

INTERNATIONAL ELECTROTECHNICAL COMMISSION

INTERNATIONAL SPECIAL COMMITTEE ON RADIO  
INTERFERENCE (CISPR)

SUB-COMMITTEE I: EMC OF INFORMATION TECHNOLOGY, MULTIMEDIA  
EQUIPMENT AND RECEIVERS

WORKING GROUP 3: EMISSIONS FROM INFORMATION TECHNOLOGY  
EQUIPMENT (ITE)

Problems with Amendment 1 (2000-08) to CISPR 22:1997

**Introduction**

CISPR/G/177/FDIS was approved by 1 vote in early 2000. This document added ferrite clamps or tubes to all cables leaving the test area for tabletop equipment in order to improve repeatability between laboratories. Questions have come up about the practicality of this method due to the large number of clamps or tubes that may be required for some types of products and consideration may need to be given to re-visiting this amendment.

**Discussion**

While CISPR/G/177/FDIS was out for vote, work was performed in the U.S. by Intel Corporation and Hewlett Packard to determine the effectiveness of this proposal. The results of their experiments demonstrated that ferrite clamps on power cables did have the effect of improving repeatability, but that the final results depended upon the clamps selected. It was determined that simply specifying the insertion loss of the clamp in a 50 ohm system was not adequate and that an addition parameter, such as the input impedance to a wire running through the clamp should also be specified. As a result, the U.S. voted no on the FDIS. The vote proved moot as the proposal passed.

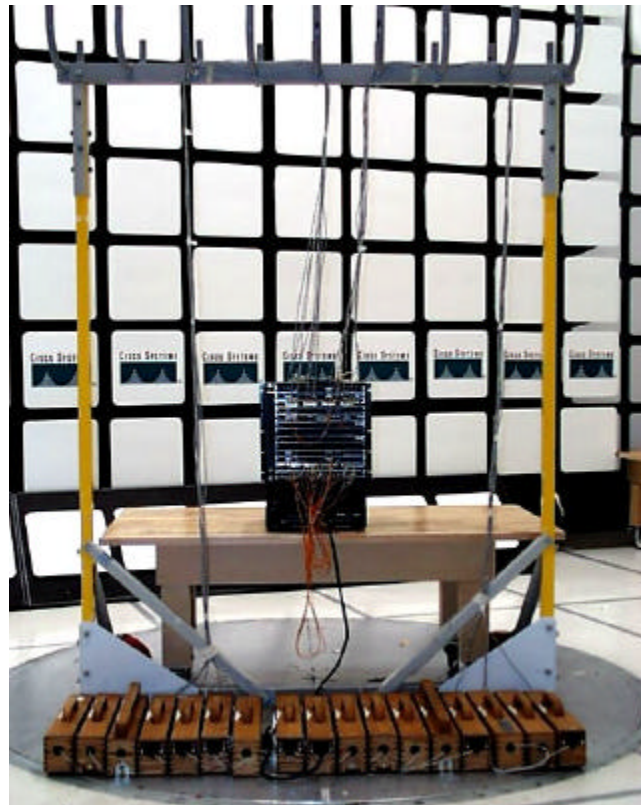
During the discussions and experiments leading up to the development of CISPR/G/177/FDIS attention was focused on EUTs such as personal computers and their peripherals. Such systems would have a relatively small number of cables (power and signal) that would leave the test area and require ferrite clamps or tubes. Questions were raised about how large products having many cables might be tested if they could be table mounted. This was not addressed in the amendment to CISPR 22.

As part of the work in the U.S. to attempt to amend the national EMC test standard (ANSI C63.4-2000) to include ferrite clamps, the issue of EUTs with large numbers of cables leaving the test area has again surfaced. As Amendment 1 to CISPR 22:1997 requires that only one

cable be routed through each clamp, large numbers of clamps may be required for the test. This is a problem for a pair of reasons.

The first problem is cost. A typical isolation clamp, such as used in testing to IEC 61000-4-6, costs around 1500 USD. For a typical personal computer system 6 such clamps may be required. A one time expenditure of 9000 USD isn't too objectionable, but what about a large table mounted network switch with 100 cables? Now the lab must spend 150,000 USD, just for ferrite clamps. This is not an insignificant problem.

The second problem is even more critical than the problem of cost. If there are 100 cables leaving the EUT, and each cable must have its own clamp, where are these clamps to be placed? The following photograph, courtesy of Cisco Systems, shows a test set-up prepared for the ANSI C63 discussions. The experiment was to see the effect of running multiple cables through clamps to reduce the number required. In this photograph there are 17 clamps. 1 is for the power cord and 16 are for the I/O cables. As can easily be seen, if more cables and, therefore, clamps were needed, the challenge facing the lab would be to find a place to put them. Room on the face of the turntable would quickly be exhausted. Stack them? Now you have different length cables radiating emissions.



17 Ferrite Clamps on Power and I/O Cables

A final issue to consider is the fact that radiated emissions measurements have been performed without ferrite clamps for the past 20 years and no significant interference problems are now noted from ITE. While the clamps clearly can improve repeatability between laboratories, the need for this expensive change to the process is still open to debate.

### **Proposals for Consideration**

Four possible proposals should be debated.

1. A CD should be drafted to modify the ferrite clamp requirement in Amendment 1 to CISPR 22:1997 to limit its use to EUTs with fewer than X cables leaving the measurement area. This may be acceptable for the following reason. Small systems, such as personal computer systems, are the most likely to be tested in multiple laboratories. Large systems with high numbers of cables leaving the measurement area tend to require specialized support systems and auxiliary equipment and are not often tested at multiple laboratories. Variability between laboratories is less of an issue in these cases.
2. Limit the ferrite clamps to power cables when large numbers (greater than Y) of I/O cables exist and exit the measurement area.
3. Allow multiples of the same cable type to utilize the same clamp.
4. Withdraw Amendment 1 to CISPR 22:1997 in its entirety.

### **Conclusion**

Amendment 1 to CISPR 22:1997 does have the potential to improve repeatability between laboratories. Unfortunately, as presently implemented, it is impractical when testing tabletop EUTs that have large numbers of I/O cables leaving the measurement area. In addition, the true need for these clamps has not been demonstrated by the interference cases (or lack thereof) from ITE. The need for this amendment should re-opened for debate.