

Benefit of Silica technology in building application on the example of CALOSTAT®

International converence of thermal Performance of the exterior Envelopes of Whole Building XIII
December 04, 2016 | Dr.-Ing. Gabriele Gärtner

CALOSTAT® material data



Thermal conductivity
 $\lambda = 19 \text{ mW}/(\text{m K})$

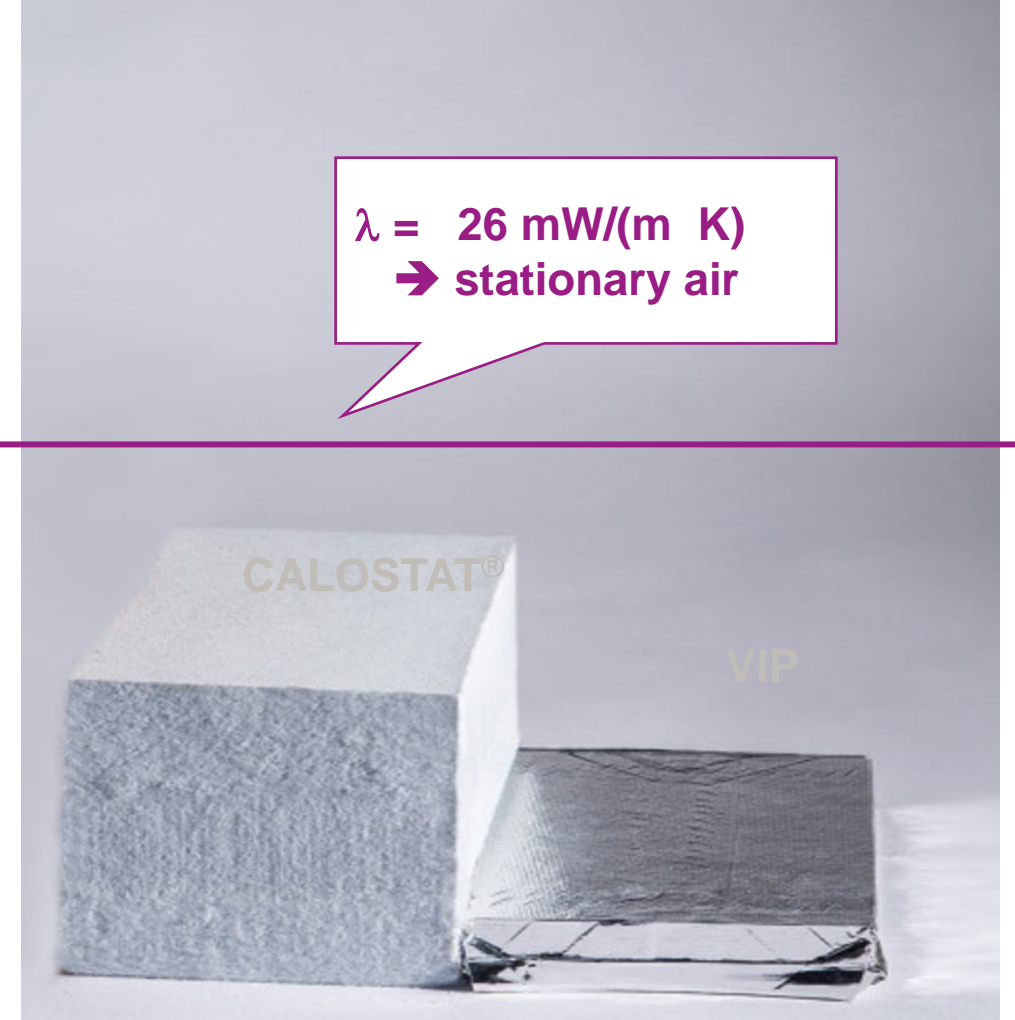
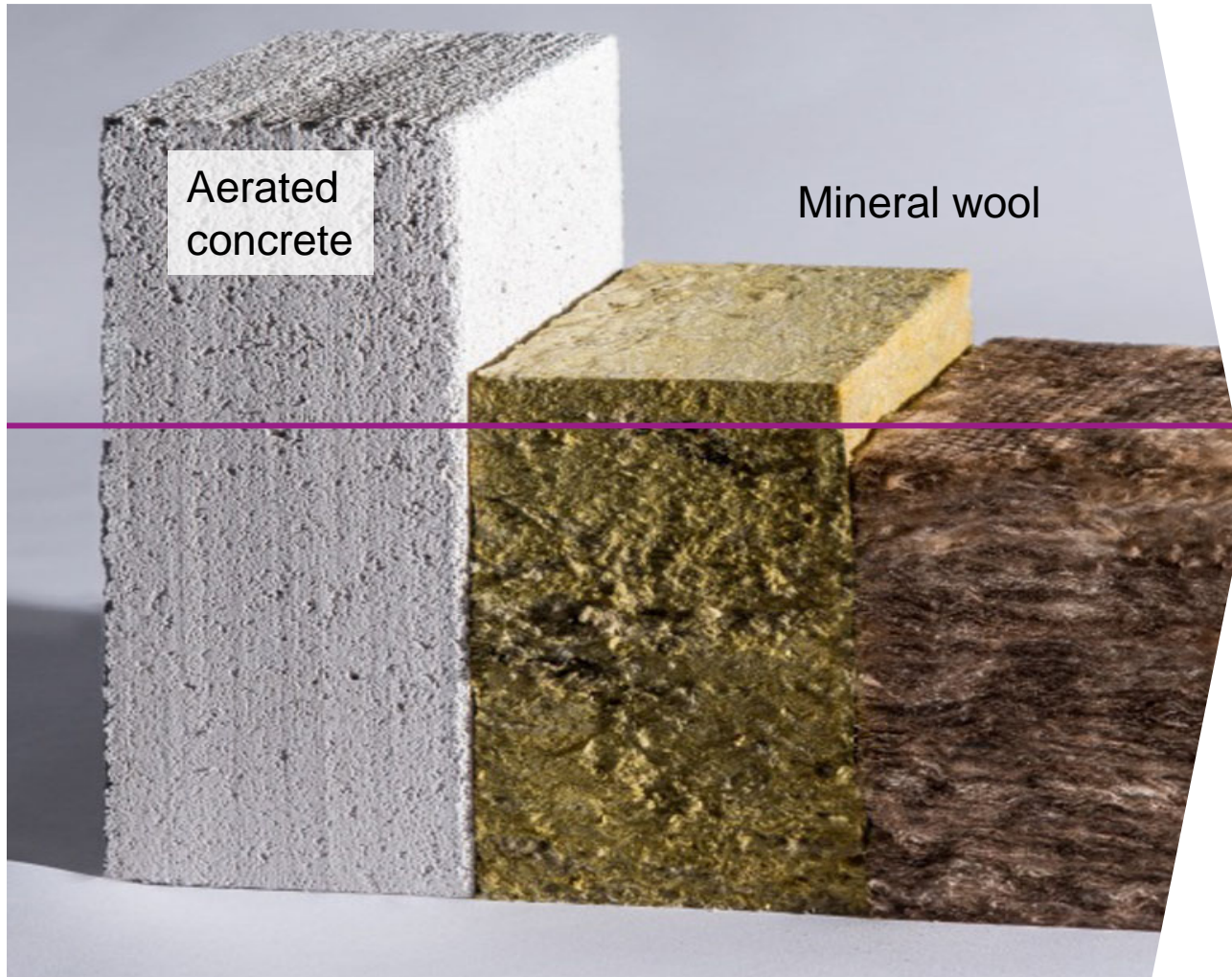
Water conductivity
 $A_w = 0 \%$

Open for water vapor
diffusion
 $\mu = 6$

Classified in
construction material
class **A2-s1 d0**
(non- flammable)



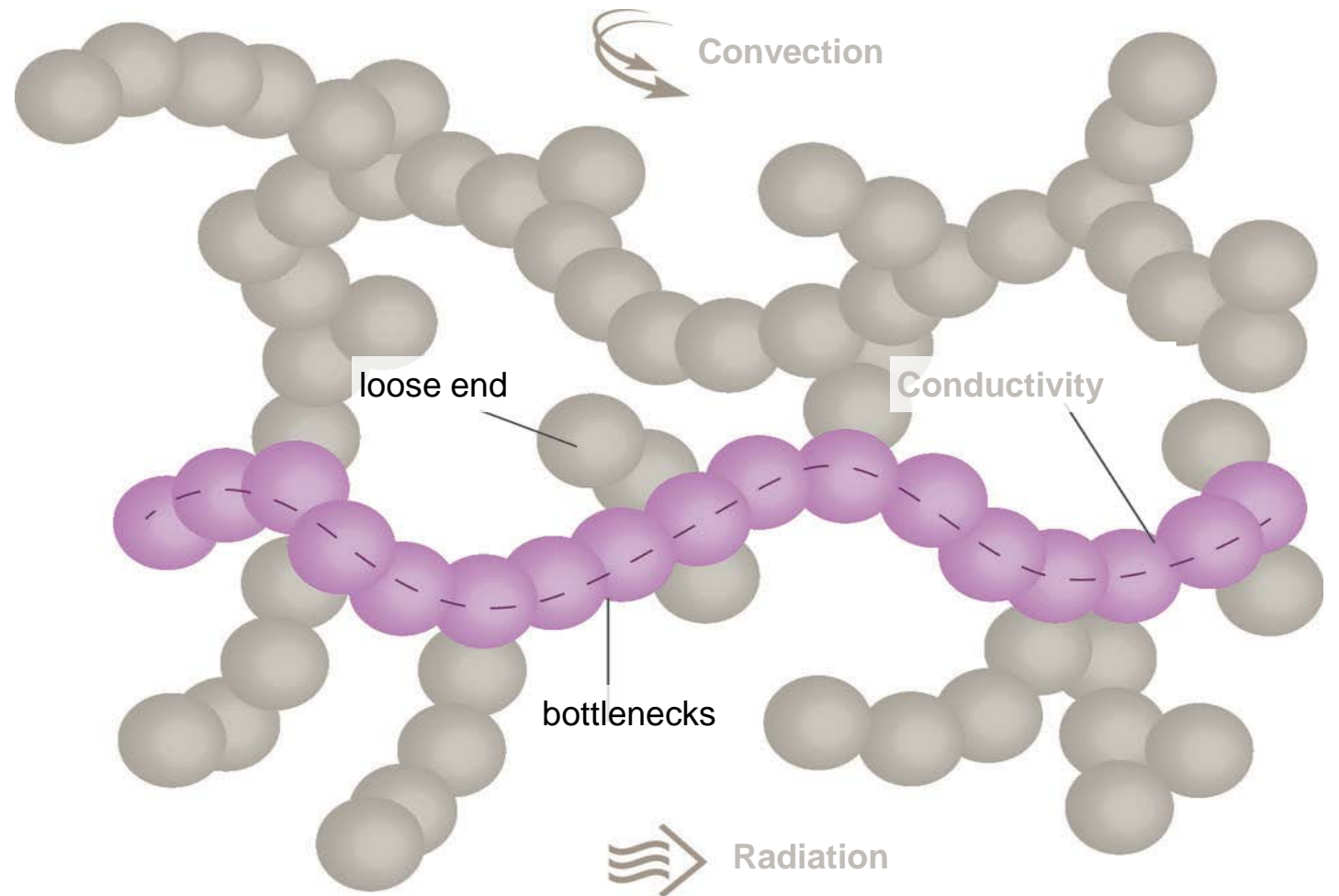
Superinsulation



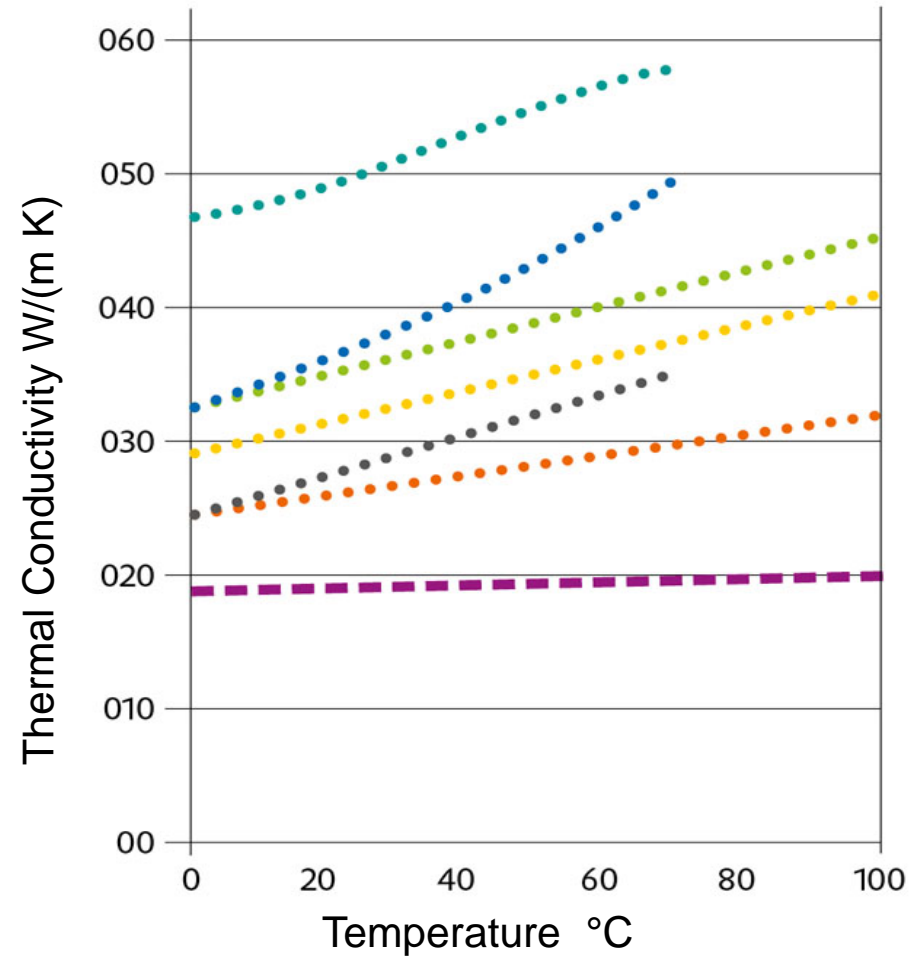
Three mechanisms of heat transportation

1. Benefits of CALOSTAT[®] structure:

- Small pores → low convection
- Bottle necks → low conductivity
- Grey colour → Good IR absorption

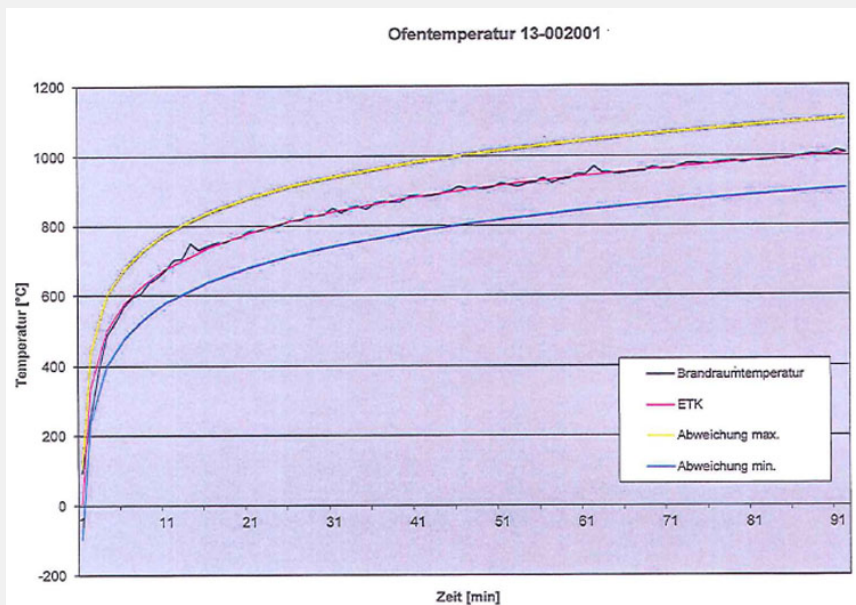


Three mechanisms of heat transportation



- CALOSTAT®
- Air
- PUR
- Glass wool
- Mineral wool
- XPS
- Perlite

CALOSTAT® provides good fire resistance rating



		Temperaturerhöhung 0104 ESG-H				
Minuten	Raumtemp	Messstelle 2	Messstelle 3	Messstelle 4	Messstelle 5	Messstelle 6
0	15,3	0	0	0	0	0
1	15,3	0	0	0,1	0	0
2	15,3	0,1	0	0,1	0,1	0,1
2	15,3	0,1	0	0,1	0,1	0,1
3	15,4	0,1	0	0,1	0,1	0,1
88	16,4	12,6	25,8	26,8	21,9	22,4
88	16,4	12,8	25,7	26,9	21,9	22,5
89	16,4	12,9	25,7	27	22	22,5
90	16,4	13	25,7	27,2	22,1	22,5
91	16,4	13,1	25,7	27,4	22,1	22,6



Small temperature rise
of 13,1 °C

Maximum temperature
rise near the frame
of 27,4 °C

Proofed by:



Source: FKN HOLDING GmbH & Co. KG

Hydrophobic superinsulation CALOSTAT®



Fire barrier



Source: TU Dresden, Lehrstuhl für Tragwerksplanung

CALOSTAT® System example for: cellar and underground car park ceiling

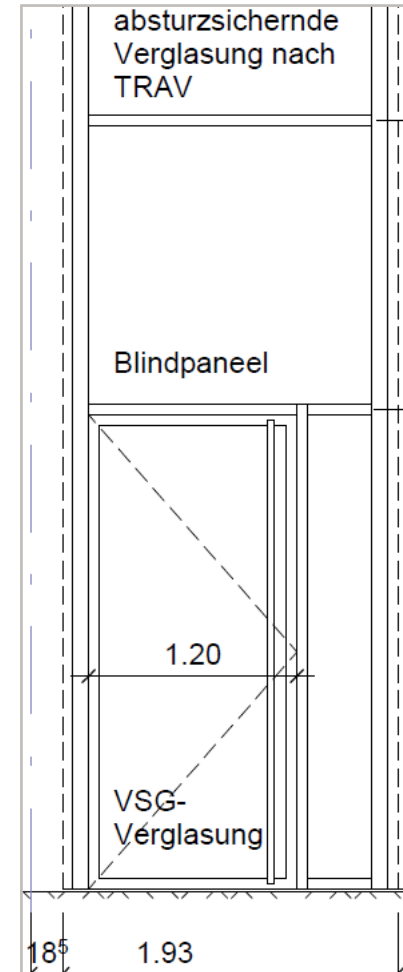
- **Project:** Building ensemble for residential use in Düsseldorf
 - **Problem:**
Limited space for refurbishment due to extinguishing water pipes
 - **Solution:**
40 mm CALOSTAT® attached to a perforated aluminum plate with U-Value of 0,4 W/m² K



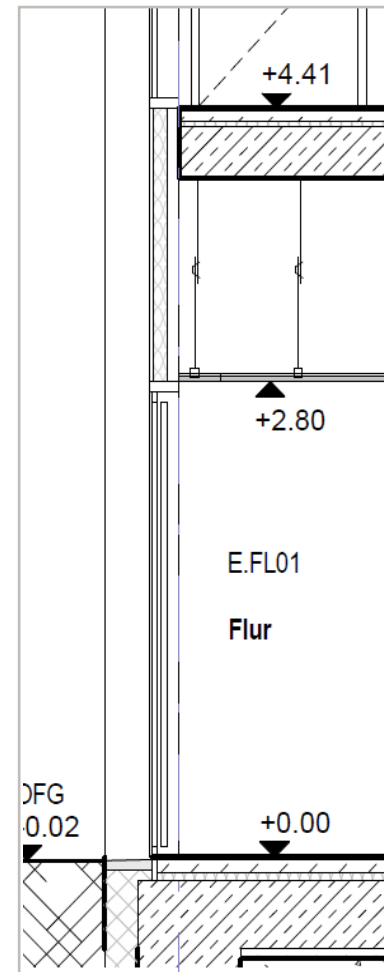
R&D Building Rheinfelden



Front view



Opening view



Renovation of an office building: FrymaKoruma in Rheinfelden, Switzerland

- Brief profile of the building
- The volume of the building is 4.200 m³ including:
 - offices for about 35 employees
 - one IT server room
 - four conference rooms
 - production of 200 vacuum processing and milling machines per year.



Summary of the FrymaKoruma refurbishment

▪ Energy and Environmental Savings:

- Energy use before renovation: 333'000 kWh/a.
- Calculated energy savings after renovation: 200'000 kWh/a

– Calculated improvement:

- Window: 62'710 kWh/a
12,6 t CO₂/a
- Opaque façade: 143'201 kWh/a
28,9 t CO₂/a



FrymaKoruma refurbishment ETICS



- Insulation: 72 mm Multisan CT panel insulated with CALOSTAT® and vacuum insulation panel (VIP);
- decorative facade: blue PLEXIGLAS® Mineral
- Facade U-value <math><0.18 \text{ W}/(\text{m}^2 \text{ K})</math>



EVONIK

POWER TO CREATE