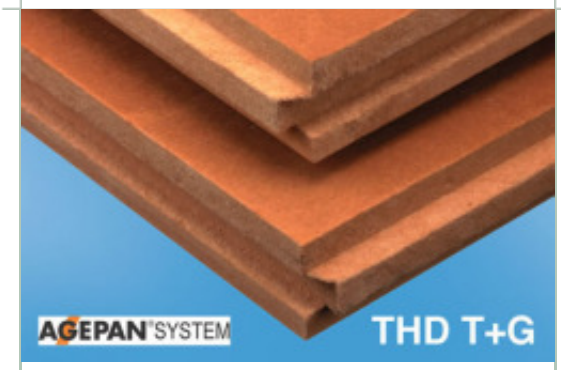
Agepan: A Vapor-Permeable, Wood-Based Insulation Board

Builders are turning to an insulating sheathing imported from Europe to make walls that won't rot.

By Erin Weaver

Agepan (pronounced "AH-ge-pahn") Functional Wood is a line of vapor-permeable, insulating, wood-fiber wall, roof, and floor panels. Manufactured in Germany since 1996 by Glunz AG and imported to the U.S. by several dealers specializing in products for Passive House construction, the fiberboard panels have been catching on in light-frame construction. To understand why, it helps to contrast them with common building practices.



Agepan THD T+G 230 is a permeable, wood-fiber thermal insulation board for use in walls and roofs.

Advantages over polystyrene

High-performing wall assemblies are increasingly incorporating continuous insulation outside of the structural assembly to reduce thermal bridging and provide continuous air and water barriers. Wrapping the exterior in rigid polystyrene foam is common, but polystyrene poses problems of its own—from use of a non-renewable resource to toxic flame retardant content to global warming potential. The relatively low vapor-permeability of polystyrene (along with many structural sheathing products) can be a benefit, though, such as in installations where sunshine can drive water vapor from masonry cladding inward through an exterior assembly.

However, in most applications using polystyrene, its low vapor-permeability is not necessarily beneficial. As long as such an assembly allows drying to the interior, it's fine, and prominent building scientists have lauded this overall approach—but some designers and builders argue that we should open the exterior to vapor movement to maximize drying potential, especially in colder climates where interior water vapor can condense inside a wall and cause rot.

"Reversing the wall assembly"

Albert Rooks imports Agepan through his Small Planet Workshop; Rooks told *EBN* that builders "on the hunt for a really high-R wall" happened upon the European concept of "essentially reversing the wall assembly" by moving the plywood sheathing—or Agepan's semi-permeable oriented-strand board (OSB)—to the interior. More permeable to the exterior than to the interior, this wall can dry in both directions, creating what the manufacturer calls a "breathing wall system."

Products Available from Agepan Functional Wood

Product	Application	Density	Permeability	R-Value
THD: Trockenverfahren hergestellte Holzfaser-Dämmplatte, dry-processed wood fiber thermal insulation board for walls and roofs				
THD STD 60mm	Interior	230 kg/m³ (14.4 lb/ft³)	18 perms	R-3/in.
THD T+G 52mm	Exterior	230 kg/m³ (14.4 lb/ft³)	21 perms	R-3/in.
DWD: Diffusionsoffene Wand Dachplatte, permeable wall and roof panel				
16mm	Exterior	565 kg/m³ (35.3 lb/ft³)	18 perms	R-1.6/in.
TEP: Trockenestrichplatte, floor underlayment panel				
40, 60, 80mm	Interior	230 kg/m³ (14.4 lb/ft³)	n/a	R-3/in.
UDP: Unterdeckplatte, lighter-duty roof panel				
22, 25, 32mm	Exterior	270 kg/m³ (16.9 lb/ft³)	n/a	n/a
OSB: Oriented strand board made with Agepan fiber-coating technology				
6–30mm	Interior	600–660 kg/m³ (37.5–41.2 lb/ft³)	0.7 perms	n/a

Sample drawings provided by the company recommend walls consisting of exterior cladding and a rainscreen over DWD, thick cavity insulation, and OSB and THD STD on the interior; flooring over TEP or OSB; and roofing installed over THD T+G 230, thick insulation, and interior OSB.

Agepan also differs from many other products that perform just one function; it can provide a thermal break, an integrated weather-resistive barrier (including air barrier), and a base for installation of a rainscreen and cladding all in one. The exterior panels are more stout than fiberboard panels made in North America; according to Rooks, "they don't bow out under dense-pack cellulose." Agepan achieves an R-value of R-3.1 per inch (U-0.33) while remaining vapor-permeable: 52mm (2") Agepan THD T+G 230, available through Rooks' Small Planet Workshop, provides R-5.74 insulation and is rated at 21 perms.

Making wood chips water-resistant

At the Agepan plant in Meppen, Germany, pine from regional forests is combined with sawmill scraps. The wood is chipped, boiled, and then dried to 2%–3% residual moisture; mixed with paraffin wax and a PMDI binder (a polyurethane-type binder); then pressed to achieve the densities that differentiate the various Agepan panels. Mixing the materials prior to pressing distinguishes Agepan's water-resistance from that of standard OSB, which is coated after pressing and is highly vulnerable to moisture absorption through the many exposed end-grains throughout the board; Agepan is water-resistant throughout, meaning that with the use of a rainscreen, no additional water-resistant barrier is needed on the exterior, according to the manufacturer. The faces of the boards are denser than the interior, with the cavities between internal wood fibers providing Agepan's insulating properties.

Installing Agepan

Agepan can be installed with staples and screws, and penetrations or cut edges can be taped if needed. In colder climates, the plywood, OSB, or THD STD serving as an air barrier on the interior should be taped to keep warm interior air from infiltrating the insulation cavity and potentially condensing, but Rooks says the tongue-and-groove exterior is tight enough to prevent wind-washing. It can also be taped to function as a primary or secondary air barrier, depending on the climate and the design of the assembly. Agepan is not UL-listed, but is rated Class E under EN 13501-1—not suitable in applications requiring resistance to flame spread.

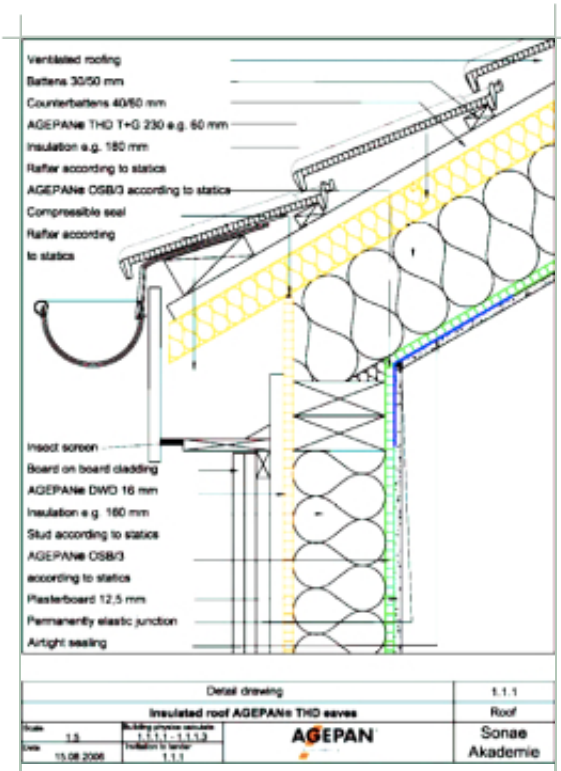
Nathan Young, owner of Nathan D. Young Construction in Portland, Oregon, says his company was hesitant at first when working with Agepan but found it easy to work with, noting that it's most important to make sure everyone understands which side of the board is which: the higher-density face goes on the exterior to provide a sturdy surface for attaching a rainscreen. Young told *EBN*, "You've just got to make sure everybody's paying attention."

Cory Eckert of Laupen Homes in Olympia, Washington, agrees that the Agepan DWD he worked with was easy to install, and he adds that one person could install the lightweight boards alone. A recent project used strips of plywood attached to the DWD as a rainscreen, and the DWD joints were only taped in places where the panels had been cut, losing the tongue-and-groove edge. "Time will tell on the performance," Eckert said, "but with all the years of use in Europe, I am sure this won't be a problem."

Evaluating costs

Young speculated that domestic manufacturing could cut the price of Agepan in half, since much of the cost is in shipping from Germany. It currently retails in the U.S. at more than $17 for a 25" x 89-3/4" sheet of 5/8" DWD, or $1.10/ft^2, and nearly $32 for a 23-5/8" x 74-1/2" sheet of 2" THD T+G ($2.62/ft^2).

Young says that although the cost is "not negligible," we also "don't have anything to compare it to that achieves the same characteristics" because of Agepan's performance and permeability. Rooks agrees, noting that his company imports Agepan because "a thick, diffusion-open wall that will last 100, even 200, years is something we need to be able to do."



This architectural detail shows one recommended combination of Agepan products to produce a high-performance building assembly that dries to the exterior.

For more information:

Small Planet Workshop
http://www.smallplanetworkshop.com/

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IMAGE CREDITS:

1. Photo: Sonae Industria
2. Source: Glunz AG
3. Image: Sonae Industria