

**Behaviour of a hardwood floor nailed onto  
plywood furring strips encapsulated in  
galvanized sheet metal**

**685-5212HN**

For:

**SONOLAM Inc.  
532, Des Grands Ducs  
Lévis QC G6K 1S6**

By:

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# 1 Introduction

Sonolam Inc. is a new company that has developed an innovative floating floor system for condominiums. Their floor coverings can be multi-layered or solid wood.

The floor system the company is promoting comprises furring strips (nailable laths) and polyethylene foam insulating against aerial and structural noises. The key component of the system, however, is the furring strips, which are manufactured from thin plywood panels covered with sheet metal. Though this type of covering strengthens the assembly and is advantageous for preventing transmission of structural noise, it is very hard to nail through with the kind of nails normally used for this application.

The floor strips are set on a polyethylene foam mat which supports the weight of the floor, furniture and occupants. The main purpose of the furring strips in this assembly is to hold the floor strips together and prevent them from shifting from usage. Sonolam Inc., exclusive owners of the installation system, is already receiving orders conditional upon the proper functioning of the assembly.

# 2 Objective

The main objective of the project is to observe the installation system proposed by Sonolam Inc. under environmental conditions similar to those experienced in summer and winter use in North American residences, namely under 20% and 80% relative humidity conditions.

# 3 Technical Team

- Marcel Lefebvre, industrial advisor, FPInnovations, Forintek Division.

# 4 Methodology

## 4.1 Installation of floor sections

Three floor sections were subjected to conditioning tests at 20 and 80% relative humidity. Each section, about two feet long and four feet wide, was installed by Sonolam Inc. The floor strips were nailed to the Sonolam 3/8-in. plywood furring strips (3 softwood cross-ply) and covered in sheet metal. The furring strips were spaced twelve inches apart, centre to centre.

The floor strips were nailed on the Sonolam furring strips with Primatek nails, which are regularly used for this type of application. The furring strips, set in a floating mode on the polyethylene foam mat, served only to keep the floor strips together. They did not touch the structure and lay only on the polyethylene mat.

The first floor section was set on a polyethylene foam mat and was free from any movement on the metal frame. The second section was set like the first one, but with a polyethylene film placed under the polyethylene foam and rose on the sides of the floor section to seal the strips from environmental humidity coming from their ends and sides. The third section was set like the second, but with the sides sealed with silicone to ensure that the strips were well insulated from the ambient humidity.

#### **4.2 Floor section conditioning**

The floor sections installed by Sonolam Inc. were first placed in a conditioning chamber under 20°C and 80% RH conditions for two weeks. Next, they were transferred to a second conditioning chamber under 29°C and 20% RH conditions for another two weeks. This constituted the first cycle of conditioning totalling four weeks.

The floor sections were submitted to another two successive conditioning cycles lasting another two weeks each. Aggregate conditioning time for all cycles was, therefore, eight weeks.

The environmental conditions imposed on the floor sections simulated the worst environmental relative humidity conditions that occur in winter and summer in North America. In addition, the transfer from one conditioning chamber to the other was done suddenly and without any transitional period.

## **5 Results**

Despite the eight weeks' conditioning, no visible defect was found on the three floor sections. Section widths were initially  $48\frac{1}{16}$ " and  $48\frac{1}{8}$ " after conditioning under 80% RH and  $47\frac{3}{4}$ " under 20% RH. These variations in dimension were considered normal for this type of installation. Given its hygroscopic nature, wood swells when subjected to a greater ambient relative humidity than in the wood and shrinks when subjected to a lower one.

The floor sections not affixed to the structure, as is the case for home installations, swelled in a normal manner for Sugar Maple. On the other hand, they remained very straight and well-supported over their entire surface on the support frame and on the polyethylene foam mat.

#### **5.1 Dismantling of the floor sections**

After the third conditioning cycle, the floor sections were cut near the Sonolam furring strips and dismantled to assess their condition after the conditioning cycles. The assessment found no apparent or non-apparent defect.

## 6 Conclusion and Recommendations

No apparent defect was found, whether after assessing the floor sections in the conditioning chambers or after they were dismantled. After the conditioning cycles, the floor strips that were bound by the furring strips remained straight and well-supported by the furring strips and did not sustain any significant heaving.

The tested floor sections reacted very well to the six changes in environmental conditions to which they were subjected, whether under relative humidity conditions of 80% or 20%. The Sonolam floor system remained stable and consistent.