Research & Development Highlights

Technical Series
93-2 11

Access Doors as Sound Barriers in Multiple-unit Buildings

Introduction

Access doors in multiple-unit buildings serve several functions. They provide security and offer some fire resistance. Access doors are also sound barriers, although their effectiveness varies.

Research Program

This factsheet summarizes the results of a project that looked at the soundproofing qualities of access doors installed in low- or medium-cost multiple-unit buildings.

Tests were conducted on five different door assemblies. The project examined the soundproofing of the door itself compared with the soundproofing of the perimeter and bottom gasketing. This comparison was done by testing the doors in two modes: as normal (operable) doors and sealed to their frame.

The project also tested a simple method to measure the sound transmission loss and sound transmission class (STC) of doors installed on site.

Findings

Solid core wood door, *4.5* cm (1¾"): The most economical access door that meets building code requirements is a 4.5 cm (1¾") thick solid door with a particleboard core and high-density masonite laminated surfaces. These doors usually come premounted in frames equipped with perimeter sound gaskets and bottom seals.

Among the doors tested, this door was one of the least effective at blocking noise. Adjusting or replacing the perimeter and bottom gaskets would improve its performance only marginally.

Solid core wood door, *5.7* cm (2¼"): Many builders believe that installing a thicker door will improve sound isolation. Testing, however, showed that this is not the case. When sealed to the frame, the *5.7* cm *(2¼")* solid core wood door provided only slightly better performance than the *4.5* cm (1¾") door. When both doors were operable, their STC rating was identical.

Filled metal door, 4.5 cm (1¾"): The STC rating and transmission loss results for the filled metal door were comparable to those of the wood doors. When the metal door was sealed to its frame, however, it produced significantly better results. This suggests that improving the gasketing would improve this door's performance.

Filled vs. hollow core metal doors, *4.5* cm (1¾"): When the sound isolation characteristics of a hollow core *4.5* cm (1¾") metal door were compared with those of a similar metal door with mineral fibre added to the cavity, the filled door performed slightly better.

Sound- and fire-rated door, *4.5* cm (1¾"): Some development projects specify sound-rated doors for which the manufacturer certifies an STC rating.

The door selected for testing was rated as STC 36. When operable, it achieved an STC of 32. When sealed, its tested STC rating of 37 was comparable to that of the filled metal door. This suggests that the double perimeter gaskets and bottom seal installed on the sound-rated door significantly improved its performance.

Perimeter and bottom sound gasketing: The results of these tests indicate that the acoustical performance of the perimeter and bottom gaskets can help improve the sound isolation performance of the door assembly. Where the difference in sound performance between sealed and operable tests for the same door is greater than *5* STC points, the performance of the operable door could be improved by doubling the gaskets at the perimeter and bottom of the door. With double perimeter and bottom seals, almost all of the doors tested could achieve STC ratings of 30 or better.

Fresh-air intake: A recent trend is to pressurize corridors in multiple-unit buildings. This system confines odours inside dwellings, supplies fresh air and compensates for the air exhausted by bathroom and kitchen fans and clothes dryers. Leaving a gap at the bottom of the access door to allow air in from the corridor to the dwelling diminishes the door's soundproofing ability. Testing showed that it is more effective to leave an opening above the door and treat it with a piece of lined duct or a silencer that provides an insertion loss consist-

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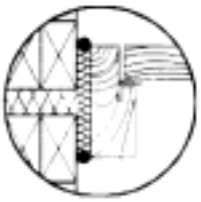
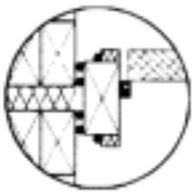
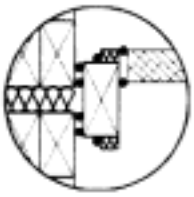
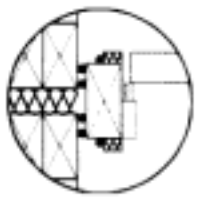
ent with the noise isolation provided by the door.

Simplified on-site sound isolation measurement method: The method normally used in the field to determine the sound isolation performance of an access door is often awkward and expensive. The consultant for this project developed and verified a simpler procedure that generally produced results that were within 1 STC point of those produced in the laboratory. The procedure is described in detail in the research report.

The doors tested. their STC values and corresponding price at the time of the project are listed in the chart.

Description	STC value Operable door	STC value Sealed door	Price	Cross Section of Operable door
4.5 cm (1¾") wood door	28	31	$142.75	
5.7 cm (2¼") wood door	28	33	$214.75	
4.5 cm (1¾") filled metal door	27	37	$319.80	
4.5 cm (1¾") hollow core metal door	—	36	$309.80	
4.5 cm (1¾") sound- and fire-rated door with silicate core	32	37	$625.00	

Project Manager: Jacques Rousseau
Research Report: Research project on the noise isolation provided by access doors in multi-dwelling buildings
Research Consultant: MJM Acoustical Consultants Inc., Montreal, Quebec

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Canadian Housing Information Centre
Canada Mortgage and Housing Corporation
700 Montreal Road
Ottawa, Ontario
KIA 0P7
Telephone: (613) 748-2367
Fax: (613)748-2098

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