

Whetstone School of Lutherie

Protecting Acoustic Instruments Against Low Humidity

Scott Hausmann – 10/14/12

Water and Wood

Acoustic instruments like guitars, mandolins, and ukuleles are made of thin pieces of wood, and they are very sensitive to changes in temperature and humidity. The two are interrelated in complicated ways, but we can use the term "relative humidity" in a general sense to express the amount of water vapor in the air.

Many areas of the U.S. have naturally low humidity all year long. However, in most regions of the country we begin to experience low humidity in our buildings at the commencement of the heating season. As we artificially heat our living spaces, we draw moisture from the air, lowering its relative humidity substantially.

The dry air desperately wants to suck up more moisture from wherever it can, and the woods in our instruments are ideal sources. Wood too has an affinity for moisture, and it's always trying to reach equilibrium with its environment. When the relative humidity drops, the cell fibers release moisture to the air until everything comes back into balance.

This dance goes on continually as the relative humidity fluctuates, usually without any drastic consequences. However, if the relative humidity drops to low, serious damage to your instrument can occur. This happens primarily due to the fact that when the wood fibers release moisture they shrink across their width – and sometimes they shrink a lot.

Here's an example: Let's say we make a 16" wide spruce guitar top in a room that's at 45% relative humidity. If we were to lower the humidity in the room to 25% percent, that same piece of spruce would then measure about 15-7/8" wide. That's not good, and when it happens to a top already attached to a guitar, we've got problems.

The optimum conditions for acoustic instruments are around 70°F and 40-45% relative humidity. We'll talk more about how to maintain these levels shortly, but first let's look at the symptoms and consequences of low humidity.

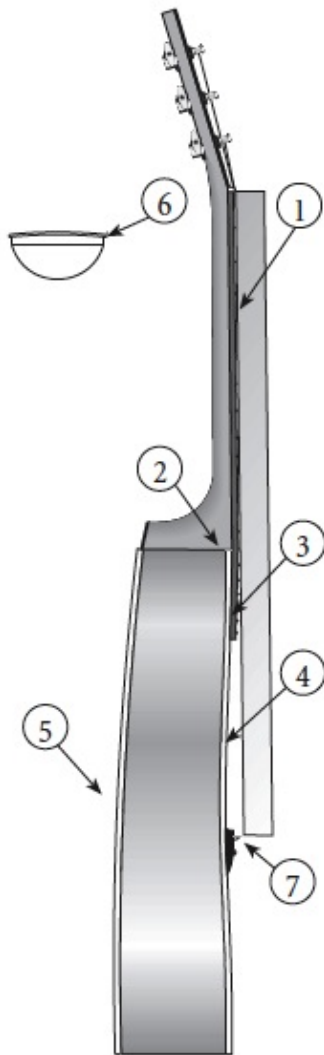
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Consequences of Low Humidity

The most well know consequences of low humidity are cracks in the top, back, or sides. If your instrument develops a crack, or an existing crack opens further, that's a sure sign your relative humidity is too low. However, there are additional symptoms of excessive drying as shown in the illustration below.



1. Lower action than normal. Strings are very close to the frets, and the amount of neck relief has diminished.
2. Hump in fretboard where the neck meets the body joint causing fret buzz as you play up the neck.
3. Sunken soundboard across the top of the soundhole.
4. Sunken soundboard between the bridge and soundhole. Also "washboarding" between the grain lines that is noticeable to the touch.
5. Back of the guitar looks very flat or even sunken
6. Sharp fret ends protrude beyond the edge of the fingerboard.
7. Plane of the neck angle rises above the top of the bridge.

Photo courtesy of Taylor Guitars

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Managing Humidity Levels

The first thing you need to get is a digital hygrometer so you can monitor the temperature and humidity levels in your living space. It's preferable to get one small enough that you can also measure the conditions inside your instrument case. There are lots of hygrometers like this on the market, but here are a couple examples.



[Oasis Digital Hygrometer](#)

[Caliber III Thermometer Hygrometer](#)

As we mentioned earlier, you need to try and maintain an environment for your instrument that is somewhere around 70°F and 40-45% relative humidity. This just so happens to be about the ideal conditions for humans.

We think the best option for you, and your instruments, is to maintain your environment around the optimum levels. Dry vapor room humidifiers can be quite effective, but be careful not to overdo it. It's always best to keep your instrument in the case to help moderate fluctuations in the ambient air.

If you can't maintain the optimum levels, or your instrument is already showing the symptoms of excessive drying discussed earlier, you need to humidify the instrument inside the case. There are lots of ways of doing this, but you have to be careful. It's possible to over humidify, and you certainly don't want liquid water or condensation to come in contact with any wood surfaces.

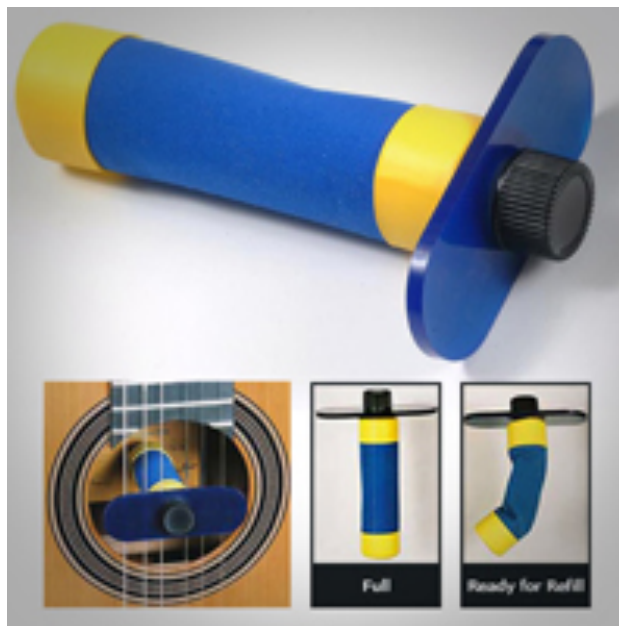
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Oasis Humidifiers

There are many instrument humidifiers on the market (mostly for guitars), but our current favorite is the Oasis. We like these because they don't leak, they distribute moisture evenly, and it's easy tell when you need to refill them. If the relative humidity is exceptionally low, or your guitar is really dry, we suggest using two – one at the headstock and one in the sound hole.



[Oasis Humidifier](#)

So in summary, remember these key points. Keep a close eye on your hygrometer to monitor the temperature and humidity, be careful not to over humidify, watch for symptoms of excessive drying, and keep your instrument in its case.