Discussion points to be solved for the edition of the draft CD

Some points are still open and need an agreement. To each of the points in question I am trying to make a three step presentation:

1. a summary of the opinions
2. my own opinion
3. a proposal of possible decisions together with a table, where I ask everybody to indicate his opinion to the proposal in three qualities:
   A: The deicision is my perferred one
   B: The decision could be accepted if most other members prefer this solution
   C: The decision can not be accepted (indicate the reason)

In such a way I hope to come to an agreement where everybody can at least accept what we are presenting to the WG

1. Terminlogy

I thank those who contributed to the discussion on terminology. I think it is very important to start with a clear terminology. We have however not yet reached a clear agreement.

We have the following proposals:

For the function:	Cable termination (Beekman, Ryser, Dunker, Stecher) RF Boundary simulator (Marshall) Exit filter (Marshall)
For the device:	Ferrite clamp, Ferrite termination (Ryser, Dunker) RF boundary Device, Cable boundary unit (Marshall) Cable termination device (Beekman)

My comments:

- The general conflict is the following: If we use terms which are familiar to the EMC community the meaning might be easier to understand, but the risk of misunderstandings is higher, because the same term might have been used for different purposes. If we create a completely new term, nowbody will understand what it means at the beginning, but the risk of misunderstanding will be smaller. For example a term including the word "absorbing" would easily illustrate the function but would contain a high potential of misunderstanding because of the "absorbing clamp" which is also a clamping device, but used for a completely different purpose in the EMC community. The terms "filter" and "termination" have also a certain potential of misunderstanding.

- The term "Boundary" simulator or device is a relatively new creation. It seems to me, that Mr Marhall as a native english speaker has no problem with such a term, while the non english members of the TF are more sceptic and would prefer the word "termination".

- It seems no problem to include the word "cable" in the term. The risk of misunderstanding is minimal, because the devices are applied to cables and the worde "cable" gives an indication where the devices are applied.
- The word "termination" has a certain potential of misunderstanding, but this could be improved by the use of an additional term like "Common mode (CM)" or "Total common mode (TCM)" (as defined in CISPR/I/CD/3, shown in Note 1 below)

- The term "cable termination" was used when the TF was created. We are not obliged keep these words, but it is one argument to remain with this term.

Note 1: Definition of TCM impedance proposed for CISPR 22 in CISPR/I/CD/3:

3.7. Total common mode impedance (TCM impedance)
TCM impedance is the impedance between the cable under test and the reference ground plane. The complete cable is seen as one wire of the circuit, the ground plane as the other wire of the circuit. The TCM wave is the transmission mode of electrical energy, which can lead to radiation of electrical energy if the cable is exposed in the real application. Vice versa, this is also the dominant mode, which results from exposition of the cable to external electromagnetic fields. (The term TCM is used here in order to clearly differentiate between the classical term of "common mode" which is defined for a 3-wire system, while the TCM as it is used for any type of cable independent of the number of wires.)

Proposal Number	Term for the function	Term for the device	My preferences
1.1	cable termination	cable termination device	A
1.2	RF boundary simulation	RF boundary device	B
1.3	cable termination	ferrite clamp	B
1.4	TCM cable termination	TCM cable termination device	B

2. Measurement impedance

Mr Marshall proposes to measure in a 150 Ohm System. Others prefer a 50 Ohm System.

My comments:
I agree that the final aim is to have devices with 150 Ohm impedance to ground. I myself have some experience with the 150 Ohm adaptors used in connection with the current injection devices according to 61000-4-6. However, the impedance of these devices is not well defined above 300MHz. I have not yet seen any broadband 50 Ohm (Coaxial) to 150 Ohm (Wire over ground) adaptor with flat impedance up to 1000MHz. My impression is, that there is still some work to do before we can introduce a well defined measurement at the 150 Ohm level including the change from coaxial to "wire over ground". Building a test jig for 50 Ohms however is relatively simple and straight forward.

The devices used today for measurements according to Amendment 1 of CISPR22 are far from being 150 Ohm devices. They are basically high impedance TCM cable terminations. Also, in Amendment 1 of CISPR22 the specification is given for the measurement in a 50 Ohm system.

All these reasons guide me to the opinion, that the draft CD should use a 50 Ohm test jig. This should not exclude further work on 150 Ohm devices and 150 Ohm measurements.

Proposal Number	Impedance of the test system	My preferences
2.1	50 Ohm	A
2.2	150 Ohm	C

3. Cable type for insertion loss measurement

It was my mistake to have taken the diameter of my typical cable as 6mm. In reality my example was a cable with about 4mm diameter. I also agree to avoid reference to a product name and to write a sentence like this:

The outside surface of a coaxial cable with appropiate outer screen diameter can be used as test wire.

As a consequence of my mistake, the wire diameter is still open. The cables under test used with the cable termination devices can be coaxial or multiwire cables with a high variety of diameters in the "copper content" which should be represented by the test wire during the verification. Coaxial cables of a screen diameter around 4mm are easily available in most labs and form a reasonable representation of screened ore multiwire cables with which the device will be used later on. Other diameters around 6mm or 8mm are available according to cable manufactorer catalogs but maybe less easily obtained in the average lab. I think we should not go below 4mm diameter.

Proposal Number	Diameter of the test wire	My preferences
3.1	4mm +/- 0.5mm	A
3.2	6mm +/- 0.5mm	B
3.3	8mm +/- 0.5mm	B

4. Dimensions of the test jig, construction of the wire connection

All questions 4.1 to 4.3 are to some extent related to the test jig of the absorbing clamp.
The TF on absorbing clamp calibration will meet on 9.4.2002 at Düssseldorf. I would like to discuss these Items also in this group at this meeting before I redraft the next version of the draft CD in April.

4.1 Fixed or variable dimension
Mr Dunker proposes to use a fixed dimension of the test jig, preferably the same dimensions as those for of the test jig used for the calibration of the absorbing clamp.

My comment:
My proposal of a flexible test jig was based on the idea that the the test jig should be flexible in such a way as to allow different sizes and constructions of "cable termination devices" to be verified.

I could also accept a fixed dimension in line with the absorbing clamp test jig.
Such a construction would however require the "cable termination devices" of smaller dimensions to be lifted to the higth of the test wire in the jig by using additional insulating material of appropriate dimension. The length of the "cable termination devices" would need to be near the same length as the absorbing clamp, in order to avoid errors of the insertion loss measurement in the frequency range 300MHz to 1000MHz. (See appendix 4 in CISPR/A/WG2(TF CT/Ryser)01-04)

Proposal Number	Dimensions of the test jig	My preferences
4.1.1	Adapted to the size of the device under test	A
4.1.2	Same as absorbing clamp test jig	B

Depending on the response of the TF members and on the discussion in the TF on absorbing clamp calibration, I will either keep the flexible dimensions adapted to the device under test, or reedit the CD to use the same same dimensions as for the absorbing clamp test jig.

4.2 Construction of the wire connection
Mr Dunker would prefer to use version 3 of the constructions proposed in the Fig YY 5 of CISPR/A/WG2(TF CT/Ryser)01-03 because the same construction cold be applied for the impedance measurements with network analyzers.

My comment:
As Mr Dunker states in his comment, the solution number 3 in Fig. 5 would bei a good approach for the impedance measurement. For the insertion loss measurement it is not necessary and other (simpler) constructions are possible as well. Showing only Example 3 would exclude simpler solutions which might be sufficient for the insertion liss measurement.

We also could cancel the Fig. 5 completely and not mention the wire connection in the draft CD.

Personally I can accept all three possible proposals and have no strong preference. Proposal 4.2.1 would eliminate the discussion and allow the laboratories or the test jig manufactorers to create theyr own solutions.

Proposal Number	Construction of the wire connection	My preferences
4.2.1	Cancel Fig 5	B (A)
4.2.2	Keep Fig 5 with all 3 examples	B
4.2.3	Show only example 3 in Fig 5	B

4.3 Reference point at the cable termination device
Mr Dunker would like to introduce a reference point on the cable termination device, indicating the exact end of the ferrite cores as it is proposed for the absorbing clamp.

My comment:
The definition of this distance will be most important in case of impedance measurements. It is also important in case of the absorbing clamp calibration. For insertion loss measurement with a flat limit, the relation to the end of the ferrites is less sensitive. It is not necessary to exactly maintain this distance, as long as the distance at both ends does not exceed about 40mm. For the typical "cable termination devices" there is normally no difference between the two ends (AE side and EUT side) and the reference point should be indicated at both ends. If we decide for the fixed jig dimensions, it will not be possible to require 20mm distance to the reference point at both ends. The distance D (30mm in Fig YY4 of CISPR/A/WG2(TF CT/Ryser)01-03, or 20mm as proposed by Mr Dunker) should in any case include a tolerance of for example +/- 5mm.

Asking for a mandatory reference point at the devices would exclude to use all the ferrite clamps already present in many labs. We could however require the distance D to relate to the end of the ferrite material, and propose to mark this end at the outside for convenience without making it a mandatory requirement.

Proposal Number	Reference point	My preferences
4.3.1	No reference point. Distance D to device (with tolerance)	A
4.3.2	Distance D to ferrite end (with tolerance). Marking of reference point (not mandatory).	B