

THE NEW CSA Z94.2 STANDARD: HEARING PROTECTION DEVICES — PERFORMANCE, SELECTION, CARE, AND USE IS NOW PUBLISHED

Alberto Behar (Ryerson University) and Tim Kelsall (Hatch)
albehar31@gmail.com / tkelsall@hatch.ca

Abstract

One of the most widely referenced acoustical standards in Canada is CSA Standard Z94.2, “Hearing Protection Devices – Performance, Selection, Care, and Use”. CSA issued the 7th edition in 2015 and there have been significant changes. The standard still has the ABC system but adds significant discussion on NRR and SNR (SF84) including the appropriate methods and derating needed in estimating actual noise exposure from these descriptors. It also discusses “Field Attenuation Estimation Systems (FAES)”, which allow performance measurement on actual users. It also meshes with the new standard Z1007, Management of Hearing Loss Prevention Programs, which should be out in 2016.

1 Introduction

After 12 years there is now a new version of CSA Standard Z94.2, “Hearing Protection Devices – Performance, Selection, Care, and Use”. Here is how CSA describes the new standard:

“This is the seventh edition of CSA Z94.2, Hearing Protection Devices - Performance, Selection, Care, and Use. It supersedes previous editions published in 2002, 1994, 1984, 1979, 1974, and 1965.

This edition expands on performance requirements and the rating schemes that might help the user select hearing protection devices. It now includes the widely used noise reduction rating (NRR) and an applicable derating scheme.

This edition no longer includes physical performance and related testing requirements (such performance is no longer sought by Canadian users). It addresses acoustical performance measurements and includes revisions in the packaging marking requirements to clarify the use of the various ratings.

Clauses 8 to 12 regarding the selection, care, and use of hearing protection devices (HPDs) have been expanded to include issues related to style and functions of hearing protectors not mentioned in previous editions, as well as the potential use of field attenuation estimation systems (FAES). Table 4, which specifies the selection of HPDs based on noise exposure levels, now requires octave-band noise measurements at exposures greater than 105 dBA.

Although users of hearing protection devices are required to follow the criteria in Clauses 8 to 12 in order

projection obtained in the field. However, they have to be kept for different reasons: the NRR is very popular and, as requested by the EPA in the USA, every protector has to have it written in the package. As for the Class, it is mandated in the legislation of some provinces in Canada.

Data obtained using ANSI S12.6-1997, Method B are used to compute a new estimate, called the Single Number Rating (Subject Fit 84th Percentile), abbreviated SNR (SF84). SNR (SF84) is the protection provided at a nominal 84% confidence interval. For instance, a protector with SNR

(SF84) = 20, will provide 20 dB or more attenuation to 84% of the users in a well-run hearing conservation program. Calculations of the sound level of the protected ear using SNR (SF84) yields results much closer to what is obtained in the real world.

Procedures for the calculation of the three indices: Class, NRR and SNR (SF84) are included in the Standard.

Probably the most important sections for the user is Section 9 “Selection of Hearing Protection Devices” that provides guidance to persons using or preparing Hearing Protection Programs for a workplace. It gets into details of the different types of hearing protectors, their characteristics and applications. It touches subjects such as sound attenuation, attenuation at frequency extremes, double protection, overprotection, etc.

Section 9 deals also with the touchy issue of NRR and its derating. Derating is the procedure to obtain more realistic attenuation value of the protector. It is well known that NRR over-estimates real protection. Table 2 in the Standard provides directions on how to derate it, when using single and also double protection. In summary, the derating scheme is as follows:

For ear plugs - 50% of the nominal NRR

For ear muffs - 70% of the nominal NRR

For double protection (plug and muff) - 65% of the sum of the NRR that has the higher NRR +5 dB

Also, if the measurement of the environmental noise is performed in dBA, there is an additional 3 dB penalty (not the 7 dB as per NIOSH) based on updated typical industrial spectra.

Numerical examples are included to illustrate the procedure.

Section 10 “Specialized hearing protection devices” expands greatly the information provided in the previous standard and now covers devices using active noise control, flat frequency response, etc. to comply with this standard, reference should also be made to applicable local occupational health and safety regulations, which can require additional or superior performance.

The CSA Subcommittee on Hearing Protection recognizes that significant variations in performance (as great as ± 20 dB attenuation) can occur depending on how an HPD is used. This Standard emphasizes the importance of a comprehensive hearing loss prevention program, including hazard assessment and instruction on the careful selection, proper wearing, and high-quality maintenance of hearing protection devices. It is the opinion of the Subcommittee that wearing HPDs without proper selection, care, and use can result in significantly lower attenuation for the user than that obtained from the tests specified in this Standard.

This Standard should be used in conjunction with CSA Z1007, Management of Hearing Loss Prevention Programs, which is currently under development. CSA Z1007 covers all aspects of the creation and management of hearing loss prevention programs.”

2 The New Standard

Following are brief descriptions of some of the highlights of the standard:

“Test Procedures” requires tests to be performed following the procedures in any of the ANSI standards S3.19-1974 or S12.6-1997, Method B. The first of them was already required in the previous edition. It is included again, since it is needed for the calculation of the Class and the NRR of the protectors. Both descriptors usually overestimate considerably the

A brand new issue is treated in Section 13 “Field Attenuation Estimation Systems (FAES)”. NRR, Class and SNR (SF84) are obtained by calculations from results of test on many subjects and shouldn’t be applied to individuals. E.g., NRR = 20 doesn’t mean that every user will get 20 dB attenuation from using that particular protector. FAES, instead, is used to estimate the attenuation provided to an actual user of the protector. The result applies to that particular user at the time of the measurement.

FAES are becoming popular because of the speed and ease of their use and also because they can be useful for

training. For instance, a worker can be retested after the technician has explained the proper way of fitting the protector. At this time, most FAES are for ear plugs only. However, there are works in progress to extend their use for muffs too.

3 Certification

The issue of how to certify that a given hearing protector device meets the requirement of the Z94.2 standard is a very important one. However, CSA does not have at the present a process for certification of hearing protectors. In this present standard, certification is not a requirement. However, user may request from the manufacturer a document to ascertain that the results quoted, are obtained at a certified laboratory using standard procedures. Appendix C gives an example of how laboratory test results should be presented. The standard is written in a way to make it easy to include such a certification requirement in a future edition. Such a requirement would only be included if regulators, users and suppliers agree that there is a need for it.

4 Relation to Other Standards

Presently, CSA is involved in the writing of an all-encompassing standard, Z1007 - Hearing Loss Prevention Program Management. Hearing protection devices are an important part of this standard. Every effort was made to ensure that, although the emphasis of both standards is different, the technical content would still be the same.

5 In Summary

This new version of the standard provides more guidance to health and safety professionals by offering reliable, up-to-date information on hearing protection. The working group is hopeful that the new version will soon be mandated in provincial regulations, as the last version has been.