

Air Conditioning Device Noise Control: Ontario Model By-law and Toronto By-Law

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Introduction

The Ontario Ministry of the Environment and Energy created an ad hoc advisory committee to develop modifications to the model municipal noise control by-law regarding noise from air conditioners and heat pumps. Members included representatives from local and provincial government, Ontario Hydro, Toronto Hydro, builders, a consumer association, manufacturers, installers and consultants. Over the past five years they struggled with the issues of sound level limits, enforcement and installation guidelines. The outcome was a comprehensive model noise by-law and a detailed guide for the installation of units including checklists for both the installer and the enforcement agency. The City of Toronto sat on the committee but pursued a different approach, partly due to the existence of their own noise control by-law which had been in use for several years. The City examined changes to their by-law in light of the work by the Committee. The paper summarizes the background and details of the two noise control documents.

History and Philosophy

The Ontario Ministry of the Environment and Energy updated its noise guideline entitled "NPC-116 Residential Air conditioners" which was part of the Model Municipal Noise Control By-Law issued in 1978. This was part of a general updating of a number of documents in the by-law. The new document entitled "NPC-216 Residential Air Conditioning Devices" was finalized in 1993 after five years of work by an advisory committee formed as the result of a symposium in 1988.

The revisions to the document followed the general philosophy of the other NPC series guidelines. This includes setting sound level limits for stationary sources on an hourly basis related to the ambient sound environment. The source descriptor is the energy equivalent sound level (Leq) and the limit is set for the source alone. The noise control guidelines are intended to be used mainly for enforcement but are useful also for design of new installations.

Recently, the ambient sound environment has been categorized by the use of "class area" designations.

The City of Toronto passed its comprehensive noise by-law (44-75) in 1975, preceding that of MOEE by three years, but the background work of each group overlapped somewhat. With respect to air conditioning devices which fell under the "source equipment" category, the philosophy was to limit the amount by which the ambient could be raised due to the source contribution. The descriptor is the L90. Thus it is not necessary to identify the sound level of the source alone in a complaint investigation, only the increase due to the source. The by-law was intended as an enforcement tool.

Sound Level Limits

The Province deals only with urban areas at present and sets both a general sound level limit and specific sound level limits. The more lenient in any situation applies. In addition, a sound emission limit is also given. The

general sound level limit is 5 dBA greater than the ambient due to road traffic. This applies to a one hour period between 7 a.m. and 9 p.m., the specific time to be determined by the noise control officer. This limit was set as a result of a survey conducted during daytime and evening hours. Even though complaints may originate at night, the annoyance threshold was found to be 5 dBA over the day/evening sound environment.

Specific hourly sound level limits are 50 dBA in Class 1 areas (major population centre), 45 dBA in Class 2 areas (urban with quiet evening) and 55 dBA in areas for which air conditioning was a mandatory noise control requirement for new developments.

The sound emission limits apply to manufacturers and are 8.0 bels ARI Sound Rating for units built in 1991 and 7.6 bels for units built after that. It applies to 3.5 ton central units and smaller. No provincial limits apply to units made before 1991.

The City of Toronto originally set an allowable L90 increase of 2 dBA in any one hour period. The latest revision has changed this to an L90 increase of 5 dBA in any time period. In essence, this means that the source cannot produce more than the L90 plus 3 dBA where previously it was the L90 less 2 dBA. It is also proposed to set a sound emission limit.

Compared to the provincial limits, the City felt that certain areas of the City would require limits lower than the provincial minimum of 45 dBA. For other areas where ambients are higher, the limits are generally more stringent under the City by-law than the provincial.

Enforcement

During a complaint investigation, the provincial model by-law requires various measurements. To be most efficient, a procedure is given whereby the ambient is measured (20 minutes minimum) and then a short (less than one minute) measurement with the unit in operation is taken. If the combined level does not exceed the limit, no further measurements are needed. If so, additional measurements with the source in operation (20 minutes minimum) are required. In all cases, the investigator must inhibit sounds other than that of road traffic and the source in question. Calculations are then done to separate the source from the ambient and to determine the magnitude of the excess, if any.

The City is required only to take measurements with and without the source operating. The time period is at the discretion of the investigator. Since the L90 setting is used, there is no need to inhibit other sounds. A simple subtraction identifies an excess of not.

Design

Because the Province has used road traffic Leq as the ambient, it is possible for designers to calculate the ambient sound level for a given installation. Alternatively, the specific limits could be used as a

conservative approach, provided the area can be appropriately categorized by class designation. Or, field measurements could be conducted.

In the City, the L90 is difficult to estimate or calculate and monitoring is probably the only solution. The City provides data from their monitoring program to assist in this regard. However, a generally more stringent limit would be set than for Provincial limits because the time period of investigation is 24 hours a day.

Installation

The MOEE has produced a set of installation guidelines to accompany NPC-216. The guidelines include a checklist for installers to use at the time of sale. It enables the appropriate bel rating to be determined in order to comply with the sound level limit. In addition, the guideline discusses other alternatives if the conventional air cooling condensing unit alone does not meet the limit.

The City of Toronto considered and rejected a permit system for air conditioners. Instead, it encourages discussion and education in order to deal with potential problems at an early stage. After the fact, City inspectors have offered guidance in providing solutions to complaints.

Summary and Conclusion

Two different approaches have been taken to air conditioner noise control; that being the sound descriptor, time of measurement and duration of measurement. Both are workable but require the use of properly trained noise control officers. This is necessary to accommodate the varying ambient sound levels which occur in urban areas.

As by-laws, they are primarily oriented to enforcement but by the fact that specific limits are given they are also useful to designers of new installations.

References

1. "Environmental Noise Guidelines for Installation of Residential Air Conditioning Devices", Advisory Committee on Air Conditioner and Heat Pump Noise, MOEE, June 1993
2. "Residential Air Conditioning Devices", Publication NPC-216, MOEE, 1993
3. Report to the City of Toronto Services Committee on Noise By-Law Review and Amendments by the Commissioner of Public Works and the Environment, April 21, 1993