

Crazy Pickleball Lady

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The sound of pickleball – a detailed explanation, and what you need to consider before building courts

July 13, 2021 Betsy

After my last post "*Respecting our neighbors – creating a quieter pickleball environment*," I received some feedback from readers seeking more information on how to deal with sound issues at their outdoor pickleball courts.



I have asked my friend, **Bob Unetich** to write a contributing article on the sound of pickleball; how to measure it, and how to reduce it in order to keep happy neighbors or select a location for new courts.

Many of you will recognize Bob as a USA Pickleball (<https://usapickleball.org/>) certified referee, or from his column in Pickleball Magazine (<https://www.pickleballmagazine.com/>) called "Rules Guru". He is also a USA Pickleball Ambassador At Large, a professional registered engineer and hosts the Facebook page called "Pickleball Noise (Mitigation)" (<https://www.facebook.com/groups/145879006219534/>)" where you will find a lot of interesting information on pickleball sound.

This post will explain the mechanics of sound, and how it relates to the human ear, and will be detailed in parts.

Bob can be reached at itsrmu@aol.com (<mailto:itsrmu@aol.com>) to answer any of your questions.

A lesson in measuring sound

Sound can be characterized in several ways, but the three terms we should use when describing pickleball sounds are “pitch” and “loudness” which is also known as “sound level”. The reality is that most sounds are combinations of multiple pitches and sound levels.

You probably have heard of music notes such as “middle C”. When you tune a piano key to middle C, it has the pitch of middle C, plus components of higher pitch sounds. Pitch is quite different from loudness or sound level. A faint middle C and a very loud middle C are both of similar pitch, but of different sound levels.

Pickleball sounds heard outside the courts are mostly the result of a ball hitting a paddle. The pitch we hear varies with the ball model and the paddle model. This is independent of loudness, so having an agreed upon way of measuring loudness is helpful.

To make this measurement, we need an agreed upon a reference sound level and a set of units of measurement. An accepted unit of sound pressure is the pascal, but human hearing is quite sensitive, so we need to measure some pressure changes that are 1 million times weaker, or a micro-pascal, which has been selected as the normal reference for sound level measurements.

In addition to our hearing being sensitive, we also have an amazing ability to hear and make sense of both very low levels, all the way up to very high levels, without incurring damage to our hearing.

Dealing with this wide range of pressures requires cumbersome arithmetic, so it is common to compare one level to another by using a base 10 logarithmic scale. Don't worry about forgetting high school math, since we can just use the defined terms to easily compare any two sound levels, even if they are millions of times apart in level.

The term we will use is the decibel. The selected reference for sound measurements is 1 micro-pascal which we set to equal zero decibels, or 0 dB as commonly written. Humans perceive an increase of 10 decibels in sound level to be roughly 2x as loud. This is quite helpful since we can then simply use a meter calibrated in decibels to take measurements, and then easily estimate how the sound levels will be perceived.

You can read more about this in Wikipedia at: https://en.wikipedia.org/wiki/Sound_level_meter (https://en.wikipedia.org/wiki/Sound_level_meter).

As it relates to pickleball

The noise problem pickleball causes is due to the fact that humans are more annoyed by higher pitch sounds in general. A beeping sound is more annoying than a rumble sound, even if those two sounds are of the same level. Tennis and some other common sports produce sounds that are usually lower pitch than in pickleball, therefore less annoying.

One aspect of this reality is that paddles that vibrate a little slower will produce a sound that is somewhat less annoying to the neighbors. This is usually the case for thicker paddles. As paddle technology evolves, we may see more paddles become available with lower pitch sound production, and these sounds should be less annoying.

So, what does this all mean to us as pickleball enthusiasts? The quietest sounds some people can hear (with excellent hearing), are about 20 decibels above the reference level of 0dB. A problem with that simplification is that human hearing sensitivity varies with pitch, so the threshold of hearing also varies. An agreed upon adjustment to this measurement method is to use a weighted sensitivity called the A curve. Sound meters usually have a reading capability of decibels adjusted for the A curve. This adjusted unit of measurement level is referred to as dBA or often as dBa.

Now we are ready to use the numbers for comparison purposes. Here are some points of reference from the website, <https://noiseawarness.org> (<https://noiseawarness.org>):

0 dBA – The softest sound a person can hear with normal hearing

10 dBA – normal breathing

20 dBA – whispering at 5 feet

30 dBA – soft whisper

40 dBA – quiet residential area on a calm day

50 dBA – steady rainfall

60 dBA – normal conversation

70 dBA – freeway traffic

85 dBA – noisy restaurant

90 dBA – shouted conversation

100 dBA – nearby snowmobile

110 dBA – shouting into an ear

120 dBA – nearby thunder

As you know, at some level our hearing can be damaged. It is recommended that we avoid extended periods of exposure to levels above 80 dBa. Above 90 dBa is considered dangerous according to the Occupational Safety and Health Association (OSHA) standards. Loud music fans beware!

Frequent pickleball sounds are typically about 70 dBa at about 100 feet away from the strike of the ball. Residents in homes located in a quiet residential area, that are within 100 feet from pickleball courts are used to noise levels of 40 dBa, therefore the level of pickleball noise is 30 decibels louder. And, remember, each time you increase a sound level by 10 decibels, it will sound twice as loud. So, an increase of 30 decibels is (10dB+10dB+10dB) or 2x as loud x 2x as loud x 2x as loud, or 8 times as loud. That's a significant increase in loudness. Would that be annoying? Probably.

Making sound level measurements requires calibrated accurate equipment. Do not rely upon sound level apps downloaded to your phone, except for simple relative readings. A good sound level meter, like the Sper840015, costs about \$500 with calibration and it needs to have its calibration checked yearly or so.

So, what can you do?

What can be done to reduce complaints? First of all, courts that are expected to get lots of use should not be located close to homes! When we increase the distance to homes, things get better. Doubling the distance drops sound levels by 6 decibels in open areas and even more when there are obstructions to

sound propagation, like hills and shrubs. Barriers can help as well. A 10 ft high wall can provide about 10 decibels of reduction, cutting the perceived sound level in half. Higher barriers help even more.

Using the quietest balls and paddles available can cut the sound as much as 10 more decibels or in half again, but many players will resist using other gear. Restricting play hours can also help reduce complaints.

Barriers can be absorbing or reflecting. Sound reflecting barriers, like that known as Acoustifence, are less expensive, but they will send pickleball sound back towards the courts or perhaps towards other homes. Absorbing barriers, like the sound blankets made by eNoise Control, are thicker, heavier and more expensive but they may be the best choice in some cases.

The reality is that most residential neighborhoods have background sound levels, known as ambient noise, close to 50 dBa. If all homes are 200 or more feet away from courts, the expected sound level will be about 64 dBa. If a sound barrier and quieter balls and paddles are used, we soon approach the typical sound level of average neighborhoods, under 50 dBa. To do more is difficult since sound will travel over a sound barrier. The solution to that problem might be a roof, basically making the courts an indoor facility and adding greatly to the cost, and an unrealistic option.

Determining what sound level is acceptable is not simple. Local ordinances can be consulted and sometimes this will set the specific sound level limits that apply, but other times an ordinance will simply state that any repetitive sound must not be “annoying”, and becomes a difficult goal to achieve. Sound level predictions and neighbor tolerance predictions must be part of designing a pickleball facility.

Summary:

Pickleball sound levels within 100 feet of courts will usually be around 70 dBa with no sound reduction efforts applied. This is as loud as freeway traffic sound.

At 200 feet, (using the 6 dB drop for doubling the distance) the level will be about 64 dBa. That’s louder than normal conversation.

At 400 feet it will be about 58 dBa. That’s quieter than normal conversation levels. By limiting use of paddles and ball brands based on sound testing, you can achieve below 50 dBa, and usually below local background level at that distance.

Adding a 10 ft. high barrier can drop that to below 40 dBa, a level below normal library sound levels.

Even at 100 feet, with consideration for equipment and sound barriers, the level could be about 52 dBa, and may be an acceptable sound level in many neighborhoods. This means that barriers and distance are the most effective tools. It also means that sound levels can be predicted in advance of having complaints, so consider your location and work with your pickleball community to make the sport a welcome addition to your neighborhood.

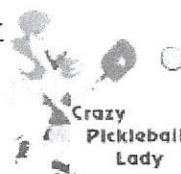
I hope the above will be helpful to those of you with current or potential sound problems. I am available to help with making sound levels estimates so send me an email if you have questions and I invite you to join the Facebook group Pickleball Noise (Mitigation) for much more pickleball sound information.

Bob Unetich,
Facebook Pickleball Sound Mitigation Group Admin
USA P Ambassador-at-large
USA P Certified Referee
A Registered Professional Engineer in Pennsylvania

Contact Bob at itsrmu@aol.com

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6 thoughts on “The sound of pickleball – a detailed explanation, and what you need to consider before building courts”

1. **NANCY** says:
March 21, 2022 at 2:51 pm
I enjoy the article on Bdh level for outdoor. But what is it for indoor on converted Tennis courts?

1. [Reply →](#)
BETSY says:
March 21, 2022 at 5:41 pm
Nancy, you should ask Bob that question. Find his email at the bottom of the post!

2. [Reply →](#)
GARY COLE says:
February 7, 2022 at 11:18 pm
I live in Wilmette, Illinois. Our Park District is planning to add eight pickle ball courts to our small park and children's playground. There are already six lighted paddle ball courts. The new pickle courts will come as close as 45 feet of some residences and be lighted for night play until 11 pm. The neighborhood is very opposed to the plan. It kills green space. It requires moving a playground which would be located between the new courts and an astroturf athletic field. The courts would also be in close proximity to a large community garden. The park district has applied for a land use variance with the local zoning board. The neighborhood has formed a group to oppose the variance. Mr. Unetich's highlights the seriousness of our problem. We need some expert testimony to put