

## CSA Standard Z107.4-M86 Pure Tone Air Conduction Audiometers for Hearing Conservation and Screening

### Scope and Application:

This standard specifies requirements for pure tone air conduction audiometers used to determine the hearing threshold level of a person, compared with standard reference threshold levels. Audiometers are manual, automatic recording, or computer controlled. The scope of this standard does not include requirements for sweep-frequency audiometers and does not cover circumaural type earphones.

### Definitions:

- **Ambient Noise Level** - The sound pressure levels present at the individual's ear resulting from acoustical sources, but not test tones from an audiometer.
- **Audiogram** - A graphic or tabular presentation of the hearing threshold levels of a person's ears, as a function of frequency and following a specific method & conditions.

### Types of Audiometers:

- *Pure Tone Audiometer* - An electro-acoustic instrument equipped with earphones that provide pure tones of specific frequencies and sound pressure levels.
  - *Manual Audiometer* - A pure tone audiometer, where the range is at least 0-70 decibels (dB). The frequencies, hearing level selection, and recording of person's responses are done manually by a technician.
  - *Automatic Recording Audiometer* - A pure tone audiometer, where the signal presentations and frequency selections provided are continuous, and recorded automatically.
  - *Computer Controlled Audiometer* - A pure tone audiometer, where the test procedure is controlled by a computer.
- **Otologically Normal Person** - A person in a normal state of health; free from any signs and symptoms of ear disease and obstructions in the ear canal; and has no history of undue noise exposure.

It is recommended in the standard that a comparison be done on the current hearing threshold levels on one otologically normal subject with his/her previously recorded baseline audiogram. If the results do not differ by more than +/- 5dB at all frequencies, the audiogram is considered ready for use. If however, the results from this subject differ by more than +/- 5 dB, it is recommended that a second person be tested. If the second set of test results differs by more than +/- 5 dB, the audiometer needs to be recalibrated, as necessary, before further use.

### Pure Tone Audiometers

#### General Requirements:

- Frequencies of pure tones generated in Hertz (Hz) and hearing levels in decibels (dB);
- Audiometers must list the manufacturer's name, model, serial number, voltage, frequency & power consumed;
- If the audiometer is battery operated, ensure the battery is tested prior to use;
- Each earphone must have an earphone cushion. (Refer to section 4.2 of the standard for the earphone requirements);
- The headband must provide a satisfactory seal;
- The audiometer should not be exposed to shock;
- Audiometers at 105 to 125 Volts are designed for a power supply of 117 Volts;
- Ensure the audiometer does not vary more than 2 dB;

(Over)

(cont'd)

- When in the ambient temperatures range of 15 to 32°C, the audiometer does not vary more than 2 dB.

Specific Requirements:

- Test tones at frequencies are measured at 500, 1000, 2000, 3000, 4000, 6000 Hz;
- To ensure accuracy, each frequency must not vary more than 3%.

**Manual audiometers**

This type of audiometer has a tone switch for the presentation of the test tones. Refer to the standard for the specific requirements for the rise and fall time, and overshoot. The manual audiometers equipped with pulsed tones, the pulse sequence complies with the automatic recording audiometers requirements.

**Automatic recording audiometers**

This type of audiometer has a switch circuit for automatic pulsed presentations of the test tones. Refer to the standard for the specific requirements for the rise and fall time, overshoot, ON phase, repetition rate, and start-stop switch.

**Computer controlled Audiometers**

This type of audiometer requires the user to refer back to the manufacturer specifications for how the tones are presented to the subject, and the time available for correct response.

**Audiograms**

The results of hearing threshold measurements made with a pure tone audiometer are recorded as:

- A numerical tabulation, or
- In an audiogram.

**Correct calibration** of audiometers and related equipment is important for reliable test results. Refer to the standard for additional information on the maximum allowable ambient noise levels for audiometry rooms, and other unwanted sounds.

**This bulletin contains a summary of excerpts taken from the Standard, for general information purposes only. This bulletin is not reflective of the complete requirements that the Standard prescribes.**

Note: *Manitoba Regulation M.R. 217/2006 Section 1.4 inconsistency:*

If there is an inconsistency between this regulation and a requirement contained in a publication, code or standard referenced in this regulation, the provisions in this regulation prevail.