Fact sheets

Information from the European Manufacturers of Expanded Polystyrene

Version: 1/2020

EUMEPS European Manufacturers of EPS | Weertersteenweg 158 | 3680 Maaseik | BELGIUM | **TEL** +32 89 75 61 31 | info@eumeps.org | www.eumeps.org

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EPS saves precious fossil resources
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ETICS

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ETICS creates a comfortable indoor room temperature
ETICS are an architectural design element
ETICS are highly durable
ETICS are safe in case of fire
Deconstruction of an ETICS

FACT SHEET

EPS saves valuable energy

Whether for new buildings or renovation of existing buildings, thermal insulation made of EPS helps save energy. This not only cuts heating costs, but also decreases dependence on the import of energy, often from areas of conflict.

- The first passive house project involving the installation of 27.5 cm EPS insulation in the outer walls of the building was successfully completed at Kranichstein (Germany) as early as 1991.

Project data

Year built: 1991

Floor area: 624 m²

Heat demand: 10.5 kWh/m²a

Source: Passivhaus Institut

- The renovation of a multi-family dwelling in Vienna using expanded polystyrene insulation demonstrates impressively that it is possible to slash the heat demand by 95 % compared with the previous level.

Project data

Year built: 1888 / renovation: 2012 - 2014

Floor area as-built: 618 m²

Floor area loft extension: 215 m²

Heat demand prior to renovation:
178 kWh/m²a

Heat demand following renovation:
7.6 kWh/m²a

Source: Andreas Kronberger

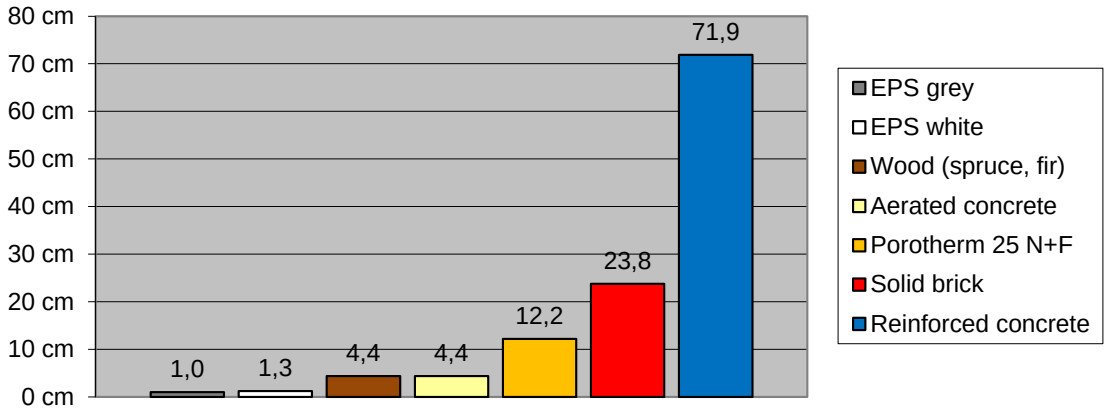
- The EU directive governing the energy performance of buildings, which came into force on 7 June 2010, aims for a 20 % cut in energy consumption in the Member States by 2020. In addition, by 31 December 2020 all new buildings must be designed as so-called nearly zero energy buildings.

FACT SHEET

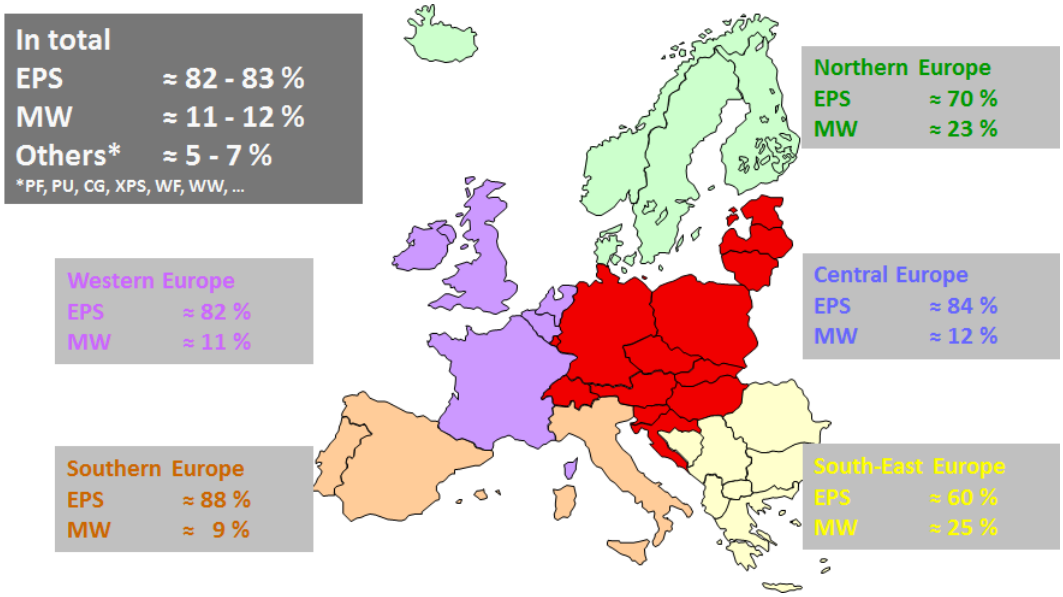
EPS offers outstanding insulation properties

Air is an extremely poor heat conductor. This is why birds puff up their feathers in the cold in order to increase the amount of trapped air and insulate themselves better. And EPS owes its outstanding insulation properties to the fact that 98 % of it is just air, enclosed in small cells in the structure.

- Grey EPS 1 cm thick offers the same insulation performance as 72 cm reinforced concrete!



- It is not only thanks to their outstanding insulation properties, but also due to their fast, simple processing using material without any health hazards, that insulation boards made of EPS form part of the highest percentage of external thermal insulation composite systems in Europe.



Source: European Association for External Thermal Insulation Composite Systems (EAE)

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09.02.2015

FACT SHEET

EPS saves precious fossil resources

It is absolutely essential to reduce the amount of oil we consume. Although polystyrene is an oil-based product, only an extraordinarily small amount of this precious natural resource is required to produce it. This is because expanded polystyrene (EPS) effectively consists of 98 % air and only 2 % polystyrene, the cells which contain the air. For every litre of oil that is used to manufacture EPS building insulation, up to 200 litres of heating oil is saved over the life of the product. Thus, there is almost no better use for oil than the production of insulating material!

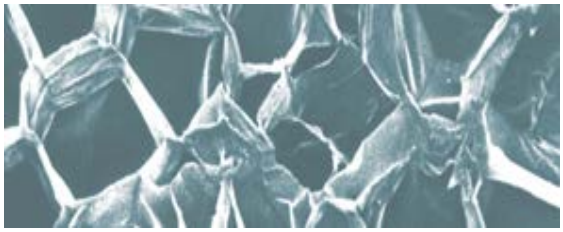

Photo: Cell structure of EPS under a microscope

- The primary non-renewable energy input value of EPS stated in the current Environmental Product Declarations (EPD) developed in accordance with the standard ISO 14025 clearly show that EPS requires the use of far fewer fossil resources (oil, gas, coal, etc.) than the "ecological alternatives" mineral foam and wood fibre.

Insulation for ETICS	PED n.r. MJ *)	EPD-No.
EPS grey	43.19	EPD-EUM-20160273-IBG1-EN
EPS white	48.51	EPD-EUM-20160269-IBG1-EN
Hemp fibre	49.45	baubook-Nr. 1383 ip
Mineral foam	55.35	EPD-XEL-20180168-IBD1-DE
Mineral wool (MW)	75.88	EPD-DRW-20120113-IBC2-EN
Wood fibre	98.45	PAV-2013254-CBG2-EN

*) per functional unit (1 m² area with R = 1 m²·K/W)

Source: Institut Bauen und Umwelt e.V. (IBU) and baubook

- Only 0.1 % of total oil consumption is used for the manufacture of EPS.

FACT SHEET

The EPS manufacturing process is energy efficient

The European Union has set itself the goal of reducing the amount of energy used in buildings. At the same time, insulation materials should also be produced in a way that minimises the consumption of energy. Due to the low input of raw material (98 % air, 2 % polystyrene) and the energy-efficient production process, the manufacture of EPS on the whole requires less energy than the production of the "ecological alternatives" mineral foam and wood fibre. Further information can be obtained from the current Environmental Product Declarations (EPD) developed in accordance with ISO 14025.

Insulation for ETICS	Production energy MJ *)	EPD-No.
EPS grey	**44.10**	EPD-EUM-20160273-IBG1-EN
EPS white	**49.65**	EPD-EUM-20160269-IBG1-EN
Mineral foam	**69.35**	EPD-XEL-20180168-IBD1-DE
Mineral wool (MW)	**84.50**	EPD-DRW-20120113-IBC2-EN
Hemp fibre	**109.19**	baubook-Nr. 1383 ip
Wood fibre	**310.06**	PAV-2013254-CBG2-EN

*) per functional unit (1 m² area with R = 1 m²·K/W)

Source: Institut Bauen und Umwelt e.V. (IBU) and baubook

- Production energy (including raw material input) includes total renewable and non-renewable ("fossil") primary energy as well as energy from secondary sources. Once EPS has reached the end of its life, there are plenty of options for recycling it. The resulting energy credits are not included in the values provided above.

- If a house that was built in the 1970s is thermally insulated with EPS insulating boards all the energy used to produce them is recouped within 2 to 4 months. Over the life of the product up to 200 times more energy is saved than was used to produce the material. Thus each cubic metre of EPS saves the same amount of energy that a car would need to travel over 30,000 km.

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23.07.2019

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EPS has excellent eco-properties

Due to the low input of raw material (98 % air, 2 % polystyrene) and energy-efficient production process, EPS has an excellent eco-balance. An analysis of the current Environmental Product Declarations (EPD) with regard to the three values "Input of Non-Renewable Primary Energy (PED n.r.)", "Global Warming Potential (GWP100)" and "Acidification Potential (AP)", summarised in the ΔOI3 index, clearly illustrates that EPS is quite on a level playing field with the "ecological alternatives" mineral foam and wood fibre.

Insulation for ETICS	PED n.r. MJ *)	GWP100 kg CO_2-Equiv. *)	AP kg SO_2-Equiv. *)	ΔOI3	EPD-No.
EPS grey	43.19	1.51	0.0038	**2.19**	EPD-EUM-20160273-IBG1-EN
EPS white	48.51	1.69	0.0043	**2.47**	EPD-EUM-20160269-IBG1-EN
Hemp fibre	49.45	-2.77	0.0113	**2.69**	baubook-Nr. 1383 ip
Wood fibre	98.45	-10.08	0.0116	**3.15**	PAV-2013254-CBG2-EN
Mineral foam	55.35	4.43	0.0067	**3.47**	EPD-XEL-20180168-IBD1-DE
Mineral wool (MW)	75.88	5.53	0.0412	**8.94**	EPD-DRW-20120113-IBC2-EN

*) per functional unit (1 m² area with R = 1 m²·K/W)

Source: Institut Bauen und Umwelt e.V. (IBU) and baubook

- The lower the ΔOI3 index, the better.
- Attention: Mass-based eco-values (i.e. per kg) cannot be compared with one another, because they do not take into account the amount of air in an insulation material. While only 15 to 18 kg of polystyrene is needed to manufacture one cubic metre of façade EPS, the amount of material required for other types of façade insulation is up to 10 times higher. The bulk density of wood fibre baseboard for example is approximately 190 kg/m³. But even volumic eco-values (i.e. per m³) are not comparable because thermal conductivity also plays a role. For this reason, insulation materials must be compared with one another in functional units and bulk density and thermal conductivity must also be taken into account.

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FACT SHEET

EPS is just as vapour-permeable as wood

One characteristic of vapour-permeable building materials is that they offer little resistance to the transport of vapour molecules. Many people are surprised to learn that the water vapour diffusion resistance of EPS matches that of wood. Therefore, unlike some suggestions you may hear, it is not like living in a plastic bag! Removing moisture from rooms also requires an adequate rate of air change. This is done by means of conventional window ventilation (short intense airing) or controlled domestic ventilation (with heat recovery).

- At an assumed outdoor air temperature of 0 °C the quantity of moisture removed from a room amounts to 245.2 g/h, of which only 3.2 g/h is attributable to vapour diffusion through the exterior wall and a full 242 g/h to air change due to the opening of the windows!

Outdoor air temperature °C	The quantity of moisture removed from a room [g/h]	
	by steam diffusion through the exterior wall	by air change (once)
-20	5,5	436
-10	4,8	378
0	3,2	242
19	0,4	15

Source: Industrieverband Hartschaum

- The water vapour diffusion resistance value (symbol μ) expresses the factor by which the water vapour diffusion resistance of a building material is greater than a layer of air of the same thickness. The greater the μ-value, the vapour-tighter the construction material.

Examples for μ-values:

Air ..... μ = 1
EPS ..... μ = 50 - 60
Wood (spruce) ..... μ ≈ 54
Concrete ..... μ = 50 - 100
Glass ..... μ = 10.000
PE-foil (0,1 mm) ..... μ = 65.000

- In a properly constructed exterior wall there is almost no exchange of indoor and outdoor air. In this regard, walls made of materials like wood and brick are no different to walls made of concrete and steel.

- The widespread concept of “breathing walls” was refuted as long ago as 1928. The building physicist Erwin Raisch established that 50 times more air passes through a keyhole in an hour than through one square metre of exterior wall!

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FACT SHEET

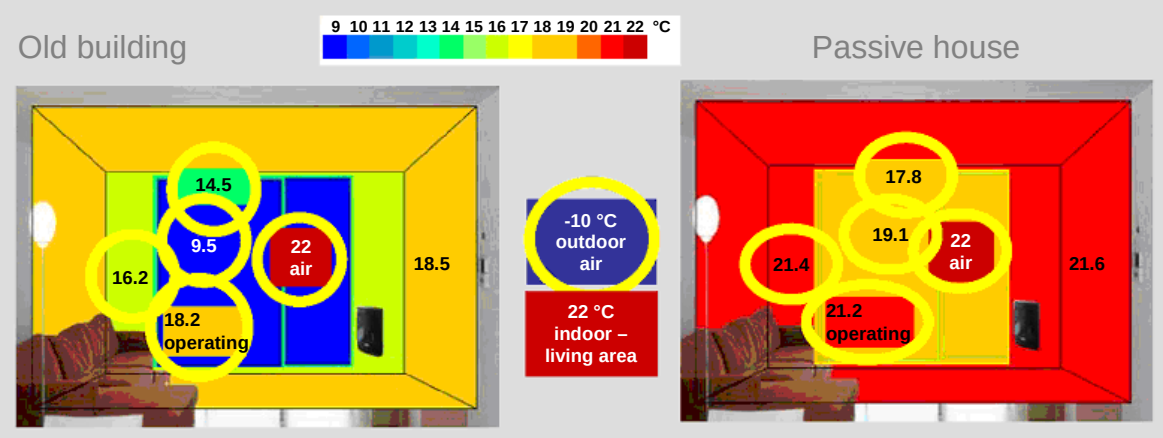
EPS helps prevent mould

The better a house is insulated, the higher the surface temperature on the interior sides of exterior walls and the smaller the risk of mould developing. In properly insulated older buildings, EPS leads to a significant improvement in the indoor climate and to a corresponding reduction in mould spores.

- This phenomenon has a simple physical explanation: warm air can absorb far more moisture than cold air. For example, air with a temperature of 20 °C and a relative air humidity of 60 % contains just as many g/m³ of vapour as air with a temperature of 15 °C and a relative air humidity of 80 %. As exterior walls and window surfaces are always somewhat colder, warm room air cools down in these places, increasing the relative air humidity. Poorly insulated buildings are therefore always vulnerable to mould!

- Moisture removal from rooms must be ensured by an adequate rate of air change. This is done by means of conventional window ventilation (short intense airing) or controlled domestic ventilation (with heat recovery).

- Well insulated homes offer their owners excellent levels of comfort. The surface temperature of the exterior walls approximates the indoor temperature, even when it is very cold outside.



Source: Helmut Krapmeier, Energieinstitut Vorarlberg

- In any case, thermal bridges should be avoided both during planning and when handling and installing the materials. The Processing Guidelines of the Quality Group for Thermal Insulation Systems should be applied when handling thermal insulation composite systems.

FACT SHEET

EPS does not release environmentally-harmful gases

EPS cells contain nothing but air. Chlorofluorocarbons (CFC) and hydro-fluorocarbons (HCFC) have never been used in the production of polystyrene. EPS insulation panels manufactured in accordance with European guidelines release no environmentally-harmful gases and can therefore also be used indoors.

- During the production of EPS, polystyrene granules containing an expansion agent are heated with steam and inflated by up to 50-times their original volume. This expanding agent, pentane, has rather the same effect as baking powder when baking a cake. This substance also occurs naturally (natural gas) and, as it is not a greenhouse gas, it does not harm the ozone layer in the stratosphere.

Content of Several Substances in the Atmosphere	
Substance	**Concentration in ppb***
Carbon dioxide CO_2 Methane CH_4 Pentane C_5H_{12}	34 600 1 700 2
* 1 ppb (part per billion) Example: A family of five is 1 ppb of the global population of currently more than 5.0 billion people.	

Source: Industrieverband Hartschaum

- The Forschungsinstitut für Wärmeschutz e.V. Munich has determined the emissions from volatile organic components (VOC) from EPS insulation panels (Test Report No. L1-07-094 of 06.12.2007). All the products that were tested satisfied the requirements regarding the safe use of building products indoors.

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EPS does not present a health risk

Cakes, ice cream and meat are all packed in EPS; nursing pillows are filled with EPS beads... If there were even the slightest risk that EPS might constitute a health risk, ministries of health and food safety authorities would immediately prohibit its use in such sensitive areas.

- Even highly biologically sensitive bee colonies appreciate polystyrene. EPS beehives are extremely durable and require little care. The bees are happy in poly hives and quickly start to make honey.

Source: Wikimedia Commons

Photo: EPS beehive

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FACT SHEET

EPS has excellent mechanical properties

Although it weighs very little EPS is an extremely stable material: Depending on the type of product, insulation boards can withstand pressures of 1.5 to 6 t/m² (at 2 % deformation). The quality of façade insulation boards depends to a large extent on their tensile strength. This tensile strength – defined as the greatest stress that the material can stand without breaking – is 15 t/m².

- One excellent example that demonstrates the compressive strength of EPS is the construction of road embankments on difficult substrates. The entire Formula 1 course in Shanghai, including the stands, was built on a metre-thick layer of EPS.

Photo: Grandstands for the Shanghai Formula 1 course under construction

- Due to their high horizontal tensile strength, EPS façade insulation boards can easily withstand wind suction forces. On new wall surfaces (building bricks and honeycomb bricks, hollow blocks and solid concrete blocks, cinder blocks, haunching concrete) it is possible to dispense with dowels completely and boards can be mounted using an adhesive.

FACT SHEET

EPS is pleasant and easy to handle

Building professionals all agree: EPS is extremely pleasant and easy to handle. On the one hand, it is ultra-light – an insulation package with roughly a quarter of a cubic metre weighs only 3.5 to 6 kg. In addition, it can be cut to shape quickly and cleanly.

- The construction of large flat roofs requires considerable manipulation. For this reason, roofing professionals swear by light-weight EPS insulation boards.

Photo: Pitched roof

- Façade insulation boards for thermal insulation composite systems (ETICS) can be precision-cut to size and shape quickly and with no dust.

Photo: EPS blank

Photo: WDVS processing

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EPS is suitable for interiors

Building materials applied in interiors should have the least possible emissions of volatile organic compounds (VOC). All EPS insulation materials are distinguished exactly by this property and fulfil easily the most stringent European specifications, such as those of the Finnish quality label M1 for low-emission building materials or the Austrian "ÖkoBau" criteria for sustainable insulation materials.

Regulation or protocol	Conclusion	Version of regulation or protocol
Finnish quality label	Pass	Criteria for emission class M1[1]
Austrian "ÖkoBau" criteria	Pass	Threshold values for VOC und SVOC emissions from insulation materials[2]
French VOC regulation		Regulation of March and April 2011 (DEVL1101903D and DEVL1104875A)[3]
German AgBB	Pass	AgBB of February 2015[3]
Belgian VOC regulation	Pass	Royal decree of May 2015 (C-2014/24239)[3]
Indoor Air Comfort®	Pass	Indoor Air Comfort 5.3a of March 2015[3]
EN 717-1 "Determination of formaldehyde release"	E1	October 2004
BREEAM International	Compliant	GN22: BREEAM Recognised Schemes for VOC Emissions from Building Products

Source: baubook, RTS and PlasticsEurope

- Testing of VOC emissions from EPS insulation materials was performed by the well-recognised laboratory Eurofins in Denmark. 21 representative samples from the European market demonstrated that the total volatile organic compounds (TVOC) gave a maximum emission of 58 µg/m³ after 28 days and so undercut the most stringent European threshold value by 71 %, with formaldehyde not detected at all. For further details see Eurofins Report 392-2016-00418900 from 21 November 2016.

- In France EPS is widely used for internal insulation ("doublage").

[1] TVOC threshold value: 200 µg/m³ after 28 days
[2] TVOC threshold value: 300 µg/m³ after 28 days
[3] TVOC threshold value: 1.000 µg/m³ after 28 days

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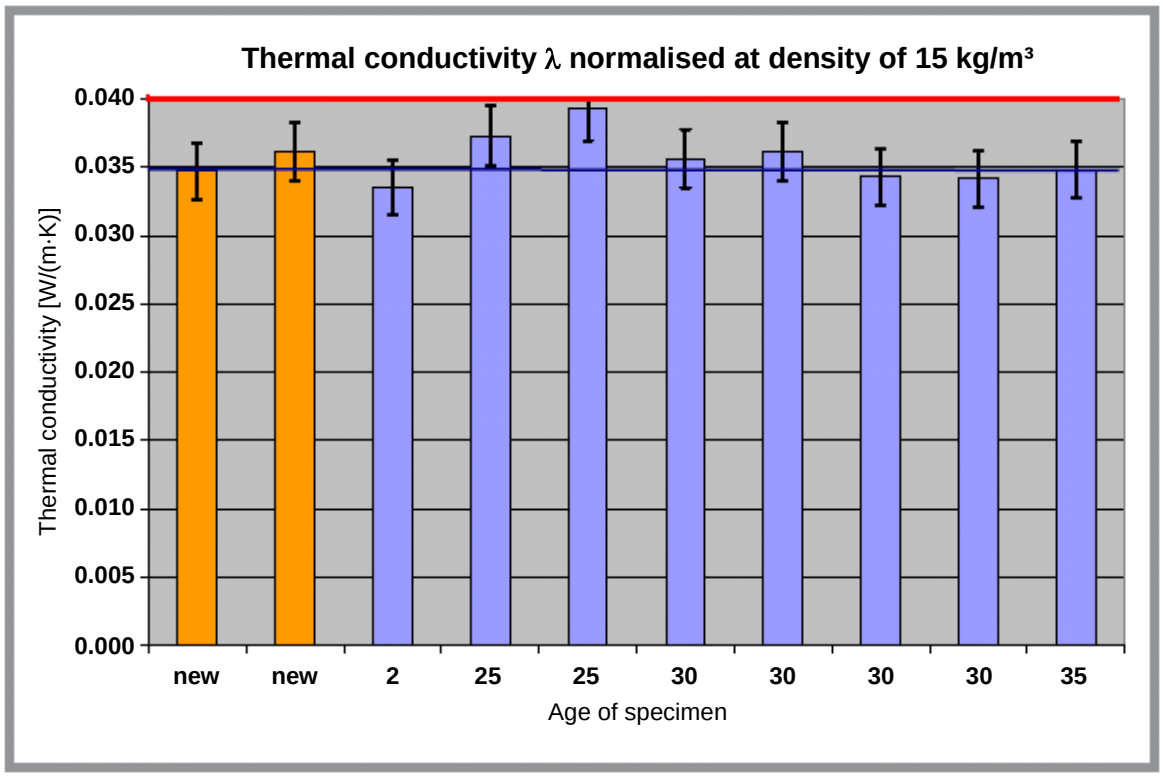
03.09.2018

FACT SHEET

EPS is durable

EPS has been used successfully for decades and lasts a building's lifetime. The thermal conductivity of EPS is not influenced by ageing, since the insulation effect is based on air. This has been clearly proven by a Swiss study about the long-term behaviour of EPS.



Source: Study "Resistance of EPS to ageing, using long-term evidence"
written by Carbotech AG, Basel in cooperation with S-E-E.ch, St. Gallen

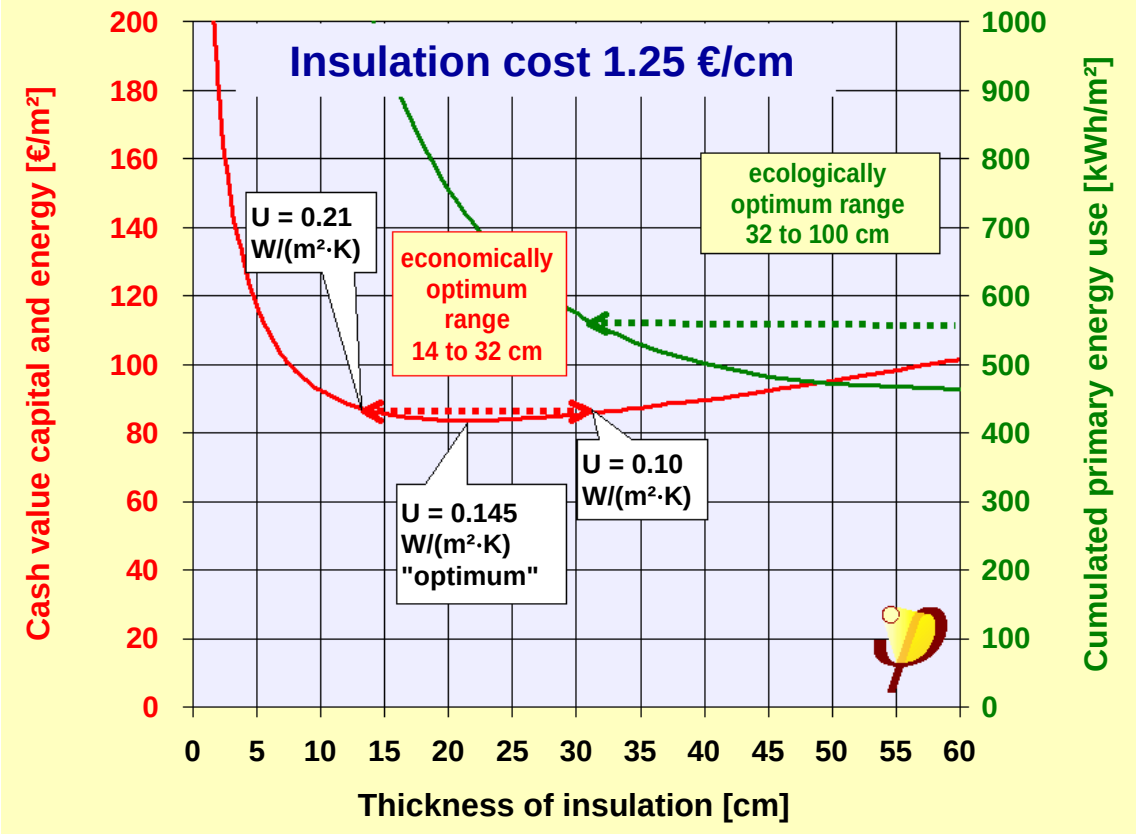
- According to the Environmental Product Declaration EPD-IVH-2009311-D, properly installed EPS insulation products display long-term stability in terms of their dimensions (length, width, thickness) and their building physical properties. They are water resistant and are not degraded by micro-organisms. If properly handled and installed EPS insulation materials will last as long as the building they insulate.

- In association with thermal conductivity, the term ageing is understood that the insulation effect deteriorates by the escape of cell gases over time. The insulation effect of EPS is based on air enclosed in the cells. No other cell gases are used, which can escape over the years.

FACT SHEET

EPS is cost efficient

EPS offers good value for money, guaranteeing optimum thermal insulation at moderate cost. Economically speaking, the best insulation thickness is between 14 and 32 cm. From an ecological viewpoint, even thicker insulation would be desirable.



Source: Passivhaus Institut

- Thermally rehabilitating a building that was constructed in the 1970s would save approximately € 1,000 to € 2,000 per year.
- Assuming that investment costs that would anyway be necessary for the maintenance of the building (so-called "business as usual costs") are not charged, thermal rehabilitations pay for themselves within about 10 years. Business-as-usual costs include, for example, the cost of scaffolding and rendering work for older facades that anyway have to be renovated. This is explained in a study carried out by the province of Upper Austria.
- With housing construction subsidies thermal rehabilitations pay off even sooner.

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FACT SHEET

Construction EPS is flame retardant

Flame retardant[1] in relation to construction EPS means that the foam melts when brought into contact with a flame without catching fire itself. All construction EPS sold in Austria is flame retardant. However, these strict fire safety requirements do not apply to EPS packaging material.

- During an exercise conducted by the fire service in Mödling, an attempt was made to ignite a block of construction EPS directly with a flame gun and indirectly with burning wooden pallets. Neither attempt succeeded.

Photo: Block of constructional EPS with flame applied

Photo: Burning wooden pallets in front of a block of constructional EPS

- Construction EPS can only be ignited by fires involving other material. For this reason, bitumen sheeting, varnishes, etc. may not be stored in proximity to EPS insulation boards.

- Fire service personnel very much appreciate that EPS does not smoulder in the case of fire.

[1] As per ÖNORM B 3800-1:1988 12 01

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FACT SHEET

EPS waste is 100 % recyclable

At the end of EPS insulation material's very long useful life there are several ecologically and economically sound possibilities to re-use it. One alternative is simply to use the insulation panels again. In most cases, however, EPS waste is mechanically recycled[1] or used for energy recovery[1]. In sufficient quantities, physical recycling[1] is also an option. EPS waste is a wanted second-hand material. For example, in Austria the demand is so high that more than 100,000 m³ have to be imported every year. Only very small quantities of EPS waste, mixed with building rubble, ends up at a landfill site[1].

- EPS insulation panels are dismantled for re-use. For example, they are deployed as protection panels or for subordinate thermal insulations.

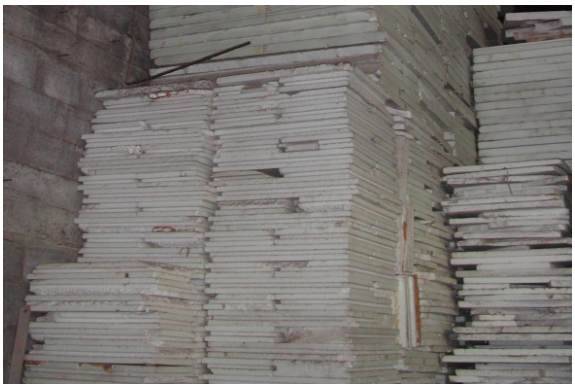


Photo: Used EPS boards

- Ideally, EPS waste is collected separately, since only in this way material recycling can be ensured. If building rubble is collected in a mixed skip, the sorting has to be performed by the disposal company.

Photo: EPS recycling bags

Photo: Waste sorting plant

[1] see separate fact sheets

FACT SHEET

Mechanical recycling of EPS waste

In the process of mechanical recycling, EPS waste is ground into granulate. It might be added to thermal insulation panels for instance, but also serves as an aggregate for lightweight concrete, bound EPS ballastings and insulating plaster, and acts as a pore inducer in the brick industry.

Photos: Recycling plant

- During the production of thermal insulation panels, up to 20 % of the weight of the recycled product is added which is gained from in-plant EPS waste or non-polluted construction waste.
- Recycling panels consist of 100 % recycled construction and demolition waste.
- The use of ground EPS as aggregate for bound EPS ballastings is standardised in EN 16025-1:2013.

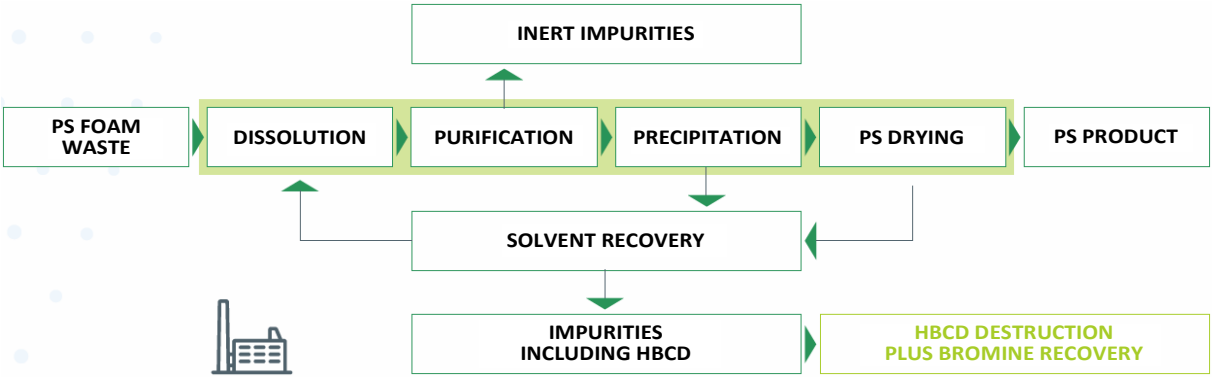
Photo: Bound EPS ballasting

FACT SHEET

Physical recycling of EPS waste

During physical recycling, polystyrene is recovered with the use of solvents. The most popular procedure is the CreaSolv® process by the German Fraunhofer Institute for Process Engineering and Packaging. It ensures a technically, economically and environmentally sustainable closed-loop recycling system for EPS waste and turns the vision of the European strategy for plastics in a circular economy into reality.

- During the CreaSolv® process a high purity of the polymer polystyrene is recovered due to its specific solubility. The potential of the process lies in the purification of the material on a molecular level. Impurities influencing the quality are gently removed whilst preserving the polymer qualities. With EPS containing HBCD it is possible to separate the flame retardant and recover the bromine in a separate process.



- PolyStyreneLoop is a recycling initiative based on the CreaSolv® process. In 2020, a demonstration plant with an annual output of 3,300 t will be built in Terneuzen, the Netherlands.

Foto: PolyStyreneLoop

- In Montréal, Canada, the technology startup Polystyvert commissioned in 2018 the world's first solvent-based polystyrene processing plant.

FACT SHEET

Energy recovery of EPS waste

The calorific value of EPS is used in incineration plants and cement factories: 1 kg of waste saves 1.3 litres of valuable heating oil. The advantage of this process is that the requirements regarding cleanliness of the EPS waste are low.

Photo: Incineration plant Spittelau (© MA 20 / Steven Duchon)

- In a large-scale test in the Würzburg waste incineration plant[1] in 2013 it was proven that burning EPS containing HBCD has no negative effects on the environment. The flame retardant HBCD is totally destroyed[2]. Even a proportion up to 30 percent by volume of EPS containing HBCD at the waste incineration changes nothing in terms of the composition of the end products such as slag, dust and filtration residues, owing to the high temperature applied.

[1] see PlasticsEurope Technical Summary Report „End-of-life treatment of HBCD-containing polystyrene insulation foams"

[2] see Waste Management & Research Article „Destruction of the flame retardant hexabromocyclododecane in a full-scale municipal solid waste incinerator"

FACT SHEET

Landfilling of EPS waste

Usually, EPS waste is mechanically recycled or used for energy recovery. It is too valuable to simply be deposited in a landfill site. EPS has no effect on ground water and poses no threat to the environment. Mixed with building rubble it can be deposited at ordinary construction waste landfills. In this respect, EPS waste is no different from other insulation material waste of organic origin such as cork, wood fibre or hemp.

Photo: Construction waste landfill (© Pfnier)

- The European Waste Catalogue (EWC) allocates waste code number 17 06 04 “insulation material” to EPS waste.
- The Austrian Landfill Directive states that building rubble may contain a maximum of 10 percent by volume of components made of metal, plastic, wood or other organic materials such as paper, cork, etc..
- Hazardous waste is referred to colloquially as "problem materials" or "special waste". The Austrian Waste Designation Directive and Waste Register give information about the various sorts of waste. These show for instance that railway sleepers and liquid crystal displays (LCD) are listed as hazardous waste, whereas packaging EPS or construction EPS is not.

FACT SHEET

The polymeric flame retardant (pFR)

This innovative flame retardant was specially developed for use in EPS insulation. Due to its high-polymer structure, it is unavailable to biological processes and cannot be accumulated in organisms. The flame retardant pFR does not exhibit bioaccumulative or toxic properties and thus represents a sustainable solution for EPS insulation.

- The polymeric flame retardant was developed by Dow Global Technologies LLC (DGTL). Currently the licensees Chemtura, ICL-IP and Albemarle supply the global market.
- The key advantage of the pFR flame retardant is that it is a plastic itself and – like EPS – not water-soluble. This prevents it being taken up by organisms.

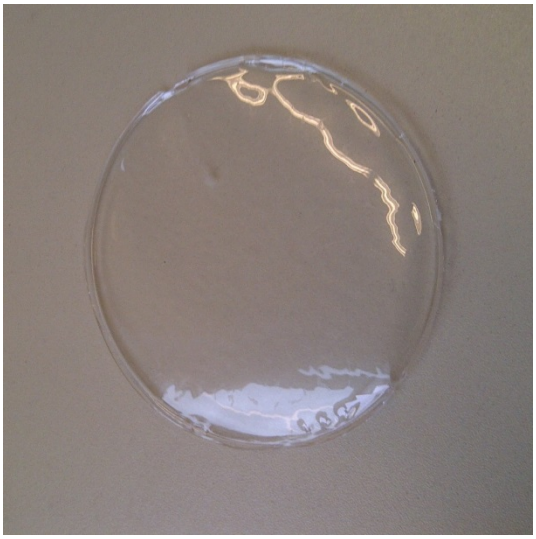


Photo: Platelet of pure pFR

Photo: Platelet of pure pFR (side view)

- The US Environmental Protection Agency (EPA) has confirmed the excellent health, safety and environmental profile of the polymeric flame retardant (EPA publication 740R14001).
- Comprehensive test programs undertaken by industry, in collaboration with the association of the plastics manufacturers in Europe (PlasticsEurope) and the German Research Institute for Thermal Protection (FIW), have shown that EPS insulation with the flame retardant pFR has very good reaction to fire properties. All other positive characteristics, such as thermal conductivity or mechanical strength, are not affected by pFR.

FACT SHEET

The flame retardant HBCD

HBCD (hexabromocyclododecane) is a flame retardant which has been used in EPS insulation materials for decades. Since HBCD is fully "embedded" in the plastic, the environmentally relevant properties are not transferred to the insulation material. Thus EPS poses no threat to humans or the environment. Since 21 August 2017, producers in all European countries have switched to the new flame retardant pFR[1].

- For decades HBCD has been added to upholstered furniture, decorative materials such as hangings and curtains, leisure equipment such as tents and awnings, domestic textiles such as carpets and bed sheets, (protective) clothing and components for electric and electronic equipment in order to offset the flammability.

- Expert opinions issued by the Fraunhofer Institute for Building Physics have shown that HBCD flame retardant is not released by EPS insulation materials, either into the air or into the water.

- HBCD as a pure substance has been included in Appendix XIV of the REACH regulation and has been listed as a Persistent Organic Pollutant (POP) by the UNEP Stockholm Convention, but could be used without restriction in Europe until the sunset date of 21 August 2015. After this date HBCD could still be used until 21 August 2017 by companies granted an authorisation under REACH.

[1] see fact sheet

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FACT SHEET

ETICS made of EPS

Façade insulations made of EPS already save fossil resources during the production process, save a huge amount of energy and can also be recycled.

- **Saving fossil resources**

  Although polystyrene is an oil-based product, only an extraordinarily small amount of this precious natural resource is required to produce it. This is because expanded polystyrene (EPS) effectively consists of 98 % air and only 2 % polystyrene, the cells which contain the air. For every litre of oil that is used to manufacture EPS building insulation up to 200 litres of heating oil is saved over the life of the product.

- **Fire Safety**

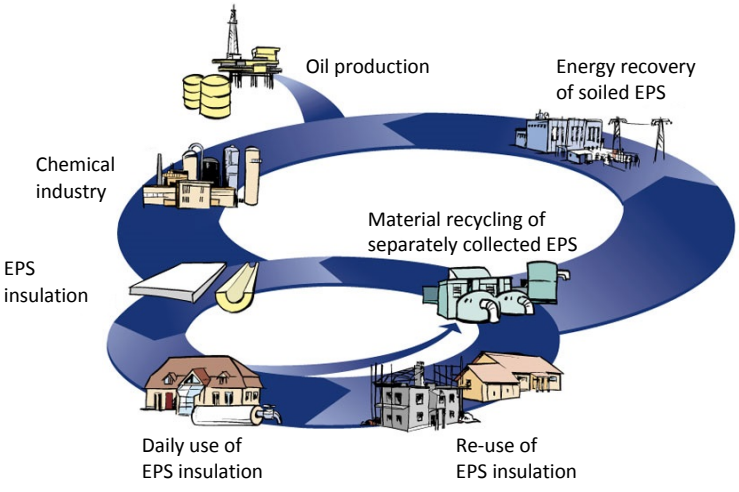
  ETICS do not present a fire hazard. A series of façade fire tests (conducted by Vienna Municipal Department 39 among others,) have proved that thermal insulation composite systems with a thickness of 30 cm have a fire resistance rating of 30 minutes.

- **Durability**

  Properly installed ETICS have been proven to last for many decades. For some time now, double layer construction has been used to achieve optimal state-of-the-art thermal insulation standards.

- **Recyclability**

  The complete removal of the ETICS from the wall is nowadays standard practice. Once the rendering system has been removed („stripping“), the insulation boards are taken off the wall and recycled separately, e.g. in ground form as aggregate for lightweight concrete. In Austria, for example, the demand for EPS waste is so high that each year more than 100,000 m³ have to be imported. Soiled EPS waste is used for energy recovery. Despite this, building rubble that includes EPS can be deposited at ordinary construction waste landfills.



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23.07.2019

FACT SHEET

ETICS creates a comfortable indoor room temperature

A thermal insulation composite system on the outside wall is beneficial all year round, not just in winter. It works like a vacuum flask, keeping cold contents cold and hot contents hot. The thermal insulation ensures that on hot days the interior stays cool longer. This is because the solar heat penetrates the facade into the interior of the house more slowly. Thermal insulation provides protection against both cold and heat alike. The effectiveness was demonstrated in a research park for building materials with ten houses identical apart from their wall construction.

- The summer of 2015 was the hottest for 100 years, when the outside temperatures hit 36 °C. The room temperatures in the uninsulated house rose above 30 °C. In contrast, temperatures in the brick house insulated with an ETICS reached a maximum of 27 °C.

Outside wall	Insulation thickness	Insulation	Inside temp.
25 cm Brick uninsulated	–	*(lime/cement-plaster)*	30 °C
24 cm Timber frame + ETICS	6 cm	EPS grey	29 °C
50 cm Insulated brick	–	*(lime/cement-plaster)*	28 °C
20 cm Wood block + ETICS	20 cm	Wood fibre	28 °C
25 cm Brick + ETICS	18 cm	EPS grey	27 °C

Source: Viva Forschungspark

- In the event of a simulated heating failure in winter (-12 °C outside temperature), after 2 days the uninsulated house had a wall temperature of 1 °C and an internal room temperature of 4 °C. Houses insulated with an ETICS performed significantly better.

Outside wall	U-value	Inside temp.	Wall temp. in the plaster
25 cm Brick uninsulated	1.80	4 °C	1 °C
24 cm Timber frame + ETICS	0.15	11 °C	7 °C
50 cm Insulated brick	0.15	13 °C	12 °C
20 cm Wood block + ETICS	0.15	13 °C	13 °C
25 cm Brick + ETICS	0.15	15 °C	15 °C

Source: Viva Forschungspark

FACT SHEET

ETICS are an architectural design element

There are attractive and unattractive buildings both with and without ETICS. For some time now, a host of ESP facade profiles such as window and door frames, window sills, fascia profiles, cornices, keystones and bosses as well as decorative elements have been available as architectural design elements for facades. Now nothing stands in the way of the desired objective of attractive new homes or lovingly restored older buildings.

Photo: Spa hotel Lutzmannsburg

- A new facade improves the visual appearance of buildings that are in need of renovation.

Photo: Dwelling house Rankweil-Schleipfweg before renovation

Photo: Dwelling house Rankweil-Schleipfweg after renovation

FACT SHEET

ETICS are highly durable

Properly installed thermal insulation composite systems have been proven to last for many decades. For some time now, double layer construction has been used to achieve optimal state-of-the-art thermal insulation standards.

Photo: Dwelling house Bahnhofstr. 43, 6890 Lustenau with ETICS made of EPS (year of construction 1966)

- In 1995 Municipal Department 39 – the City of Vienna's Research Centre, Laboratory and Certification Service Centre – stated that the top layer of a thermal insulation composite system can be expected to last at least 30 years, while the insulation material should last much longer. However, this does not mean that the top layer has to be completely renewed after 30 years, as is the case with mineral render. This is also only retouched, buffed and re-coated in places.

- Like a car, ETICS should be regularly inspected. Remedial measures should be taken immediately as soon as it becomes apparent that maintenance work is needed.

- Standards for doubling up an existing ETICS are defined in ÖNORM B 6400:2011, Appendix C. A second, usually thicker, layer of EPS is mounted on an existing thin EPS façade.

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09.02.2015

FACT SHEET

ETICS are safe in case of fire

Numerous façade fire tests conducted, inter alia, by Municipal Department 39 (the City of Vienna's Research Centre, Laboratory and Certification Service Centre) have proved that thermal insulation composite systems with a thickness of 30 cm have a fire resistance rating of 30 minutes. This means that within this period there is no fire spread on or beneath the surface of the façade and no large or burning parts drop off.

Photo: Façade fire test

- The fire authority and fire service in Graz conducted several façade fire tests on thermal insulation composite systems (ETICS) at the premises of Tagger. All the systems tested satisfied the requirement that a fire may not spread over the surface of the façade. This proves that ETICS satisfy to the highest degree the protection targets (residents can leave the building by themselves or can be rescued by other means, allowance is made for the safety of the emergency services and the fire can be extinguished effectively).

Photo: Façade fire test (after 27 minutes)

FACT SHEET

Deconstruction of an ETICS

This can be understood as the complete removal of the insulation system from the wall, nowadays this is a common practice with ETICS made of EPS. Ideal is the so-called selective approach, which does not mix the individual components of the system such as insulating material or rendering. The other option is to scrape or mill the entire ETICS off the building facade. However, in this case the mineral and organic fractions must be subsequently separated in a mixed construction waste separation plant.

- Selective approach: After removal ("stripping") of the rendering system, the insulating boards are taken off the wall and recycled separately. Other procedures such as the thermal peeling of the rendering system are still being developed.

Photos: Deconstruction of an ETICS

- Using the computer-based BIBER® system, the entire ETICS can be stripped from the wall in strips in a single operation using a facade miller. At the same time the building waste is collected for disposal in a container, using a special vacuum cleaner. The milling cutter can be attached to a lifting work platform, telescopic fork-lift truck or excavator.

Photo: Milling cutter in operation