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RESEARCH PROJECT ON THE NOISE ISOLATION PROVIDED BY ACCESS DOORS IN MULTI-DWELLING BUILDINGS

MJM Acoustical Consultants Inc., Montreal, February 1993

Executive Summary

MJM ACOUSTICAL CONSULTANTS NC. Has been retained by the Canada Mortgage and Housing Corporation to conduct a research project on the noise isolation provided by access doors in multi-dwelling buildings. A total of nine Sound Transmission Loss (TL) tests were conducted on four 1 3/4" doors (one wood door and three metal doors) and one 2 1/4" wood door.

This research project has also been used as a preliminary attempt to validate a simple method to measure the Sound Transmission Loss and Sound Transmission Class of a door when it is installed on site. With one exception, the STC obtained using this method correlated within 1 STC point with those obtained in laboratory.

The analysis of the results of the tests indicates that:

- The Sound Transmission Class of the doors tested in this study varied from STC 27 to STC 32 when operable and from STC 31 to STC 37 when sealed to their frame.
- It appears that installing double perimeter gaskets and bottom seals on the 2 1/4 in. wood door and on the metal doors tested would improve the noise isolation which they provide. This can be achieved most easily by installing one seal between the door frame or sill and the door, and a second gasket on the door stop in the case of the perimeter seals and on the door in the case of the bottom seal. When equipped with double perimeter and bottom seals, it is estimated that the STC rating of the above mentioned doors would be superior to STC 30 when operable.
- Replacing a 1 3/4 in. door by a 2 1/4 in. wood door could lead to a maximum improvement of 2 STC points. Replacing a 1 3/4 in. solid core wood door with

a 1 3/4 in. hollow core metal door could lead to a maximum improvement of up to 8 STC points.

- Filling the core of a 1 3/4 in. metal door with mineral fibre (1 psf) improved the 1/3 octave sound transmission loss of the doors by 2 to 9 decibels at frequencies above 1250 Hz, and resulted in an improvement of 1 STC point; below 1250 Hz no improvement was noticeable.
- When operational, the sound rated door supplied by BUMEDA provided a Sound Transmission Class of 32, which, although 4 points inferior to its rating of STC 36, is the highest Sound Transmission Class obtained by the operable doors tested in this study. When sealed to its frame, the Transmission loss curve of the rated door was comparable to that of the metal door of same thickness constructed with 18 Ga. sheet metal, with the core filled using mineral fibre. This suggest that the better performance obtained by the rated door when compared to the operable filled metal door is mainly due to the better performance of its perimeter and bottom gaskets.
- In multi-dwelling buildings where the corridors are pressurized, it is recommended that an opening above the door be put in place and treated with a piece of lined duct or a silencer providing an insertion loss consistent with that of the door. Based on the TL provided by the best operable door measured in this study (STC 32), and taking into account a ventilation surface of roughly 36 sq inch (corresponding to a 1" gap at the bottom of the door), the approximate insertion loss required has been estimated as follows:

Frequency	125	250	500	1K	2K	4K
Insertion Loss	5	10	15	15	15	15