

T&E Update

Testing • Engineering • Consulting

Issue 12



STANDARDS UPDATE

The following standard changes are in process or will soon be adopted. We encourage our clients to review the following for applicability to their products. If there are any questions regarding the implementation or interpretation of these changes, please feel free to call us!

United States

MAJOR OVERHAUL OF FCC PART 68 FOR TELEPHONE TERMINAL EQUIPMENT

FCC Part 68 will soon be relegated to the area of Supplier's Declaration of Conformity (SDoC). This means that manufacturers of devices that interface with the Public Switched Telephone Network (phones, fax machines, modems, T1 and ISDN equipment) will no longer be required to submit Applications for Registrations to the FCC or Telecommunications Certification Bodies (TCBs).

This action was taken after years of regulation of telecon products by the FCC, which originally imposed its rules in 1984 upon the breakup of AT&T.

The following was adapted from the FCC's Report and Order (R&O) in Docket 99-216:

Under the Commission's SDoC process, the supplier is required to accurately test the equipment and provide a written declaration that the terminal equipment conforms to applicable Administrative Council technical criteria. The declaration shall include, at the minimum:

- the identification and a description of the supplier and the product
- a conformity statement and referenced standards
- the date and place of issue of the declaration
- the signature, name and function of person making declaration.

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Europe

The year 2001 appears to be a busy year for product manufacturers that are planning on marketing equipment within the European Union. The EMC Directive has several standards which will either be superseded or amended this year. Also, there are more Product Specific standards and new mandatory standards that must be complied with sometime this year. Following is a listing of some of the new requirements and the related standards with the date listed on which the standard becomes mandatory. This information listed was obtained from the most recent (December 14, 2000) Official Journal for the EMC Directive; 89/336/EEC, which should be consulted for a complete list of all harmonized standards.

ELECTRICAL PRODUCTS ARE AFFECTED

Compliance with the Harmonics and Flicker requirements (EN 61000-3-2 and EN61000-3-3, respectively) are now required for most products entering Europe. The latest amendment to the EN61000-3-2 (Amendment 14) was adopted at the 11th hour which substantially relaxed the original requirements.

EMISSIONS STANDARDS

From August 1, 2001 all Information Technology Equipment must comply with the 1998 version of EN55022 for emissions. This standard incorporates the additional of conducted emissions testing of telecom ports.

As of January 1, 2001, the Product Specific Standard EN55011:1998 covering Industrial, Scientific and Medical equipment became mandatory. Note: Amendment A1:1999 will become mandatory as of August 1, 2002.

OUTGOING IMMUNITY STANDARDS

July 1, 2001 will be the final date that equipment evaluated with EN50082-1:1992 can be shipped into Europe. Products that have been tested and will continue to be marketed will need to be re-evaluated to the new Generic Immunity Standard, EN50082-1:1997. The scope of this new standard is more encompassing and requires several additional tests.

NEW PRODUCT SPECIFIC STANDARDS FOR ITE AND LABORATORY EQUIPMENT

Compliance with the immunity requirements of EN55024 comes into affect as of July 1, 2001 for Information Technology Equipment. This is also the date in which EN61326:1997, immunity requirements for laboratory equipment, becomes mandatory, superseding generic standards as a way to prove conformance with the essential requirements.

Other product specific standards are also coming into effect this year such as EN55014-2:1997 (January 1, 2001) for household appliances and electric tools and EN 300 386-2:1997 (September 30, 2001) for Telecommunication Network Equipment.

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U.S. Update continued from page 1

The FCC requires the supplier to notify the Administrative Council of any changes in this information. The FCC was convinced that, in the competitive terminal equipment market, accreditation of testing laboratories is not necessary.

As stated in the Public Notice: "Current equipment approval procedures, which do not require the testing laboratories to be accredited, have proven to be so successful that the Commission is able to undertake this present streamlining initiative."

European Update continued from page 1

AMENDMENTS TO EXISTING STANDARDS

In addition to the new requirements, many standards have amendments that are mandatory for showing compliance this year. An example is EN55020 which covers immunity requirements for broadcast receivers and associated equipment. Amendments to this standard include A12:1999, A13:1999 and A14:1999, and equipment must comply with these on August 1, 2001. Additionally, EN55013, which lists the emission requirements for broadcast receivers and associated equipment, has Amendment A14:1999 which is also mandatory as of August 1, 2001.

Other amended standards include EN55014-1; Amendment A2:1999 (August 10, 2001) which covers emission requirements for household

appliances and electric tools and EN55015; Amendment A2:1999 (October 10, 2001) covering electrical lighting and similar equipment.

EUROPEAN TRANSMITTERS: R&TTE DIRECTIVE

In addition to the many standards that are being updated this year for the EMC Directive, this is also the year in which the R&TTE Directive; 1999/5/EC, becomes mandatory for conformity of Radio Equipment and Telecommunications Terminal Equipment. The R&TTE Directive goes into effect as of April 1, 2001. All radio equipment and telecommunications terminal equipment being placed within the European Union market must conform with this "Self Declaration" standard replacing the previously required "Type Approval and Type Acceptance".

USCC Seeks Strategic Partner

Conformity Group ISO International Certification Organization To Take Advantage Of Their Exclusive Agreements With Beijing Partner

In June of 2000, Washington Laboratories and its subsidiary, US Conformity Consultants (USCC), formed the Testing and Certification Center for Chinese Products in Beijing, China. Testing and consultative services are provided through exclusive agreements that USCC has established with the China Council for the Promotion of International Trade (CCPIT) and the China Chamber of International Commerce (CCOIC).

The center provides testing and certification services for Chinese textiles, foods and electronic products for entry into domestic and international markets. With China's eventual accession to the World Trade Organization (WTO) and the recent granting of Permanent

Normal Trading Relations by the United States, it is necessary to provide access for Certification and Testing for products bound to world markets. USCC provides the testing services through its network of domestic and international laboratories.

With the flood of inquiries exceeding expectations, USCC has begun seeking a significant partner to provide services to Chinese manufacturers. Through their promotional efforts throughout China, several hundred inquiries and requests of information have already been processed through the Beijing operation.

USCC has developed a proposal package. For more information contact Mike Violette at 800/839-1649.

Wireless Certifications Taking Too Long?

Fast FCC Certifications are now available from AmericanTCB for wireless customers. Since June 2000, ATCB has been actively working with manufacturers who produce a variety of wireless products. With particular focus on Spread Spectrum, low power and licensed equipment, AmericanTCB provides full-services FCC Approval services.

For speed and convenience, AmericanTCB has inaugurated its electronic filing over the Internet - that means speedy submission, review and approvals times.

AmericanTCB operates as an independent body. Chief Technical Officer, William Graff, is an internationally recognized expert on radio regulations. Bill recently returned from London, where he provided technical instruction to over 70 prospective TCB's and manufacturers.

For more information contact **Anne Violette, Office Manager** at e-mail: annev@americantcb.com or telephone at 703/847-4700

e-mail: info@americantcb.com

Or visit us on the web at www.AmericanTCB.com





PUBLIC NOTICE

Federal Communications Commission
445 12th St., S.W.
Washington, D.C. 20554

DA 00-1950
August 24, 2000

REMINDER OF SEPTEMBER 1, 2000, DEADLINE FOR COMPLIANCE WITH REGULATIONS FOR HUMAN EXPOSURE TO RADIOFREQUENCY EMISSIONS

On September 1, 2000, all existing transmitting facilities, operations and devices regulated by the Commission must be in compliance with the Commission's radio frequency (RF) exposure guidelines, pursuant to Section 1.1307(b)(1) through (b)(3) of the Commission's rules, or if not in compliance, file an Environmental Assessment (EA) as specified in Section 1.1311. See 47 CFR 1.1307(b)(5).

This is the third in a series of Public Notices reminding licensees and grantees of the September 1, 2000, RF compliance requirement. For more information, see Public Notice, "Year 2000 Deadline for Compliance with Commission's Regulations Regarding Human Exposure to Radiofrequency Emissions," originally released February 25, 2000; re-released as Public Notice, DA 00-912, April 27, 2000.

After September 1, 2000, if any facility, operation or device is found not to be in compliance with the Commission's RF exposure guidelines, and if the required EA has not been filed, the Commission will consider this to be a violation of its rules, resulting in possible fines, forfeiture or other actions deemed appropriate by the Commission. Random spot checks for compliance with the Commission's RF exposure guidelines will be conducted.

Consumers should be aware that hand-held cellular and PCS telephones that were authorized by the FCC after August 1, 1996 have been evaluated for compliance with FCC guidelines. Furthermore, PCS devices subject to equipment authorization have been required to comply with the RF guidelines since 1994. This means that a large number, if not the majority, of cellular and PCS telephones now in use in the United States have already been evaluated for compliance with the FCC's RF exposure limits. To the extent that a wireless device received an FCC authorization prior to the August 1, 1996, effective date, and is still being produced and marketed, manufacturers of such devices will be required to file EAs if the device in question is not in compliance with the FCC's RF guidelines.

Further information on the Commission's RF exposure guidelines and on evaluating compliance with the RF guidelines may be found at the Commission's RF Safety Web page: www.fcc.gov/oet/rfsafety. In particular, the Office of Engineering and Technology's Bulletin 65 and supplements to this bulletin (all available at the Web Site for viewing and downloading) offer detailed guidance on evaluating compliance. Requests for information or copies of these documents can also be directed to the FCC's RF Safety Program in the Office of Engineering and Technology, (202) 418-2464 or by e-mail to: rfsafety@fcc.gov.

For information on specific filing procedures for EAs, licensees and grantees should consult the following web sites or contact the appropriate FCC office or bureau:

Wireless Telecommunications Bureau: www.fcc.gov/wtb ; Irene Griffith: (202) 418-1315.

Mass Media Bureau: www.fcc.gov/mmb ; FM (Brian Butler): (202) 418-2700; AM (Joseph Szczesny): (202) 418-2700; TV (John Morgan): (202) 418-1600.

International Bureau: www.fcc.gov/ib ; (202) 418-2222.

Office of Engineering and Technology: www.fcc.gov/oet/rfsafety ; (202) 418-2464.

GUEST
EDITORIAL

Power Line Quality Conundrum: Harmonics and Flicker Update

J. M. Woodgate

The following is excerpted from "EMC- Low frequency conducted emissions: The truth about IEC 61000-2-3 and -3, and their EN clones" © August 2000 by J. M. Woodgate, member of IEC SC77A/WG1 and WG2

"How can I claim to tell the truth when all sorts of different stories are circulating?"

"Because I'm a member of IEC SC77A/WG1 and WG2, responsible for these standards."

BACKGROUND

Control of low-frequency conducted emissions began with the voluntary IEC standards IEC555-2 and -3. These emissions are of two kinds:

IEC555-2 dealt with the generation of harmonic currents by non-linear loads. These cause capacitors, motors and transformers to overheat. Peak clipping of the voltage waveform reduces the efficiency of switch-mode power supplies and can thus also cause overheating.

IEC555-3 dealt with the amplitude modulation (termed 'voltage changes') of the supply voltage by loads drawing time-varying currents. This causes filament lamps to flicker, which is disconcerting, especially for household consumers. The sudden connection of numerous loads, when supply is restored after an outage, can cause deep amplitude modulation and serious problems, if the loads draw 'inrush currents' far in excess of their steady-state currents. Circuit-breakers and fuses may operate, and damage may even be caused to wiring.

In due course, these standards were reviewed and steps taken to replace them by new standards in the IEC61000-3 series of EMC standards. Unfortunately, it wasn't realised (this was in 1988 or thereabouts) that the effect of the European EMC Directive

would be to make these standards quasi-legal documents, instead of the voluntary standards they superseded. This meant that the precision of the language should have been orders of magnitude higher, but it wasn't. Some of us tried to improve the drafts in the early 90s, through the national standards committees, but it was very difficult to have much influence after the work had been in progress for some years. Both of the initial standards, IEC61000-3-2 and IEC61000-3-3, apply only to equipment rated at up to 16A per phase. For higher currents, IEC opted to produce Reports, IEC61000-3-4 and IEC61000-3-5. However, the European Commission refused to recognise Reports as suitable for implementing the EMC Directive, so it has been necessary to replace them by IEC61000-3-11 (for voltage changes) and -12 (for harmonics) and neither are published yet.

IEC61000-3-2 and -3 (and -11 and -12) are 'product-family standards', so they have authority above the Generic Standards (which refer to them). But they are exceptional in that:

- they are produced by IEC SC77A instead of a product committee
- the 'product-family' is 'anything that can be connected to the public low-voltage electricity supply'. Note that that is a restriction: the standards do not apply to something that will not conceivably be connected to the public low-voltage supply. But the standards DO apply to both professional (as defined in IEC61000-3-2) and household equipment. The requirements, however, are not identical, because there is so much more household equipment than professional equipment connected to the public supply. Much professional equipment is actually connected to an industrial MV or HV/LV transformer, and doesn't affect the public supply in the same way as a directly-connected load.

CURRENT POSITION

The European standards body CENELEC adopted the IEC standards verbatim, and they were notified in the Official Journal (OJEC) as suitable for demonstrating conformity with the

EMC Directive. (Note, products conform, manufacturers comply.) They are due to come into mandatory effect on 01-01-01. However, the pressure for amendment of both standards prevailed and work began in 1998, in IEC SC77A/WG1 and WG2.

Both amendments are being processed as fast as possible in IEC. However, CENELEC decided to use a shorter approval procedure (Unique Acceptance Procedure - UAP) in the case of just the 'harmonics' amendment. That this is illogical must be obvious, but when one is dealing with CENELEC....

It is intended that from 01-01-01, manufacturers will be able to choose, for 3 years, whether to apply the unamended or the amended standards. Almost all will find it better to choose the amended versions. In the case of the amendment to IEC/EN61000-3-3, which will not be published in time, it is likely that the authorities will take no enforcement action in respect of products that would be admissible under the amended standard.

THE CHANGES

It's quite impossible to give details of all the changes: that could in fact only safely be done by publishing the amendments. The main changes are:

IEC/EN61000-3-2:

Class D is no longer defined by a 'special waveform', and applies now only to television receivers and desktop computers. (Clearly, a switch-mode power supply [SMPS] intended for use in a PC would need to take that into account.) In the future, other products may have to be added, but only after a full and searching investigation.

The change of lower limit of application of Class D limits from 75 W to 50 W is NOT implemented, and will not be implemented unless National Committees vote to include this change in a later edition.

Note: IEC SC77A/WG1 is already working on a new edition, probably timed for implementation in 2005.

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2001 Testing Workshop Series



Washington Labs has set its Free Workshop Schedule for 2001. These popular seminar/practical workshops include demonstrations, guest speakers, the latest EMC and safety compliance news, and lunch!

EMC Testing and Measurements

Designing to Avoid EMC Problems Down the Road

Watch as our engineers demonstrate several testing techniques that uncover EMC flaws in electrical and electronic equipment—problems which can be avoided before the testing stage. You'll have the opportunity to "get specific" with the engineering staff on particular problems you may be encountering with current R&D designs.

FEBRUARY 16

MAY 18

AUGUST 17

NOVEMBER 9

Be sure to register early as positions fill up quickly.

Call Patty or Melissa at 301-417-0220 to register today.

CE Marking Course at GWU

The Europeans, in their quest to form the largest economic single trading area have enacted regulations that affect suppliers of many types of products. The "CE Marking" encompasses the European Union requirements for equipment and products to be sold in the EU. For the electronics industry the CE Marking is required for all electrical/electronic products placed on the market in the member nations.

As a way to reduce technical barriers to trade within the EU, various Directives have been enacted that force manufacturers to assess and evaluate all products to a common set of standards.

"CE Marking and the European Union, a Practical Course for Design and Compliance" is a three-day course, that will be held on April 16-18 at George Washington University.

The course will explore this requirement that has affected manufacturers of consumer electronic goods, communications equipment, computing equipment, machinery, etc. The two major areas that are affected are Electromagnetic Compatibility (EMC) and Product Safety. In many cases, it is possible for the manufacturer to "self-certify" their equipment. In other cases, it is necessary for a European authority to certify the equipment.

This course is intended to provide an overview of the regulations surrounding the Directives, provide methods of compliance, provide in-depth explanation of the testing requirements, and design guidance to meet the requirements.

In addition to the technical presentation, demonstrations will be provided to show the types of testing used to evaluate equipment, as well as fundamental concepts to design equipment to meet the requirements.

Mike Violette, President of Washington Labs, will be the instructor for this three day course. For more information or to register contact George Washington University at 202/994-5000 or on the web at GWEB.GWU.EDU.

Employee Spotlight

Chad Beattie

Everyone at Washington Labs has a variety of responsibilities and Chad Beattie is no exception. Chad pulls double duty as not only a NARTE Certified EMC Compliance Engineer, but he also functions as the corporate IS Administrator.

As IS Administrator, Chad is responsible for WL's LAN, integration of the Frederick, Gaithersburg and McLean satellite office computer systems, and the corporate FTP site. And keeping the hardware and software running for a company of engineers is no small feat.

Chad has been with Washington Labs since the summer of 1996 — having previously been with American Technology Labs as an Electronic Technician. Prior to that he was a Ground Radio Communications Specialist, Senior Airman for the United States Air Force for 3 years. There he maintained, repaired, and aligned VHF and UHF single and multiple channel transmitters, receivers, transceivers, ground wave emergency networks, high altitude radiation detection systems,



and survivable low frequency communications systems.

He's currently in his senior year, studying to earn an EE degree at Montgomery College with plans to transfer to Capitol College for completion. Chad earned his Associates Degree in Electronic Systems Technology from the Community College of the Air Force.

When not studying, testing, and IS troubleshooting, Chad enjoys riding his ATV and racing motocross. He and his wife, Angie, an administrator at NIST, live in Gaithersburg.

Why Washington Labs? "It's the people I work with here—both our employees and customers are great, plus there are lots of opportunities for growth here."

EMC continued from page 4**IEC/EN61000-3-3:**

Higher limits for voltage changes are introduced for some equipment that is not considered likely to cause annoying flicker or unacceptable voltage dips. For example, some high-power garden power appliances do not normally cause flicker because they are used only during daylight hours. The method of measuring voltage changes has been clarified in cases where the IEC60868 or IEC61000-4-15 flicker meter is not used.

COMMENTS

SMPS are by no means the only source of harmonic current emissions. 'Linear' power supplies draw substantially the same short current pulses and produce the same harmonic spectra. The only difference is that the current pulses of an SMPS are typically shorter and taller, thus producing somewhat stronger harmonics. The main problem is that all the power supplies produce harmonics that add up nearly arithmetically - there is hardly any phase difference between them. And where the SMPS are fed between phase and neutral of a three phase system, the triplen harmonics (multiples of 3) add up arithmetically in the neutral conductor. Some installations had thinner neutrals than phase conductors, but the neutral current can exceed TWICE the phase current (the theoretical value is about 2.8 times!), so it is not surprising that neutral conductors have overheated.

If you don't think that there is a problem with harmonic emissions, examine the voltage waveform of your local residential mains supply (carefully!), especially in the evening when all the television receivers are in use. You will see flat tops on the sine waves, caused by the big current pulses (typically peaking at 60 A) drawn by each receiver.

Inrush current is not only bad news in terms of flickering lamps, it can damage components within the culprit equipment. The inrush current of an SMPS is highest if the switch is closed at a voltage maximum, but for a 'linear' supply, with a transformer, especially a toroid, the situation is more complex. The filter capacitor causes the largest inrush if the switch is closed at a voltage maximum, but the transformer has two possible actions. If the switch was turned off, and the internal arc extinguished, at a positive-going zero-crossing of the voltage waveform, and the switch is subsequently closed at or near a negative-going zero-crossing,

there is minimal effect. BUT, if the switch is closed at or near a positive-going zero-crossing, a very large inrush current occurs. Why? Well, the original switch-off actually left the core magnetised. It is a closed magnetic circuit, so even though it is of magnetically 'soft' material, it does retain most of its magnetisation. When the switch is closed at a positive-going zero-crossing, the core is driven hard into magnetic saturation, the primary inductance of the transformer is dramatically reduced and a huge magnetising current flows.

Because of this behaviour, voltage changes are assessed on a statistical basis, taking an average of several measurements using the product's own mains switch (which affects the results). Typically, the average value is about half the worst-case value, and it is this average which is compared with the limit. Note, too, that the limits are expressed as half-cycle r.m.s. values, NOT peak values. This implies that a worst-case peak inrush current of well over 70 A may be tolerable.

WASHINGTON LABS is one of the CABs

Good News! The US and EU have entered into the Operational Phase of the MRA for EMC and R&TTE, ending a two-year confidence building period. Thirty-three US CABs (10 R&TTE, 23 EMC) and thirty-two European CABs (7 R&TTE, 25 EMC) have been confirmed and are recognized to be competent by US and EU government regulatory authorities to test and certify equipment under these two annexes. These CABs now may begin testing and certifying products within the scope of their designation. Additional CABs will be added in the near future.

A list of US CABs for both EMC and R&TTE will be available on NIST's web site shortly at <http://ts.nist.gov/ts/htdocs/210/216/mramain.htm>. The EU CABs will also be posted soon and may be viewed at <http://www.europa.eu.int/comm/enterprise/international/indexb1.htm>.

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