

The use of Propiconazole in wood preservatives for timber windows and doors

Executive summary

Considering the unprecedented consequences of the ban of Propiconazole for the timber window and door industry, the absence of alternative biocidal products and the limited risk of leaching in the environment, CEI-Bois, EuroWindoor and SBS call for a renewal of the approval of Propiconazole until an equivalent substitute is available, tested and assessed for use in timber windows and doors.

Furthermore, CEI-Bois, EuroWindoor and SBS call for increased collaboration (e.g. Public Private Partnerships) with the Commission in regard to wood preservatives, where public authorities and industry share a common interest in finding sustainable alternatives to biocidal products containing the Active Substances Propiconazole, Tebuconazole and IPBC.

Background

Based on the Biocidal Products Regulation (BPR 528/2012), many Active Substances with fungicide activity are currently approved for the use in Wood Preservatives PT 8¹. Among these, only 5 substances can be applied by surface treatment with effective protection against wood-destroying and blue stain fungi, which are necessary for wooden products in Use Class 3² such as window frames, doors or facade elements. All wood protection products suitable for timber windows and doors are using Propiconazole, Tebuconazole, IPBC or combinations of these.

While Propiconazole is approved as Active Substance in Film Preservatives (Product Type 7) at least until 30.11.2026 (see (EU) 2015/1609), its approval period for Wood Preservatives (Product Type 8) is up for renewal on 31.12.2022 (see (EU) 2021/354). The same renewal evaluation is about to affect 2 other active substances: Tebuconazole on 30.09.2022 (see (EU) 2019/1951) and IPBC on 31.12.2022 (see (EU) 2019/1969).

The expiry date of Propiconazole is primarily a consequence of its recent classification as Reprotox 1B (toxic for reproduction) by the Risk Assessment Committee (RAC) of ECHA, which represents an exclusion criterion for Active Substance approval according to BPR. In addition, an ongoing evaluation is looking into the possible classification as an endocrine disruptor, which would be a further exclusion criterion.

Currently, there are no alternatives that can be used directly by manufacturers of wooden products for Use Class 3, without a considerable time and development effort³. Besides, our sector has unfortunately not been able to identify any suitable alternative in PT 8 to Propiconazole-based products for use in timber windows and doors (see Annex II for conclusions in 9 European countries).

¹ PT 8 refers to the category “Product Type 8 – Wood Preservatives” defined by the Annex V of the [Biocidal Product Regulation](#). The complete list of Product Types can be found [here](#).

² The Use Class represents the service situation to which wood and wood-based products can be exposed. The Use Classes are defined in EN 335. Use Class 3 corresponds to “*Situations in which the wood or wood-based product is above ground and exposed to the weather (particularly rain). Attack by disfiguring fungi and wood-destroying fungi is possible*”. EN 599-1 defines the required efficacy criteria in biological test for Use Class 3.

³ [IHD \(Institut für Holztechnologie Dresden\)](#), Position on use of propiconazole in wood preservatives, 22/06/2020.

The manufacturers are currently in the process of identifying alternative wood protection strategies and integrating them into production. However, no matter which solution is identified by the industry, the upscaling and commercialization process (including industry specific testing for windows and doors) would normally take at least 5-10 additional years from promising laboratory results to a well-functioning full scale, commercial process⁴.

Wood in the European timber window and door industry

Wood is a sustainable material widely used in the European construction sector: load-bearing structures, carpentry work, cladding, indoor finishing, windows, doors etc...

For timber windows and doors, Softwood species are used because of their material's strength compared to their weight, their good insulating properties, their ease to process, and their renewable and sustainable condition as a resource that stores CO₂.

The wood used for sashes and frames of windows and doors mostly comes from responsible forestry sourced as PEFC or FSC certified. The certified forests guarantee social, economic and environmental sustainability, hence an important mean to ensure the European forests' role as carbon sinks.

The availability of timber provided by European forestry industry has turned wood into a popular primary material for many industrial sectors, among which the timber Window and Door industry plays a key role and follows strict processes to meet the properties demanded by construction standards.

Required impregnation of wood to ensure durability

To deliver the declared performance, the profiles of windows and doors must be dimensional stable. This means that twisting and dimensional changes must remain at a minimum level over the complete service life of a product. This sets a number of restrictions to what can be used as suitable materials for windows and doors to maintain the product properties over time. Therefore, wood shall be treated to fulfil efficacy criteria defined in EN 599-1 (*Durability of wood and wood-based products - Efficacy of preventive wood preservatives as determined by biological tests*), for the Use Class 3 as defined in EN 335 (*Durability of wood and wood-based products - Use classes: definitions, application to solid wood and wood-based products*)².

Some alternatives in wood sourcing are relevant to obtain more durable wood reducing the use of treatment and impregnation products, but none of them constitutes a scalable solution for the European timber windows and doors market.

- **See Annex I for more details on wooden materials and required treatments.**

Without appropriate substitutes, compliance with the wood treatment requirements contained in European standards would not be possible. End of approval of propiconazole will thus lead towards a market exclusion for products subjected to the conditions specified in EN 599-1 and EN 335. In addition, this could also lead to changes in the type of woods used, as classic wood species originating in the EU (e.g. Sweden) can no longer be used in some cases and have to be replaced by other wood species extracted from non-EU locations. This would unfairly discriminate internal trade market at the benefits of importations that would create additional detrimental environmental effects due to the impacts of transportation from foreign sourcing.

⁴ "Statement on time-scheduling for the substitution of wood preservatives", Wood Biology and Wood Products, Georg-August-Universität Göttingen, 2021 ([link](#))

Importance of Propiconazole in timber windows and doors

Despite all good reasons for using wood in construction products and more specifically in windows and doors, in the humid European climate, it is necessary to protect the timber sash and frame against fungal attacks (see Annex I) and thus ensure a long service life of the products.

Therefore, timber window and door manufacturers are currently using the approved Active Substance (AS) Propiconazole in combination with one or two other Active Substances (Tebuconazole and/or IPBC) when impregnating timber. The combination is essential to keep the total amount of Active Substances at a minimum, limit the concentration of impregnation product and at the same time ensure a long service life for the windows and doors.

Our sector has been carrying out in-depth analysis, conducted by independent institutes, in 2020-2021 to search for alternative Active Substances and potential substitutes to Propiconazole. However, within the 9 investigated countries, none of the studies (see Annex II) have led to identifying suitable alternative biocidal product free from Propiconazole or Tebuconazole and which could be used as of January 2023.

Minimal leaching to the environment

Over the past decades, the timber window and door industry has been optimizing their impregnation processes to prevent any leach to the environment, limit the use of chemicals and reduce the concentration of timber impregnation (e.g. switch from solvent to water-based treatment).⁵

The impregnation process of timber products is handled with care by window and door manufacturers and is carried out on finished components, preventing any risk of spreading biocidal products via wood chippings.

Besides, processes are also mostly carried out in closed loops with water-based impregnation and reuse of excess liquid in a closed system⁵. Other uses and working conditions are described in the assessment documents.



Figure 1: Example of a FlowLine impregnation machine
Source of picture: [GIARDINA Group](#)

⁵JRC Report, BAT Reference Document on Surface Treatment Using Organic Solvents including Preservation of Wood and Wood Products with Chemicals, 14.3.2.4 Emissions to water, p 457 ([link](#))

Furthermore, impregnated timber windows and doors are encased in topcoat on all exteriors. In addition, the painted wood surface is in some cases covered with additional aluminium cladding on the exposed surfaces (e.g. for metal-clad timber windows). Therefore, the rainwater does not come into direct contact with the wooden profile (which only represents a small percentage of the exposed area of a window), so the leaching of impregnation from timber windows and doors is very unlikely. However, even without direct contact with rain water, timber profiles are exposed to ambient humidity on both side of the window or door. This therefore does not eliminate the need for impregnation as described before.

The figures below show typical constructions of a timber and a metal-clad timber windows, which includes a protection coating on the timber frame and sometimes additional metal cladding.



Figure 2: The outer 1-3mm of the Timber profile contains impregnation product, which is covered by a Topcoat of 100-150 µm
 Source of pictures: Wertbau GmbH



Figure 3: The impregnated and coated timber is covered by an additional aluminium cladding on the exterior side

CEI-Bois, EuroWindoor and SBS understand the decision on banning Propiconazole in agriculture due to the direct spread on land of this process, but likes to point out that the responsible use of the substance in the timber window and door industry is totally different and presents a low and controlled risk of leaching.

Conclusion and risk of non-renewal of Propiconazole for PT 8

Generally, the successive exclusion of Active Substances since the start of biocide regulation in 1998 has posed major challenges for material protection, including wood preservation. It must be avoided that the properties of wood products deteriorate due to insufficient protective measures.

In light of the New European Bauhaus ambition to use more natural construction materials, we believe that our sector can greatly contribute to this objective and are therefore determined to investigate all technological solutions to make sure that wood remains a relevant material for new buildings and renovation projects. Maintaining and expanding the use of the sustainable native material wood in the construction sector is an important contribution to achieving the EU's climate goals defined in the EU Green Deal. Recent life-cycle calculations⁶ have shown that over a 50-year period, wood-based buildings would emit between 34.5 and 45.2 percent less CO₂ than similar buildings with conventional materials, making wood construction materials an indispensable part of a future decarbonised European building stock.

⁶ Ramboll, CO₂-Besparselse Ved Traebyggeri, June 2020 (link [here](#))

Considering the unprecedented consequences of the ban of Propiconazole for the timber window and door industry, the absence of alternative biocidal products and the limited risk of leaching in the environment, **CEI-Bois, EuroWindoor and SBS call for a renewal of the approval of Propiconazole** until an equivalent substitute is available, tested and assessed for use in timber windows and doors, for the following reasons:

- **Availability of several approved Active Substances is important:** The timber window and door industry currently uses a combination of Propiconazole and 1 or 2 other Active Substances, allowing manufacturers to significantly reduce the concentration and the quantity of Active Substance use for wood impregnation.
- **There are currently no suitable alternatives for use in timber window and doors industry:** Out of 4 studies conducted in 9 countries, no impregnation product free from Propiconazole and Tebuconazole was deemed suitable for industrial needs (s. Annex II). In case a non-renewal of Propiconazole, and with the upcoming expiry date on Tebuconazole approval in September 2022, **the window industry would be left without any option of impregnation as of January 2023.**
- **The approval process of the Biocidal Product Regulation requires 5-10 years** before a new Active Substance can be used in wood impregnation products.
- **New alternative solutions and processes have to be thoroughly tested for their health and environmental properties:** Any wood preservation/protection solution placed on the market requires the durability of windows and doors to be tested for at least 5-10 years. Hence, European timber window and door manufacturers require a certain transition period to implement new alternative solutions.

Finally, **CEI-Bois, EuroWindoor and SBS call for increased collaboration (e.g. Public Private Partnerships) with the European Commission** in regard to wood preservatives, where public authorities and industry share a common interest in finding sustainable alternatives to biocidal products containing the Active Substances Propiconazole, Tebuconazole and IPBC.

About CEI-Bois – The European Confederation of Woodworking Industries (CEI-Bois) represents 21 European and National organisations from 15 countries and is the body backing the interests of the whole industrial European wood sector: more than 180.000 companies generating an annual turnover of 133 billion EUR and employing 1 million workers in the EU.

About EuroWindoor AISBL – EuroWindoor AISBL was founded as an international non-profit Association, in order to represent the interests of the European window, door and facade (curtain walling) sector. Our 19 national associations speak for European window, door and facade manufacturers that are in direct contact with consumers, and thereby having large insights on consumers' demands and expectations. We are at the forefront interacting with dealers, installers and consumers buying windows and doors, and the companies behind the associations cover selling all over Europe.

About Small Business Standards – SBS is a European non-profit association co-financed by the European Commission and EFTA Member States. Its goal is to represent and defend small and medium-sized enterprises' interests in the standardisation process at European and international levels. Moreover, it aims at raising the awareness of small and medium-sized enterprises about the benefits of standards and at encouraging them to get involved in the standardisation process.

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Annex I: Limitations of alternative wood sourcing for the timber window and door industry

Distinction between Hardwood and Softwood species as well as distinction between heartwood and sapwood

Hardwood is wood from broad leaved trees of which many species are deciduous. Hardwood trees are often slow growing and the wood from these trees is mostly harder than that of softwoods.

Softwood is wood from coniferous trees such as pine and spruce. Being readily available, easily processable and with good properties softwood from pine and spruce are the preferred wood species for window and door production in Europe.

Softwood vs Hardwood



Figure 4: Distinction between Softwood and Hardwood trees
Source of picture: [Resene – Protection of Wood by use of Coatings](#)

With a few exemptions both Hardwood and Softwood consist of two distinct core parts: **Sapwood** and **Heartwood**.

During the formation of heartwood resin, fats, sugars, tannins, alkaloids, waxes, dyes and minerals are precipitated in the cells making the wood darker. Heartwood is more or less effectively protected against attack by fungi and insects, partly through poisoning and partly through clogging and gluing of vessels and pores.

However, the share of Heartwood substantially differs between Hardwood and Softwood (see Figure 5):

- Most Hardwood primarily consists of Heartwood
- The most important Softwood, e.g. pine and spruce primarily consist of Sapwood

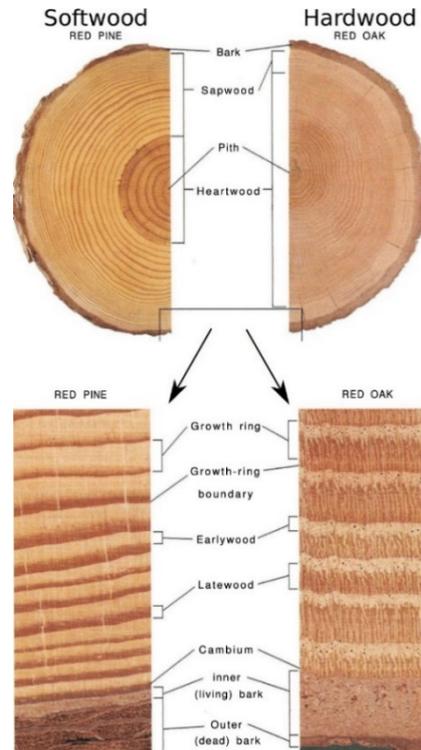


Figure 5: Constitution of Softwood and Hardwood and their respective share of Sapwood and Heartwood
 Source of picture: [Care for Cultural Material - Wood](#) (referenced to Hoadley, 2000, *Understanding Wood*, pp.7.)

Limitations to the use of Sapwood from Softwood and Hardwood species

Softwoods like Pine (*Pinus sylvestris*) and Spruce (*Picea abies*) are abundant in forests all over Europe and are an easily available, cost-effective and sustainable choice of raw material for the European wood industry. They also present better insulation properties than hardwood, making them a preferred choice for energy efficient windows and doors: better performances can be achieved with similar amount of material, and equivalent performances could also be achieved with limited use of resources. In addition, the inherent mechanical properties and processability makes the mentioned softwoods a valid material for building constructions

Sapwood must be considered as of low durability, without distinction whether from Hardwoods or Softwoods.

All products intended for Use Class 3 like windows and doors must therefore be treated against fungal attacks, and treatment products are currently based on Propiconazole (with or without a combination of Tebuconazole or IPBC).

All Sapwood, whether they come from Hardwood or Softwood, should be treated against fungal attacks.

Limitations to the use of Heartwood from Hardwood species

The durability of Heartwood from many hardwood species is in general very good.

However, Hardwoods like Oak are used for a very limited number of windows and doors. This is related to factors like availability of resources and material costs. The heartwood of White Oaks is very durable towards wood-destroying fungi. Hardwood represents less than 5% of timber used in the window and door industry in Europe. The Dutch market has a significant share of tropical hardwoods that differs from the rest of Europe.

Due to resource limitations, Hardwood cannot be used as standard wood for the mass window and door market

Limitations to the use of Heartwood from Softwood species

Heartwood can be found in European Softwood species like Pine or Spruce, but its share is limited (see Figure 5) and it is not available in sufficient quantities.

For Softwood species available in Europe, Heartwood is available in limited shares.

Limitations to the use of tropical wood species

The Heartwood of many tropical wood species presents a good durability and dimensional stability.

However tropical wood species cannot be found via the European forestation and require to be imported at the expense of transportation environmental impact, adding to the already high price index.

Tropical wood species are not available in Europe and require to be imported at a high environmental impact for transportation.

Limitations to the use of modified timbers

Chemically or thermally (TMT) modified timbers generally have a higher biological durability and reduced moisture uptake in comparison to the natural timber. Thermal modification usually reduces the mechanical characteristics of the modified timber, especially impact resistance.

Thermal modification is carried out on both Hardwood (e.g. beech, ash) and Softwood species (e.g. pine, spruce), whereas the easily impregnable sapwood of Radiata Pine (*Pinus radiata*) from New Zealand is preferred for chemical modification.

The modification procedures are more or less energy-intensive in addition transport costs have a negative environmental impact on chemically modified timber. The significance of modified timbers in window and door production is therefore very low. If at all, they are used as outer layers in laminated timber blanks/scantlings mostly in combination with spruce and pine.

All modified timbers are susceptible to discolouration by bluestain / sapstain and therefore require a protective treatment which is best achieved via the use of propiconazole.

The use of modified timbers on a large scale would significantly increase the price index of timber windows and would have severe consequences on the environmental impact of the manufacturing due to an energy intensive process. Transportation would also harm the overall environmental impact.

Annex II: Availability of suitable alternatives for Propiconazole in PT 8 for use in timber windows and doors

The following table presents the results of 4 studies conducted in 9 EU countries in 2020-2021. All studies aim at identifying alternative wood preservatives (Product Type 8) authorized at national level for Use Class 3, containing no Substance of Very High Concern (SVHC), suitable for industrial use, and presenting sufficient efficacy against wood rotting/destroying fungi and against wood discolouring fungi (“blue stains”).

Country	Institute/ Consultant	Number of Authorized Biocidal products NOT containing Propiconazole	Limitations to the use of identified alternatives
Austria ⁷	HFA	1 product	Contains Tebuconazole (expiring in September 2022)
Belgium ⁸	SHR	1 product + 1 product family	The product uses an Active Substance which has not been tested for windows and doors (unknown compatibility). The product family is solely based on IPBC which usually does not present a sufficient efficacy against wood-destroying fungi
Denmark ⁹	DHI	None	-
Finland ⁹	DHI	None	-
France* ¹⁰	FCBA	None	-
Germany ⁷	HFA	1 product	Contains Tebuconazole (expiring in September 2022)
Norway ⁹	DHI	1 product	Contains Tebuconazole (expiring in September 2022)
Sweden ⁹	DHI	1 product	Contains Tebuconazole (expiring in September 2022)
The Netherlands ⁸	SHR	1 product family	The product family is solely based on IPBC which usually does not present a sufficient efficacy against wood-destroying fungi

* Due to specific national regulation, efficacy against insects was also included in the scope of the study.

⁷ HFA: Holzforschung Austria – Study on authorized wood preservatives for industrial use as primers to manufacture wooden windows (HFA-A.Nr.: 2635/2020/1-HO)

⁸ SHR: Stichting Hout Research – Approved wood preservatives in Belgium and The Netherlands (21.0298-B)

⁹ DHI: DHI Group – PT 8 products approved in Denmark, Norway, Sweden and Finland (11817983)

¹⁰ FCBA: Institut Technologique FCBA – Survey of products registered to date for the preservation of wood intended for the manufacture of exterior joinery (n°401/20/162ZBis)