QUALIFICATION OF THE DEGREE OF ACOUSTIC COMFORT IN MULTI-FAMILY BUILDINGS

Introduction

While all occupants of multi-family buildings may insist on the right to live peacefully at home without having to worry about bothering or being bothered by the neighbours, few of them can objectively describe the acoustic privacy of their dwelling. To most people, acoustic comfort is a vague concept that becomes clear only when they are dissatisfied. The vocabulary that builders use to describe the acoustic comfort from which future tenants will benefit is just as inadequate; they often refer to "superior" soundproofing, which is very difficult to define in a legal context when occupants are not satisfied and turn to the courts to exercise their rights.

Numerous research projects funded by CMHC during the 1980s and 1990s made it possible to considerably expand the construction industry's knowledge with regard to the principles associated with the transmission of noise produced by human activity, plumbing and mechanics inside multi-family buildings and to the techniques available to reduce this transmission. The NRCC also received a grant from CMHC to carry out a Canada-wide research project in order to establish a correlation between people's subjective perception of the sound insulation procured by their dwelling and the objective measurement of this same insulation using a recognized standard.

In Canada and other countries, there are construction regulations and standards that concern the acoustic comfort of housing occupants. There also exist standards for measuring the fading of airborne and impact noises (ASTM and ISO). However, measurements taken in strict compliance with these standards can be costly and are not within everyone's means. Furthermore, these measurements may not be the best tool when used to control or evaluate the overall quality of a building.

Research Context

The objective of this study was to provide the construction industry with a reliable tool to evaluate the degree of acoustic comfort of dwellings.

The first problem that condominium builders and buyers face is determining the degree of sound insulation that each unit should provide. Of course there are the STC55 and IIC 65/55 criteria developed by CMHC (Quebec regional offices) in the early 1980s, which are used as standards in the construction industry, but there are no criteria governing the transmission to dwellings of noise produced by plumbing, garbage chutes, elevators, garage doors, etc.

The sound insulation objectives that are set must take into consideration not only the population's expectations but also the structural, spatial, budgetary and practical constraints to which all construction projects are subject. A good number of these constraints have been defined in previous research projects done for CMHC. It is by taking into account the results of these research projects that the acoustic comfort criteria and objectives were established during the first phase of the current research project. This project also outlines a systematic method to objectively evaluate the level of acoustic comfort provided by a housing unit in order to be able to produce a written evaluation that could be given to the builder, the buyer or the financial institution.

SOUND INSULATION OBJECTIVES TO ATTAIN IN MULTI-FAMILY BUILDINGS

The sound insulation objectives that the study suggests are summarized in Table 1 below. The reasons behind the choice of these objectives are clearly presented in the research report.

MEASURED DATA	OBJECTIVE
Exterior noise, Leq(A)(5min)	<=55
Interior ambient noise, Leq(A)(5min)	<=33
STC or Da, inter-unit wall	>=55 (with TL at 125 and 160 Hz >= 35)
STC or Da, corridor wall, exit stairwell	>=55
IIC or TMR (hard floor) inter-unit	>=55 (IIC) or >=50 (TMR)
IIC or TMR (carpet) inter-unit	>=65
IIC or TMR (lateral transmission - exit stairwell)	>=55 (IIC) or >=50 (TMR)
STC access door (1)	>=25 or >=35 if the door opens onto the entrance hall or an elevator hall
Leq(A) plumbing	<=33
Leq(A)(5 cycles) garage door	<=34 if concrete structure
Leq(A)(5 cycles) garage door	<=38 if wood structure
Leq(A) condenser or water tower	<=33
L(Max)35ms elevator	<=33
L(Max)35ms garbage chute	<=33

CONTRIBUTION TO MULTI-FAMILY CONSTRUCTION SECTOR

The first phase of this research project is an attempt to develop a method to evaluate the degree of acoustic comfort provided by housing units in multi-family buildings. The available knowledge on the subject was compiled and used to establish sound insulation objectives to be attained in multi-family construction. An evaluation protocol was also developed to allow an economical classification of each housing unit forming part of a multi-family complex.

Project Manager: Jacques Rousseau

Research Report: Qualification Of Degree Of Acoustic Comfort In Multi-Family Buildings, 1996

Research Consultant: MJM Consultant en Acoustique

A full report on this project is available from the Canadian Housing Information Centre at the address below.

Housing Research at CMHC

Under Part IX of the National Housing Act, the Government of Canada provides funds to CMHC to conduct research into the social, economic and technical aspects of housing and related fields, and to undertake the publishing and distribution of the results of this research.

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