

# The Story of Hardbord

## A Technical Discussion

Over the last few years we've received countless calls from customers wanting to understand the conflicting information they've read or been told on whether hardboard (most often referred to as Masonite) is a good substrate for painting. In the following paragraphs we've condensed some of our research and information regarding the choices we've made for the hardboard we use to make our wood panels. For those artists who have been reluctant to use the current generation of hardboard, this up to date information should provide a level of comfort to try this versatile and long-lasting substrate that has gained a wider following as a result of today's revival in panel painting.

## Why the bad rap on "Masonite"?

To begin, the word "Masonite" is a brand name for "hardboard". It has been commonly known as "Masonite" after the founder of the Masonite Corporation, William Mason invented this wood product in 1924. Today a few select manufacturers in the US as well as foreign companies produce hardboard. Since Ralph Mayer wrote *The Artist's Handbook* in 1949 where he warns against using "Masonite", the method of manufacturing hardboard has changed. This book, already in its 5th revision has not updated artists on the current generation of US made hardboard. Thus the incorrect information continues to be disseminated in both classroom and practice.

In the 40's and 50's, tempered hardboard was made by immersing the panels in dipping tanks of tung or linseed oil to harden them, leaving an oily residue that caused adhesion problems for artists. Untempered boards also had problems with chipping and fraying, which made conservators leery of paintings done on these now outdated hardboards. Over 20 years ago, the high cost of tung and linseed oil forced U.S. manufacturers to change the way they manufacture hardboard. Today's U.S. hardboard is made differently and does not have the characteristics of the old hardboard.

## So, what is the difference between tempered and untempered?

Mark Gottsegen, in his book, *A Manual of Painting Materials and Painting Techniques*, writes that both tempered and untempered hardboard can be used successfully for painting. Both untempered (or standard) and tempered hardboards are made by the same process. The only difference is that there is one final step for some tempered hardboard. A very small amount of oil (normally linseed) is applied with a roll coater and then baked. We have found manufacturers applying as little as 1.8 oz (approximately 2 tsp per side) on a 4 x 8 ft sheet.

Most of this oil is flashed off when the boards are baked at temperatures about 400 degrees F. This oil "tempering" is invisible and does not leave an oil residue on the panel that can cause adhesion problems, as did the outdated hardboard. The purpose of this process is to make the board stronger and less prone to warping. Unfortunately, artists and conservators have incorrectly been led to believe that even today's tempered hardboard is impregnated with a lot of harmful oil.

## The Manufacturing Process Explained

We have found that how the hardboard is manufactured and which species of wood is utilized, are more important questions for the artist than whether or not it is tempered. Three methods of manufacturing hardboard are used: 1) Wet Process, 2) Wet/Dry Process, and 3) Dry Process. In Wet Process after the wood chips are pulverized into wood fibers, they sit in water and are aligned in such a way that an internal bond is created using the natural resins already in the wood. This process produces the SIS (smooth one side) with a screen pattern on the back.

The Wet/Dry Process is essentially the same as the wet process except that a dryer is used to remove part of the water from the fibers so that the board can be pressed between two plates to create the S2S (smooth 2 side). Dry Process hardboards in comparison are manufactured without water by taking the pulverized wood chips and adding different synthetic additives to bind the fibers together and press them to make both SIS and S2S. The various methods can produce different quality hardboards depending on the species of wood, additives, and techniques used in manufacturing.

## Here's How We Decided On Our Hardboard

After extensive research and testing, we chose hardboard that is made through the Wet/Dry method. The Wet/Dry process method removes the lamella that contains many of the lignins and tannins that can cause discoloration in a painting over time. Through the use of water, this process leaches out many of water-soluble chemicals and acids that exist in the wood, leaving a more inert surface than a solid wood panel. No additional additives are necessary in this process because the natural wood fibers are used for binding, resulting in a stronger, more uniform, and denser board.

The next step in choosing our hardboard was to determine which species of wood to use. For example, hardboards manufactured through the dry process such as MDF boards are made from softwoods that tend to be more acidic in content. The Ampersand Hardbord™ is primarily manufactured from Aspen trees that have more uniform fibers and have more of a neutral pH than that of other woods.

Now for the tempered/untempered question...In all of our testing using both untempered and tempered hardboard, we find that today's tempered hardboard does not cause adhesion problems. In fact, our tempered hardboard seals more effectively with our primers than the untempered. Ampersand's manufacturer of its 1/8" tempered hardboard uses less than 1.8 oz (2 tsp per size) of a pH neutral vegetable oil on a 4ft x 8ft sheet. After baking, there exists less than .03 oz per square foot of oil on the surface. When artists call Ampersand we always recommend using tempered hardboard because it will resist warping and the edges won't fray as they sometimes do with untempered or standard hardboard. Furthermore, tempered hardboard creates a better seal with oil and acrylic primers so that the painted surface is protected from any potential discoloration.

## Wood is wood – so seal it!

All wood surfaces should be sealed with a good primer before gessoing or painting on them. Unlike hardboard that has been processed and reconstructed, plywood and other solid wood panels still have their cell structure intact and the harmful lignins and wood tannins could affect a painting if not sealed correctly. Ampersand recommends using Golden's Acrylic GAC 100 to seal panels for water-based painting and the Gamblin's Oil Painting Ground for use with oil paints. Ampersand's Hardbord™ can be primed using these products or try one of the already sealed and coated panels.

Ampersand uses a two part emulsion process for sealing the hardboard before applying our different acid-free grounds. We first apply an acrylic sealer that seeps into the fibers of the hardboard and then we do a final sealing layer to create a barrier between the wood and the ground.

This barrier will ensure that over time the lignins in the hardbord will not interact with the ground or your paints. Each of our grounds whether it be the acrylic gesso on Gessobord or our clay-coated grounds for Claybord smooth, Textured Claybord, and Pastelbord are non-yellowing and have been created to give the artist a variety of surface options to choose from. These grounds are carefully "poured on" to the surface and dried to ensure excellent adhesion with the sealing layer.

Our sealing process along with our acid-free coatings gives artists painting on Ampersand's wood panels the assurance that their work will be around for a long time. We realize that in these short paragraphs we couldn't cover everything, so please give us a call if you have any further questions – 1-800-822-1939.

## Hardboard-Physical Properties

The physical properties of any hardboard are primarily dependent upon the wood furnished, the degree and uniformity of defiberation, the ability to properly form the wet mat at economical production speeds, the density to which the mat can be consolidated in the hot press and the degree of heat treatment after consolidation. Manufacturers have a varying degree of choice with respect to finished properties, depending upon their physical location and mill facilities.

Ampersand's source for hardboard holds a prominent position in the hardboard industry. A number of wood species are available, making it possible to select the species according to specific property requirements of the end product. Slow-growth aspen produces clean, strong, highly-uniform fibers for our S2S hardboard. A fine fiber slush overlay provides S2S with an extra smooth surface for finishing. By fusing special additives into the cellulosic structure, they have developed a high water resistant board while maintaining the high quality finishing properties.

Their aggressive manufacturing control systems and frequent QC testing, assure the qualities of flatness, dimensional stability, machinability, smoothness, and paint hold-out. The hardboard we use is highly engineered S2S(smooth two sides). The manufacturing process begins with slow-growth aspen that produces clean, highly uniform fibers making the S2S a dimensionally stable and consistently flatter board.

The unique fiber slush overlay provides a superior smooth surface that leaves no ripples, dimples, or blemishes. This smoother surface is impeccable for wet or dry finishing applications, giving us a superior finished quality product. The following information compares Ampersand's Hardbord to the standard hardboard on the market:

Tempered Hardboard S2S 1/8"	Ampersand Hardbord S2S	Basic Standard Untempered S2S 1/8"
Density Lbs./Cu. ft	70.0	n/a
Internal bond, psi	>250	>130
Modulus of Rupture, psi	>9000	>6000
24 Hr. Water Soak	-	-
% Water Absorption	-	-
% Thickness Increase	-	-

## Environmentally Safe and Superior Quality

Our hardboard supplier does not use urea-formaldehyde glue in the manufacturing process. They rely on the natural lignin in wood for the bonding of the wood fibers, making our board environmentally sound. Ampersand's Hardbord is considered HWR hardboard (High Water Resistant) and is suitable for those applications where improved water resistance is required over normal hardboard. Special additives are fused into cellulosic structure to form a barrier against water absorption. This results in improved dimensional stability, so the products you make with HWR hardboard are far less likely to swell or warp. Aggressive manufacturing control systems and frequent quality control testing insure consistent results. These improved properties are achieved while maintaining the industry's leading finishing qualities expected for the hardboard we use.

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