

A quick overview of calibration

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What is calibration?

Equipment used to test the hearing or balance functions of patients often produce numerical data to describe the patient's status. For example, audiometric test equipment may produce data describing the patient's hearing threshold levels, expressed in the physical unit called "dB Hearing Level".

In order for the measured data to be reliable and usable for diagnostic purposes, it is important that the characteristics of the presented stimuli or the collected responses are correct within some well-defined tolerances. The physical properties of the transducers used as part of the test equipment (for example, the earphones) vary from one transducer to another, which would result in different stimulus levels or different recorded levels if not managed. To compensate for the variation in transducer properties, the signal generation- or data collection components of the test equipment often allow for adjustments. Alternatively, the deviations from the nominal values may be measured and recorded, allowing for manual compensation (if desired). Such adjustment or establishment of deviations is called calibration.

Calibration is not a once-in-a-lifetime event for an instrument. Over time, the physical properties of transducers may change due to material aging and wear and tear. Sudden changes in performance may be observed if the transducers are subject to rough handling, for example if they are relocated or dropped. In addition, most instruments also require calibration in cases where transducers are being replaced (unless the transducers carry built-in calibration data), and after repairs.

Why is calibration important?

The short answer is that the accuracy of the test results obtained for a patient directly depends on the correct calibration. The results of tests performed on patients may be used for various purposes, including the diagnosis of hearing and balance problems, fitting of hearing instruments and the determination of compensation in legal claims. For these reasons, various standards, organizations and government bodies¹ recommend or require that test equipment should be properly calibrated when the test results are to be used for the above purposes. Reimbursement for performing the tests may also depend on the equipment being maintained properly. Routine calibration on audiology equipment is normally recommended annually.

What is a good calibration?

As you might suspect, a successful calibration depends on two main factors: a qualified calibration/service technician, and the use of proper verified calibration test equipment.

A qualified and knowledgeable technician will be able to perform the required calibration procedures as prescribed by the instrument manufacturer, and he or she will also be able to spot any developing issues with the equipment before they turn into actual problems.

In order to be able to document that you have maintained your equipment, you will want to have a certificate issued after the calibration has been performed. The certificate should state all the parameters which have been verified and – if adjustments have not been performed - state the actual deviations from nominal parameter values.

¹Some examples: ENAC (Spain), MHRA (UK), MPBetreibV (Germany), NIOSH (USA) and OHS (Australia).

In many countries, the requirements to your hearing or balance test equipment are described in either IEC/ISO or ANSI standards, including the IEC 60645, the ISO 389 and the ANSI S3 series. Some countries have implemented slightly modified versions of these standards. Your calibration/service provider should be able to guide you on which of these standards to follow. The standards sometimes leave a few options for the clinic to choose; for audiometers this includes the method of equalization of speech signals.



As mentioned above, proper calibration of your equipment determines the quality of your test results. But the equipment used to perform the calibration must also be calibrated correctly with reference to recognized standards. A record of traceable calibration for such equipment should be maintained by your calibration/service provider.

Several pieces of verified measurement equipment are used for the calibration of hearing and balance equipment. For example, a Class 1 sound level meter and appropriate couplers are essential for audiometer calibration, while a pressure meter is required for tympanometer calibration.

What is your role in maintaining your test equipment?

Many issues with your test equipment may be found by performing some simple checks on a daily basis. For audiometers, you can find recommendations in ISO 8253-1, ANSI S3.6, and in local guidelines. Daily equipment checks should include cleaning and inspection of all accessories and cables; listening tests to verify that sound levels are approximately correct and that signals sound “clean”; and listening tests to verify that signals are stable and not subject to intermittency.

You should determine the intervals at which your equipment requires calibration and other services, International standards and national organizations provide recommendations. Natus Medical Inc. recommends an annual calibration, but the frequency should be increased if your equipment is subject to heavy use, harsh environments or frequent relocation.

Natus Medical Inc. recommends that your medical test equipment should be serviced by authorized providers only. Qualified technicians, using appropriate equipment, will help you maintain your medical devices and provide the service you want for your customers and satisfy local regulatory bodies and any other required compliance.

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