FIRE PROTECTION SYSTEMS

HENSOTHERM® coating systems for wood fire protection

RUDOLF HENSEL GMBH – The company

Rudolf Hensel GmbH was founded in 1922 as a paint and varnish factory and, as an independent company, is now a leading global manufacturer of fire protection systems for passive structural fire protection.
The company is based in Börnsen near Hamburg.

Decades of experience in the development and production of fire protection coatings are reflected in the high quality standard and excellent processing properties of HENSOTHERM® and HENSOMASTIK® products.

The product range covers coating systems to protect steel, wood, concrete and cables from fire, to produce wall and ceiling penetration partitions and fire-resistant joints. Specialised fire protection solutions for industrial applications round off the range. For each of these applications, the Green Product line offers sustainable, environmentally-friendly products that have qualified as building materials for ecological construction.
Hensel fire protection systems are assessed according to the European standard (EN), approved in Germany with a general type approval (aBG) and have other international certificates in compliance with VKF, BSI, UL and GOST.

Over 100 years of creativity, high quality standards and intensive interaction with its customers have made Rudolf Hensel GmbH one of the leading manufacturers of coatings for preventative structural fire protection 'made in Germany'.

FIRE PROTECTION – OUR PASSION

Mitglied der DGNB Deutsche Gesellschaft für Nachhaltiges Bauen German Sustainable Building Council

ÉMISSIONS DANS L'AIR INTÉRIEUR A+ A+ A B C

Institut Bauen und Umwelt e.V.

eco 1 ecobau Cert.

green product HENSEL

Made in Germany HENSEL

HENSOTHERM®
fire protection systems

Fire protection coatings are an important component of passive structural fire protection in building planning. Whether for steel, wood or concrete components, especially when renovating and converting existing buildings, special coating systems come into play whenever the appearance needs to be preserved and fire protection requirements must be met. Fire protection coatings are paint materials that do not differ significantly in their surface appearance from other paint coatings and can also be applied by brush, roller or airless spraying.
When used on wood components / structures, wood fire protection systems improve the building material / flammability class from normal flammability (B2) to low flammability (B1), which significantly slows down the ignition of wood in the event of a fire, reduces the spread of fire and gains time for the evacuation of people.

HENSOTHERM® 1 KS INNEN to protect the wooden ceiling panelling in corridors that serve as escape routes in the event of fire.

Removal of the carbon foam from the wood surface after fire test

How HENSOTHERM® fire protection systems work

The fire protection effect is based on a heat-insulating foam layer (stable carbon foam), which develops at temperatures from approx. 200 °C, due to a fire.

Fire protection coatings protect human life and preserve values.

Fire test

Fire behaviour of wood

Flammability classes and fire protection classifications

Wood is a combustible building material and represents a calculable fire load in the building that must be taken into account as early as at the building design stage. The calculable fire resistance of wood results from the fire behaviour. During a fire, wood forms a char-coallayer that acts as a protective shield due to its low thermal conductivity.

The flammability classes of building materials are now tested and classified according to European standards. Classification is in accordance with DIN EN 13501-1. The following table lists the European classifications, the assignment of the terms used by the building authorities and, for comparison, the old class designations for building material classes in DIN 4102.

In addition to fire behaviour, the European classification system also regulates the secondary fire phenomena. Three classes are specified for smoke release (s1, s2, s3) and burning droplets (dropping: d0, d1, d2); the property increasing along with the number - see the table on Page 5.

The burning rates for wood and wood-based materials are specified in DIN EN 1995-1-2: 2010 "Eurocode 5: Design and construction of timber structures" Table 3.1. A distinction is also made between the flammability class of the material and the fire resistance of the construction.

Most of the untreated wood and wood-based materials used in wood construction correspond to building material class B2 in accordance with DIN 4102-1 or the European classification D-s2,d0 and are therefore categorised as "normally flammable" building materials (D), belong to smoke development class (s) 2 and do not drip when burning (d0). These materials include solid wood, glulam or cross-laminated timber as well as wood-based materials such as OSB, laminated veneer lumber or plywood.

Building authority designation	Flammability class in accordance with DIN EN 13501-1	Building material classes in accordance with DIN 4102
Non-flammable	A1, A2	A1, A2
Flame-retardant	B, C	B1
Normally flammable	D, E	B2
Highly flammable[1]	F	B3

[1] Highly flammable building materials may not generally be used in construction.

Fire test standards / methods

SBI and DIN 4102 are two different fire test standards used to determine the fire behaviour of building materials and products. SBI stands for "Single Burning Item" and is a fire test method developed in Europe in accordance with EN 13823, which classifies the fire behaviour of building products under thermal stress from a single burning object in accordance with EN 13501-1. DIN 4102 is a fire protection standard that assesses the flammability, combustibility and smoke development of materials and products in Germany. The standard includes several test requirements, including B1, B2 and B3 tests, which determine the fire behaviour of the material or product. The DIN 4102 standard is widely used in Germany and is recognised as the standard for the classification of building materials.

Note: A fire protection coating for wood therefore has no effect on the fire resistance duration of the component, but rather on its building material class. Wood components can only be upgraded to a fire resistance class by means of dimensioning or the burning rate.

HENSOTHERM® wood fire protection coatings

The term "fire resistance class" is linked to the fire behaviour of standardised components and cannot be readily applied to wood-based materials. The vast number of shapes of wood components makes such a standard classification and standardised fire tests simply impossible. Wood components are therefore not classified with regard to their fire behaviour and therefore cannot be referred to as fire resistance classes in connection with them and fire protection coatings.

By applying a fire protection coating, it is possible to upgrade to a higher building material class up to B1 "flame-retardant" according to DIN 4102-1 or up to B-s1,d0 according to DIN EN 13501-1 (SBI test) depending on the fire protection system used, so that wood can also be used where flame-retardant building materials are prescribed, e.g. in publicly accessible buildings, without restricting the advantages of wood as an architectural design element.

HENSOTHERM® wood fire protection coatings not only offer outstanding fire protection performance but also a long service life. The coatings are available for interior and exterior use and can be customised by using protective top coats in almost all RAL colours, or leave the wood visible in its natural colour and emphasise the surface texture.

Intumescent coatings	HENSOTHERM® 1 KS INNEN	HENSOTHERM® 2 KS INNEN weiss	HENSOTHERM® 2 KS schwarz-anthrazit	HENSOTHERM® 2 KS AUSSEN
Approved in accordance with	DIN 4102-1	DIN 4102-1	DIN 4102-1	–
Classified in accordance with	DIN EN 13501-1 (SBI test)	DIN EN 13501-1 (SBI test)	DIN EN 13501-1 (SBI test)	DIN EN 13501-1 (SBI test)
Classification of fire behaviour	B-s1,d0 / same as B1 flame-retardant	B-s1,d0 / same as B1 flame-retardant	B-s2,d0 / same as B1 flame-retardant	C-s2,d0 / same as B1 flame-retardant
Fire behaviour	B	B	B	C
Smoke development	s1	s1	s2	s2
Burning dripping	d0	d0	d0	d0

Insulating foam layer (left), which develops due to a fire and temporarily protects the coated wood component (flame-retardant) from immediate ignition (right).

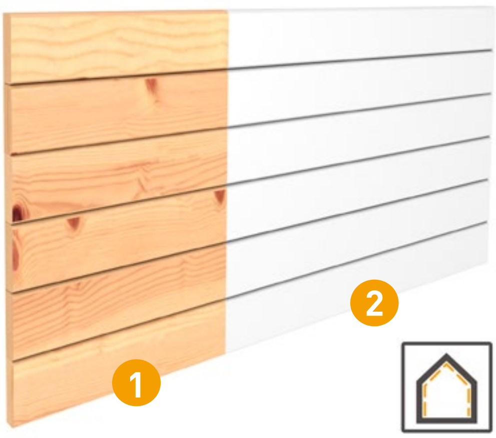
HENSOTHERM® wood fire protection systems
for indoor use

HENSOTHERM® 1 KS INNEN | transparent

1. Solid wood, flat pressed chipboard, construction veneer plywood in a thickness of > 12 mm
2. Intumescent material **HENSOTHERM® 1 KS INNEN**
3. Top coat **HENSOTOP 84 AF** (absolutely essential!)

ÉMISSIONS DANS L'AIR INTÉRIEUR A+ LEED

HENSOTHERM® 2 KS INNEN weiss | opaque



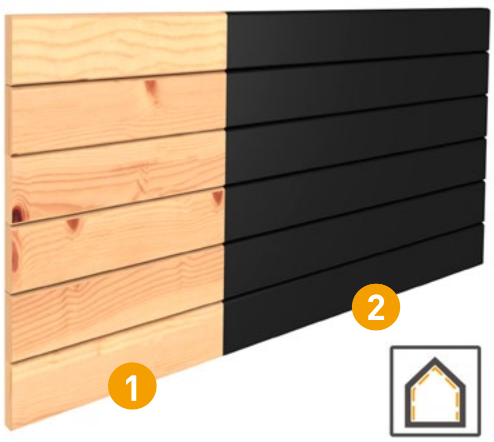
1. Solid wood, flat pressed chipboard, construction veneer plywood in a thickness of > 12 mm
2. Intumescent material **HENSOTHERM® 2 KS INNEN weiss**
3. Optional: Colourful design with the top coat **HENSOTOP WB Green** in any desired RAL colour or according to an individual colour sample.

ÉMISSIONS DANS L'AIR INTÉRIEUR A+ LEED

HENSOTHERM® 2 KS INNEN schwarz-anthrazit | opaque

1. Solid wood, flat pressed chipboard, construction veneer plywood in a thickness of > 12 mm
2. Intumescent material **HENSOTHERM® 2 KS INNEN schwarz-anthrazit**

HENSOTHERM® 2 KS INNEN schwarz-anthrazit is a fire protection coating that was specially developed for wood structures in theatre and stage construction.

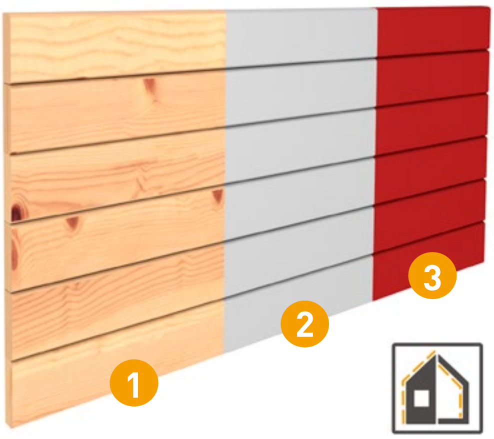


Wooden facade of the Waldorf School in Wendelstein protected with HENSOTHERM® 2 KS AUSSEN

HENSOTHERM® wood fire protection systems
for outdoor use

HENSOTHERM® 2 KS AUSSEN | opaque

1. Carrier boards based on wood or solid wood at least 12 mm thick, gross density at least 630 kg/m³ (tested); the carrier board standard 13238-2010 allows a deviation downwards of 25 % of the tested gross density, wood-based panels must be assigned to utilisation class 3 (DIN EN 1995-1-1)
2. Intumescent material **HENSOTHERM® 2 KS AUSSEN**
3. Top coat **HENSOTOP SB** (absolutely essential!)



Note: We recommend always checking the substrate for suitability and adhesion, especially before starting work! The surfaces to be coated must be free of dust, dirt, grease, wax, separating layers, adhesives, lime and oil. Old coatings must be completely removed! If necessary, sand the substrate and pre-treat with HOLZGRUND AQ or HOLZGRUND SB* (approx. 100 g/m² required) to prevent highly absorbent substrates and excessive penetration of the intumescent material into the wood components.

*The primer HOLZGRUND SB is used to saturate highly absorbent wood surfaces or to improve the adhesion of the intumescent material on smooth surfaces.

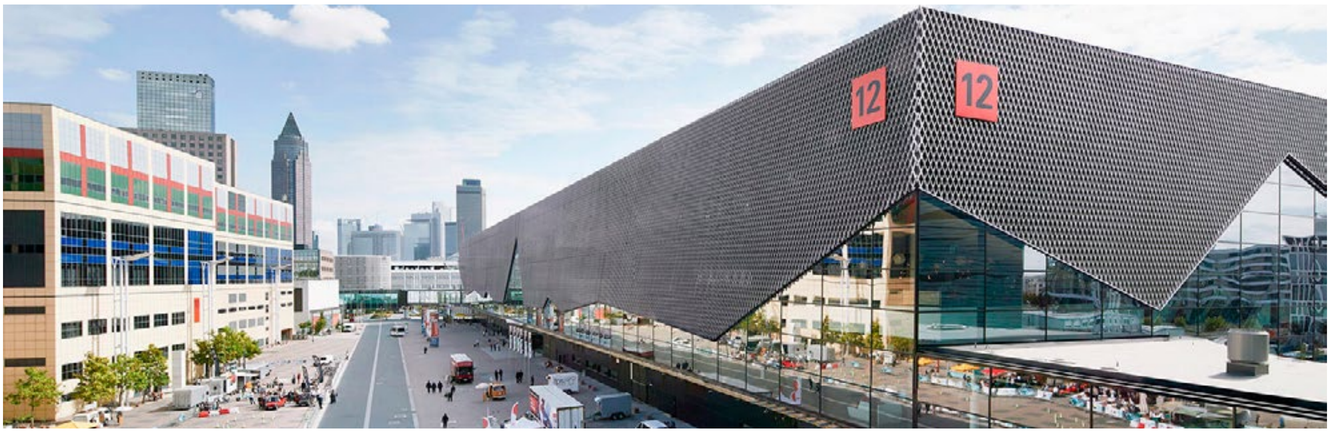
References

Rulantica at Europa-Park

The wooden structures of the Rangnakor Panorama in the interior are protected over an area of approx. 2,000 m² with the wood fire protection system HOLZGRUND SB, HENSOTHERM® 2 KS AUSSEN and HENSOTOP SB (construction year 2019).
rudolf-hensel.de/rulantica

Royal Opera House, Copenhagen

Copenhagen is home to one of the most modern theatres in the world, the Danish National Opera. The wooden structures in the building are protected with the transparent wood protection system HENSOTHERM® 1 KS INNEN over an area of approx. 3,000 m² (construction year 2005).
rudolf-hensel.de/royal-danish-opera

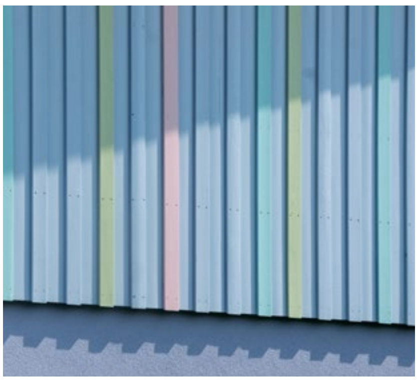


Exhibition hall 12 in Frankfurt a. M.

The wood ceiling constructions made from board slats have been coated over an area of approx. 12,000 m² with the wood fire protection system HENSOTHERM® 1 KS INNEN and the substructure has been coated with HENSOTHERM® 2 KS INNEN schwarz-anthrazit (construction year 2018).
rudolf-hensel.de/messehalle-12

Waldorf School in Wendelstein

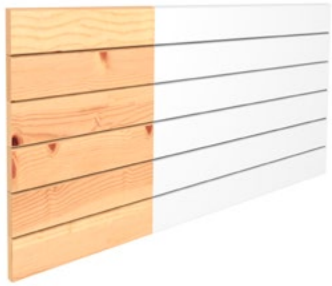
The partial cladding of the exterior façade made of wood in the fully-weathered exterior area was applied on all sides over an area of 850 m² using the wood fire protection system: Holzgrund AQ, HENSOTHERM® 2 KS AUSSEN and HENSOTOP SB (construction year 2011).
rudolf-hensel.de/waldorfschule



HENSOTHERM® wood fire protection systems

HENSOTHERM® 1 KS INNEN

- Approved in accordance with DIN 4102-1 | GISCODE: M-KH01
- Classified in accordance with DIN EN 13501-1: B-s1, d0 same as B1 (flame-retardant)
- AbP No. P-BRA09-3172607, FIRE LABS BRA09, Berlin
- Enables the categorisation of wood and wood-based materials in building material class B1 - flame retardant
- Use only in dry indoor areas
- Suitable for impact walls in sports halls
- Do not use under mechanical stress
- Transparent, keeps the wood structure visible
- Contains no solvents or formaldehyde
- Coating varnish: HENSOTOP 84 AF absolutely necessary
- Application with sprayer, brush or roller
- Non-VOC, contains no halogens, APEO, borates, fibres, or plasticisers

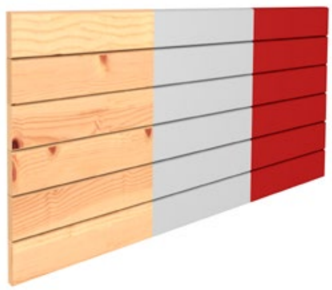


HENSOTHERM® 2 KS INNEN weiss

- Approved in accordance with DIN 4102-1 | GISCODE: M-DF01
- Classified in accordance with DIN EN 13501-1: B-s1, d0 same as B1 (flame-retardant)
- AbP No. P-BRA09-3445913, FIRE LABS BRA09, Berlin
- Enables the categorisation of wood and wood-based materials in building material class B1 - flame-retardant
- Use only in dry indoor areas
- Do not use under mechanical stress
- Colour: matt white
- Coating varnish: HENSOTOP WB Green or HENSOTOP SB
- Non-VOC, contains no halogens, APEO, borates, and plasticisers

HENSOTHERM® 2 KS INNEN schwarz-anthrazit

- Approved in accordance with DIN 4102-1 | GISCODE: M-DF01
- Classified in accordance with DIN EN 13501-1: B-s2, d0 same as B1 (flame retardant)
- P-BRA09-3155107, FIRE LABS BRA09, Berlin
- Enables the categorisation of wood and wood-based materials in building material class B1 - flame-retardant
- Use only in dry indoor areas
- Makes wooden constructions disappear visually against black backgrounds
- Solvent-free and formaldehyde-free / colour: anthracite matt / with HENSOTOP SB topcoat also available in black RAL 9005



HENSOTHERM® 2 KS AUSSEN

- KB No. 230005537-7 MPA NRW | GISCODE: M-DF01
- Classified in accordance with DIN EN 13501-1: C-s2, d0 same as B1 (flame retardant)
- Synthetic resin dispersion
- Contains no organic solvents or plasticisers
- For outdoor use
- For carrier boards based on wood or solid wood
- For wood-based panels in utilisation class 3 (DIN EN 1995-1-1)
- Good adhesion, smooth finish
- Colour: light grey, with top coat in RAL colours

Our technical advisers will be pleased to assist you with your enquiries over the phone on **+49 40 72 10 62-44** or by e-mail to **contact-rh@rudolf-hensel.de**.
Further information on the products and downloads can be found at **www.rudolf-hensel.de**

3.7 ha of own beech woodland adjacent to the company premises.

Acting (more) sustainably step by step

Our claim in the development of our fire protection systems is as sustainable and ecological as building with wood. The focus is on the environmental compatibility and sustainability of our HENSOTHERM® fire protection systems for use in passive structural fire protection, which have been consistently developed and optimised in the Green Product Line for over 20 years, in the interests of the environment and especially for sustainable construction.

This "green view" of the environment, society and our surroundings is confirmed by the continuous increase in demand for fire protection systems from our Green Product line. Over the past few years, Green Products have been used in numerous DGNB, BREEAM and LEED-certified new buildings and sustainably refurbished existing buildings in Germany and around the world thanks to their exemplary product properties.

Sustainability is a long-term strategic success factor, not only for Rudolf Hensel GmbH but also for its suppliers and subcontractors. As a company, we are committed to this idea. We express this in our daily actions and thoughts : **We act responsibly.**

For this reason, it is very important for us to participate in standardisation committees in order to actively help shape the usual standards in the industry, redefine them in line with the times and implement them in the interests of society.

Rudolf Hensel GmbH is guided by the 17 Sustainable Development Goals (SDGs) of Agenda 2030 as a global plan to promote sustainable peace and prosperity and to protect our planet.

With the corporate principles and the CSR guideline, Rudolf Hensel GmbH aims to support all affiliated companies and colleagues in fulfilling their social responsibility and facing up to the complex challenges of global markets and increasingly networked cooperation in the value chains. These are based on the conviction that entrepreneurial behaviour oriented towards ethical values not only generates trust, but also guarantees sustainable economic success.

RUDOLF HENSEL GMBH
Lack- und Farbenfabrik

Lauenburger Landstraße 11
21039 Börnsen | Germany

Tel. +49 40 72 10 62-10
Fax +49 40 72 10 62-52

Email: contact-rh@rudolf-hensel.de
Internet: www.rudolf-hensel.de

Extensions:
Orders: -40

Technical advice / sales
D/A/CH: -44, international: -48

LRQA CERTIFIED ISO 9001

UKAS MANAGEMENT SYSTEMS 0001