immunity measuring apparatus and methods - Part 2-4: Methods of measurement of disturbances and immunity - Immunity measurements

CISPR/TR 16-3 Edition 3.0 (2010-08-10) Specification for radio disturbance and immunity measuring apparatus and methods - Part 3: CISPR technical reports

CISPR/TR 16-4-1 Edition 2.0 (2009-02-23) Specification for radio disturbance and immunity measuring apparatus and methods - Part 4-1: Uncertainties, statistics and limit modelling - Uncertainties in standardized EMC tests

CISPR 16-4-2 Edition 2.0 (2011-06-08) Specification for radio disturbance and immunity measuring apparatus and methods - Part 4-2: Uncertainties, statistics and limit modelling - Measurement instrumentation uncertainty

CISPR/TR 16-4-3 Edition 2.1 (2007-01-18) Specification for radio disturbance and immunity measuring apparatus and methods - Part 4-3: Uncertainties, statistics and limit modelling - Statistical considerations in the determination of EMC compliance of mass-produced products

CISPR/TR 16-4-4 (**developed by CISPR/H**) Edition 2.0 (2007-07-16) Specification for radio disturbance and immunity measuring apparatus and methods - Part 4-4: Uncertainties, statistics and limit modelling - Statistics of complaints and a model for the calculation of limits for the protection of radio services

CISPR/TR 16-4-5 Edition 1.0 (2006-10-25) Specification for radio disturbance and immunity measuring apparatus and methods - Part 4-5: Uncertainties, statistics and limit modelling - Conditions for the use of alternative test methods

These publications have been written (and some repeatedly partly re-written) over the years by numerous people, so there are inconsistencies in language and style. CISPR intends to deal with this, but don't hold your breath!

The intention, also, is to collect into CISPR 16-1 and -2 all except the most specialized methods of measurement from other CISPR standards. Those from CISPR 13, 20, 22 and 24 that qualify have already been included or soon will be.

One point to beware of is the risky mixing in some of these standards of decibels and impedances in ohms. I pointed the problem out through BSI some years ago and it seemed to be accepted that a change was necessary, but later the comment was rejected. Even so, I believe it is valid. Consider :

$$V = IR$$

Convert to dB: the multiplier must clearly be 20 for all:

$$20\lg V = 20\lg I - 20\lg R$$

Now consider:

$$W = V^2/R$$

Convert to dB:

$$10\lg W = 10\lg(V^2) - 10\lg R$$

The multiplier must clearly be 10.

So, to convert 150 ohms to dB (which is needed as a correction factor in some calculations), do you multiply 2.18 by 10 or 20? Rather than mixing decibels with ohms, the correction can just be expressed as a number, explaining that it is derived from the 150 ohm impedance.

CISPR TR/16-3

This Technical Report is not widely known, but it is well worth study. It explains a lot about EMC and CISPR standards that isn't explained elsewhere. It isn't adopted by CENELEC, but it is published by BSI. Unfortunately, it is quite costly.

IEC 61000-4

This also needs a whole article to do it justice, so that will have to wait for the next issue.

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