

**PERDUE ACOUSTICS**  
Amarillo, TX • Erin, Tennessee  
(806) 374-9402 or (800) 729-9402  
Fax: (806) 374-9450

## **What Does a 1.5 Sec Reverb Time Room Mean To Me?**

In the field of acoustics, we all strive to create rooms of various reverb times without any echo whatsoever. You see any echo robs a room of clarity; no matter how distant, or slow the echo is or how close, and fast the echo is. Slow echoes can double double everything everything you you say say, while fast echoes can double a certain consonant such as a “t” or “d.” I tease pastors all the time that echoes can start whole new doctrines in the church. “Did he say Jesus did or didn’t die for our sins? “T-T-Tell me if you c-c-can!”

Now let’s take reverb. I have experienced 10-second reverbs in tile shower rooms where I couldn’t understand a man talking to me from 3 feet away. Many have experienced bad gymnasiums of 6 seconds reverb where you can’t understand someone from 20 feet away. In these environments, don’t kid yourself; you are not coaching or instructing, you are just yelling and the kids are nodding as though they understood.

We give three levels of treatment in such cases. Three seconds is a budget proposal. This is a great help and achieves clear communication from 50 to 75 feet. Not really nearly what it should be, but great compared to the 20 feet of the untreated 6-second room. Our 2.25- second guarantee allows clear communication at all distances from a human or amplified voice. At 1.5 seconds, we feel the higher volumes of amplified voices and bands at 100 to 110dB will be clear. Basically, anything you want to do can be done in a 1.5 second reverb time room – truly a multi-purpose.

Now, just briefly, how are reverb times determined? A reverb time or RT-60 is the time it takes for a sound burst to decay 60dB in a room. Since 40 dB of ambient room noise is common, I like to say “the time it takes for a sound burst to decay from 100dB to 40dB”. In some cases, 90dB down to 30dB is adequate. Time consuming and costly tests can be performed to see exactly what frequencies are reverberating and at what times, but with a study of the interior finishes we can closely predict this anyway. So, what do I propose? A loud hard clap, starter pistol, or snare drum whack and a stopwatch will tell you most of what you need to know (or just go with the loud hard clap and count slowly). Acoustical materials are generally broad banding absorption available for fine-tuning.

If you need more help or explanation, just call us. We are always glad to help. In some cases we cannot sell you a thing, but you will always get an honest answer!

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## **How to Compare NRC to NRC**

An NRC rating is simply a value per Sq. ft. of material of absorption. Let me simplify its comparison for you considering a room needing 1,400 Sq ft. sabins reduction.

It would take 1,400 Sq. ft. of NRC 1.00

It would take 1,000 Sq. ft. of NRC 1.40

It would take 2,000 Sq. ft. of NRC .70

It would take 2,800 Sq. ft. of NRC .50

It would take 4,000 Sq. ft. of NRC .35

Believe it or not, our NRC (frequency) 1.40 at 1,000 Sq ft. has been “or equaled” to a competitors NRC .35 at 1,000 Sq. ft.! My point? ... We are not talking slight differences here! They actually provided 1/4 the desired effect! When you know how to compare apples to apples, Perdue Acoustics is the best value in the country. (Probably the world!)

Now please allow me to make another point. An NRC rating averages 4 frequencies, 250Hz., 500Hz., 1,000Hz., and 2,000Hz. Back years ago when this system was developed, tweeters and subwoofers were not even in common use. We are creating 10 times the low frequency energy we used to. For this reason, Perdue Acoustics always posts its low 125Hz.test frequency absorption. It is important and we are consistently superior to all other products in this area as well!

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### Small Object Impact Test

ASTM Impact tests; D-2794, D-3029, D-4226, and G14 are done with a BYK-Gardner Light Duty Impact Tester. The impacter is a two-pound steel cylinder with a 1.27 cm. (0.05 in.) diameter round nosed end. This weight may be lifted to any desired height in a graduated guide tube approximately 40.6 cm. (16in.) high and then dropped, subjecting the specimen to an impact force of up to 28 inch/pounds. We conducted our own “in-house” test that we might better assist our clients in choosing the right products for their application. We performed this test from a 4” drop, 8” drop, 12” drop and finally a maximum 16” drop, subjecting the sample absorber panels to the impact force of 28 inch/pounds. We also have done tests on larger Sq. in. areas with more weight to calculate compression. In gymnasiums, where the impact is most likely to be a basketball or volleyball, we believe the larger impact area has more bearing. We will be glad to send you a copy of our findings. Below you will find our report on these tests, where impact, once again, is a rounded 2 lb. 1/2” steel rod. It would require an object smaller than most table and chair legs to impact an acoustical absorber in this fashion.

<b>High Impact-Tackable</b>	<b>Standard Absorber w/Plastic Edge (1-layer of mat)</b>	<b>Standard Absorber W/Soft Edge (1-layer of mat)</b>
4” drop – no indentation 8” drop – no indentation 12” drop – trace indentation 16” drop – 1/8” indentation *Went off the scale without tearing the cloth, barely visual defamation.	4” drop – no indentation 8” drop – 1/8” indentation 12” drop – 1/4” indentation 16” drop – 3/8” indentation *Went off the scale without tearing the cloth, dented only.	4” drop – no indentation 8” drop – trace indentation 12” drop – 1/8” indentation 16” drop – 1/4” indentation *Went off the scale without tearing the cloth, slightly dented only.
<b>After 30 minutes – Maximum 16 inch (28 inch/pounds) impact test only:</b>		
Must feel to know product was impacted, no visual indentation.	3/8” is now 1/4” indentation	Barely visual indentation
<b>After 24 hours – Maximum 16” (28 inch/pounds) impact test only:</b>		
No sign of ever having been impacted.	You can still visually see indentation noticeably on original 3/8” indentation	Must feel to know product was impacted – no visual indentation.

\*The only difference between specimens 2 & 3 is the plastic edges. Upon examination, we believe, at least in this small size, the cloth and mat being glued to the hard edges holds it tight. It’s inability to flex from the edges at impact caused it to absorb more impact and deform the face more readily.

## COMPRESSION TEST

### STEEL ROD - 50 LBS OVER 27/16" DIAMETER OF 2.237 SQ. IN. SURFACE AREA

<b>1" 8 lb. Nominal:</b>	<b>With mat:</b>
1. 11/32" = 22/64"	9/32" = 18/64"
2. 23/64" = 23/64"	19/64" = 19/64"
3. 23/64" = 23/64"	17/64" = 17/64"
4. 25/64" = 25/64"	5/16" = 20/64"
5. 13/32" = 26/64"	21/64" = 21/64"
<b>Average: 24/64" or 3/8"</b>	<b>Average: 19/64"</b>

### STEEL ROD - 50 LBS OF 27/16" DIAMETER ON A 3"x4" BLOCK FOR 12 SQ. IN. SURFACE AREA

Using a 50 lb steel rod of 27/16" diameter and 2.237 sq. in. of surface area gave us much more measurable compression differences to work with; however, on 2" tests and 100 lbs tests on 1", a block 3"x4" for a total surface of 12 square inches had to be used, as the 2.237 square inch surface of the end of the rod ripped through the mat and destroyed and broke down the core material. Increasing the square inches of surface gave us a more accurate compressive strength test.

<b>2" 8 lb. Nominal:</b>	<b>With mat:</b>
1. 3/16" = 3/16"	3/16" = 12/64"
2. 1/4" = 4/16"	1/8" = 8/64"
3. 1/4" = 4/16"	7/32" = 14/64"
4. 5/16" = 5/16"	1/8" = 8/64"
5. 1/4" = 4/16"	5/32" = 10/64"
<b>Average: 4/16" or 1/4"</b>	<b>Average: 10/64" or 5/32"</b>

**50 LBS ON 12 SQ. IN. ACHIEVED 12.5% COMPRESSION ON 2" AND 10% COMPRESSION ON 1" WITHOUT MAT. THESE TABLES SHOW LBS OF COMPRESSION NECESSARY TO ACHIEVE 12.5% COMPRESSION WITH MAT.**

<b>1" 8 lb Nominal</b>	<b>2" 8 lb Nominal</b>
1. 90 lbs	90.5 lbs
2. 100 lbs	105 lbs
3. 100 lbs	90 lbs
4. 105 lbs	105 lbs
5. 90 lbs	100 lbs
<b>Average: 99 lbs</b>	<b>Average: 98 lbs</b>

CONCLUSION: THE FIBERGLAS MAT INCREASES THE COMPRESSIVE STRENGTH OVER THAT OF THE MINERAL WOOL BOARD ALONE BY 98% IN THE 1" TEST AND 96% IN THE 2" TEST.

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### **Sag Test**

Two identical specimens of mineral wool board were cut from the same shipment. Each was a standard 1" specimen 2 1/2" wide and 48" long. The specimens were gently placed across two tables 46" apart for the test, first on one side and then the other so that if any natural bow existed in the samples, the average of the two numbers, one from each side, would give an accurate account of their sag. One specimen was then matted with the standard Dura Glass 7511 glass fiber mat. A straight edge suspended between the two tables measured a distance from floor to straight edge in the center at 36 1/8". The first sample, the one without the Dura Glass 7511 glass fiber mat, but identical in every other way, measured a sag of 35" on one side and 34 7/8" on the other side. The sample with the Dura Glass 7511 glass fiber mat measured a sag of 35 3/4" on one side and 35 3/4" when turned over to the other side.

Therefore, the average sag of the specimen without mat was 1 3/16" while the specimen with mat was only 3/8". This is extremely significant when considering that in the field handling of acoustical panels, sag, and flop creates delamination of the fabric to the core and excess sag can thus relate to an unusable acoustical panel. Once the panel is on the wall and fastened securely, sag no longer becomes a factor, but in the handling of these materials, it is critical.

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