Technical Note

Comparison of IEC 60118-13 and ANSI C63.19 EMC measurements

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Assignment carried out for EHIMA
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The comparison is based on 16 hearing aids.

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Method

The field strength basis of the IEC Input Related Interference Level (IRIL) measurements, together with the IRIL values, has been extrapolated up to the field strength used during the ANSI measurements.
The IRIL values have subsequently been plotted into a scatter plot in pairs.
The X-axis of the plot gives the IEC IRIL value, while the Y-axis indicates the IRIL value of the same unit during the ANSI test. See the plot on page 3.

It is assumed that the hearing aid is linear during extrapolation and that it follows the "field strength [dB]: level [dB]" ratio of "1:2".

Only IRIL values that have been generated within the same superimposed frequency area between the IEC and the ANSI measuring methods are included.
The joint frequency range is: 800 to 950 [MHz] and 1600 to 2000 [MHz].

The comparison has been restricted to the E-field, so as to be able to compare the results between the ANSI and IEC methods.

Facts

The analysis includes 16 hearing aids, 4 of which have no telecoil.

The transparent green area of the plot represents data where the acoustic gain of the current hearing aid at input levels below 50 dB SPL has not been known.
If the acoustic I/O graph of the hearing aid is linear, this data may be included.

The transparent green area also covers measurements in the noise floor.

Conclusion

The IEC test generates higher IRIL values than the ANSI test. The ratio between IEC and ANSI is an offset of approx. 30 dB.
This corresponds to a real difference of 3 ANSI category steps.

Explanation

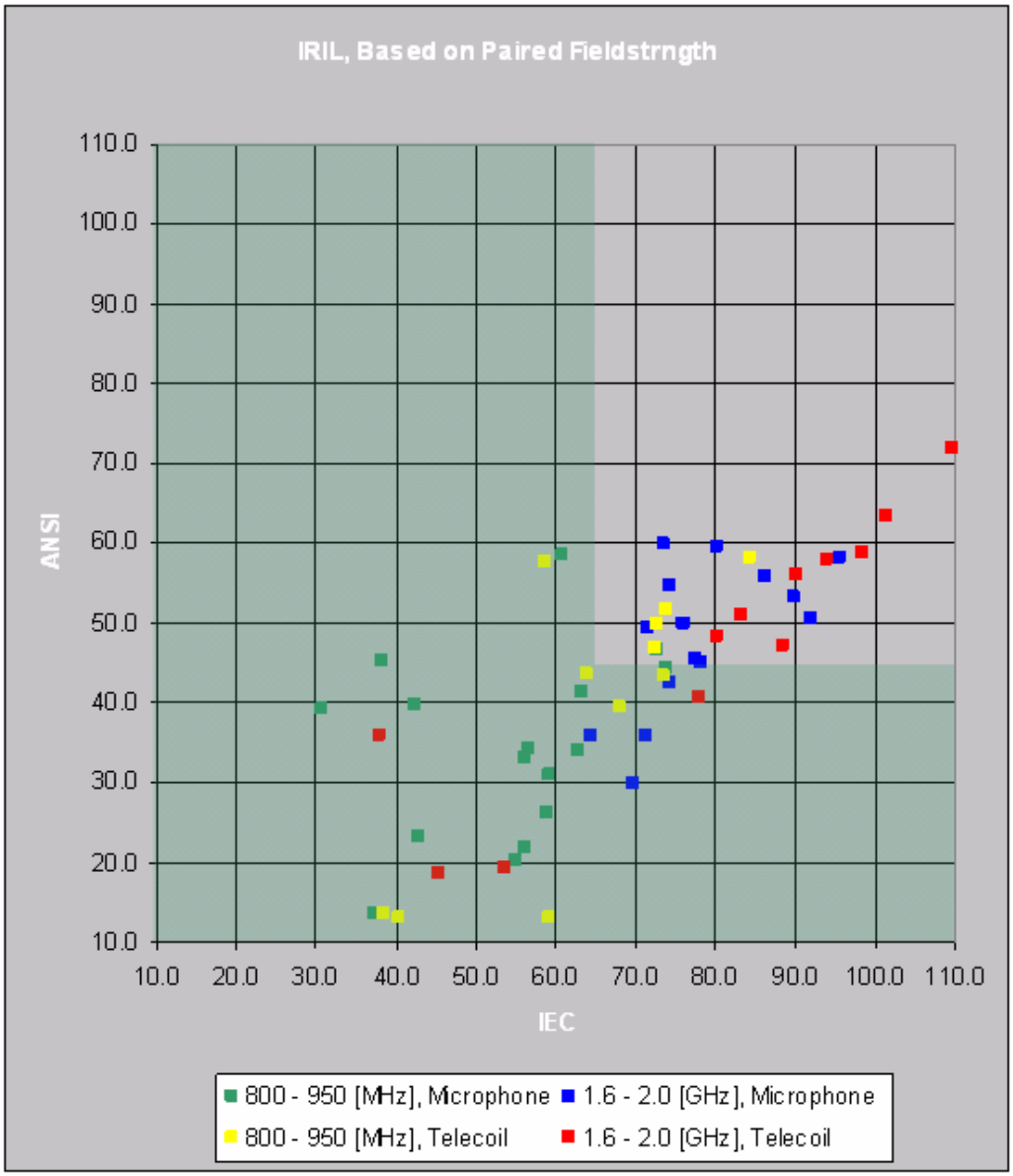
A change in the output level of a hearing aid within the linear working field of 30 dB requires a field strength modification of approx. half – i.e. 15 dB. The ANSI categories are divided in increments of 5 dB. Consequently, the real difference between ANSI and IEC is 3 categories.

Example

If an IRIL value of 55 dB SPL at 32 dB V/m is determined via IEC, our analysis shows that an additional 15 dB of field strength is required to generate the same IRIL value using the ANSI method, i.e. 47 dB V/m.

32 dB V/m corresponds to a field strength of 40 V/m, which means that the unit is categorised as being “Bystander Compatible”, but not “User Compatible” in accordance with the IEC standard.

According to the ANSI method, 47 dB V/m will categorise the same unit as being in the best category, i.e. U4.
Please see the ANSI categories in Appendix 1, page 4.



1: Scatter plot of IRIL values in accordance with the ANSI and IEC methods

Appendix 1

ANSI Categories

Category	E-field immunity	H-field immunity
U1	30.0 – 35.0 dB (V/m)	-23.0 – -18.0 dB (A/m)
U2	35.0 – 40.0 dB (V/m)	-18.0 – -13.0 dB (A/m)
U3	40.0 – 45.0 dB (V/m)	-13.0 – -8.0 dB (A/m)
U4	> 45.0 dB (V/m)	> -8.0 dB (A/m)