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Technology

# T-Block™

## Liquid Tannin Blocking Agent

*Technical Leaflet*

for tomorrow's
World

# T-Block™

T-Block™ is a highly effective blocking agent for tannin and other stains. It provides excellent tannin blocking properties on various hardwoods, such as merbau and oak. T-Block™ offers unique features, including its applicability in both water-based and solvent-based systems. T-Block™ demonstrates stain blocking properties in both primers and topcoats.

## Benefits

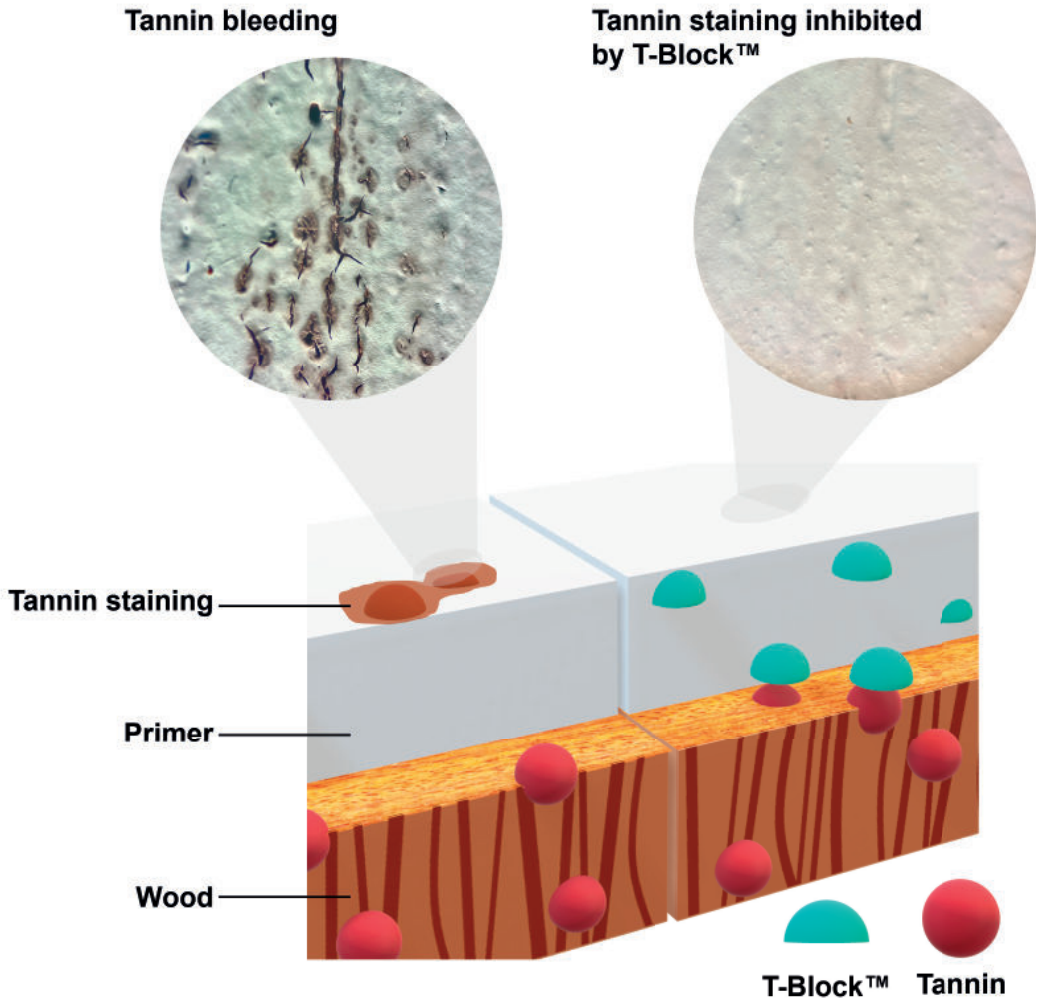
- ✓ No need for zinc- or zirconium-based stain blocking products
- ✓ Prevents tannin bleeding of hardwood, like merbau and oak
- ✓ Excellent blocking properties in the primer and topcoat layer
- ✓ Suitable for post-addition to paints
- ✓ VOC-free, label-free, ECO-label compliant

| Properties | |
|---|---|
| **Chemical nature** | Proprietary blend of surface active and chelating compounds |
| **Appearance** | White liquid |
| **Active content** | ~100% |
| **Density at 25°C** | 0.95 - 1.05 g/ml |
| **Viscosity at 25°C** | 200 - 1000 mPa·s |
| **Applications** | Water-based wood primers and finishes<br>Solvent-based wood primers and finishes |

This technical leaflet presents the results of T-Block™ stain-blocking properties. In this series of tests, an ammonium zirconium-based competitor product was evaluated as market reference. Zinc- and zirconium-based additives are often harmful to human health and the environment. In contrast, T-Block™ has a minimal environmental impact, as it is partly biobased, readily biodegradable, non-hazardous and VOC-free.

## Tannin blocking mechanism

Tannins are polyphenolic compounds that are present in certain types of hardwood, like oak, merbau and cedar. These molecules play a crucial role in the natural durability and resistance of wood against decay, insects, and microbial attacks. Tannins can leach out and create brown or yellow discolourations on paint surfaces when moisture or certain finishes interact with wood. This is particularly common with water-based paints and primers. To prevent tannin bleeding, it is recommended to use a high-quality stain-blocking primer before applying the final coat of paint. ADDAPT Chemicals BV has developed an additive based on novel technology, T-Block™, which can be added to wood primers to effectively counter tannin staining of various types of hardwood.




When a water-based primer is applied onto wood, the wet paint penetrates the porous wood structure. As primers are typically slightly alkaline, it has great tendency to solubilise the hydrophilic tannin complexes. Tannin molecules can eventually migrate to the surface and create discolouration and staining of the paint surface. To prevent this process, T-Block™ can be added to the primer or topcoat system. Through its chelating properties it scavenges the tannins at an early stage and prohibits them from migration to the coating surface.

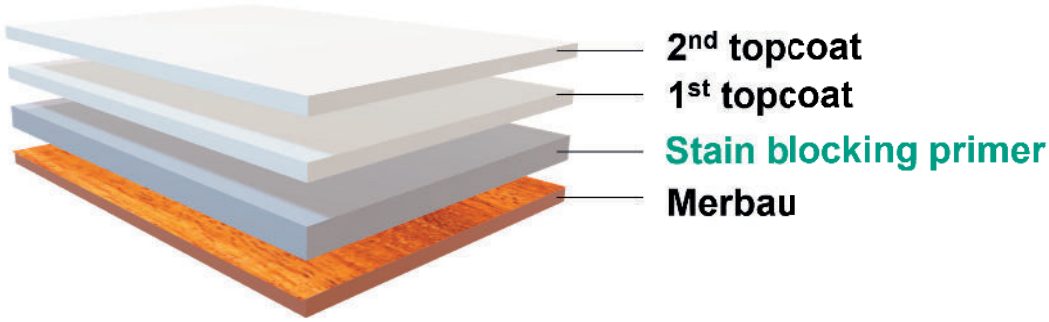
# Tannin blocking on hardwoods

Tannin staining can appear after applying a primer, especially on tannin-rich hardwoods To further enhance the bleeding process, coated wood panels could be exposed to high humidity conditions. Under these circumstances, tannin bleeding is likely to occur, as water helps solubilise tannins and transport them to the surface. These accelerated tests are conducted to evaluate and compare the effectiveness of paints in blocking tannin bleeding.

## Tannin stain resistance test

The stain-blocking primers are prepared by adding T-Block™ or a competitor product to the standard primer, as outlined in the table below:

| |
|---|
| Topcoat (acrylic-based, PVC 9.4%) |
| Primer (acrylic-based, PVC 16.7%) |
| **+4% Competitor** (Zr based) blocking agent (50% in water) |
| **+4% T-Block™** |



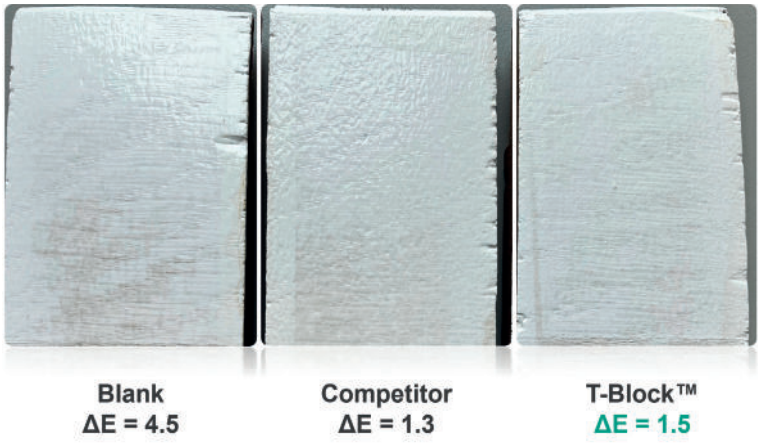

## Procedure:

1. Apply a primer with a spread rate of 7.5 $m^2$/kg on merbau wood panel with a roller
2. Dry overnight at ambient temperature
3. Apply a white topcoat with a spread rate of 12.5 $m^2$/kg over the primer layer
4. Dry for 4 hours at ambient temperature
5. Apply a second layer of topcoat with a spread rate of 12.5 $m^2$/kg
6. Dry for 2 hours at ambient temperature
7. Measure the colour using an X-Rite RM-200 spectrometer following the CIE-lab model
8. Expose the coated panels to 90 - 100% RH at 40 °C for 18 hours
9. Dry for 2 hours at ambient temperatures
10. Measure the colour after testing
11. Calculate the colour difference ΔE based on the measurements before and after testing:
    $\Delta E = \sqrt{(\Delta L^2 + \Delta a^2 + \Delta b^2)}$

## Tannin stain resistance test


Severe bleeding is observed on the wood panel without any additive (blank) and with the competitor product. Tannins emerging from the wood layer creates dark spots at the coating interface, resulting in significant colour differences. With T-Block™, tannin staining is greatly reduced, leaving almost no visible spots on the coating surface.

## Blocking performance of stain blocking primers on oak



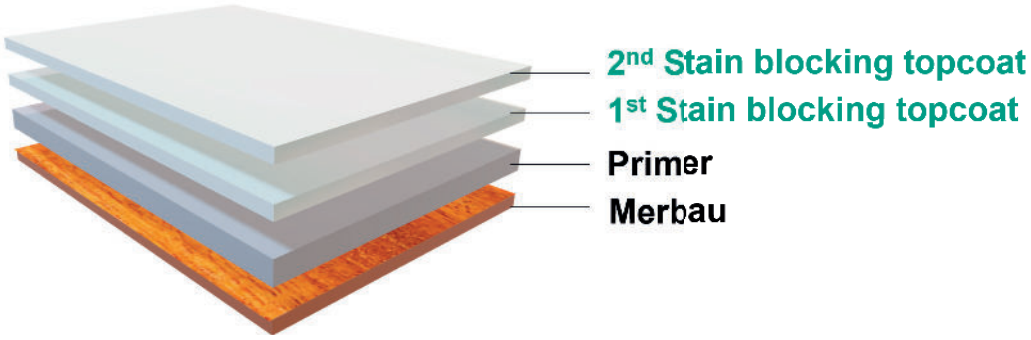

Tannin bleeding on oak appears to be less severe, mainly causing slight discolouration of the topcoat film. In this test, the competitor product and T-Block™ exhibited similar blocking properties.

## Stain-resistant properties of the topcoat layer

If wood surfaces are treated with a non-stain-resistant primer, it can exhibit severe tannin bleed-through. In this case, T-Block™ offers a solution as well. By adding T-Block™ to the topcoat system, it provides effective tannin-blocking properties.

The stain blocking topcoats are prepared by post-adding either T-Block™ or competitor blocking agent to the topcoat paint system, as described in the table below:

| |
|---|
| Topcoat (acrylic-based, PVC 9.4%) |
| **+4% Competitor** (Zr based) blocking agent (50% in water) |
| **+4% T-Block™** |
| Primer (acrylic-based, PVC 16.7%) |

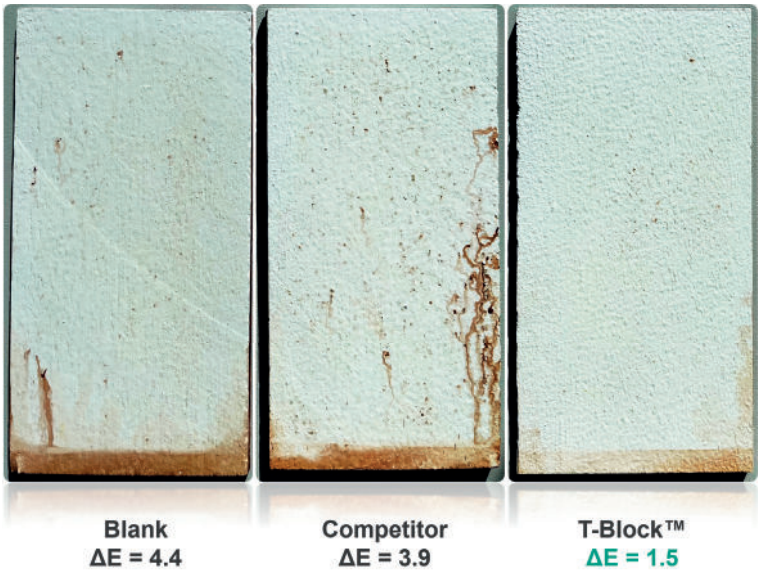



### Procedure:

1. Apply a primer with a spread rate of 7.5 $m^2$/kg on merbau wood panel using a roller
2. Dry overnight at ambient temperature
3. Expose the coated panels to 90 - 100% RH at 40 °C for 18 hours
4. Dry overnight at ambient temperature
5. Apply a white topcoat with a spread rate of 12.5 $m^2$/kg over the primer layer
6. Dry for 4 hours at ambient temperature
7. Apply a second layer of topcoat with a spread rate of 12.5 $m^2$/kg
8. Dry for 2 hours at ambient temperature
9. Measure the colour using an X-Rite RM-200 spectrometer, following the CIE-lab model
10. Expose the coated panels to 90 - 100% RH at 40 °C for 18 hours
11. Dry for 2 hours at ambient temperatures
12. Measure the colour using an X-Rite RM-200 spectrometer following the CIE-lab model
13. Calculate the colour difference (ΔE) based on the measurements before and after testing:
    $\Delta E = \sqrt{(\Delta L^2 + \Delta a^2 + \Delta b^2)}$

## Blocking performance of topcoats on merbau

The merbau wood panels were first treated with a standard primer and then exposed to humidity to accelerate the tannin bleeding process. Afterwards, two stain-blocking topcoat layers were applied and again exposed to high humidity.




It is observed that the tannin bleeding into the topcoat layers is less extreme, while small dark spots and yellowing are still visible in the blank sample and in the coating with the competitor product. As seen in previous tests, T-Block™ effectively prevents tannin stains from migrating to the surface by scavenging tannins at the primer interface.

# CONTACT INFORMATION

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