

## ACOUSTICS STANDARDS ACTIVITY IN CANADA 2005 UPDATE AND INVITATION TO PARTICIPATE

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### ABSTRACT

This article is an update for 2005 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 involved with the many standards activities, currently underway in Canada and on behalf of Canada around the world.

### SOMMAIRE

Cet article est une mise à jour des activités de normalisation en acoustique au Canada pour 2005, 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 et pour le Canada parcourant le monde.

## 1. INTRODUCTION

Technical Committee Z107 – Acoustics and Noise Control and its subcommittees look after all but one of the 10 Canadian Acoustics Standards (the exception is Z94.2 Hearing Protection Devices, which has its own technical committee). Z107 also 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 involved with these activities. Participation is one of the best ways to stay in touch with this fast moving field and an excellent way to meet the leaders in the many acoustic fields. Any acoustician interested in becoming involved with Acoustics standards in Canada is invited to contact the author or any of the subcommittee chairs. Most chairs welcome newcomers willing to work. The following is an overview of the areas involved.

## 2. Z107.10 OMNIBUS STANDARD

The most important progress made by Z107 is the drafting by Cameron Sherry and his Editorial Subcommittee of Z107.10,

Guide For The Use Of Acoustical Standards In Canada, a new omnibus standard. The first draft is being balloted this fall, less than a year after drafting commenced, which is acknowledged as a new speed record for writing an acoustics standard. One reason for this is that most of the drafting was done by the committee chairs responsible for the various acoustics standards of concern to Z107. Another is that the standard is designed to be easily updated each year and will be published electronically to expedite this.

The standard summarises all acoustics standards for which Z107 has an interest, including CSA standards, as well as the ISO, ASTM, ANSI, IEC standards that Z107 considers of importance to Canada. This gives the reader a single source for information relating to Acoustics standards of interest to Canada, including those referred to by regulations and guidelines within Canada.

The following is an example of the contents of the standard:

**ASTM E492**, Test Method for Laboratory Measurement of Impact Sound Transmission Through Floor-Ceiling Assemblies Using the Tapping Machine. This test method covers the procedures for laboratory measurement of impact sound transmission of floor-ceiling assemblies, using

a standardized tapping machine. It is assumed that the test specimen constitutes the primary sound transmission path into a receiving room located directly below. Measurements may be conducted on floor-ceiling assemblies of all kinds, including those with floating-floor or suspended ceiling elements, or both, and floor-ceiling assemblies surfaced with any type of floor-surfacing or floor-covering material. The corresponding single-figure rating is the impact insulation class (IIC), which is determined according to ASTM E989.

Architects, builders, and code authorities can use the IIC rating for acoustical design purposes, to specify the attenuation of sound from impacts due to footsteps for specific building constructions. The use of IIC to define the required impact sound insulation is recommended in the National Building Code of Canada, but is not mandatory.

The above example shows an entry for a typical standard from elsewhere which is endorsed for use in Canada. It describes the standard, its results and the relevance in a Canadian context.

The omnibus standard is breaking new ground for CSA by streamlining the way in which acoustics standards from other organisations are reviewed and approved in Canada. Before, it was necessary to consider and ballot each standard separately. Each would then be re-examined in 5 years. With this new approach, each endorsed standard is reviewed and re-approved annually. Given the speed with which ISO and other groups are changing standards, this new approach is not only convenient, it is essential.

### 3. COMMITTEE ACTIVITIES

#### 3.1 Z107 Acoustics and Noise Control

The Z107 main committee meets once a year, during the Canadian Acoustics Week conference in October. 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.

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.

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

- **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.
- **Z107.56-94** 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. A new draft indicates that the primary measurement method should be to use a 3 dB exchange rate, but a method using a 5 dB exchange rate is still provided to be useful to Ontario and Quebec. Final editing by CSA is now in progress before the latest revision goes to ballot.
- **Z107.58-2002** Noise Emission Declarations for Machinery was written by a group chaired by Stephen Bly and was published<sup>3</sup> in 2002. It became a National Standard of Canada 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 manufacturers 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 and in technical sales literature. Measurements are made according to ISO standards and include estimates of the likely variability of the measurements. Canada recommends use of either a declaration stating the level and uncertainty as two numbers, or adding them 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.

**Environmental Noise**, chaired by Bill Gastmeier is taking over responsibility for standards which have been part of Industrial Noise, Transportation Noise and Powered Machines. These include:

- **Z107.53-M1982** (R1994) Procedure for Performing a Survey of Sound Due to Industrial, Institutional, or Com-

mercial Activities. This standard will be replaced with the new ISO1996-2, which will be balloted shortly. A working group chaired by Chris Krajewski and including several Ontario consultants examined using the ISO 1996 series that existed prior to 2003 as a way of updating the way tonal and impulse sounds are handled in community noise<sup>1</sup>. They have run several round robin tests of the procedures with sample sounds<sup>2</sup>. Stephen Keith of Health Canada is acting as liaison with the ISO committee. However, ISO recently came out with a new standard, which will require a re-examination of how the new standard fits the Canadian context. Meanwhile, the most recent versions of ISO 1996 have been adopted without change as Canadian standards, with any needed 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 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.
- **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.

This group is also responsible for endorsing standards on powered machines and vehicle noise.

**Editorial**, chaired by Cameron Sherry, (which reviews all proposed standards) and is responsible for reviewing and  
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endorsing ANSI S1.1-1994 Acoustical Terminology. They recently reviewed the latest revision to Z107.56. In addition, they were 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. They recently were reviewing endorsed standards on building acoustics (a large part of the current Z107 list) and preparing 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:** George Wong, is the chairman (and the CSA liaison) for the SCC Canadian Subcommittee of IEC/TC 29: Electroacoustics. This group deals with all instrumentation pertaining to acoustical measurements, such as WG 4: Sound level meters; WG 5: Microphones; WG 10: Audiometers; WG 13: Hearing aids; WG 17: Sound calibrators; WG 21: Ear simulators; and maintenance teams (MT) MT19: Filters; and MT20: Hearing aids induction loops. All of the above international Working Groups have Canadian members, with calibration and measurement data supported by the Institute for National Measurement Standards of the National Research Council of Canada.

**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 and actively seeking new volunteers.

### 3.2 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.

## 4.0 CANADIAN ACOUSTICS STANDARDS

The following list 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.

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 Noise Emission Declarations for Machinery 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

## 5.0 REFERENCES

1. C. Krajewski, Rating Sound Level- An Overview of Amendment 1 to ISO 1996-2, Canadian Acoustics, Volume 29, No. 3, September, 2001.
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.

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