Acoustics Standards Activity In Canada
2004 Update And Invitation To Participate

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ABSTRACT

This article is an update for 2004 of Acoustics Standards activities in Canada, especially those of the Canadian Standards Association. CSA currently has 10 Acoustics Standards and three more with significant acoustics content. More than twice that number of acoustics standards from other organisations, such as ANSI and ISO, have been reviewed and either endorsed or adopted as suitable for use in Canada. We intend in the coming year to replace these with a major omnibus standard which will act as a guide on the contents and use of all these standards. Canadian acousticians are invited to contact the author to become more involved with the many acoustics standards activities currently underway in Canada.

SOMMAIRE

Cet article est une mise à jour des activités de normalisation en acoustique au Canada pour 2003, spécialement celles de l'Association canadienne de normalisation (ACNOR). L'ACNOR a présentement 10 normes acoustiques et 3 autres comportant un contenu acoustique important. Plus du double de ce nombre de normes provenant d'autres organisations telles que ANSI et ISO ont été revues et soit endossées ou soit adoptées comme étant acceptable pour une utilisation au Canada. Pour l'année qui s'en vient, nous avons l'intention de remplacer celles-ci par un recueil majeur de normes qui va agir à titre de guide sur leur contenu et leur utilisation. Les acousticiens canadiens sont invités à contacter l'auteur pour s'impliquer dans les nombreuses activités en rapport avec les normes acoustiques actuellement en cours au Canada.

1. INTRODUCTION

Recently the author became chair of CSA Technical Committee Z107 – Acoustics and Noise Control. This committee and its subcommittees look after all but one of the 11 Canadian Acoustics Standards (rhe exception is Z94.2 Hearing Protection Devices, which has its own technical committee). Z107 coordinates all Canadian acoustics standards activity, with representatives from Z94.2 and from Canada's international standards effort providing liaison to their activities. The major goals of this article are to inform Canadian acousticians of progress in Canadian Standards activities and to invite those who are interested to become more involved with these activities. Participation is an excellent way to stay in touch with progress in the field and meet those who are leading it in many fields. It is also one of the best ways to stay in touch with this fast moving field. Any acoustician interested in becoming involved with Acoustics standards in Canada is invited to contact the author or any of the subcommittee chairs.

2. COMMITTEE ACTIVITIES

2.1 Z107 Acoustics and Noise Control

The Z107 main committee meets once a year, during the Canadian Acoustics Week. Its executive, consisting of all the subcommittee chairs and representatives of other committees, meets in the spring. The main committee reviews progress by each subcommittee and votes on any new work proposals. The main committee is also the last technical hurdle for a standard before CSA editors put it into final form. The steering committee, to which the main committee reports, approves work and reviews completed standards, however they cannot make technical changes.

During the most recent executive meeting an initiative was started to more closely integrate Z107 and its subcommittees with the Standards Council's Canadian Advisory Councils for IEC TC 43 chaired by Stephen Keith. Specifically, this is one of several groups who review ISO and IEC acoustics standards and cast Canada's ballot for any draft international standards. The problem has always been to find sufficient people with the expertise to review all the diverse standards being reviewed. The Z107 solution for IEC TC43 would be to have each subcommittee chair assist Stephen in finding the most suitable member to assist with a particular standard. This initiative is still getting underway.

Another recent initiative is the development, under the guidance of Cameron Sherry, Editorial Subcommittee chair, of an omnibus standard which will replace the existing adopted and endorsed standards. The intent is to have a listing of all Canadian and International acoustics standards

recommended and reviewed by Z107 with a brief description of each standard and what it is for. CSA would reissue this document annually in an electronic format so that it is kept constantly up to date. The hope is that this document will provide Canadian acousticians with a definitive list of national and international acoustics standards from a Canadian perspective. For example, guidance would be given on the most appropriate building acoustics standards from ISO and ASTM within the Canadian context.

The main activities are within the Z107 subcommittees, which are responsible for the following standards:

Hearing Measurement, chaired by Alberto Behar, responsible for **CAN3-Z107.4-M86** Pure Tone Air Conduction Audiometers for Hearing Conservation and for Screening and **CAN/CSA-Z107.6-M90** Pure Tone Air Conduction Threshold Audiometry for Hearing Conservation

Vibration, chaired by Tony Brammer, which provides liaison between Z107 and the Technical Advisory Committee of Standards Council on ISO standards on vibration. Tony is active on the ISO group for ISO 2631, the definitive standard on measurement of whole body vibration.

Powered Machines, which no longer has standards of its own but recommends adopting or endorsing ANSI, SAE or ISO standards. Currently a search is underway for a chair. Otherwise the subcommittee will be disbanded.

Industrial Noise, chaired by Stephen Bly, is responsible for the following standards :

- **Z107.51-M1980 (R1994)** Procedure for In-Situ Measurement of Noise from Industrial Equipment. This standard is being replaced with a series of international standards, within the framework of the new Z107.58 standard.
- **Z107.52-M1983 (R1994)** Recommended Practice for the Prediction of Sound Pressure Levels in Large Rooms Containing Sound Sources. This standard is in need of major updating and a chair is being sought to do this work. The intent is to provide guidance to Canadian industry on how to design quiet plants. It is seen as building upon Z107.58, which provides advice on buying quiet equipment.
- **Z107.53-M1982 (R1994)** Procedure for Performing a Survey of Sound Due to Industrial, Institutional, or Commercial Activities. This standard will be replaced with ISO1996, which will be balloted shortly. A working group chaired by Chris Krajewski and including several Ontario consultants examined using 1996 as a way of updating the way tonal and impulse sounds are handled in community noise[1]. They have run several round robin tests of the procedures with sample sounds[2]. Stephen Keith of Health Canada is acting as liaison with the ISO committee. Unfortunately, ISO recently came out with a new standard, which will require a re-examination of how the new standard fits the Canadian context. Meanwhile, 1996 will be balloted for adoption as a Canadian standard, with the deviations to be balloted later.
- **CAN3-Z107.54-M85 (R1993)** Procedure for Measurement of Sound and Vibration Due to Blasting Operations. A working group, chaired by Ramani Ramakrishnan and Vic Schroter, is revising this standard. This activity is just getting started.
- **CAN/CSA-Z107.55-M86** Recommended Practice for the Prediction of Sound Levels Received at a Distance from an Industrial Plant. A joint CSA/ANSI working group co-chaired by Rich Peppin and Tim Kelsall is looking at ISO9613. This standard was originally written by an ISO working group chaired by Joe Piercy of NRC. It may ultimately replace or become the basis for a revised version of Z107.55, however the group has identified a number of shortcomings which need to be addressed. A new draft has recently been pulled together and is being reviewed. A recent meeting of this working group in Ottawa was standing room only.
- **Z107.56-94** Procedures for the Measurement of Occupational Noise Exposure is referenced in Federal and some provincial regulations and has been updated by a working group chaired by Alberto Behar. At the subcommittee meeting in June 2002 it was decided to remove all reference to a 5 dB exchange rate although Ontario and Quebec still use it. The subcommittee felt that this exchange rate was no longer technically defensible and that only the 3 dB exchange rate should be used. Consultation with the provinces is ongoing, but a recent request by Ontario to revisit this issue was overwhelmingly turned down by the subcommittee members. The Editorial Subcommittee is currently reviewing this standard before the latest revision goes to ballot.
- **Z107.58-2002** Guidelines For Machinery Noise Emission Declarations Levels was written by a group chaired by Stephen Bly and was published[3] in 2003. It is a voluntary guide on noise emission declarations for machinery to be used in Canada and is compatible with European regulations to allow Canadian machinery to be sold into that market. It is intended to help workplace managers (purchasers) to purchase quieter machinery and plan noise control strategies. It does so by enabling manufactureres to formally provide sound-level data in an agreed format.

A Noise Emission Declaration is a statement of sound levels produced by equipment, which would usually be included with the instruction or maintenance manual. Measurements are made according to ISO standards and include estimates of the likely variability of the measurements. Canada recommends use of a declaration stating the level and uncertainty as two numbers, although in some cases they may be added together into a single number.

In addition, the Industrial Noise subcommittee undertakes reviews of proposed federal and provincial regulations, often at the request of the regulators, and other activities affecting industrial noise.

Transportation Noise, chaired by Soren Pedersen, is responsible for **CAN/CSA-Z107.9-00:** Standard for Certification of Noise Barriers. This standard is an adaptation of the Ontario MTO Highway Noise Barrier specification. It provides municipalities, developers, road and highway departments, railways and industry with a standard specification which can be used to define the construction of barriers intended to be durable enough for long term use in Canadian conditions.

Manufacturers and their specific barrier designs are certified as complying with the standard in such areas as: plant facilities, design concept, materials used, quality control, durability, and acoustical performance.

In addition, each barrier installation is reviewed and certified for compliance with such items as structural and foundation design, quality assurance, field assembly and installation.

The US Department of Transportation, Federal Highway Administration, Highway Noise Barrier Design Handbook is already harmonized with the CSA standard, as is the Ontario Provincial Standard, and numerous US state transportation agencies, making this the de-facto standard for barriers across North America.

Editorial, chaired by Cameron Sherry, (which reviews all proposed standards) and is responsible for reviewing and endorsing ANSI S1.1-1994 Acoustical Terminology. They are currently reviewing the latest revision to Z107.56. In addition, they will be the main group pulling together the omnibus standard from input by each subcommittee chair. Cameron is actively looking for new members to assist in this work and can be contacted directly or through the author.

Building Acoustics, chaired by David Quirt, does not have its own standards, but review other standards from a Canadian viewpoint, mostly from ASTM and ISO. The immediate task is review of endorsed standards on building acoustics (a large part of the current Z107 list) and preparation of appropriate entries for the new Z107 omnibus document. David Quirt is also chair of the Standards Council of Canada Steering Committee for ISO TC 43 SC2, Building Acoustics.

Instrumentation and Calibration, chaired by George Wong, which liases with Canadian activities on ANSI, IEC and ISO instrumentation standards and provides recommendations on Canadian use of these standards. They have been actively involved in ongoing work to prevent changes to the A-weighting at the international level. This subcommittee is harmonised with the Standards Council of Canada Steering Committee for IEC Acoustical Instrumentation standards, TC29.

Liaison with the Canadian Steering Committee for ISO TC43 (Acoustics) and TC43(1)(Noise), chaired by Stephen Keith provides Canadian comments and votes on ISO standards and coordinates the work of Canadian representatives on several ISO working groups. The Steering committee is run by the Standards Council of Canada and is harmonised with the Z107 committee to which Stephen reports regularly on progress. Draft international standards are provided on a private website to which members have access in order to review them and recommend Canada's position. Stephen is working closely with Z107 to expand the pool of reviewers.

2.2 Z94 – Hearing Protection

The second CSA Acoustics Standards Committee, Z94 is responsible for a single standard, the Hearing Protection Standard Z94.2 which defines Type A, B, and C type hearing protectors and is widely referred to in Canadian occupational noise regulations. They have recently approved a major new version of this standard in light of changes to the ANSI hearing protector standards and procedures. This will mean the introduction of user-fit hearing protector measurements, similar to those used by ANSI and now recognized as being more representative of how hearing protectors are used in practice than the old technician-fitted testing methods. This standard also has extensive information for users on how to select and use hearing protection.

3. Canadian Acoustics Standards

Table 1 shows all the Canadian Standards currently in force and also lists three standards with significant acoustical content. This table will also soon be found at the CAA website and will be kept up to date there. Meanwhile the list can be found at
http://www.csa-intl.org/onlinestore/GetCatalogDrillDown.asp?Parent=430
although at the time of writing, the following list was more up to date.

There are also 24 acoustics standards from ANSI, ISO and ASTM endorsed by Canada. They are listed in Table 1 following the CSA standards.

Table 1- CSA Acoustics Standards

CAN3-Z107.4-M86 Pure Tone Air Conduction Audiometers for Hearing Conservation and for Screening / Audiomètres tonals à conduction aérienne pour la préservation de l'ouïe et pour le dépistage

CAN/CSA-Z107.6-M90 Pure Tone Air Conduction Threshold Audiometry for Hearing Conservation

CAN/CSA-Z107.9-00: Standard for Certification of Noise Barriers

Z107.52-M1983 (R1994) Recommended Practice for the Prediction of Sound Pressure Levels in Large Rooms Containing Sound Sources

Z107.53-M1982 (R1994) Procedure for Performing a Survey of Sound Due to Industrial, Institutional, or Commercial Activities (soon to be replaced by ISO 1996).

CAN3-Z107.54-M85 (R1993) Procedure for Measurement of Sound and Vibration Due to Blasting Operations / Méthode de mesure du niveau sonore et des vibrations émanant des opérations de dynamitage

CAN/CSA-Z107.55-M86 Recommended Practice for the Prediction of Sound Levels Received at a Distance from an Industrial Plant / Pratique recommandée pour la prévision des niveaux sonores reçus à une distance donnée d'une usine

Z107.56-94 Procedures for the Measurement of Occupational Noise Exposure / Méthode de mesure de l'exposition au bruit en milieux de travail

Z107.58-2002 Guidelines For Machinery Noise Emission Declarations

Z94.2-02 • Hearing Protection Devices - Performance, Selection, Care, and Use / Protecteurs auditifs

Standards with Acoustics Component:

Z62.1-95 Chain Saws
CAN/CSA-Z412-M00 Office Ergonomics / L'ergonomie au bureau
CAN/CSA-M5131-97 (R2002) Acoustics - Tractors and Machinery for Agriculture and Forestry - Measurement of Noise at the Operator's Position - Survey Method (Adopted ISO 5131:1996)

Endorsed Standards

ANSI S1.1-1994 Acoustical Terminology(R1999)
ANSI S1.4-1983 Specification for Sound Level Meters (R2001)
ANSI S1.11-1986 Specifications for Octave-band and Fractional (R1998) Octave-band Analog and Digital Filters
ANSI S1.13-1995 Measurement of Sound Pressure Levels in Air (R1999)
ANSI S12.31-1990 Precision Methods for the Determination of (R1996) Sound Power Levels of Broad-band Noise Sources in Reverberation Rooms
ANSI S12.32-1990 Precision Methods for the Determination of (R1996) Sound Power Levels of Discrete-frequency and Narrow-band Noise Sources in Reverberation Rooms
ANSI/ASTM Standard Test Method for Sound Absorption and C423:00 Sound Absorption Coefficients by the Reverberation Room Method
ANSI/ASTM Standard Test Method for Laboratory E492-90 (1996) E1 Measurement of Impact Sound Transmission Through Floor-ceiling Assemblies Using the Tapping Machine
ASTM C384-98 Standard Test Method for Impedance and Absorption of Acoustical Materials by the Impedance Tube Method
ASTM E90-99 Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements
ASTM E336-97 Standard Test Method for Measurement of Airborne Sound Insulation in Buildings
ASTM E596-96 Standard Test Method for Laboratory Measurement of the Noise Reduction of Sound-isolating Enclosures
ASTM E795-00 Standard Practices for Mounting Test Specimens During Sound Absorption Tests
ASTM E966-99 Standard Guide for Field Measurement of Airborne Sound Insulation of Building Facades and Facade Elements
ASTM E989-89 Standard Classification for Determination of (1999) Impact Insulation Class (IIC)
ASTM E1007-97 Standard Test Method Field Measurement of Tapping Machine Impact Sound Transmission Through Floor-ceiling Assemblies and Associated Support Structures
IEC 60651-2001 Sound Level Meters
ISO 4872-1978 Acoustics – Measurement of Airborne Noise Emitted by Construction Equipment Intended for Outdoor Use – Method for Determining Compliance with Noise Limits
ISO 6393:1998 Acoustics – Measurement of Exterior Noise Emitted by Earth-moving Machinery – Stationary Test Conditions
ISO 6394:1998 Acoustics – Measurement at the Operator's Position of Noise Emitted by Earth-moving Machinery – Stationary Test Conditions
ISO 6395-1988 Acoustics – Measurement of Exterior Noise Emitted by Earth-moving Machinery – Dynamic Test Conditions
ISO 6395:1998 Acoustics – Measurement of Exterior Noise Emitted by Earth-moving Machinery – Dynamic Test Conditions – Amendment 1
SAE J919-1995 Sound Measurement – Off-road Work Machines – Operator Singular Type
SAE J1096-2000 Measurement of Exterior Sound Levels for Heavy Trucks under Stationary Conditions

References :

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2. William J. Gastmeier and James L. Fielders, ISO 1996 Acoustics – Description and Measurement of Environmental Noise Round Robin Testing, Canadian Acoustics, Volume 29, No. 3, September, 2001 presented at CAA Conference 2001
3. Stephen Keith, Stephen Bly, Tim Kelsall, A preview of the Draft CSA Guideline – Noise Emission Declarations for Machinery, Canadian Acoustics, Volume 29, No. 3, September, 2001