40--Why Is Hardwood Flooring So Much Noisier than Carpet and What Can a Community Do About It?

Hardwood flooring is much less effective then carpeting at insulating against the transmission of sound and produces impact noise when it is walked upon. Even if properly installed, "hard surface" floorings can result in noise issues for the Unit below. A community can adopt policies that ensure Unit flooring meets appropriate noise reduction standards and minimize the cost of investigating complaints and bringing noise enforcement actions against Owners who choose to install hard surface floor. Building code sets minimum standards for floors. Associations can adopt higher standards, even if the Declaration fails to restrict flooring. The Department of Housing and Urban Development ("HUD") established standards in 1967, which are widely used today.

How Is Noise Transmission Measured?

Floors are evaluated on two noise reduction characteristics: impact insulation and sound transmission. The Impact Insulation Class ("IIC") of the partition indicates how well it reduces structure borne sounds transmissions such as footsteps. The Sound Transmission Class ("STC") indicates how well the partition reduces airborne sound transmission such as a television. The ratings approximate the sound reduction, in decibels, of the floor assembly. The sound testing uses a logarithmic scale and an increase of 10 points represents about a 50% reduction in perceived loudness. The higher the rating the better the material is at reducing noise.

Sound transmission can be accurately and objectively tested. To determine a floor assembly's actual performance, an acoustic professional will test the partition's Apparent Impact Insulation

Class ("AIIC"). AIIC is a new standard that has replaced Field Impact Insulation Class ("FIIC").[1] AIIC is measured through on-site testing after the flooring has been installed. AIIC is the best indication of the floor assembly's noise reduction performance.

What Surfaces Perform Best?

Cushioning impacts is the cheapest and most efficient way to prevent noise transfer through the floor. On a floor covered by a carpet and a pad, the floor is well cushioned and less noisy. When the flooring is hard, the only way to reduce the transmission of impact sounds is through the construction of the floor structure.[2]

In one of the most poorly constructed buildings we have worked with, a floor with carpet and pad tested at an AIIC rating of 58, but a "cork floor," over one of the best sound pads, tested at only 40. Another building with carpet over concrete tested at over 70, but without the carpet it tested at less than 30. Carpeting offers a clear advantage in noise reduction and can be used to remedy impact-based noise issues. This option is available to an Owner even after the floor has been installed. Some Owners solve noise problems with the use of area rugs, or by modifying their use of the floor (like wearing slippers). We believe that if a certain surface material cannot meet the requirements of the flooring policy or causes a nuisance or annoyance, the Unit Owner must choose a different material for the floor surface.

What Guidelines Already Exist?

The Department of Housing and Urban Development ("HUD") has established guidelines which classify multi-family housing into three grades: Luxury, Average or Minimum.[3] For each grade, floor and wall partitions must meet certain IIC and STC ratings. The specific requirements will depend on the floor plans of the upper and lower Units. However, for an average grade, at the minimum, the floor assembly above a bedroom must have STC and IIC ratings of 52. For luxury grade, the standards call for a minimum STC and IIC rating of 55 but can call for a rating as high as 65.

The International Building Code sets minimum sound transmission requirements for multi-family buildings. The code requires designed STC[4] and IIC[5] ratings of 50, or actual performance of 45 if field tested.[6] These code requirements are 10 points lower than the qualifying standards for a HUD luxury rating. This would mean that a building only meeting the Building Code would seem about twice as loud as a luxury rated building using the HUD standard. Many of our clients adopt even higher standards. We generally recommend that a standard set at the same performance as the original construction (with carpet) is reasonable.

What Should Your Policy Contain?

First, these tests and standards can be useful even if you do not have hard floor policies or prohibitions. Testing the floor can help a Board evaluate if the floor violates nuisance or annoyance provisions of the Declaration. A more thorough policy is helpful because it clarifies the standards that will be applied.

A flooring policy should reference specific standards to establish an objective measure for approving design plans and determining a violation. By adopting widely used standards, it will be easier to enforce the policy, and to defend an installing Owner's claim of unreasonable standards. Widely accepted standards come with established testing protocols, which means Owners will be able to determine *before construction begins* whether their desired flooring can conform to the rules of the community. This will help prevent conflicts from occurring in the first place.

To enforce the policy, a community should require that Owners request written permission before they make alterations to their floors. The request should include the material components of the new floor assembly and the new assembly's designed IIC rating. Sound pads by themselves have no IIC rating; products are sold to reduce sound, and most will (deceptively)[7] claim high sound ratings based on the building structure's ability to reduce sound. The claimed ratings are impossible to achieve in any wood framed

building. Before approving construction, the community could require the Owner to assume the responsibilities and risks associated with the installation of a hard surface floor. This should include making the Owner responsible to hire an acoustical engineer to investigate any noise complaints that may be made and require that the Owner remedy any violation of the flooring and noise policies at their own expense.

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[1] ASTM E1007-16, Standard Test Method for Field Measurement of Tapping Machine Impact Sound Transmission Through Floor-Ceiling Assemblies and Associated Support Structures, ASTM International, West Conshohocken, PA, 2016, www.astm.org.

[2] *A Guide to Airborne, Impact, and Structure Borne Noise - Control in Multi Family Dwellings*, U.S. Department of Housing and Urban Development, § 7-3 (September 1967).

[3] *Id*. at § 10-8, *et seq*.

[4] *Air-borne sound*, Seattle Building Code § 1207.2 ("Walls, partitions and floor/ceiling assemblies separating *dwelling units* and *sleeping units* from each other or from public or service areas shall have a sound transmission class of not less than 50, or not less than 45 if field tested, for air-borne noise when tested in accordance with ASTM E90.")

[5] *Structure-borne sound*, Seattle Building Code § 1207.3 ("Floor/ceiling assemblies between *dwelling units* and *sleeping units* or between a *dwelling unit* or *sleeping unit* and a public or service area within the structure shall have an impact insulation class rating of not less than 50, or not less than 45 if field tested, when tested in accordance with ASTM E492.")

[6] *See, Structure-borne Sound*, 2018 International Building Code § 1206.3 ("Floor-ceiling assemblies between *dwelling units* or *sleeping units* and a public or service area within the structure shall have an impact insulation class rating of not less than 50, or not less than 45 if field tested, where tested in accordance with ASTM E492…")

[7] Whisper mat claims in its advertising to have an IIC of up to 72, but in its technical data, reports only 50 using the test required by the building code.