

SLENTEX® & SLENTITE®

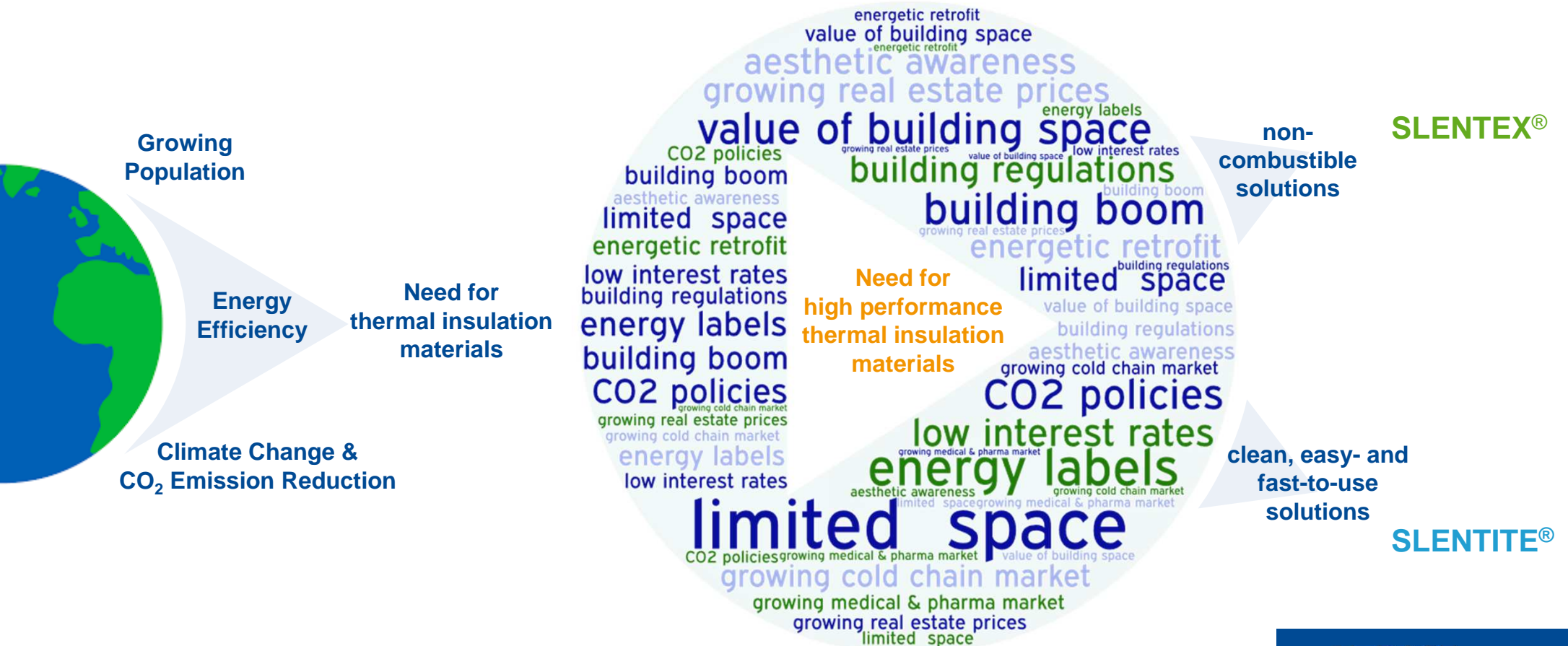
Aerogele als
Hochleistungsdaämmstoffe –
neuartige Ansätze für
energieeffizientes Bauen

12.09.2019

Dr. Marc Fricke

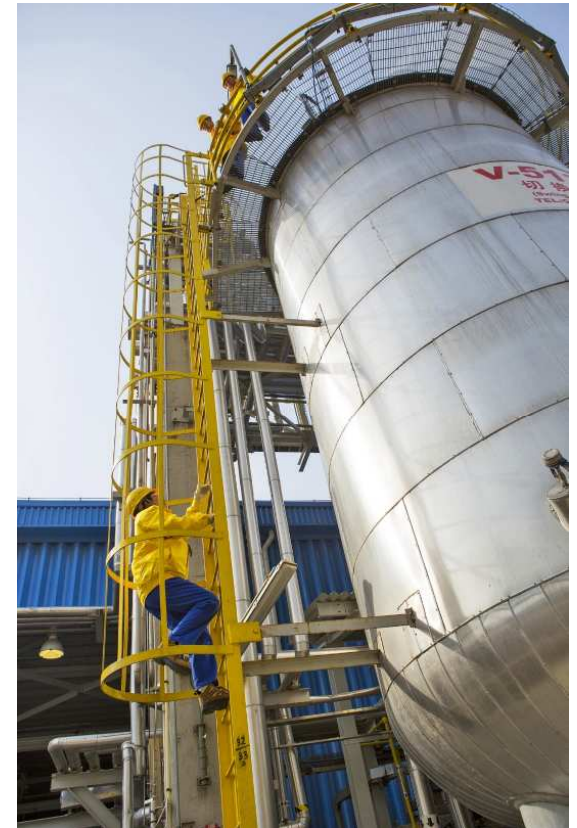


Strong Fundamental Megatrends for Energy Efficiency and CO₂ Emission Reduction Continue to Drive Need for Thermal Insulation



BASF – We create chemistry

- Our chemistry is used in almost all industries
- Employees (as of December 31, 2017): 115,490
- 6 Verbund sites and 347 other production sites
- Combined into five **segments**, 13 **divisions** bear operational responsibility and manage our 55 global and regional **business units**
- The operating divisions develop strategies for the 86 different **strategic business units**
- The **regional divisions** contribute to the local development of BASF's business, help to exploit market potential and are responsible for optimizing the infrastructure for our business
- Eight **functional units** and seven **corporate units** support the BASF Group's business activities.



Challenges of today and tomorrow

Existing Buildings

Driver: Energetic retrofitting of historic buildings



Thermal super insulation materials help to save energy and win space



New Buildings

Driver: Lack of space, aesthetics

Challenges of today and tomorrow

Rank	City	Prime Property (m sq) per million dollars USD
1	Monaco	16
2	Hong Kong	22
3	New York	25
4	London	28
5	Geneva	41
6	Paris	46
7	Sydney	48
8	Shanghai	54
9	Los Angeles	58
10	Beijing	66

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New Buildings

Driver: Lack of space, aesthetics

We Continue to Innovate

Thermal Insulation Materials



1950
Styropor®



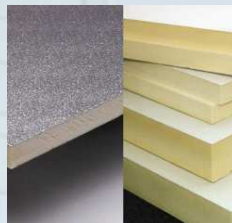
EPS foam

1970
Styrodur®



XPS foam

1990
Elastopor®



PU foam

2000
Neopor®



Advanced EPS foam

2010
Elastopir®



PIR foam

Today
SLENTITE®



PU aerogel

SLENTEX®

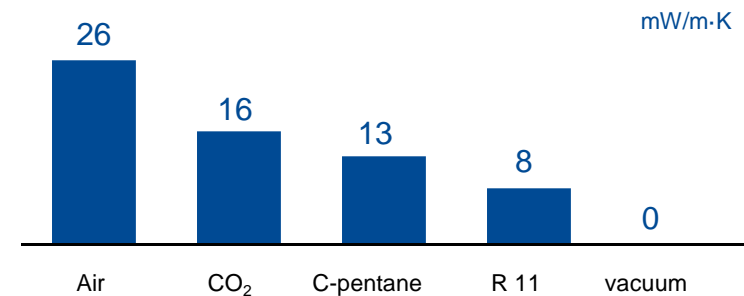


Silica aerogel

Thermal Conductivity: λ

Conventional Foams

$$\lambda_{\text{foam}} = \lambda_{\text{matrix}} + \lambda_{\text{cell gas}} + \lambda_{\text{IR}} + \lambda_{\text{k}}$$



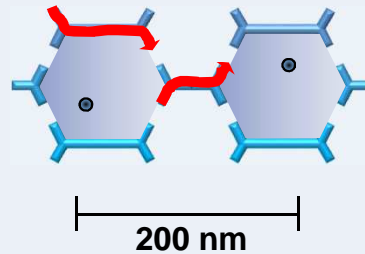
Contribution to thermal conductivity λ by cell gas ~60%

Aerogels

The Knudsen Effect and Porosity

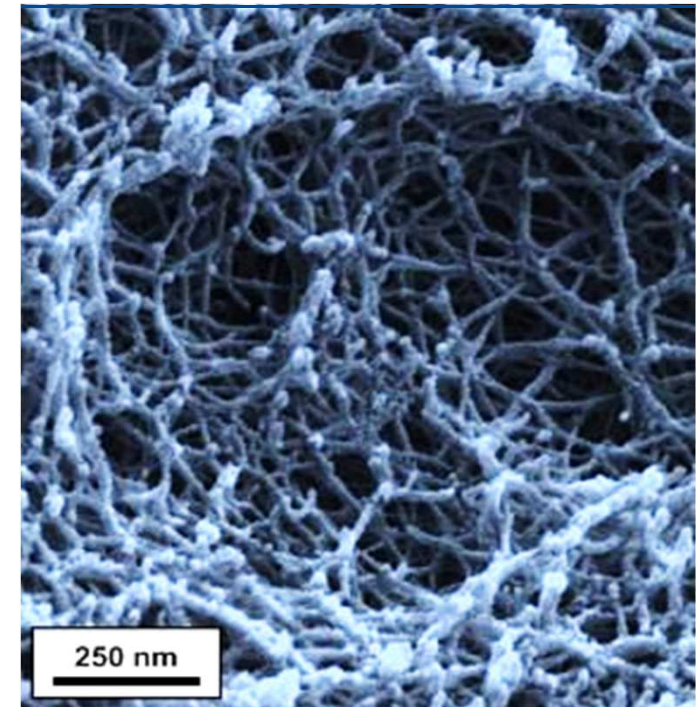
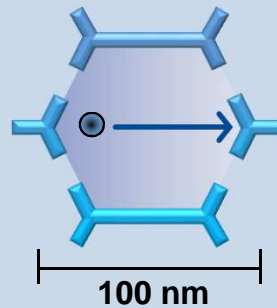
Reduction of matrix contribution

A maximized path through the material at minimal points of contact reduces overall thermal conductivity.



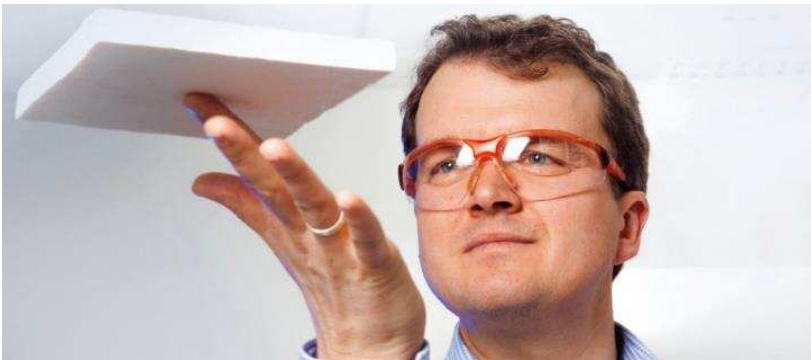
Minimal conductivity & convection

Nanoporosity drastically reduces heat transfer: contribution of cell gas and convection is significantly reduced.



High-Performance Insulation

Space saving and efficient



Aerogels with a thermal conductivity value in the range of **18 mW/m*K**



Compared to conventional products, **25 - 50 % slimmer** insulation is possible

SLENTITE® and SLENTEX®

High Performance Thermal Insulation by BASF



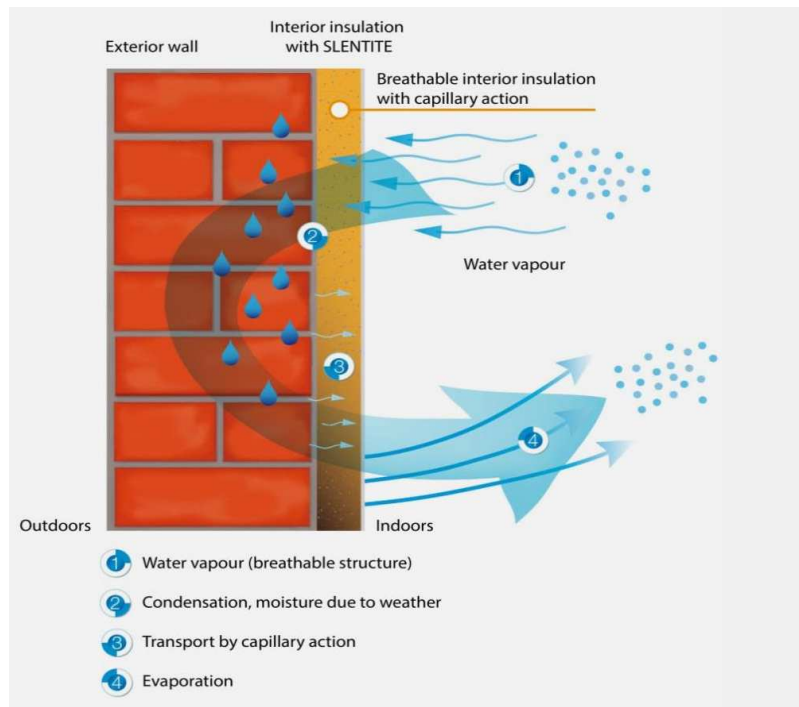
SLENTITE® =
Interior insulation & thermal breaks



SLENTEX® =
Exterior insulation & fire-protection

High-Performance Insulation

Water-vapor diffusivity



Hydrophobic surface and special material composition with an open porous structure



Active moisture regulation indoors will positively impact the room climate

SLENTEX®

Exclusive by BASF



- Non-burning material (A2-s1 d0, EN 13501)
- High temperature stability (> 400 °C)
- λ_D 19 mW/m·K (@10°C, EN 12667)
- CE certified
- Flexible blanket of 10mm tks
- Hydrophobic, but water vapor diffusive
- Compression resistant, robust, machinable (density ~200kg/m³)

→ 50% space saving compared to glass fiber based insulation

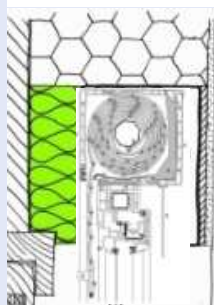
SLENTEX®

Typical space limitations in energetic retrofitting

Windows reveal



Sunblind, roller shutter



Exterior chimneys



Areas between houses



Entrance areas



Passage ways



Demanding geometries



Balcony areas



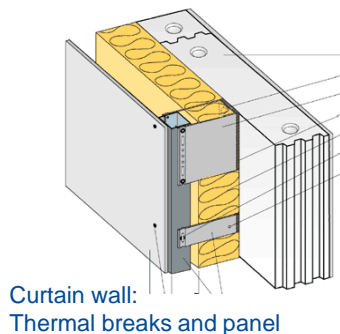
Buildings direct on boundary line



Heritage building ensembles

SLENTEX®

Ventilated façade insulation



Challenge:

The metal bracket used in ventilated facades are to be designed according to the weight, windload and design of the full system, which is determined by the insulation performance.

Solution:

SLENTEX® allows for reduced thickness of the insulation and thermal decoupling of brackets from the wall, improving the U-value by 50-70%. This results in more valuable interior space as well as an A2-s1 d0 complying facade system.

SLENTITE®

The First PU Aerogel Panel



-
- λ 18 mW/m·K (@10°C, EN 12667)
 - Robust, dust-free PU aerogel panel of 15 mm tks
 - Hydrophobic, but water vapor diffusive ($\mu = 8$)
 - High compressive strength (density ~ 120 kg/m³)
 - Easy handling and processing with standard tools
 - Excellent adhesion properties and compatibility
 - Production on pilot scale
-

SLENTITE®

Key Value Propositions



Low thermal conductivity for a lasting slim insulation: **18 mW/m*K**



Clean, robust board for easy handling, application and integration.



Built-in moisture regulation.



Customized Climate Management.

SLENTITE®

The robust and dust-free panel



High compressive strength of >300 kPa:
100% improvement compared to standard PU
insulation boards.



Dust-free handling and simple
customization.

Machining, sawing, drilling can
be done on site.

SLENTITE®

Adhesion Properties and Integration into Systems



Excellent adhesion properties and compatibility to various inorganic and organic substrates and materials.



Can be glued, laminated, combined or sandwiched with textiles, fabrics, meshes, films, foils, paints, coatings or other materials.

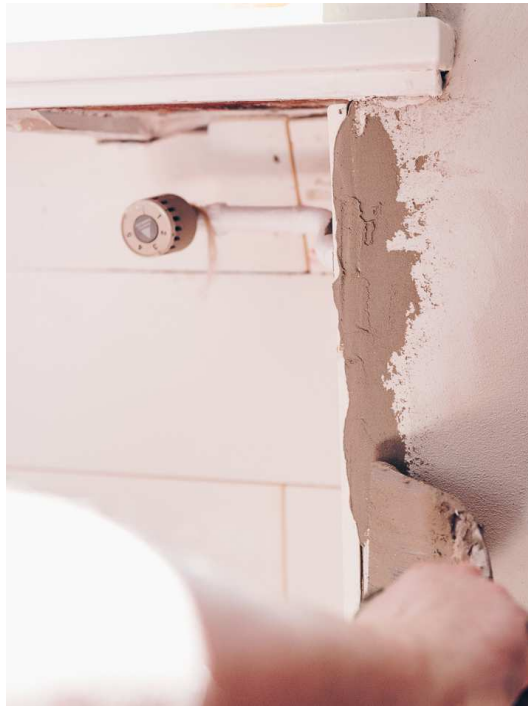
SLENTITE®

Interior Wall Insulation



SLENTITE®

Interior Wall Insulation



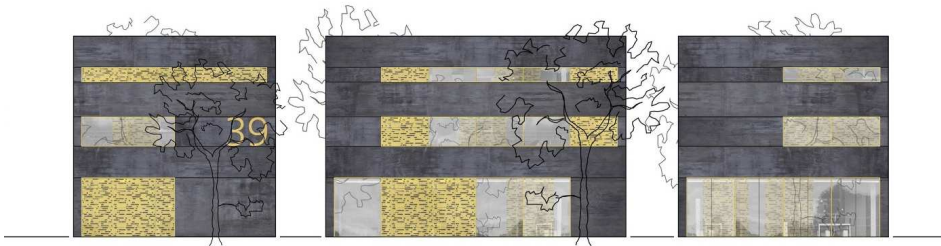
SLENTITE®

Interior Wall Insulation

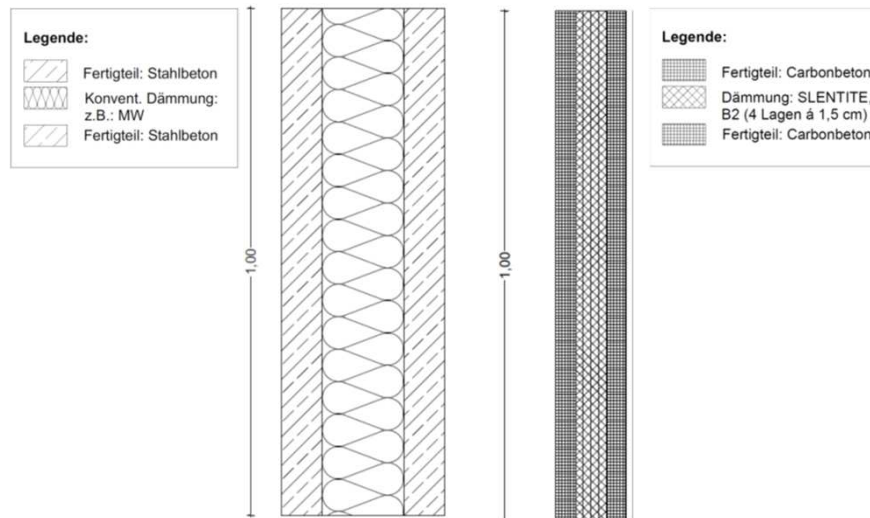


SLENTITE®

Carbon Concrete Composite Elements



Facades west/south/east of town house



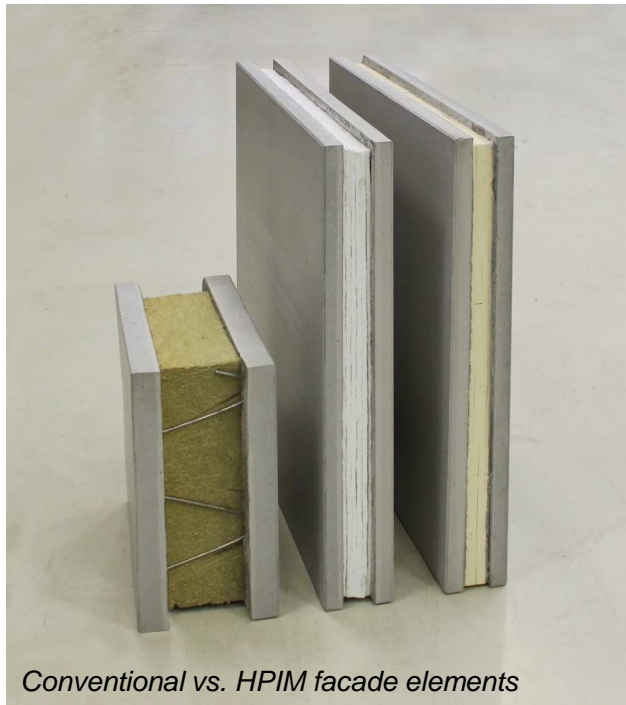
Town house
Reduction of grey energy of building elements and impervious surface

Exemplary wall area in town house

Only 5 % of building area (BGF) will be sealed. In conventional construction it would be up to 10 %. In total 5 % earning of building area in a free-standing house.

SLENTITE® and SLENTEX®

Carbon Concrete Composite Elements



Town house

Reduction of grey energy of building elements
and impervious surface

Exemplary wall area in town house

Comparison of conventional non-structural facade
made of reinforced concrete with different insulation
materials:

- mineral wool (left)
- SLENTEX (middle) and
- SLENTITE (right)

Thermal properties as well as moisture behaviour
are similar.

SLENTITE® and SLENTEX®

High Performance Thermal Insulation by BASF

Pre-marketing



SLENTITE®

Commercially available



SLENTEX®



We create chemistry