PU circular economy in the German construction industry: The case of purenit

PUR Annual Meeting, 7 May 2026, Nyborg, Dr. Andreas Huther

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purenit®

puren gmbh

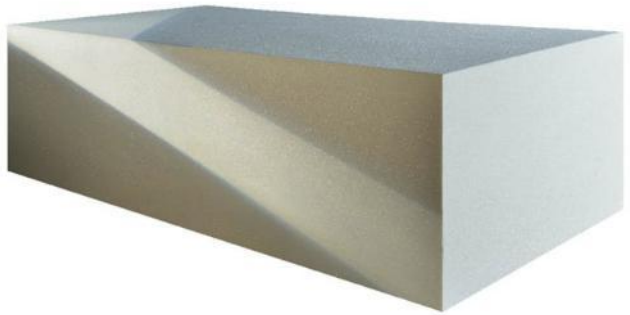
- founded 1968 at Überlingen (Southern Germany)
- Specialist for Polyurethane (PU) rigid foam
- 320 employees in Germany
- 4 production plants in Germany
- ~ 120 Mio. € total sales
- 100% family business

Business Units

- **High-performance insulation** materials for the entire building envelope
- **Construction materials** for the automotive industry
- **Functional material purenit** for construction and industry
- **Circular Economy** and **recycling** of PU rigid foam

High-performance insulating materials with flexible facings

Block Foam

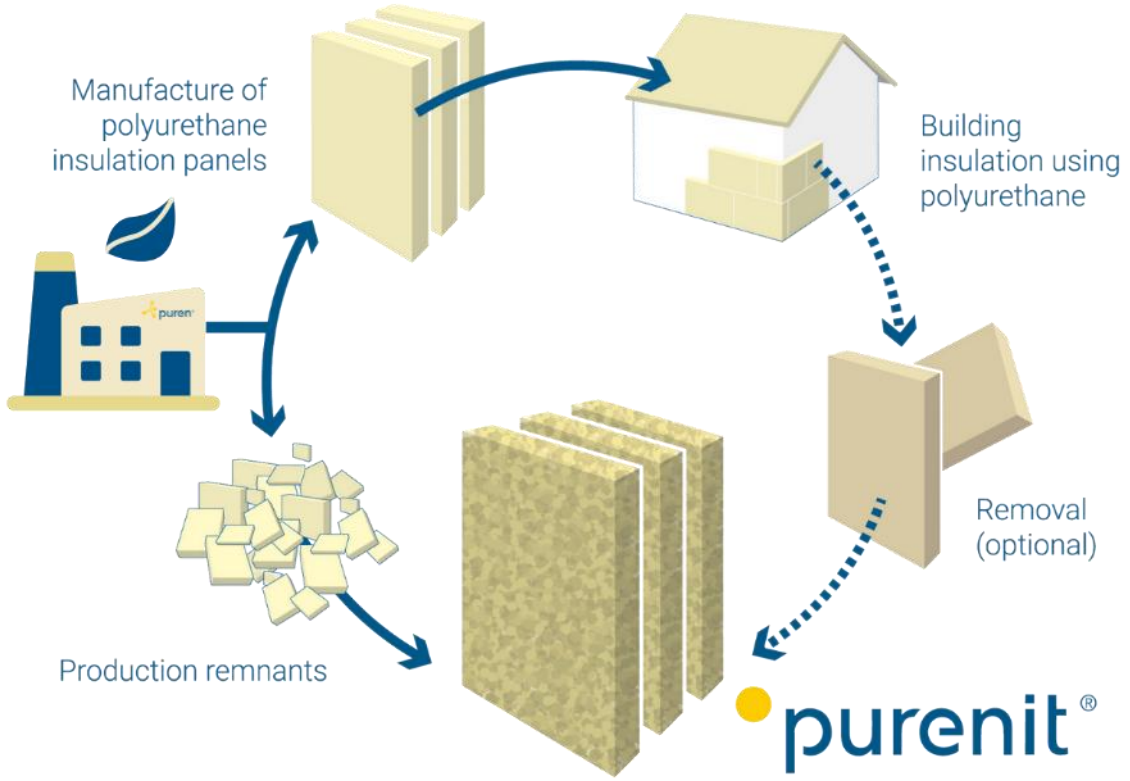


Functional Materials, Mechanical Recycling

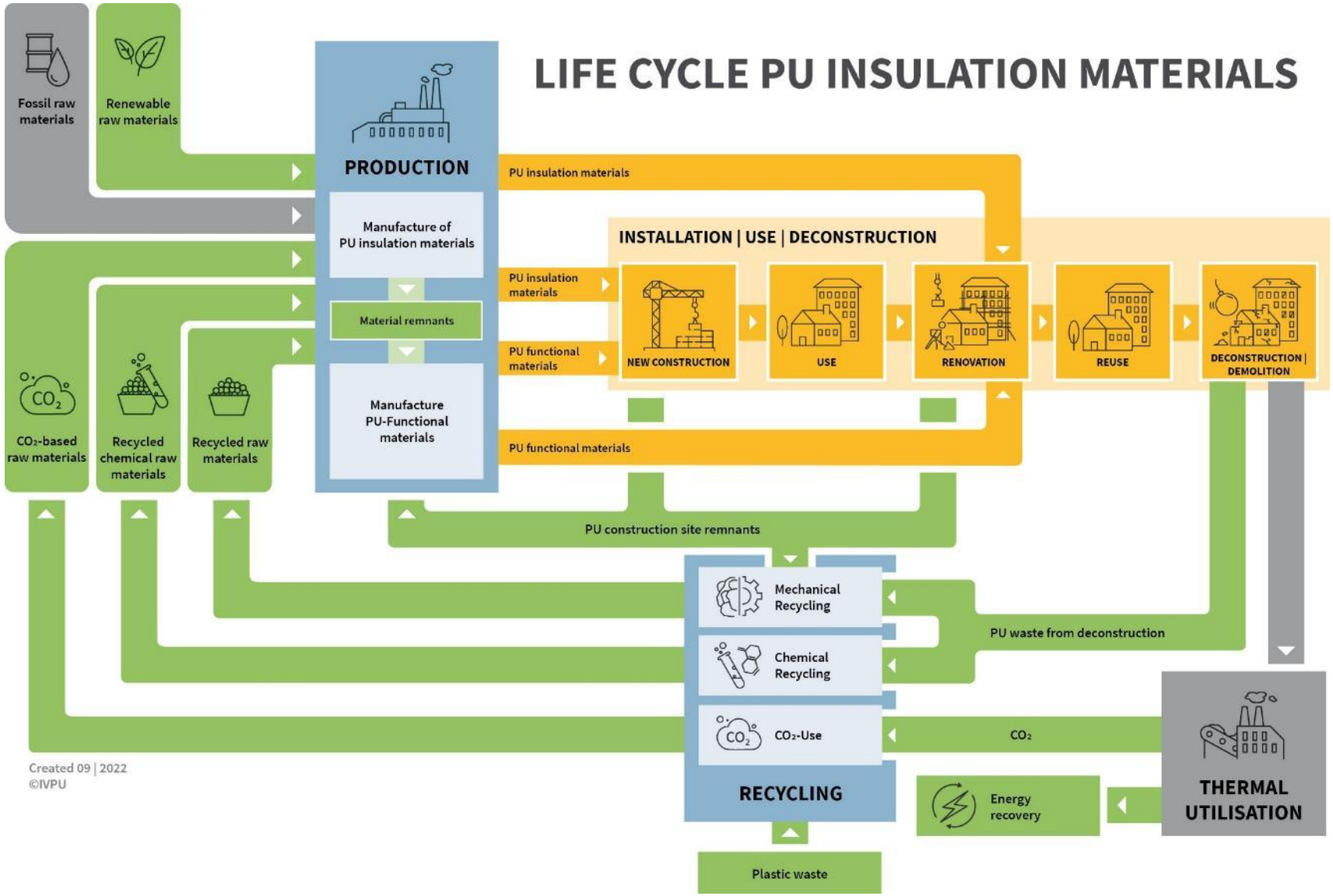
A sustainable development from the very beginning

The principal of puren‘s sustainability

- Creating products saving more energy than was required for their manufacture throughout their life cycle and use
- Manufacturing products in a way they can be reintroduced sustainably to the material cycle
- Producing and manufacturing in an energy-efficient and resource-conserving environment



Life Cycle of PU Rigid Foam



Focus on open loop

- The industry must care of open-loop concepts
- Closed-loop concepts are not flexible enough, are risky and technologically not yet available for all plastic types
- PU Europe & NTA's support in respective Standardization Committees is appreciated

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PU-material residues

Collection of PU construction site remnants and bring them to the circular economy

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Bundesministerium für Wirtschaft und Energie

AUFGRUND EINES BESCHLUSSES DES DEUTSCHEN BUNDESTAGES

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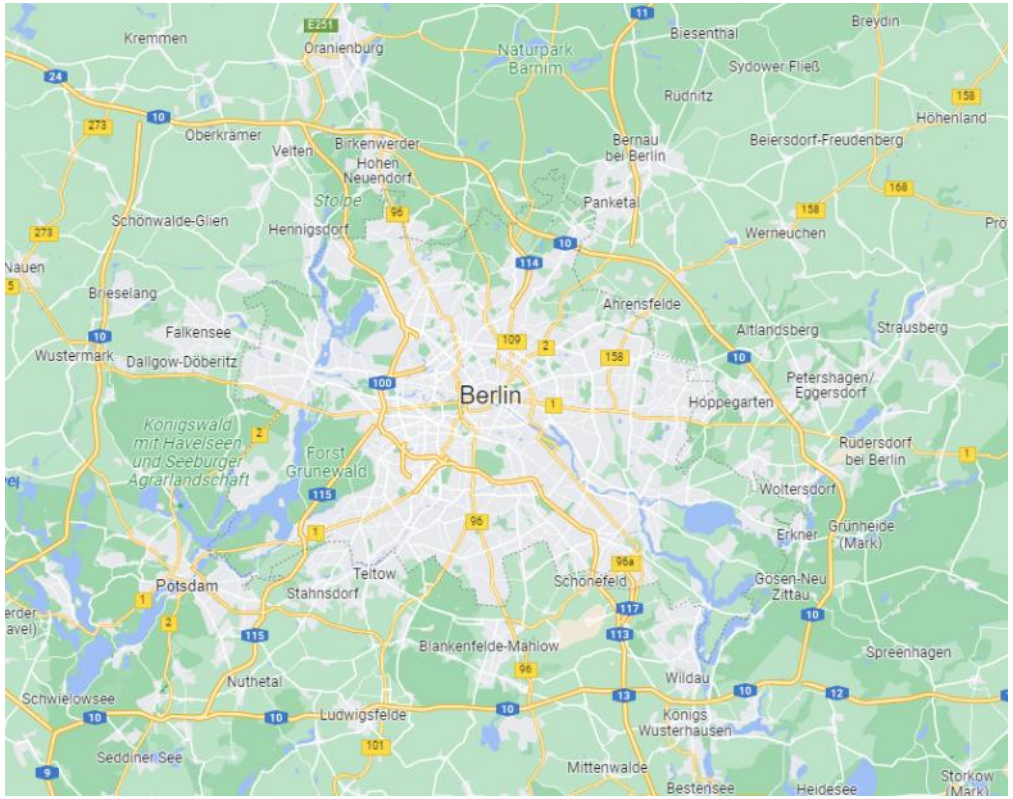
Pilot project with IVPU, puren and association of roof makers in collaboration with state government of Berlin



IVPU Pilot Project:
PU take-back scheme for Berlin & Brandenburg

- Collection system for PU cutting residues
- Cooperation of IVPU with roofers' association and regional building products retailers
- Bags with cutting residues are processed mechanically to PU functional boards (purenit)
- Costs per bag: 50 € (incl. logistics)
  ➔ less expansive than disposal as construction waste

IVPU Pilot Project:
PU take-back scheme for Berlin & Brandenburg

Construction Site

Collection of PU residues in 1 m³ bags

Collection point

Shredding and briquetting

Production site

Production of PU functional boards

IVPU Pilot Project:
Why a take-back scheme for PU matters

- One bag with PU cut-offs can be used to produce 1.5 m² of PU functional material (like purenit)
- Every year, around 100,000 m³ PU cut-offs from constructions sites are incinerated (in Germany only)
  ➔ “Raw material” for approx. 6.000 m³ PU functional materials

- PU functional materials
  - are made from 90% recycled raw materials
  - are durable and versatile
  - can be recycled multiple times

Raw Materials / PU-material residues

Raw Materials / PU-material residues

- Briquettes from production sites in Germany and continental Europe, production byproducts, cut-offs
- From customers and various industrial partners in big-bags, PE-bags or cut-offs on pallets
- From other PU manufacturers according EN 13165 (briquette containers >220 tons p.a.)

Raw Materials / PU-material residues

Raw Materials / PU-material residues

The concept of NEXT STEP PU

Re-use instead of disposal

- Waste prevention instead of waste recycling
- **Contractual agreements for acceptance of PU material with intended purpose to use it as raw material for PU functional materials instead of disposal**
- Material residues must be clearly identifiable
  → only in specially designed bags or visibly on pallets

purenit Factory
at Obermarchtal (Germany)

purenit®

purenit Factory at Obermarchtal (Germany)

Raw material processing

purenit Factory at Obermarchtal (Germany)

Raw material processing

purenit Factory at Obermarchtal (Germany)

purenit production line

Properties and characteristics of purenit

- moisture resistant
- thermally insulating
- mold resistant
- chemical resistant
- rot proof
- high compressive strength
- high dimensional stability
- light in weight
- easy to handle standard woodworking tools
- also available in Class C (hardly flammable)

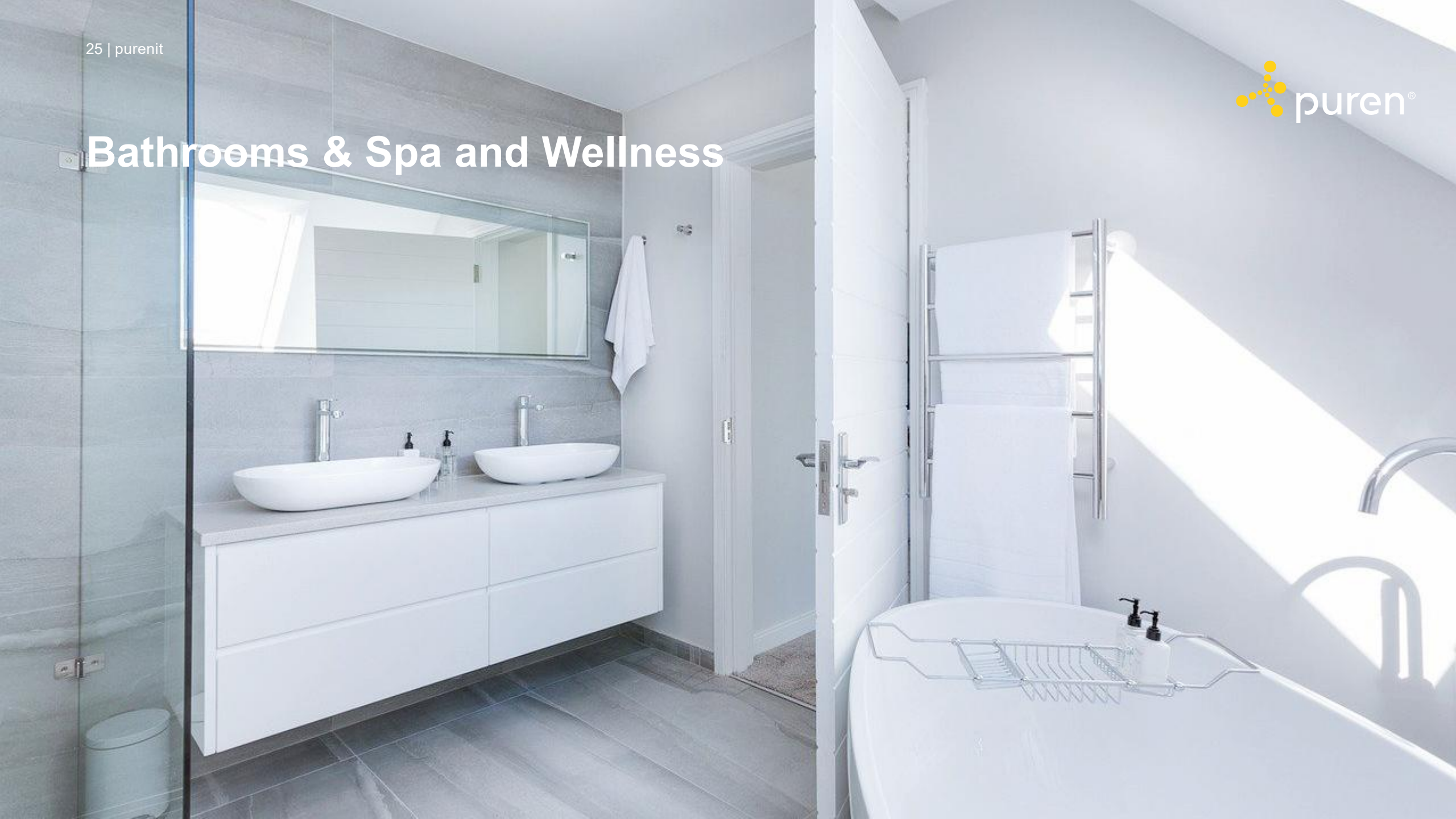
→ **purenit makes sense where wood reaches its limits**

Range of Applications

- Solutions to avoid thermal bridges in buildings
- Fixing elements and frames for windows and doors (ground profiles, frames, attic, roller shutter boxes)
- Furniture (interior or exterior)
- Bathrooms, Spa & Wellness areas
- Caravans and Motorhomes
- Ship building (sailboats, cruise ships, yachts)
- Agriculture (milking stations, green houses)
- …

Outdoor Kitchens

Bathrooms & Spa and Wellness



Caravans & Motorhomes

Cruise ships & Yachts

Ground profiles

Sales counters

Attic and roof edges to avoid thermal bridges

Insulating and fixing frames

Window construction to avoid thermal bridges

Window frames for cavity walls

Composite elements

Facades

Food trucks / sales booths

Agriculture

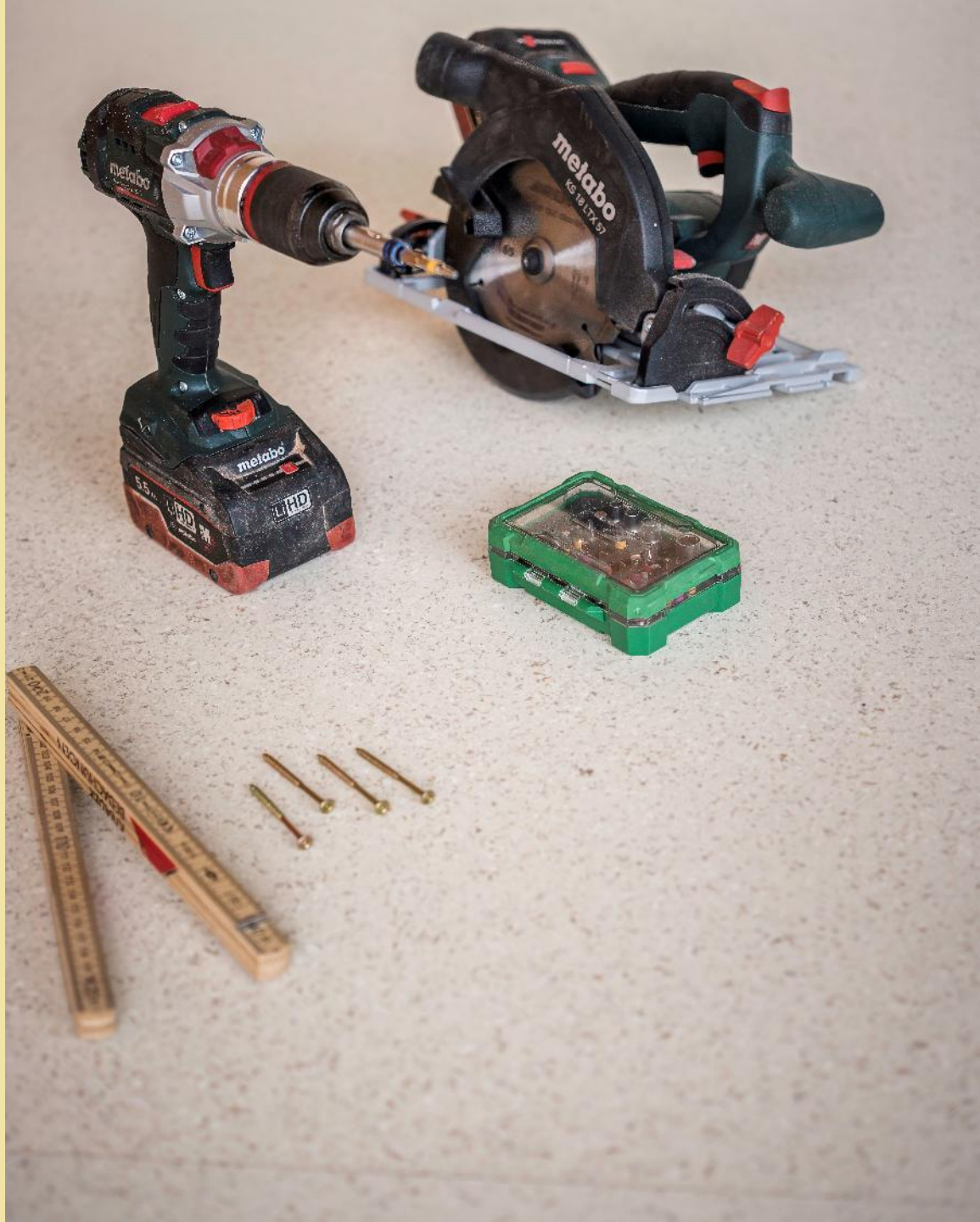
Thank you!

Backup

Processing

Processing facts

Milling	Effortlessly and accurately with standard woodworking machines.
Drilling	For the predrilling of screwed joints, an An HSS drill is sufficient for pre-drilling.
Saws	Precise and easy to saw. Water jet cutting is also possible. Carbide tools are recommended for longer tool life.
Coating	Practically no restrictions when bonding and coating with other materials. Ideal substrate for laminates.
Gluing	Suitable for processing with all common adhesive systems.
Paint	purenit even tolerates paints and varnishes containing paints and varnishes.



Formats

purenits Standard plate format

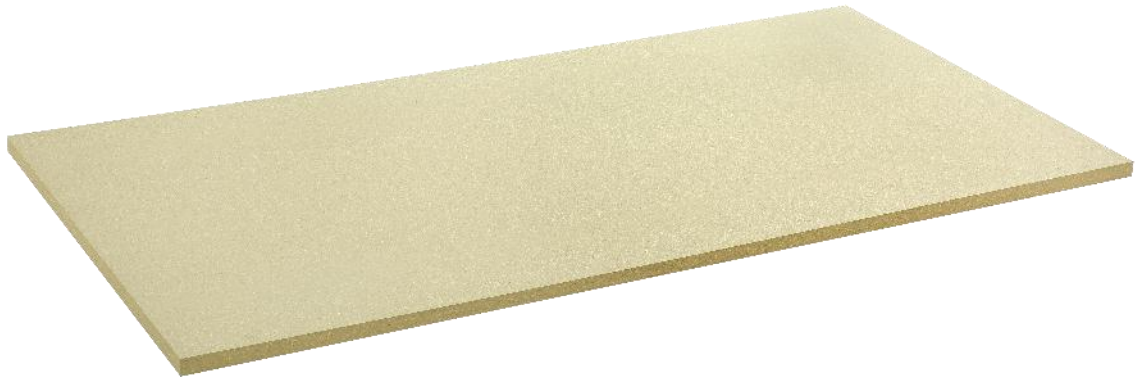
length	2.440 mm
width	1.220 mm

thicknesses 10, 15, 20, 30, 40, 50, 60 mm

Other strengths and formats available on request (small format, large format, special format)

pallet goods

- Delivery only in whole packaging units

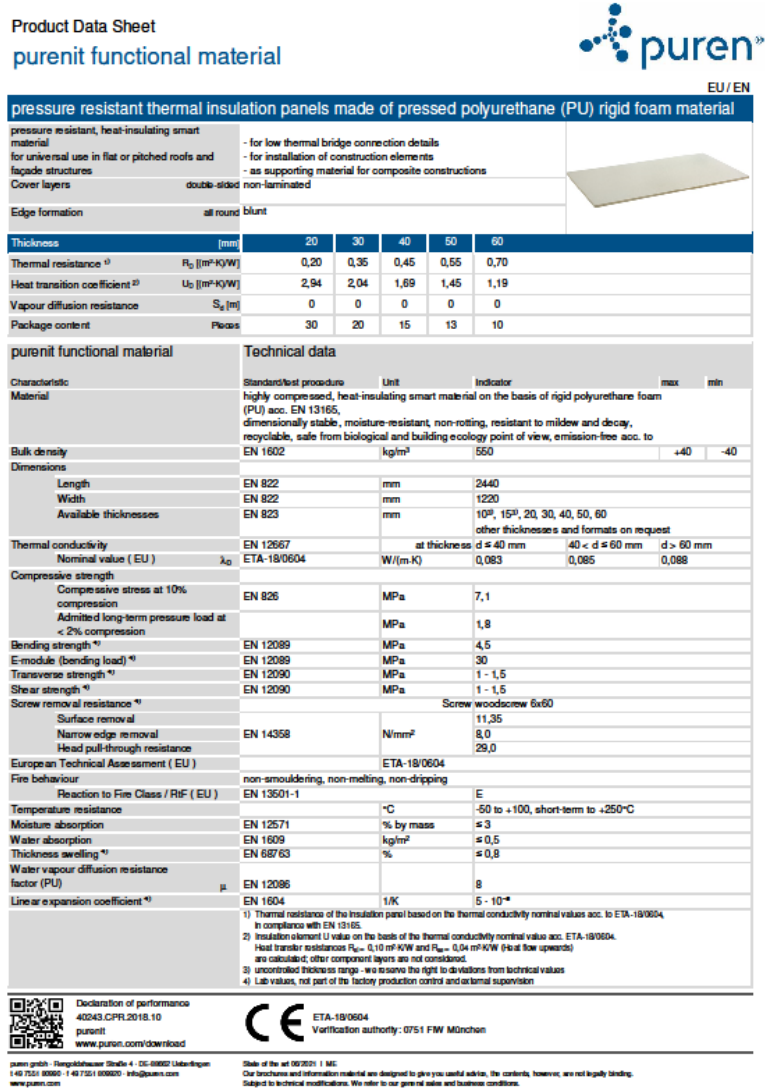


Technical specifications

Regulated by building authorities in accordance with ETA-18/0604 (European Technical Assessment)

- Declaration of Performance (DoP) in various national languages

fire behavior DIN EN 13501-1	Class E Class C-s2,d0	▶ purenit ▶ purenit C
Nominal value of thermal conductivity λ_D	0,083 W/(m·K) 0,085 W/(m·K) 0,088 W/(m·K)	20 mm ≤ d ≤ 40 mm 40 mm < d ≤ 60 mm 60 mm < d ≤ 80 mm
compressive strength	≥ 7.100 kPa	
Water absorption (short-term one-sidedimmersion)	≤ 0,5 kg/m²	
water vapor diffusion μ	8	
Tensile strength perpendicular to the panel plane	≥ 800 kPa	



Product Data Sheet
purenit functional material

EU / EN

pressure resistant thermal insulation panels made of pressed polyurethane (PU) rigid foam material

pressure resistant, heat-insulating smart material for universal use in flat or pitched roofs and façade structures		- for low thermal bridge connection details - for installation of construction elements - as supporting material for composite constructions
Cover layers	double-sided	non-laminated
Edge formation	all round	blunt

Thickness [mm]	20	30	40	50	60
Thermal resistance [1] R_D [(m²·K)/W]	0,20	0,35	0,45	0,55	0,70
Heat transition coefficient [2] U_D [(m²·K)/W]	2,94	2,04	1,69	1,45	1,19
Vapour diffusion resistance S_d [m]	0	0	0	0	0
Package content Pieces	30	20	15	13	10

purenit functional material — Technical data

Characteristic	Standard/test procedure	Unit	Indicator	max	min
Material	highly compressed, heat-insulating smart material on the basis of rigid polyurethane foam (PU) acc. EN 13165, dimensionally stable, moisture-resistant, non-rotting, resistant to mildew and decay, recyclable, safe from biological and building ecology point of view, emission-free acc. to				
Bulk density	EN 1602	kg/m³	550	+40	-40
Dimensions					
Length	EN 822	mm	2440		
Width	EN 822	mm	1220		
Available thicknesses	EN 823	mm	10[3], 15[3], 20, 30, 40, 50, 60 other thicknesses and formats on request		
Thermal conductivity	EN 12667	at thickness	d ≤ 40 mm	40 < d ≤ 60 mm	d > 60 mm
Nominal value (EU) λ_D	ETA-18/0604	W/(m·K)	0,083	0,085	0,088
Compressive strength					
Compressive stress at 10% compression	EN 826	MPa	7,1		
Admitted long-term pressure load at < 2% compression		MPa	1,8		
Bending strength [4]	EN 12089	MPa	4,5		
E-module (bending load) [4]	EN 12089	MPa	30		
Transverse strength [4]	EN 12090	MPa	1 - 1,5		
Shear strength [4]	EN 12090	MPa	1 - 1,5		
Screw removal resistance [4]	Screw woodscrew 6x60				
Surface removal			11,35		
Narrow edge removal	EN 14358	N/mm²	8,0		
Head pull-through resistance			29,0		
European Technical Assessment (EU)		ETA-18/0604			
Fire behaviour	non-smouldering, non-melting, non-dripping				
Reaction to Fire Class / RtF (EU)	EN 13501-1		E		
Temperature resistance		°C	-50 to +100, short-term to +250°C		
Moisture absorption	EN 12571	% by mass	≤ 3		
Water absorption	EN 1609	kg/m²	≤ 0,5		
Thickness swelling [4]	EN 68763	%	≤ 0,8		
Water vapour diffusion resistance factor (PU) μ	EN 12086		8		
Linear expansion coefficient [4]	EN 1604	1/K	5 · 10⁻⁶		

1) Thermal resistance of the insulation panel based on the thermal conductivity nominal values acc. to ETA-18/0604, in compliance with EN 13165.
2) Insulation element U value on the basis of the thermal conductivity nominal value acc. ETA-18/0604. Heat transfer resistances R_{si}= 0,10 m²·K/W and R_{se}= 0,04 m²·K/W (Heat flow upwards) are calculated; other component layers are not considered.
3) uncontrolled thickness range - we reserve the right to deviations from technical values
4) Lab values, not part of the factory production control and external supervision

Declaration of performance
40243.CPR.2018.10
purenit
www.puren.com/download

CE ETA-18/0604
Verification authority: 0751 FIW München

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State of the art 09/2021 | ME
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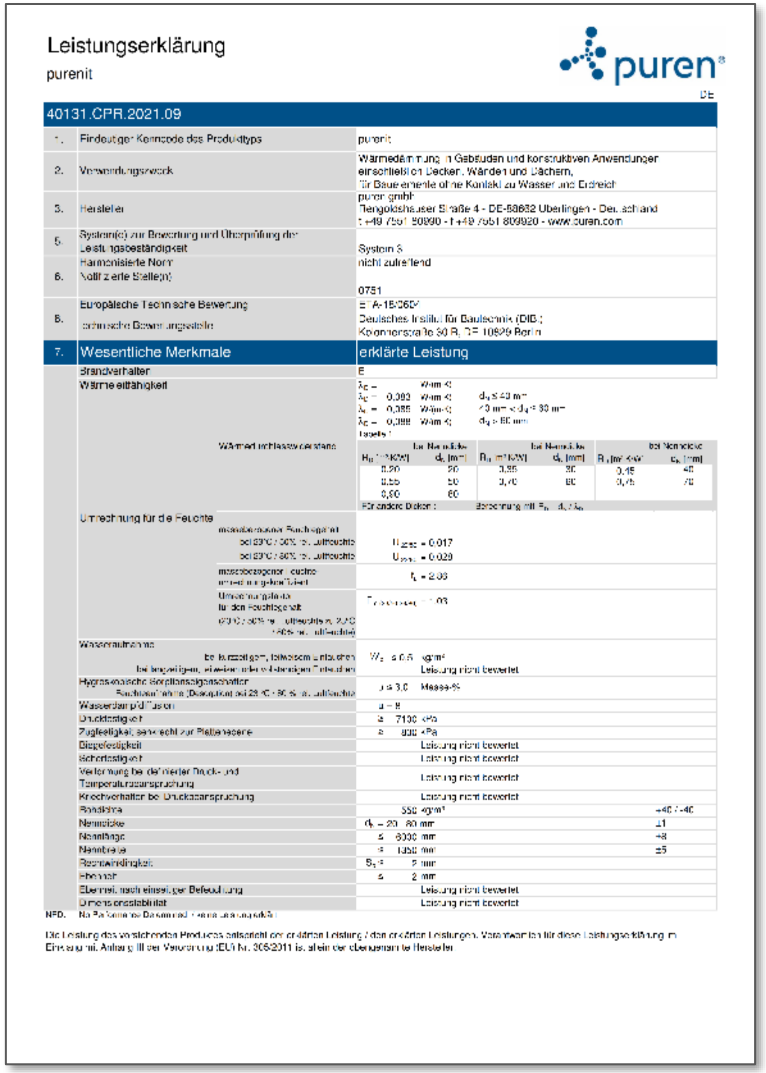
Subject to technical modifications. We refer to our general sales and business conditions.

Technical specifications

Other available, reliable mechanical characteristics (scientifically determined characteristic values)

flexural strength	4,5 MPa
Modulus of elasticity (bending)	30 MPa
shear strength	1 – 1,5 MPa
shear strength	1 – 1,5 MPa
screw extractor	
surface extraction	11,35 N/mm²
Narrow space pull-out	8,0 N/mm²
head clearance	29,0 N/mm²
Temperature-stability	-50 bis + 100 °C Short term up to + 250 °C

- ▶ Not approved by the building authorities
- ▶ Not suitable for statically relevant components


Leistungserklärung

purenit

40131.CPR.2021.09

7. Wesentliche Merkmale | erklärte Leistung

Technical data for water and moisture

- moisture-resistant
- rot-resistant
  - No verification method available/empirical
- Not waterproof
  - Increased water absorption when exposed to splashing water (e.g., driving rain)
  - Technical values only applicable in installation situations protected from weather and UV exposure!

Product video

Our product video summarizes everything you need to know about our functional material purenit:

→ Watch me

https://www.youtube.com/watch?v=GMGjD8WaIOE&list=PLDfp8ROGBbQpaj9GxDbxM0MawRUNc-e7X&index=2