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INTERNATIONAL ELECTROTECHNICAL COMMISSION

INTERNATIONAL SPECIAL COMMITTEE ON RADIO INTERFERENCE (CISPR)

SUBCOMMITTEE A: RADIO INTERFERENCE MEASUREMENTS AND STATISTICAL METHODS

Subject: Additions to current revisions of standards related to measurement uncertainty calculations

The national committee of the US likes to request the following amendments to the identified standards:

1) **CISPR 16-4-2 (2011)**:
The standard contains some guidance for the calculation of radiated emissions measurements using a hybrid antenna in comment D.12. However, no sample calculation is provided and no value of U_{CISPR} is available. Since hybrid antennas are widely used a sample calculation seems necessary to provide adequate guidance to all test laboratories for this use case. Practice has shown that there is confusion how to combine uncertainty contributions related to biconical and logarithmic-periodic antennas (e.g., antenna balance, cross polarization and phase center variation) in one sample uncertainty calculation. It is therefore requested to provide a sample calculation for the use case of a hybrid antenna and, if deemed necessary, derive a new value for U_{CISPR}.

2) **CISPR 16-1-4 (2010)**:
This standard calls out various site validation methods like NSA and RSM applicable to the frequency range 30 MHz to 1 GHz as well as SVSWR for the frequency range 1 GHz to 18 GHz. Many accredited calibration laboratories provide site validations at as a service under their scope of accreditation and are therefore required to calculate the measurement uncertainty of these site validation methods. In order to ensure a consistent calculation yielding comparable measurement uncertainty values it is requested to add sample calculations for the site validation methods to CISPR 16-1-4. It is also to be decided if uncertainty is to be applied when determining compliance of a test site with the stated acceptance criterion, or, alternatively, a U_{CISPR} for these validation methods is to be developed.

3) **CISPR 16-1-4 (2010)**
This standard defines the test jig that shall be used for the calibration of CMADs, including L_A and L_B adaptor sections connected to the jig flanges. In clause 9.4 the measurement of CMADs is described suggesting the TRL calibration of the vector network analyzer. This approach is used to convert from a 50 Ω environment to the impedance of the system under measurement.

The alternative SOLT calibration of the network analyzer is more challenging as a method to remove the undesired fixture effects must be applied. CISPR-16-3 clause 4.9.3.4 describes a method using Smith chart matching where the test port offset function is used. The residual uncertainties of this Smith chart technique are undefined. Also, the residual uncertainties related to TRL calibration are not defined nor the effect of an ABCD transformation on a measurement. Since accredited calibration laboratories provide calibration services involving both TRL and SOLT calibration methods a sample uncertainty calculation is to be provided for these two CMAD measurement methods to ensure a consistent calculation resulting in comparable measurement uncertainty values. This matter is quite complex and requires further guidance to ensure proper determination of uncertainty estimates. It is also to be decided if uncertainty is to be applied when determining compliance of a test site with the stated acceptance criterion, or, alternatively, a U_{CISPR} for these validation methods is to be developed.

4) **CISPR 16-1-3 (2004)**
In clause B.2 of the standard the main uncertainty contributions for the clamp calibration methods are identified but no sample calculations are provided. Since accredited calibration laboratories provide calibration services of absorbing clamps using either the jig or the original method sample uncertain calculations are requested to be included in this standard to ensure a consistent calculation resulting in comparable measurement uncertainty values.

5) **CISPR 16-1-2 (2006)**
The standard specifies a measurement method of the voltage division factor (VDF) in clause A.8 and describes in clause 4.1 the measurement of the complex impedance of AMNs. In addition, the standard also describes the calibration of current probes in clause B.6. The calibration of AMNs and current probes are very common services provided by accredited calibration laboratories. Since the adaptation of the network analyser to LISN ports have a significant impact on the accuracy of the impedance and VDF sample uncertainty calculations are necessary to ensure proper treatment of these uncertainty contributions. In addition, uncertainty calculations for both magnitude and phase are required for complex AMN impedance measurements. Similarly the treatment of the influence of the calibration fixture is to be properly included in a sample uncertainty calculation for the calibration of current probes.