



# Fire, Smoke & Decorative Laminates

by Patrick J. Galvin

Architect Jay Warren Bright of New Haven, Conn., recently posed four questions about high-pressure decorative laminates (HPDLs) following my January column on woods used in kitchen cabinets.

Since they're probably of interest to all builders, I decided to devote this month's column to all four questions—starting with the easiest.

## 1. What temperature can high-pressure decorative laminates withstand in hot pans or pots?

The answer is 275 F, but who knows the temperature of a pot? Put it this way: You can take a pot of boiling water off the range and put it down on the countertop without damage. But don't try it with a frying pan.

## 2. I've seen a 20-year-old woodgrain countertop fade to white under a skylight. Is this still likely?

That's very extreme and not at all likely today.

Melamine is almost unique in being one of the few materials with both hardness and light stability. The dyes and other colorings are as light-stable as technology can make them.

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However, Formica's Bob Fremont, chairman of the National Electrical Manufacturers Association (NEMA) technical committee, says the technology over the past 10 years has been limited seriously by environmental controls on pigments. As a result, light stability has been difficult to maintain, but "we have at least held our own," says Bob.

Twenty years of sunshine intense enough to fade a modern woodgrain laminate to white is almost unthinkable in New England. In my old stomping grounds of south Texas, where sunshine is both plentiful and intense, laminates of the '40s and early '50s would fade after four or five years of direct sunlight. But it was noticeable only when some object that had been in place for a long time, such as a decorative dish, was moved.

But the technology improved considerably after that, even with pigmentation restrictions.

To sum it up, the sun's power is inexorable. But fading should not be considered a serious problem anywhere in New England.

## 3. What's the difference between high- and low-pressure laminates?

The National Electrical Manufacturers Association specifies a manufacturing pressure of more than 500 p.s.i. for HPDLs. (They fall under NEMA's purview because melamine originally was an electrical insulating material; decorative laminates started as a byproduct.)

In addition, HPDLs always are made as separate sheets, with thermosetting resins throughout, so they must be laminated to a substrate in a separate process.

Whenever the substrate itself is part of the manufacturing process, it can't be called HPDL.

Low-pressure laminates usually come as laminated panels, such as the Melamine Component Panel introduced by Formica a dozen years ago. These panels look exactly like an HPDL laminated to a corestock, but they don't compare in hardness.

Thus they are easy to cut and excellent for edging cabinets, furniture and wall coverings. But they are not hard enough to withstand the abuse to which kitchen countertops are subjected.

Other LPDL materials don't follow the standard definition in that they can be bought separate from a substrate. These include vinyls and polyesters, for example.

Vinyl is calendared at very high speed onto rolls. Sometimes it is applied to a 4x8 or 9x12 substrate before it leaves the calendaring machine, but it also can be bought in rolls for later lamination. Either way, it is still a low-pressure material.

European cabinet surfaces are called HPDL by their own people, but they do not fit our definition because they are made in a "short cycle" process. The melamine is laminated to the substrate in one step, rather than by making a separate laminate sheet and then gluing it to a corestock.

It is done beautifully, but I have found the European material easier to chip and less durable than "true" HPDLs.

So many laminates and laminated boards are available today that the best way to identify HPDLs may be by brand name. Only a few are made in the U.S., while several come from abroad. (And in Italy, there seems to be an HPDL manufacturer in every valley.)

The U.S. national brands are Consoweld, Formica, Micarta, Nevamar,

tion of laminate, glue and core. All of these can differ in composition and thickness, and they combine in different ways.

So I again called on Bob Fremont, the resident expert at Formica, who has tested and documented hundreds of combinations of laminate, glue and corestock.

Flame spread is designated by values relative to the rate at which flames spread on asbestos cement board (zero rating) and red oak (100 rating). The requirement for smoke-developed ratings set by most codes usually is a maximum value of 450, although this always must be checked locally.

Fremont groups his ratings in the three regular categories generally used by building codes as well: Class I (A), 0-25; Class II (B), 26-75, and Class III (C), 76-200.

For countertop-grade laminates with and without backer laminates tested with three adhesives (Formica 150, Pierce & Stevens Hybond and Koppers), Fremont found a flame-spread range of 30 to 60 and a smoke range of 5 to 170. The 170 rating was with standard 3/4" particleboard core and Formica 150 glue. With 3/4" fire-rated particleboard and the same glue, the flame spread was 55, and the smoke, 80.

For vertical-grade laminates such as those used on kitchen cabinets, the ranges were 30 to 70 for flame and 40 to 235 for smoke. The high figures were for 3/4" standard particleboard, which never would be used in cabinets. For 3/8" fire-rated particleboard, the figures were 40 and 45. But with 3/8" standard particleboard and Formica 150 glue, the smoke rating jumped to 235. A change to Koppers glue dropped it to 135.

Ratings with lauan or birch plywood substrates were not significantly different.

Getting back to toxicity, there never has been any agreement on what tests to use. The two used commonly are those of the National Bureau of Standards and

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Pioneer and Wilsonart. Consoweld and Pioneer merged early this year, and both now are owned by Libby Owens Ford.

## 4. How do HPDLs compare with wood in regard to flame spread and toxicity?

Flame spread and smoke can compare very favorably. As for toxicity, as college professors say when they don't know the answer, that's a good question. But as far as we know, it is equivalent to that of wood.

NEMA makes no independent studies of these questions, relying instead on data from the manufacturers involved.

The problem here is that any test of the HPDL itself is worthless, because the product in application consists of a combina-

tion of laminate, glue and core. All of these can differ in composition and thickness, and they combine in different ways.

According to Fremont, "Everything is toxic in fire, and some things are a lot more toxic than others. But melamine, generally speaking, is not a toxic material. The nearest I can come to a practical answer is that the fire toxicity of a fully laminated panel is about equivalent to that of burning wood," he reports. ■

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