



Greener timber and concrete finishes

Whether you have concrete or timber underfoot in your home, choosing the right finish for your floor, building materials and furniture is important to ensure that you protect the surface, your family's health, and the environment.

WORDS Sarah Robertson

WHEN IT COMES TO TIMBER AND

concrete finishes, a growing range of environmental and health conscious products are now available. Some are greener than others, but a basic understanding of how different finishes work and the type of finish they deliver can help you tread carefully through the greenwash and choose the right finish to meet your needs in your home.

TYPES OF FINISHES

There are two main types of finishes for timber and concrete surfaces. Film-forming finishes lay a water-repellent varnish over a surface. These finishes can be solvent/oil-based or water-based and are available in different gloss and sheen levels. Meanwhile, penetrating finishes, including oils and stains, penetrate into the concrete or timber surface. While some finishes are designed specifically for application on particular surface types, many finishes can be applied on a variety of surfaces.

Timber coatings and concrete finishes used around the world in the last 50 years have largely been petroleum-based solvent/oil polyurethane coatings that contain toxic solvents with high volatile organic compound (VOC) content. VOCs have been linked to air pollution and their deleterious effects on health in indoor environments – from headaches to respiratory problems in more extreme cases – have been recognised by government bodies such as CSIRO. The Green Building Council of Australia limits the total VOC content of timber finishes to 140 grams per litre for credits in the Green Star rating for buildings. [Ed note: See our article on greener paint in *Sanctuary* 16 for more information on VOCs.]

In the last ten years, lower VOC water-based polyurethanes have entered the Australian market as a less toxic, yet still durable alternative. More environmentally friendly and health conscious still are natural products made from naturally occurring and often non-toxic ingredients.

FROM LOW VOC TO NATURAL FINISHES

Looking for products with minimal VOC content is the first step on the path to greener and healthier finishes.

As Deb Preston of paint and timber finish supplier Painted Earth explains, however, it's important to be aware that choosing a water based or low VOC product doesn't mean it is entirely non-toxic, particularly for chemically sensitive people, as not all chemicals that are classed as hazardous are categorised as VOCs. "Low VOC has become a measure of the eco-friendliness of a product because VOCs add to environmental air pollution and smog," she says. While low VOC means fewer chemical fumes emitted into the indoor environment, it doesn't say anything about the toxicity of the other ingredients in the product, she adds.

"Mostly the ingredients in a product, if not emitted, will remain in a stable form in the dried finish and not affect the inhabitants of a building. However this doesn't mean we can eat the product and it doesn't mean it's safe to dispose of in our soil or waterways."

Angela Petruzzi from Livos reiterates the point: "It's not the level of VOCs in a product, it's the types of solvents it has in it." She points to a comparison of two products, explaining that while one is a very low VOC product and one is high VOC, the higher VOC product is certified food safe, while the low VOC product isn't.

This is why natural finishes are generally considered to be a more people-friendly and eco-friendly option than synthetic finishes.

Whether you choose a low VOC synthetic product or a natural finish ultimately comes down to personal choice, however, and will depend on how much weight you give health issues, the desired look of a floor or other surface, the required durability of the finish, and environmental concerns.

FILM-FORMING FINISHES

Film-forming finishes are available as two pack polyurethanes (made up of a finish and a

hardener that must be mixed together before application), single pack urethanes, acrylics, epoxies, and combinations of these.

Low VOC water-based polyurethanes are the most common and environmentally and health conscious film-forming alternative to traditional polyurethane finishes. These coatings are hardwearing and contain less of the nasty solvents and chemicals, such as free isocyanates and formaldehyde, than their solvent-based predecessors.

Moreover, improvements in toxicity standards in Europe have seen an increasing range of non-toxic classified polyurethane finishes become available in Australia. All commonly available DIY polyurethanes, however, do still contain some form of cross-linking agent/hardener that enables them to cure.

Co-founder and Technical Director of Ecospecifier and GreenTag Program Director David Baggs says: "Water-based polyurethanes still contain toxic components. In fact some contain products known to cause birth defects in their liquid state and when freshly applied. Bisphenol A (BPA) is one organic compound used in some epoxy resins that can migrate from within the base polymer via direct contact and has raised concerns amongst health experts, particularly in the context of floors where infants or toddlers may play."

He adds that factory applied prefinished "UV catalysed polyurethanes" (PURs) are another healthier film-forming option as they have very low to no VOC emissions. As Baggs explains, UV catalysed PURs are typically only available for in-factory application and so have to be purchased already applied to products. Almost all bamboo flooring comes finished with UV cured PURs, and so do many floating or laminated timber flooring options.

"The technology is not unlike that used by dentists for white polymer fillings, although mostly a different polymer base is used," he says. "The benefits are that the products contain no



ⓘ A timber floor with a Livos natural finish.



ⓘ An EpiMax professionally finished concrete floor. The finish is achieved with a combination of a solid base colour, a second coat applied intermittently by squeegee and then a clear, non-yellowing seal coat.

Benefits and drawbacks of finish alternatives

PRODUCT TYPE	BENEFITS	DRAWBACKS
Solvent-based polyurethanes (film-forming)	<ul style="list-style-type: none"> - Durable, hard coating - Recoating not required as frequently as natural oils 	<ul style="list-style-type: none"> - Contain toxic components and a high VOC content - VOCs can continue to off-gas long after finish has dried - Solvents required to clean coating equipment - Edge bonding (where a gap forms between boards that split as the wood moves or shrinks) can occur - Maintenance: floor must be completely sanded back and recoated afresh - Finish can yellow over time - High embodied energy
Water-based polyurethanes (film-forming)	<ul style="list-style-type: none"> - Durable (slightly less hard than solvent based) - Low VOC and lower toxicity products available - Recoating not required as frequently as natural oils 	<ul style="list-style-type: none"> - Edge bonding (see above for definition) can occur - Can contain toxic components (non-toxic in use) - Maintenance: floor must be completely sanded back and recoated afresh - Can draw tannin in timber to surface on species such as Blackbutt, Tallowwood and American White Oak - High embodied energy
Natural oils and stains (penetrating)	<ul style="list-style-type: none"> - Rejuvenating finish is simple and as straightforward as mopping and wiping dry - Easy to maintain – spot rejuvenation an option - Low VOC, non-toxic options - Made largely from plant-based ingredients - Some food safe products available - Can highlight natural richness of timber - Can give polished concrete a lusted look 	<ul style="list-style-type: none"> - Requires rejuvenation more often than polyurethane and epoxy coatings – after approximately three to four years, but this will vary - Can be more expensive than water-based polyurethanes - Not necessarily suited to all concrete floors - Less hard than polyurethanes

This table synthesises information from a variety of sources and should be used as a guide only. Ecospecifier Global lists the environmental benefits and drawbacks of a variety of products on its website: www.ecospecifier.com.au

Greener timber and concrete finish options

BRAND	PRODUCT & APPLICATION	TYPE	INGREDIENTS	SUITABILITY
Natural Paint Company	Hard oil	Penetrating natural oil finish	Linseed oil, tung oil, stand oil, colophonium glycerine ester, lead-free drying agents	Interior untreated timber, cork & natural stone
Organoil	Range of timber & concrete products			Interior timber & concrete
Ecowood Oil	Range of products & applications	Penetrating oil finish	Ingredients include: Tung nut oil, eucalyptus oil, beeswax, gum turpentine, pine oil, citrus oil, linseed oil	Interior & exterior timber
Intergrain	EnviroPro Endure 2 Pack	Film-forming water-based polyurethane		Interior timber & parquetry floors
BIO Products	Floor varnish	Film-forming finish	Based on tung oil, rosin, wax, lemon peel oil, paraffin oil, pine oil, quartz, lead-free drying agents	Timber & stone floors
Livos	Koimos High Solid Floor oil	Penetrating finish	Ingredients include: Linseed oil, wood oil, castor oil, stand oil, orange oil, dehydrated amino sugar, ethanol, chalk, soy lecithin, lead-free drying agents. Full declaration of ingredients available on website	Interior concrete & timber floors
Oikos	Novalis Woodstain	Penetrating finish		Interior & exterior timber
Treatex	Treatex Eco	Oil and wax combination		Interior timber, particularly floors
Bona	Mega	Film-forming waterborne polyurethane	Made with a dispersion of at least 75% fatty acids derived from Brassica napus, oilseed rape. NMP (n-Methyl pyrrolidone) free	Interior timber floors
Murobond	Murothane	Film-forming water-based polyurethane		Timber & concrete
Synteko	Natural	Natural oil extracts mixed with alkyd resin		Interior & exterior timber
EpiMax	Green Certified Protection range of products	Protective coatings		Interior & exterior concrete
Concrete Colour Systems	Range of products	Penetrating and film-forming finishes		Interior & exterior concrete
FLOORChef	Range of decorative flooring systems	Film-forming	Resin based flooring systems containing no solvents, carcinogens or heavy metals	Interior & exterior concrete

Please note that many of the listed suppliers have a greater range of finishes than we've been able to list. Go to their websites for more information.

SOLVENT & VOC LEVEL	ADDITIONAL INFO	APPROXIMATE COSTS & COVERAGE	SUPPLIER
Free of solvents		0.75L – coverage 12 sqm: \$47.15 2.5L – coverage 40 sqm: \$110.95 5L – coverage 80 sqm: \$197.35	www.naturalpaint.com.au
	Tung oil: For concrete and timber. This product must be thinned (with a solvent) for application on timber		www.organoil.com.au
	Contains no petrochemical-based ingredients		www.ecowoodoil.com.au
VOCs < 100g/L	Available in gloss, satin or matt	Coverage: 8-10 sqm/L	www.intergrainenviropro.com.au
	Available in gloss or satin	Coverage: 15-18 sqm/L, depending on the absorbency of the timber	www.bioproducts.com.au
VOCs 26g/L (2.8%)	Product lifetime: Domestic, heavy wear areas: 4-8 years if correctly maintained; light wear areas eg, bedrooms: indefinite	Coverage: 40 sqm/L Average cost: \$2.20/L more than traditional solvent-based polyurethane	www.livos.com.au Application: www.anrofloorcare.com.au
Free of solvents VOCs < 1g /L		Coverage: 12-14 sqm/L Cost: 0.75L \$48.25	www.designerpaintco.com
Low VOC Virtually solvent-free (99% solids)	Not suitable for cork, OSB & very microporous timber	1st coat: 30-40 sqm/L 2nd coat: 40-50 sqm/L	www.whittlewaxes.com.au
54g/L (5.2%)	One component product. Available in 4 sheen levels – Extra matt, Matt, Satin and Gloss. Recommended for normal domestic situations.	Coverage: 8-10 sqm/L Cost: Up to \$6-\$8/sqm more than traditional solvent-based polyurethane	www.bona.net.au
6.6% VOC	Can be used in conjunction with Murobond Woodwash for Scandinavian limed look. Not suitable for external or internal wet area usage. Lifespan: High traffic commercial usage 3-5 years. Low traffic 5-7 years+	Coverage: approx 12-16 sqm/L Cost: \$38/L	www.murobond.com.au
Zero VOC & free of solvents		Coverage: 15-60 sqm/L Cost: approx 15-20% more than traditional solvent-based finish	www.synteko.com.au
Low VOC			www.epimax.com.au
Low VOC options			www.concretocoloursystems.com.au
Total VOC emissions less than 0.05mg/sqm	Each system available in either full glaze or frosted glaze; for wet areas, the Duraglaze varnish is recommended	Products range in price, starting from \$36/sqm	www.floorchef.com

solvents at all and fewer toxins, so overall they are a healthier alternative.”

NATURAL OILS

Natural wood oils are a good choice for those looking for a health and environmentally conscious product, and they often highlight the natural beauty of timber surfaces. By soaking timber floors or furniture in an oil-wax-resin mixture, they work to repel water while maintaining the vapour permeability of the floor or other surface.

For concrete, Preston advises using oil finishes only on fairly dense smooth floors, as oil can be over-absorbed when used on very porous concrete. She adds that this can make application expensive and result in a matt rather than a lustred finish.

Tony Palmer from Palmer Constructions uses tung oil finishes on timber and concrete floors alike. He explains that most concrete floors have some sort of finish on them as it makes them easier to clean.

It is important, however, to be aware of greenwash when choosing a “natural” product. Environmental labels such as GECA and Global GreenTag and online knowledge bases such as Ecospecifier Global can help to sort the good from the bad, but not all “good” products will have an eco-label or be in product databases of verified and certified products such as Ecospecifier. In the end, Preston’s advice is to check the ingredients.

“Some products are called Natural Oils but are in fact synthetic oils or oils with added synthetic chemicals,” says Preston. “There are a number of these on the market and their names can be misleading to a person wanting a truly natural product on their floor.”

DURABILITY AND PERFORMANCE

When applying a finish to any concrete or timber floor, it is imperative to prepare the surface properly and follow the manufacturer’s application directions.

Petruzzi explains that this applies whether you are getting your floor professionally finished or doing it yourself. “As with all products, if you don’t follow instructions, you can get into a mess,” she says.

Polyurethane finishes are considered to be the most hardwearing and are therefore often used in commercial situations. However, scratches can show up more clearly on these high gloss and satin finishes. As Petruzzi explains, protection against scratches and

scuffmarks doesn’t depend only on the product chosen, but also on the nature of the floor itself. Soft timbers, for example, are likely to scratch more easily than hard timber floors, regardless of the type of finish.

Maintenance is also an important point to consider. While natural oil-finished surfaces can be spot rejuvenated, a floor with a film-forming coating needs to be entirely sanded back to the raw timber or concrete surface and recoated from scratch.

CHOOSING THE RIGHT PRODUCT

Choosing the right product for your floors and furniture comes down to personal choice, your values and whether the finish is fit-for-purpose. You may have to compromise on some qualities to fulfil other requirements, but it’s important to do your research and speak to your architect, builder and supplier about products they have used successfully.

“There are a variety of natural oils on the market and a variety of good water-based film forming products as well,” says Preston. “Each person will have their own requirements so it is good to compare the qualities of several different finishes in each category and see what suits you best.”

LINKS

GreenPainters:

www.greenpainters.org.au

GECA certified floor coverings:

www.geca.org.au/floor-coverings.html;

www.geca.org.au/coatings--paints.html

Ecospecifier Global:

www.ecospecifier.com.au

Global GreenTag:

www.ecospecifier.com.au/our-services/greentag-certification



↑ This floor in Auckland, New Zealand, features a coat of Bona Prime Intense and two coats of Bona Mega Extra Matt finish.

—Case Study

Natural oil on timber

Peter Steudle chose a natural oil-wax-resin system from Livos for the recycled timber flooring in his family’s inner Melbourne home.

Ten years ago he was delighted to find that these European health and environmentally conscious floor coatings were available in Australia.

A chemical engineer with his own Passive House (Passivhaus) building performance business, Peter is adamant that products he can put on his skin and perhaps even in his mouth, as well as on the floor and furniture, are the healthiest option.

He’s very happy with the floor, and all it gets is a regular clean every two weeks. “You can walk around enjoying the feel of the floor with bare feet. It’s really a coating within the material so it enables the material to be appreciated both in grain, feel and texture,” he says.

Peter explains that it’s not a high gloss finish and it does cope with real life very well, particularly with two young kids who are, as he puts it, “pretty hard core on it”. If the finish does get damaged, it can be easily spot repaired.

He points to a timber shelf where he used the same product, noting that where the sun hits the oiled finish it does dry out more quickly, but he can just rub in some more oil to restore the satin finish that’s still visible in a corner of the shelf not exposed to direct sunlight.



↑ This Australian home’s timber floor is finished with Livos products similar to the finish Peter chose several years ago.