Testing methodology and application

Wood species and profiles that comply with fire class B after treatment

Hestus Partner in Fire retardancy

DGMR - SEAL OF APPROVAL

Summary

This whitepaper discusses how the fire-retardant treatment carried out by Hestus has been tested for fire safety. The document covers fire safety regulations, test methods such as the SBI test, and the results of tested wood profiles and applications. In addition, the possibilities of coatings and extended applications (EXAP) are discussed.

This whitepaper is a guide for professionals in the construction industry.

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1. Introduction

Wood has become indispensable as a sustainable and circular building material. It combines aesthetics with ecological benefits and is increasingly used in construction projects, for example as wall and façade cladding. Still, fire safety remains an important concern. How can it be ensured that wood meets the required fire class, in an environmentally friendly way?

Hestus offers a solution by treating wood with BurnBlock®, an environmentally friendly fire-retardant that meets the strict requirements of the NEN-EN 13501-1 standard (fire class B). But what does that mean in practice? Which wood species and profile types can be fire-retardant treated to demonstrably meet these requirements?

Hestus has had this investigated by construction consultancy DGMR. This document provides insight into the results of this research. It shows how and which combinations of wood species and profile types can successfully comply with Fire Class B and how the tests were carried out.

2. What does the law say about fire safety of exterior façade material?

2.1 Explanation of legislation regarding fire safety of exterior façade material

In the Netherlands there are rules governing the fire safety of building materials. These rules divide materials into different classes, from A1 (non-combustible) to D (highly combustible). The higher the fire safety required, for example because the building is tall or because the material is used structurally, the stricter the requirements are. These rules are set out in the Building Works and Living Environment Decree (Bbl), which applies to all new construction projects, among others.

Required fire classes for exterior façade finishing new construction

Height above reference level (ground level)	Exterior sides of façades, adjacent to	Residential	Assembly	Cell function	Healthcare function	Industry, office, education, sports, retail, other	Lodging	Lodging structure not being a building
0 to 2,5 meters	-	B[1]	B	B	B	B	B	D
2,5 to 13 meters	Extra protected escape route	C	C	B	C	C	C	C
	Protected escape route	C[2]	C[2]	B	C[2]	D	C	D
	Other	D	D	D	D	D	D	D
13 meters or higher	-	B	B	B	B	B	B	B

[1] For ground-level houses fire class D is required from 0 to 2.5 m

[2] For ground-level houses, other assembly functions and other healthcare functions fire class D is required

Note: Current requirements are based on 5 and 13 meters. In 2026 (possibly later) the limits of 30 and 50 meters, and specific user functions are also expected to be included.

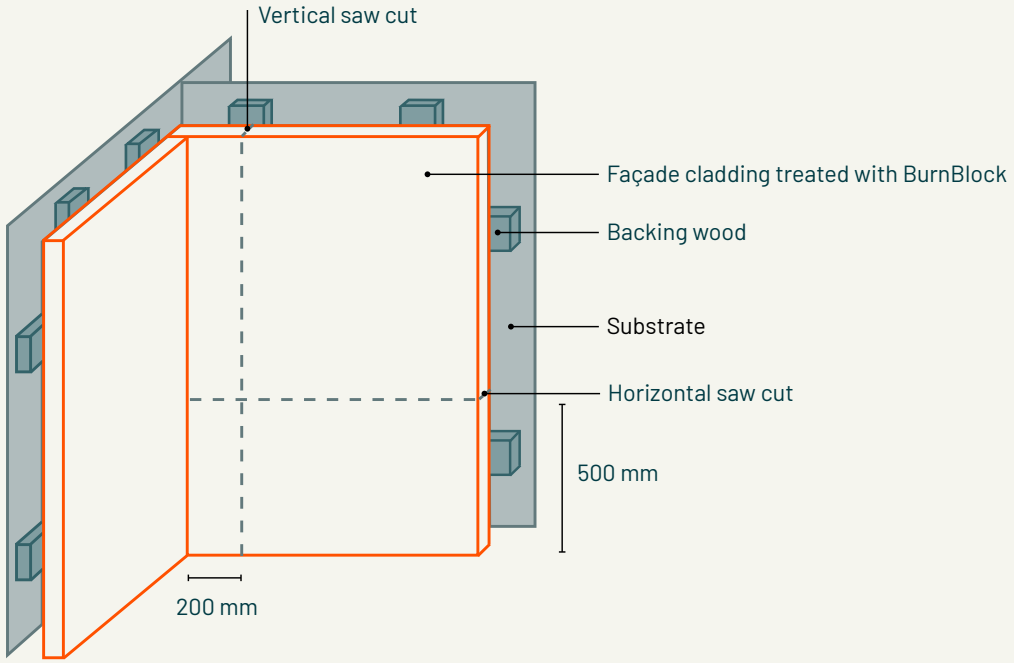
If there is a risk of fire spread, strict requirements apply to how quickly fire may spread across the façade. According to the NEN 6068 standard (fire spread calculations), at least 95% of the façade must comply with fire class B to prevent rapid fire spread. The exception to this are façade openings, which must meet at least fire class D.

3. How is wood that has been treated with fire-retardant tested for fire safety

To determine the fire safety of a building material, specific tests are carried out. In the first test (small flame test or cone calorimeter test) a small piece of the material is exposed to a small flame. In the second test (SBI test) a larger part of the façade is tested with a larger flame. Based on these tests it is determined in which fire class the material falls, according to the NEN-EN 13501-1 standard.

An SBI test (Single Burning Item test) is a method to determine how a building material, in this case wood treated with the fire-retardant BurnBlock, reacts to fire. This test is especially important for façade materials and other building components that must meet strict fire safety requirements.

The different wood species that can be fire-retardant treated by Hestus have been tested and meet fire class B. In these SBI tests a standard configuration was used: a non-combustible substructure (fire class A1 or A2), with a wooden framework (class D) on top and the wood treated with BurnBlock. This configuration serves as the basis for how the material can be applied to a façade.

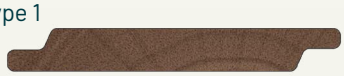
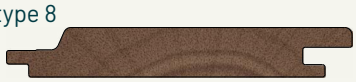


SBI setup according to EN 13823

4. Which wooden profile types comply with fire class B after treatment?

Different standard wood profiles can be fire-retardant treated by Hestus. Test results and resultant reports are available which permit determination as to which of these profiles the fire-retardant treatmentcan be applied. The table below lists 10 different profiles, each assessed separately for their suitability for Fire Class B. This does not take into account specific wood species or additional treatments. For the applicability of other profiles please contact Hestus.

Standard profiles

Profile type	Complies	Explanation
Profile type 1 	Yes	The profile shape has strong similarities with the profiling from the various test reports.
Profile type 2 	Yes	The profile shape has strong similarities with the profiling from the various test reports. The extra groove in the profile is limited in size, the number of extra grooves per façade surface is limited and will have minimal influence on the results of fire tests.
Profile type 3 	Yes	The profile shape has strong similarities with the profiling from the various test reports.
Profile type 4 	Yes	The profile shape has strong similarities with the profiling from the various test reports.
Profile type 5 	No	The profile shape differs significantly from the profiling in the fire tests. An overlap of separate parts is missing and open joints with the substructure may occur.
Profile type 6 	No	The profile shape differs significantly from the profiling in the fire tests. An overlap of separate parts is missing, and the profile is mainly used in an open façade construction.
Profile type 7 	No	The profile shape differs significantly from the profiling in the fire tests. Although there is an overlap between the separate parts, the profile results in a considerably larger wood surface.
Profile type 8 	Yes	The profile shape has strong similarities with the profiling from the various test reports.
Profile type 9 	No	The profile shape has strong similarities with the profiling from the various test reports. The extra groove in the profile is limited in size, however the number of extra grooves per façade surface is greater (than profile type 2) and results in a larger wood surface.
Profile type 10 	No	The profile shape differs significantly from the profiling in the fire tests. An overlap of separate parts is missing, and open joints may occur when the 'thin' tongues burn away.

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5. How can the fire-retardant treated wood be applied?

After the wood has been fire-retardant treated by Hestus, it can be applied to a construction project under specific conditions to ensure that it complies with fire class B. These conditions are based on the results of fire tests and the specific test setups used.

The table below lists important conditions, such as thickness, density, substructure and profile type. Because new findings and wood species are continuously added, we recommend always consulting the most recent version of this **table** on the Hestus website. For the most recently classified wood species, see **hestus.nl/en/knowledge-centre**.

Wood species treated with BurnBlock®	**Profile type** (see page 7)	**Profile thickness**	**Density** (kg/m³)	**Application**	**Installation orientation**	**Fixing**	**Air cavity** (mm)	**Coating**
Spruce	1 to 4 & 8	15-42	355-536	Closed	Horizontal & Vertical	Mechanical	Max 42mm	Profile thickness 18-42mm, pre-weathering and color, Bs1 d0
Pine	1 to 4 & 8	15-42	540-600	Closed	Horizontal & Vertical	Mechanical	Max 42mm	Profile thickness 18-42mm, pre-weathering and color, Bs1 d0
WRC	1 to 4 & 8	15-42	316-630	Closed	Horizontal & Vertical	Mechanical	Max 42mm	Profile thickness 18-42mm, pre-weathering and color, Bs1 d0
Larch	1 to 4 & 8	15-42	550-630	Closed	Horizontal & Vertical	Mechanical	Max 42mm	Profile thickness 18-42mm, pre-weathering and color, Bs1 d0
Douglas	1 to 4 & 8	15-42	550-630	Closed	Horizontal & Vertical	Mechanical	Max 42mm	Profile thickness 18-42mm, pre-weathering and color, Bs1 d0
Spruce Thermally modified	1 to 4 & 8	15-42	314-434	Closed	Horizontal & Vertical	Mechanical	Max 42mm	Profile thickness 18-42mm, pre-weathering and color, Bs1 d0
Ash Thermally modified	1 to 4 & 8	15-42	590-680	Closed	Horizontal & Vertical	Mechanical	Max 42mm	Profile thickness 18-42mm, pre-weathering and color, Bs1 d0
Pine Thermally modified	1 to 4 & 8	15-42	450-500	Closed	Horizontal & Vertical	Mechanical	Max 42mm	Profile thickness 18-42mm, pre-weathering and color, Bs1 d0
Ayous Thermally modified	1 to 4 & 8	19-42	269-374	Closed	Horizontal & Vertical	Mechanical	Max 42mm	Profile thickness 18-42mm, pre-weathering and color, Bs1 d0
Fraké Thermally modified	1 to 4 & 8	15-42	410-730	Closed	Horizontal & Vertical	Mechanical	Max 42mm	Profile thickness 18-42mm, pre-weathering and color, Bs1 d0
Poplar Thermally modified	1 to 4 & 8	15-42	350-500	Closed	Horizontal & Vertical	Mechanical	Max 42mm	Profile thickness 18-42mm, pre-weathering and color, Bs1 d0
Accoya	1 to 4 & 8	19	400-600	Closed	Horizontal	Mechanical	Max 42mm	

Substructure:

For all species, except Accoya: A1/A2 substrate, thickness min. 12.5 mm >525/kg m³ or cement-bonded board A2, thickness min. 4.5 mm >1300 kg m³

For Accoya: A1/A2 substrate, thickness min. 12.5 mm >525/kg m³

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Some conditions, such as a non-combustible substructure (class A1 or A2), come from the NEN-EN 13823 standard. Other conditions, such as the thickness of the wood or the dimensions of battens, are determined by the properties of the materials used.

The wood has been tested under specific conditions, and the test results are only valid if the wood is applied to or within a construction project in exactly the t same way. In case of deviations from this application, the wood must be tested again to ensure fire safety. Alternatively, the application can be assessed by a specialized fire safety consultancy, such as DGMR.

5.1 Apply a coating

On wood fire-retardant treated by Hestus you can in many cases apply a color coating. Various wood species have been tested with coatings of specific brands, which have shown that fire class B is retained. Because new brands and products are regularly tested, we recommend checking the most recent overview of tested coatings on the **Hestus** website. The coatings can be applied within a CE declaration.

What is a CE declaration?
Manufacturers, distributors and importers of construction materials must have a CE marking. This means that they must draw up a Declaration of Performance (DoP). With this declaration they show that their construction materials meet the key safety requirements within the EU. For some products an external check by an official body, the Notified Body, is mandatory. This body checks the product and confirms the DoP with a certificate, the Certificate of Constancy of Performance (CCOP). Hestus has passed this check and is CE-certified. You can find the certificate in the knowledge center on our website. Hestus's coating partner is also CE-certified.

6. How does testing for end use (end-use test) work?

Fire safety requirements often apply not only to individual components, but to the entire construction, such as an exterior wall. It is not self-evident that separate materials that meet the requirements will also meet the same fire class when combined. That is why it is important to test the complete assembly.

Testing has been carried out at product level, not at end use. For example, it may be that the wooden framework and the fire-retardant treated wood directly adjoin insulation material or a timber frame wall. In theory, a combination with a cement-bonded board (non-combustible substructure) and mineral insulation could also comply with fire class B. However, this must be examined and assessed for each project. The same applies to a construction where the wooden framework is applied directly to insulation materials, such as rigid foam. This must also be assessed specifically for each project.

> *According to Dutch laws and regulations you must be able to demonstrate that the entire façade, as it is ultimately used, complies with fire class B. Simply using materials that themselves have fire class B does not automatically mean that the entire façade also complies with that class.*

You can demonstrate this by having a fire safety specialist provide substantiation or by having a special test carried out, a so-called end-use test. In such a test the entire façade construction is tested, not just the outer cladding. This test is carried out by means of an SBI test and classified according to the European standard EN 13501. If the test is successful, you can be sure that the complete façade complies with the applicable fire safety requirements.

6.1 Sometimes you don't need to test again, then you can use EXAP.

With EXAP (Extended Application) you can use test results of a construction product for similar applications, without having to carry out a new fire test for every situation. For example, you can assume that a product with a slightly different thickness or build-up still meets the fire safety requirements.

When a construction product is tested for fire safety (for example with an SBI test), the test result strictly applies to the tested configuration, materials and conditions. This is called the direct field of application. With EXAP you can, under strict conditions, assume that a product also meets the fire safety requirements in similar situations, without having to test it again. This is done based on pre-established European standards and guidelines, which define which variations are permitted. This makes the process faster and more flexible, while safety remains guaranteed.

EXAP may only be determined by a competent authority. Hestus can help you to involve the right party and guide you in this.

7. Closing statement

The fire-retarded resulting from treatment by Hestus offers a reliable solution to comply with fire class B according to the NEN-EN 13501-1 standard. The test results show that various wood species and profile types can be treated effectively, provided they are applied to a construction according to the specified conditions, such as a suitable substructure and build-up. In addition, a coating can be applied to improve the aesthetics and functionality of the wood, while maintaining the required fire class. This document describes what has been tested and what the application possibilities are.

Do you have specific questions or need tailored advice? Contact Nienke de Pijper
via **06 83 24 66 22** or **n.depijper@hestus.nl**.

About Hestus

Hestus is your partner in fire retardancy. We contribute in a nature-friendly way to the safety of our physical living environment. We make wood fire-retardant in a responsible manner, so that fire safety and sustainability come together. As a subsidiary of sustainable developer and investor Schipper Bosch we have strong roots in making wood more sustainable.

Our knowledge and philosophy form the basis of everything we do and are tangible throughout our entire organization. We stand for clarity. Because we notice that there is still a lot of uncertainty surrounding fire safety. We can translate complex matters of fire classifications, laws and certifications and we can help you in the search for the most responsible solution. Everything that we and our partners in fire retardancy do is tested, checked and documented.

Hestus was founded in response to the growing demand in the market and a drive to do better. In the construction world the use of wood is only increasing. At the same time fire safety regulations are becoming increasingly strict. Hestus offers a 100% nature-friendly solution for the business market.

Join us in contributing to a physical living environment that is both fire safe and clean.
Contact us for the possibilities.

Hestus Partner in Fire retardancy

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