

2025
WHITE PAPER

Leaching of Fire Retardants

Why Leaching Happens and How to Prevent It

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Wood’s new role in modern construction comes with responsibility

Wood has taken on a new role in contemporary construction – including façades and other exterior applications. But with the outdoor use of fire-retardant treated wood comes a clear responsibility: to ensure that the fire protection remains effective over time and meets the appropriate durability classification.

An approved fire performance at the time of delivery is not enough. Weather and moisture can degrade the ef-

fectiveness, and a lack of understanding about leaching can, in the worst case, compromise both safety and credibility. This white paper provides decision-makers, advisors, and sales professionals with a clear overview of leaching – what it is, why it matters, and how to make the right product choices. The objective: to equip you with confidence in your recommendations and to ensure long-term fire safety in the completed structure.

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What is fire-retardant treatment

It’s important to note that the same fire classification does not always indicate identical performance – understanding the differences is key to making informed and safe choices.

The Importance of Use Class

The use class classification determines whether a product is suitable for use in different environments.

It All Starts with Responsible Planning and Design

Specifying the right properties at an early stage is crucial for maintaining fire safety in the completed building.

This highlights the importance of making well-informed material choices.

Implications for Environment, Safety, and Economy

Using fire-retardant treated wood without the correct use class can have far-reaching consequences— not only for safety, but also for the environment and the economic sustainability of the project.

Tightened Insurance Terms

Insurance companies are placing increasingly strict requirements on the coverage of timber buildings. This section highlights what you need to know to avoid future complications.

Common Pitfalls

By understanding common mistakes, you can avoid unnecessary risks. This section outlines the most frequent pitfalls—and how they can be prevented through increased knowledge and awareness.

Durability of Fire Performance – EN 16755 (Use Class)

An overview of the EN 16755 standard—its different classes, key changes in upcoming revisions, and clarification of the transition from the previous BS-EN 16755 standard (no longer valid) to the current EN 16755 standard.

Fire Retardant Treatment

– A Regulated Industrial Process

Fire retardant treatment by vacuum pressure is an industrial process subject to third-party verification and regulated under various frameworks, including the EU Construction Products Regulation (CPR 305/2011), in accordance with Assessment and Verification of Constancy of Performance (AVCP) System 1. It is a globally recognized method that enhances the properties of wood and ensures long-term fire protection.

The process begins with the placement of the wood in a pressure vessel (autoclave), where the treatment parameters are adjusted based on wood species and the required fire classification, depending on the product's intended installation conditions. An initial vacuum removes oxygen from the cellular structure of the wood, after which the fire retardant is pressure-impregnated deep into the material. This is followed by a final vacuum and a drying phase, where the moisture content is normalized and the fire retardant is fixed within the wood.

The Need for Certification and Knowledge

Fire safety is governed by legal requirements, and it is essential that products placed on the market comply with certification standards and are subject to third-party control. It is important to understand that the term “fire-retardant treated wood” is not a guarantee of identical properties between different manufacturers—variations may affect the product's performance and its approval for specific applications.

Technical Challenges

A particular challenge with fire retardant treatment is that each wood species forms a unique combination with the specific fire retardant used. In essence, the wood product itself becomes the active fire protection. As a result, properties such as suitability for interior or exterior use and hygroscopic behavior can differ significantly between manufacturers and product solutions.



The Role of the Certification Body

All documentation supporting a product's performance and classification must be issued by an accredited certification body. Self-assessments, manufacturer-issued statements, or technical opinions that are not backed by proper certification are not legally valid and cannot serve as the basis for CE marking or marketing under current legislation.

Solution

To address this, it is essential to thoroughly check and verify the classified properties of the product through proper certification.

Type Approval Certificates:

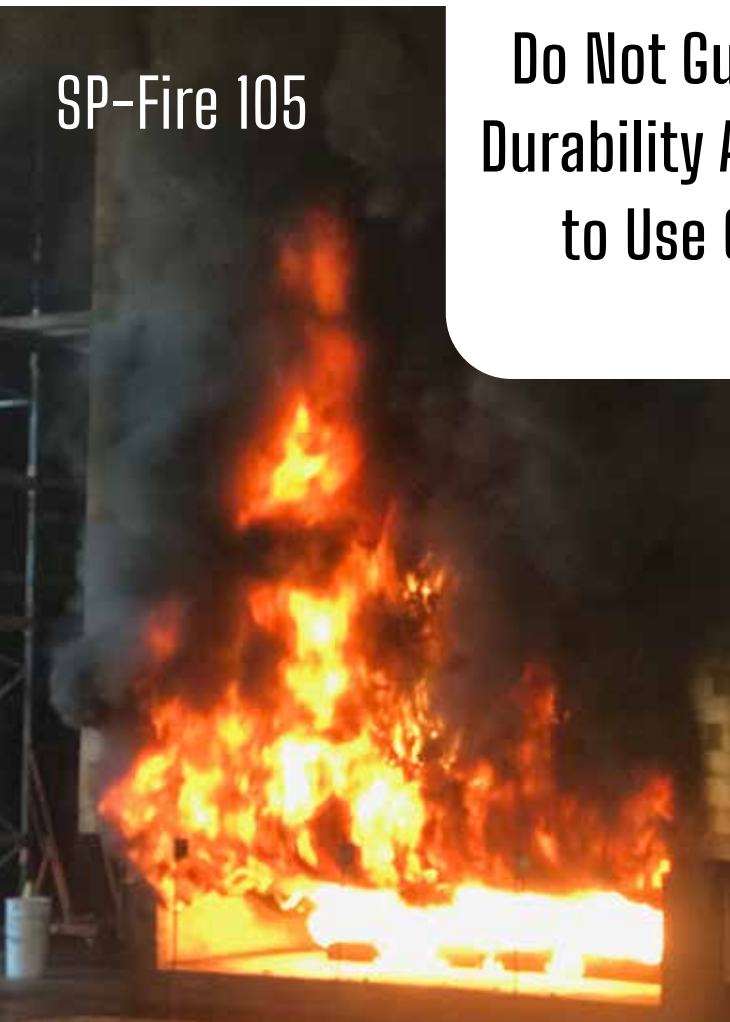
- Façade cladding (SP-Fire 105)
- Use Class EN 16755 INT1, INT2
- Use Class EN 16755 EXT, with surface treatment required
- Use Class EN 16755 EXT, without surface treatment required

Fire Classification:

- Declaration of Performance (DoP)
- The DoP must be supported by a valid CE Certificate (annex ZA, AVCP system 1)



ISO 5660-1

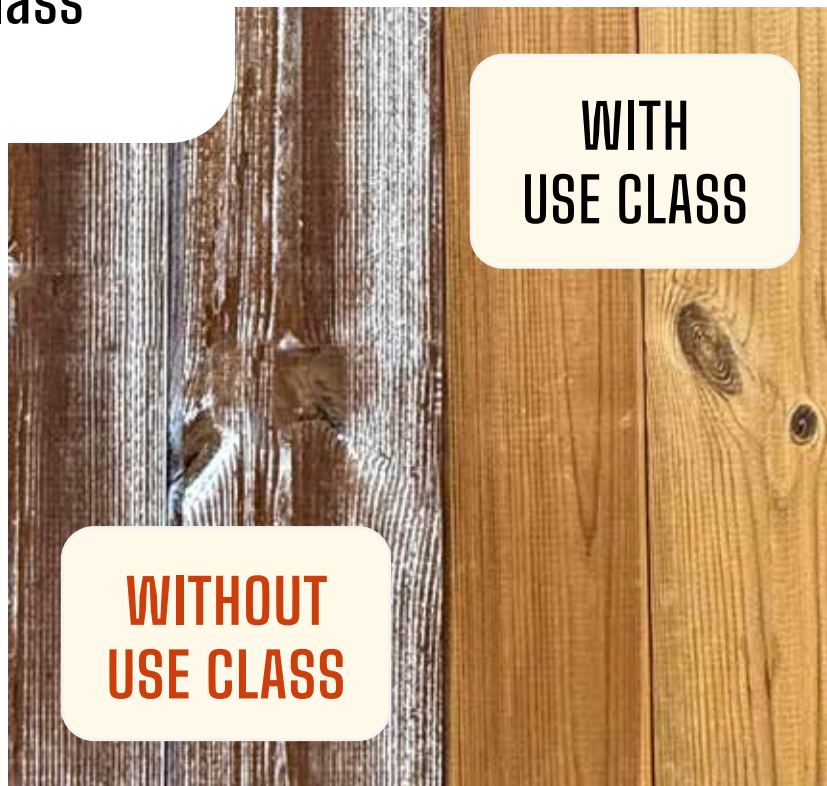


SP-Fire 105

“Passed Fire Tests
Do Not Guarantee
Durability According
to Use Class”



SBI EN13823



WITH
USE CLASS

WITHOUT
USE CLASS

Products with the same classification are not necessarily equivalent. The details can make all the difference!

Important to Know:

Two products with the same fire classification can differ significantly in performance. Technical properties, resistance to humid environments, and suitability for indoor or outdoor use vary—and in practice, these factors directly impact both safety and durability. Always ensure that the documentation is complete, traceable, and that the product is intended for the correct application.

Not All Products Are Equal – Despite Having the Same Classification

Having a fire-retardant wood product classified as EXT according to EN 16755 does not automatically mean it is equivalent to other products with the same classification. Each product has specific technical characteristics that can significantly impact its functionality and longevity in real-world applications.

The Challenge: Choosing the Right Façade Product

When selecting a fire-classified façade cladding, two products may appear similar on the surface. However, it is crucial to understand what lies behind the classification. The chemical composition of the fire retardant plays a major role in determining whether the wood panel must be coated with paint to maintain its fire-protective performance over time.

Some fire retardants require a fully covering paint or surface treatment to validate their classification in exterior environments. Others—often more technically advanced—are tested and approved without the need for painting, offering greater flexibility in both design and maintenance.

Pitfall 1: Inadequate Documentation

There are marketing claims suggesting that certain products meet use class requirements for exterior use—yet they lack proper and traceable documenta-

tion from an accredited certification body. Without this third-party verification, the classification is not legally valid. Using such products may result in serious safety risks and legal consequences.

Pitfall 2: Overreliance on Surface Treatments

It is common to overestimate the effectiveness of surface treatments—such as opaque paints, stains, or silicon-based finishes—in solving issues related to leaching or the absence of appropriate use class. However, a surface treatment alone does not guarantee long-term fire protection. To confirm its effectiveness, testing according to EN 16755 EXT is required, as this standard is specifically designed to evaluate durability in outdoor conditions.

Solution: Verified, High-Quality Documentation

Rely only on documentation issued by independent, third-party accredited bodies. Documentation that has not been verified should not be considered trustworthy. Ignoring this introduces risk to both human life and property.

By thoroughly verifying product documentation from credible sources—and by understanding the chemical and practical properties of the products being considered—you lay a solid and sustainable foundation for choosing the right fire-retardant façade material.

Fire-Retardant Treated Wood and Use Class

– A Critical Distinction

A wood product treated with fire retardant is designed to delay and reduce the spread of fire in the event of an outbreak. However, it is crucial to understand that the fire classification alone does not indicate the product’s suitability for use in humid or outdoor environments—such as façades, swimming facilities, subways, mines, or other exposed structures.

Systems With Use Class

Products tested and approved according to EN 16755 EXT have documented durability in humid conditions. These systems are based on a more permanent impregnation, where the fire retardant is formulated and fixed to resist leaching over time.

Two Types of EXT Use Class Products

1. Use Class EXT – Without Surface Coating Requirement

This type of product has an advanced chemical composition that is fixed in the wood through curing. It functions fully in outdoor environments without the need for a protective surface treatment, such as paint. This results in robust and low-maintenance fire protection.

2. Use Class EXT – With Surface Coating Requirement

This product typically contains substances such as ammonium phosphates, borates, or similar compounds, which require a protective coating system (e.g., film-forming paint) to achieve durability under the EXT use class.

Important Considerations for Product Type 2: The paint system must be tested as an integral part of the classified EXT system.

The correct amount of paint per layer must be applied according to the manufacturer’s instructions. The paint requires ongoing maintenance to ensure continued protection against leaching over time.

The (EXT) symbol serves as an identifier for fire retardant treatments approved for use in humid environments. Only products that meet the requirements of EN 16755 EXT are permitted to carry this mark.




Image A shows thermally modified pine without EN 16755 EXT use class.

Image B shows comparable thermally modified pine with certified EN 16755 EXT use class.



Image C shows thermally modified pine with a surface coating without EN 16755 EXT use class, resulting in the paint layer detaching from the substrate.



Specifying products for construction projects carries significant responsibility—for human life, property, the environment, and not least, one's own professional credibility.

Specifying products for construction projects is more than a technical task—it is a commitment to safety, quality, and responsibility. Every decision impacts not only the functionality of the structure, but also human lives, the value of property, and the protection of our shared environment. Acting with knowledge and integrity at every stage not only enhances the safety of the project—it also strengthens the specifier's professional credibility.

Pitfall 3: Insufficient Consideration of Use Class

Specifying only the fire classification—without including requirements for use class—can lead to serious consequences. The use class is essential for ensuring that fire protection performance is maintained in the environment where the wood product will actually be used. Omitting this aspect during the design phase creates a risk that the building's actual fire safety will be inadequate, especially in humid or weather-exposed environments.

Pitfall 4: Cost Savings at the Expense of Fire Safety

Financial considerations often play a central role in construction projects. However, compromising on fire safety to cut costs can have disastrous consequences.

Investing time and money in proper specifications—only to deviate from them during procurement or execution—poses a real risk to life, property, and the environment.

The Solution: Expertise and Correct Implementation

The effective and safe use of fire-retardant wood requires:

- Competence to read, interpret, and apply relevant regulations
- Proper procurement of materials according to the specification

Careful installation and ongoing maintenance

When the entire process—from specification to final installation—is carried out with the right knowledge and sense of responsibility, both economic benefits for the developer and a safe, secure environment for occupants can be achieved.

Effective fire safety requires a holistic approach, where every step in the chain is managed with professionalism and precision.

Risk of Water and Environmental Contamination from Improper Use of Fire-Retardant Treated Wood

Water Contamination

Leaching can result in chemicals from fire retardants being transported to nearby water bodies such as streams, lakes, and seas. This degrades water quality and may harm aquatic organisms, threatening sensitive freshwater and marine ecosystems.

Environmental Impact on Plant and Animal Life

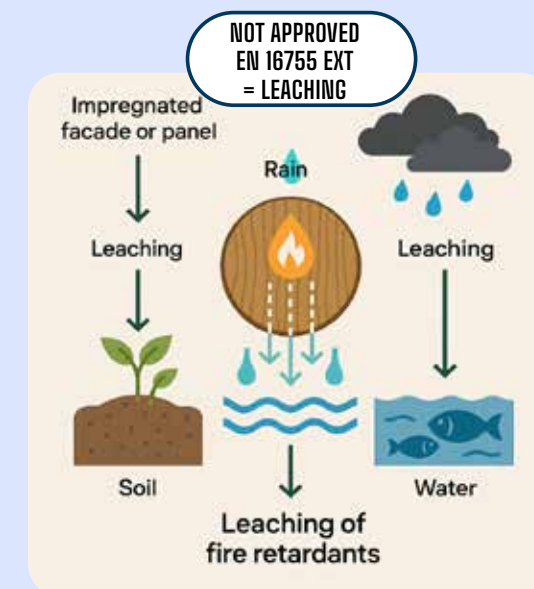
Many fire retardants contain substances that, if released into soil or water, can have harmful effects on surrounding flora and fauna. The ecological balance in the area may be disrupted—especially in the case of prolonged exposure.

Bioaccumulation in the Food Chain

Some chemical compounds in fire retardants have the potential to accumulate in the food chain. This occurs when organisms absorb substances from water or food, which in turn can lead to elevated concentrations in top predators. Such effects may have long-term consequences for the stability of entire ecosystems.

Responsible Handling and Correct Application

To minimize these risks, responsible handling and correct application of fire retardants are essential. Recycling materials, proper waste management, and choosing products with an approved use class are key measures for protecting both the environment and human health.



The image shows a hygroscopic fire retardant penetrating the paint layer.



Leaching – An Underestimated Financial Risk in Construction Projects

Failing to consider use class when selecting fire-retardant treated wood can lead to far-reaching financial consequences. Below are three key risk areas where insufficient control can result in unexpected costs and liabilities.

1. Remedial Costs Related to Fire Protection

If a fire retardant is prone to leaching in humid environments, this may require costly remedial actions, such as:

- Reinstallation of fire-retardant treatment
- Addition of protective surface coatings
- Demolition and replacement of materials

These interventions are often technically complex and expensive, potentially driving up the total cost of the construction project significantly.

2. Decreased Property Value

Inadequate fire protection—such as that caused by leaching—can affect the building's classification and ultimately its market value.

- Properties not meeting applicable fire safety standards may be harder to sell or lease
- Risk of devaluation and extended selling periods

3. Legal and Financial Consequences

The developer or property owner may be held liable if damages or accidents occur due to insufficient fire protection. This can result in:

- Legal disputes and claims for damages
- Loss of reputation and trust
- Significant financial penalties

Tightened Fire Protection Requirements from Insurance Companies

Insurability and Fire Protection – A Shared Responsibility

Wood as a Building Material: Environmental Benefits and Fire Risk

Wood is widely recognized for its environmental advantages, thanks to its renewable nature and low climate impact. At the same time, its combustible properties present an increased vulnerability to fire damage—which can lead to serious safety and financial consequences.

Insurance Requirements That Exceed Building Codes
A growing challenge is that current building regulations do not always fully reflect insurance companies' expectations for long-term fire safety. In particular, there is a lack of clear requirements regarding use class for exterior façade materials in fire-exposed environments.

In response, several insurance providers have introduced their own, more stringent fire protection standards. These are designed to ensure that fire protection remains effective throughout the entire lifespan of the building—a key factor in managing risk for both the insurer and the customer.

A Shared Responsibility

This development is a positive step from a risk and safety perspective. However, it is critical that property owners and developers take proactive steps to ensure their construction projects meet both regulatory and insurance requirements—especially to avoid future issues with insurability.

Source: https://www.lansforsakringar.se/493b60/globalassets/varmland/dokument/blanketter/11976_OO_krav_hoga_trabyggnader_faktablad_webb.pdf



Avoid Insurance Issues by Adhering to Recognized Standards

Solution: Avoid Insurance Issues by Using Certified Façade Systems

To prevent increased insurance premiums—or, in the worst case, denial of coverage—only type-approved façade systems should be used, especially in projects where exterior wood is exposed to weather. Systems that have been tested according to SP Fire 105, classified under EN 16755 (Use Class EXT), and carry a valid type approval certificate meet the requirements that many insurance companies now consider essential for granting coverage.

Example of Insurance Requirements

(in effect from 2023-01-01):

- Façade cladding: Tested according to SP Fire 105
 - Use class: EN 16755 EXT
 - Documentation: Valid type approval certificate
- According to the Swedish Planning and Building Act (PBL), a construction product may only be used in a building or structure if it is suitable for its intended pur

pose. A type approval serves as a key tool to demonstrate this suitability—particularly in projects where verifiability, traceability, and regulatory compliance are critical.

Through type approval, the developer or user can demonstrate that the product meets Swedish building code requirements—provided it is used and installed in accordance with its intended application as specified in the approval and related documentation, such as installation instructions.

A type approval must be issued by an accredited certification body. This ensures that the product's properties have been verified through testing or calculation, and that the manufacturing process is subject to quality-controlled production oversight with independent third-party monitoring.





Use Class – Critical for the Proper Application of Fire-Retardant Treated Wood

It is absolutely essential to understand that both fire-retardant treated wood and fire-retardant coated wood must meet the use class requirements set out in EN 16755—especially when used in exterior or moisture-exposed environments.

The use class ensures that fire protection remains effective over time, despite exposure to moisture, UV radiation, and temperature fluctuations.

A common misconception is that a product automatically meets the use class requirements simply because it has been fire classified or surface-painted. This is not the case.

Even if a fire-retardant treated wood product is classified according to EN 16755 EXT, the classification may be conditional—for example, requiring the product to be coated with a specific paint system. In such cases, the surface treatment is not an optional enhancement—it is a prerequisite for the use class to remain valid.

Notably, there are currently far more fire-retardant coatings on the market that lack use class classification than those that are properly tested and approved for exterior use.

Key Distinctions:

- Fire-retardant treated wood without coating requirements is often treated with advanced polymer-based fire retardant systems. These are permanently fixed within the wood and can withstand outdoor conditions without the need for additional protection.
- Salt-impregnated wood, typically based on simpler compounds such as phosphates or borates, generally requires an approved surface treatment to meet use class requirements—otherwise, the fire protection is at risk of leaching out.
- Fire-retardant coatings do not alter the fire properties of the wood itself, but act as a protective surface layer. These systems, too, must be classified according to EN 16755 EXT in order to be valid for outdoor use.

EN 16755 (INT2) – Verified Moisture Resistance in Wood-Based Building Products

EN 16755 is a European standard that specifies requirements and test methods for evaluating the moisture resistance of fire-retardant treated wood and other wood-based materials. The standard is particularly relevant for structures where moisture exposure may lead to material degradation, mold growth, or leaching of fire retardants. A core component of the standard is hygroscopic testing, which measures a material's tendency to absorb moisture from its surroundings. This testing is critical for assessing the risk of moisture penetration that may create conditions for microbial growth or structural deterioration.

Testing in accordance with EN 16755 provides reliable information about a material's behavior in humid environments, enabling:

- The selection of suitable products for outdoor or moisture-prone applications
- Prevention of moisture-related damage and mold growth
- Preservation of the building's structural integrity over time

As such, EN 16755 contributes to more sustainable and long-term fire protection in timber constructions—especially in exterior applications where climate exposure is a critical factor.

Hygroscopic Test Conditions According to EN 16755 To ensure the long-term durability of fire protection in various environments, two standardized climate conditions are defined for testing wood products—especially fire-retardant treated wood without surface coatings:

Indoor Climate – Normal Conditions (INT1)

Acclimatization until equilibrium is reached at:

- Relative Humidity: $50\% \pm 5$
- Temperature: $23^{\circ}\text{C} \pm 2$

This test applies to untreated wood surfaces and evaluates the product's moisture-related performance under stable, dry indoor conditions.

Indoor Climate – Intermittent High Humidity (INT2)

Used to simulate environments with periodically high humidity. Test conditions:

- Relative Humidity: $90\% \pm 5$
- Temperature: $27^{\circ}\text{C} \pm 2$

Pass Criteria:

- The wood surface must be untreated
- Moisture content of the material must not exceed 28%
- No liquid outflow may occur
- Salt crystallization must be minimal, with no significant surface accumulation
- Any biological growth, such as mold, must be documented
- These stringent requirements ensure that materials classified under EN 16755 INT2 can withstand demanding indoor environments while maintaining fire protection performance.



Use Class – Long-Term Safety Through Verified Durability

“Durability of Fire Performance,” commonly referred to as use class, is regulated by the European standard EN 16755. This standard is designed to evaluate the performance and durability of fire retardants in different service environments—with a particular focus on exposure to moisture and weather. EN 16755 is essential for determining whether a fire retardant maintains its effectiveness over time in the climate where the product is intended to be used. For outdoor applications, the product must comply with Use Class EXT.

The Standard Includes Testing of:

- Leachability
- Moisture absorption (hygroscopicity)
- Retention of fire performance after climatic exposure
- By adhering to EN 16755 EXT, one gains a reliable indication of how the fire protection performs during prolonged exposure to rain, sunlight, temperature changes, and humidity.

International Link:

EN 16755 also references the American standard ASTM D2898, which specifies accelerated weathering tests for fire-retardant treated wood. This cross-reference further supports the real-world relevance and reliability of the test results.

Pitfall: Ambiguity in EN 16755 EXT Classification

It is crucial to understand that a product classified under EN 16755 EXT may fall into one of two entirely different categories:

- Classification without surface treatment requirement
- Classification with surface treatment requirement (e.g., film-forming paint)
- A product classified with a surface treatment requirement does not meet the EXT standard without that specific treatment. Assuming that an EXT classification always implies full durability without additional coatings is a potentially costly—and dangerous—misinterpretation.

Solution: Demand Clear Documentation

Always request verifiable documentation from an accredited certification body that clearly specifies:

- Whether the product is approved with or without surface treatment
- Which specific wood species are covered by the approval
- That the classification is based on testing according to EN 16755 EXT

This information is vital for making the right material selection and ensuring the fire protection complies with technical, legal, and insurance requirements.

Accelerated Weathering and Fire Testing for Use Class EXT

To ensure that fire protection remains effective in outdoor environments, exterior testing according to EN 16755 EXT can be carried out using one of the following approaches:

- Accelerated aging in a climate chamber using defined exposure cycles
- Natural weathering under controlled outdoor conditions

Accelerated Aging – Current Methods:

- Method B (recommended – includes UV exposure)
- Method A*
- EN 927-6*
- Fire Testing After Weathering Exposure:
- EN 13823 (SBI – Single Burning Item)
- ISO 5660-1*

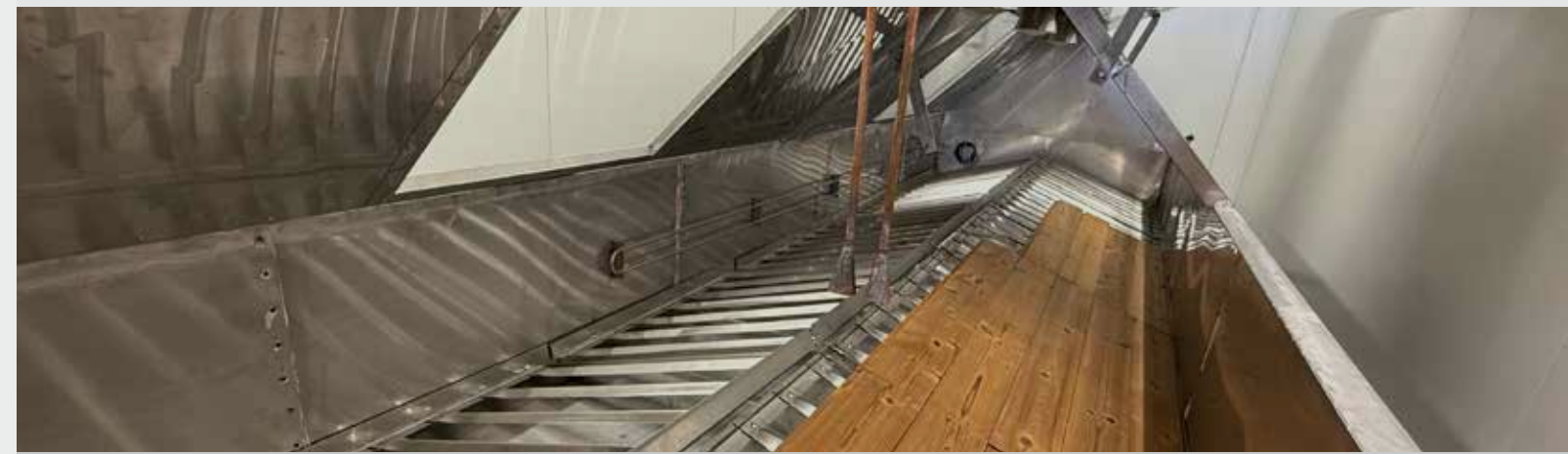
*Note: Method A, EN 927-6, and ISO 5660-1 are proposed for removal in the ongoing revision of EN 16755.

Recommended Documentation and Verification Requirements

To ensure that a product meets the requirements for long-term and verified fire safety in exterior use, the following should be requested and verified:

- Type approval certificate issued by a notified body
- Test reports from an accredited certification body
- Classification according to EN 16755 EXT, specifying Method B (including UV exposure)
- Fire classification according to EN 13501-1
- Fire test results per EN 13823 (SBI), demonstrating that the fire classification is maintained after weathering exposure and compared to untreated reference samples

This level of documentation provides a credible foundation for assessing the long-term performance and safety of fire-retardant treated wood in demanding outdoor environments.





Revision Underway for EN 16755 – Use Class Standard for Fire-Retardant Treated Wood

The EN 16755 standard is currently undergoing a comprehensive revision. The objective is to clarify test method selection, enhance relevance for fire protection applications, and improve the quality of performance evaluation under weather exposure.

Proposed Test Methods for Removal:
***EN 927-6:** Originally developed for testing paints and surface coatings; lacks relevance for fire-retardant treated wood.
***ISO 5660-1:** A small-scale fire test method, considered inadequate for representing the real-world fire safety performance of larger building products.
***Method A:** Accelerated aging without UV exposure. UV radiation has proven to be critical in simulating actual outdoor conditions. For this reason, only Method B is recommended going forward.
***These methods are under discussion for removal in the upcoming version of the standard.**

Harmonization of British Standard (BS-EN 16755 EXT)
Until October 31, 2022, the UK applied a national variation of EN 16755 in which certain critical criteria—such as the threshold for Total Heat Release (THR) in cone calorimeter testing—were not assessed. As a result, some products were approved under the British version even though they did not meet the full requirements of the European standard.

Since that date, the UK has withdrawn its national annex and now applies the same EN standard as the rest of Europe. This means that EN 16755 EXT is now fully harmonized across the EU/EEA and the UK, ensuring consistency in the evaluation and approval of fire-retardant treated wood products.

Checklist

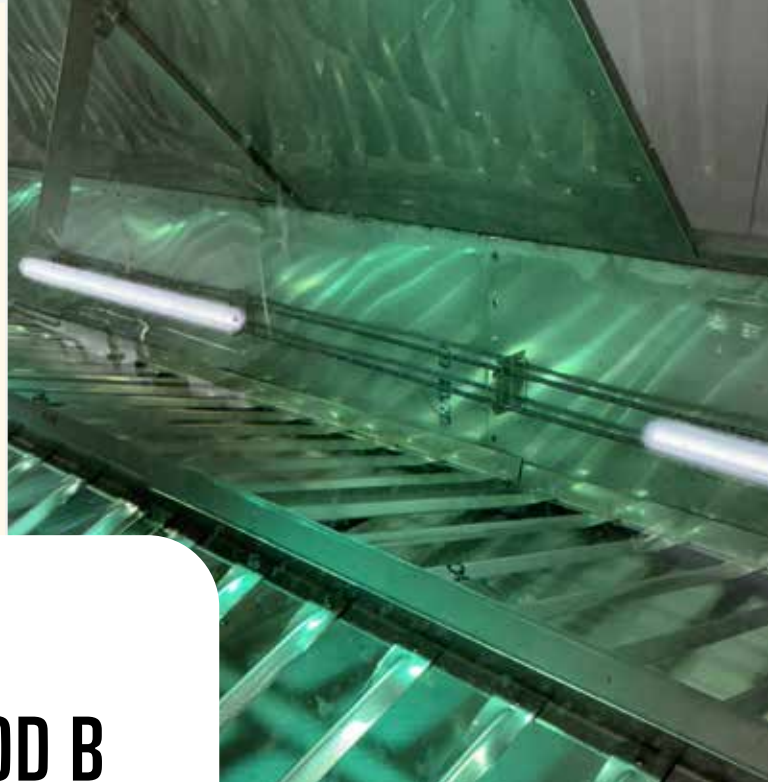
Supplier/Brand: _____

Project: _____

Notified body: _____

If not approved by Notified body: _____

IS THE FOLLOWING DOCUMENTATION AVAILABLE	APPROVED/CERTIFIED	NOT APPROVED/ MISSING
CE Marking, EN14915:2013+A2:2020		
Type Approval Certificate, EN 16755:2017/AC:2018 EXT		
EN 16755:2017/AC:2018 EXT Approved Without Coating		
EN 16755:2017/AC:2018 EXT Approved with Coating Required		
Third-Party Classification and Certification by Notified Body (e.q. RISE 0402, RISE 1002)		
Quality Management System ISO 9001:2015		



**METHOD B
EN 16755 EXT**

**Example of
NON-APPROVED
EXT Use Class**



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