

ALMA Standards: January 8, 2003

Review and discussion of:

AES19-1992 (r1998) (ALMA TM-100)	AES–ALMA Standard test method for audio engineering — Measurement of the lowest resonance frequency of loudspeaker cones
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Potential Issues with the current standard

- Though it does not affect the usefulness of the standard, equation 1) is not technically accurate in that it neglects the mass of the air load on the cone under test (calculation of this load would be quite difficult)
- This standard is not useful when using manual observation techniques for cones that have high (> ~150 Hz) resonances. A drive level creating 100 dB SPL at the cone shelf will not generate a sufficiently visible motion in the cone under test
- No mention of gage capability (R&R, accuracy, etc.) exists
- Potential correlation issues between machines
 - The spec does not specify the maximum allowable “slop” between surround roll OD and clamp ID relative to the tolerance on the surround roll OD (minimum value.)
 - Issues affecting driver/cone loading & drive level
 - 5.4. Size of driver baffle (specified as 15”.) Many existing systems don’t conform
 - 5.4. The size of the test cone baffle (specified as 15”.) Many existing systems don’t conform (The drawing seems to indicated a larger test cone baffle and a smaller drive woofer baffle)
 - 5.4. The size of the driver woofer (specified as only “relatively large”) probably affects the drive level of the test cone
 - Placement of the system near a wall or in a corner will load the cone under test and driver woofer and could affect results
 - 6.1 Procedure. Drive levels could vary significantly (how hard the cone is driven can significantly vary the measured results.)
 - 2) Specifies that the amplifier should be set to achieve 100 dB SPL at the outer edge of the cone mounting plate surface at a frequency 20% below the expected resonance of the cone. Since the plate is square and the specified cone-driver plate distance can vary (specified as 9-10cm), the SPL measured with a microphone in the nearfield of the driver woofer could potentially vary quite significantly.
 - 3) Resonance will drop with surround exercise and the most significant drop will occur during the initial break in the test specimen is exposed to. The specs states “slowly raise the oscillator until maximum excursion is observed.” Depending on the surround material and drive level of the cone, measured resonance values can change (drop) by as much 10% within 20 repeated measurements. The time uncertainty will affect variability in some cases. Should the specification dictate a virgin cone (i.e., unexercised?)
 - There is no mention of required/recommended small signal parameters/non-linear capability (xmax), or power handling of the driver woofer. Further, certain parameters can change with time.
 - 5) Manual judgment of excursion/recording of frequency is subject to interpretation/error.
 - 6.2 Reporting. This section is full of highly manual operations that are probably never done in reality. Potential for human error/bias is high.
 - 6.2.3 Recommends reporting the mean and unbiased standard deviation (“sigma n-1”). A more useful statistic to report would be Cp or Cpk.