dBB SPL Meter - Technical Validation Summary

dBB SPL Meter was developed and tested to be accurate with current sound level meter standards. The intent was to have a highly accurate meter readout that could pair with a highly accurate audio interface and measurement microphone. The specific standards that dBB SPL Meter is verified to are:

- **IEC 61672-1** - the current international standard for sound level meters
- **ANSI/ASA S1.4-2014 / Part 1** - the current US national standard
- **ANSI S1.4-1983** - the predecessor US national standard, incorporated by reference in some US federal regulations

The Class 1 designation (IEC 61672-1 and ANSI/ASA S1.4-2014) is equivalent to Type 1 (ANSI S1.4-1983). Both define the tighter tolerance category for sound level meters intended for accurate field and laboratory measurements. There is also a Class 2 or Type 2 which offers a wider tolerance. If a device passes Class 1/Type 1 it would also pass Class 2/Type 2.

In the most basic sense, a sound level meter's accuracy for measuring decibel levels comes down to how accurately the meter measures and compares the audio source through A-weighting and C-weighting filters, which dBA and dBC are calculated from. Most metering types used for volume measurement are based on dBA and dBC, which is why getting these calculations correct is most important.

Testing Methodology

dBB SPL Meter's A-weighting and C-weighting filter implementations were validated against the standard frequency response curves at the 34 standard ISO 1/3 octave band center frequencies from 10 Hz to 20 kHz, tested at both 48 kHz and 96 kHz sample rates.

dBB SPL Meter Results for IEC 61672-1 Class 1 Verification

Measurement		48 kHz Testing	96 kHz Testing
Class 1 Pass Rate	**A-Weighting**	34/34 (PASS)	34/34 (PASS)
	C-Weighting	34/34 (PASS)	34/34 (PASS)
Average deviation, (20 Hz - 16 kHz)	**A-Weighting**	-0.016 dB	0.009 dB
	C-Weighting	-0.014 dB	0.008 dB
Average deviation, full band (10 Hz - 20 kHz)	**A-Weighting**	0.353 dB	0.034 dB
	C-Weighting	0.352 dB	0.036 dB
Maximum mid-band deviation		0.699 dB @ 8 kHz	0.158 dB @ 8 kHz

All 34 frequencies pass IEC 61672-1 Class 1 tolerance limits at both sample rates.

The larger full-band average at 48 kHz reflects expected digital filter rolloff as 20 kHz approaches the Nyquist frequency (24 kHz). The standard accounts for this digital filter behavior with appropriate tolerance at band edges. At 96 kHz, where Nyquist sits at 48 kHz, this rolloff effect is essentially eliminated.

Within the human hearing range (20 Hz to 16 kHz), measured filter accuracy is at the limits of measurement precision itself - an average deviation of 0.009 dB at 96 kHz is more than two orders of magnitude tighter than what most hardware Class 1 meters achieve.

For applications requiring maximum accuracy at the upper end of the frequency range, operation at 96 kHz or higher sample rates is recommended.

What this means & Limitations

dBB SPL Meter's software filter performance meets the tolerance requirements of IEC 61672-1 Class 1, ANSI/ASA S1.4-2014 Type 1, and ANSI S1.4-1983 Type 1 across the full measurement band when paired with appropriately calibrated hardware. Total measurement system accuracy in any deployment depends on the user's microphone and audio interface in addition to the software.

dBB SPL Meter is **validated software**, not a **certified hardware system**. Validation was performed by the developer, not by an accredited third-party laboratory. The plugin is appropriate for internal monitoring, engineering reference, educational use, acoustic consulting field measurements, and compliance contexts where the user's organization accepts validated software measurement. For formal regulatory enforcement requiring certified hardware (OSHA enforcement, court-admissible noise documentation), certified hardware instrumentation remains the appropriate primary measurement tool.

Validation results reflect software filter performance. Measurement accuracy in any specific deployment depends on the complete measurement system including microphone and audio interface. This document does not constitute certification, regulatory advice, or warranty.