Fraunhofer Institut Bauphysik

Mold Growth Prediction by Computational Simulation

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Problems caused by mould fungi

Mould growth on inner surfaces

Problems

- health risks
- financial risks (in Germany 200 Mio € / p. year)

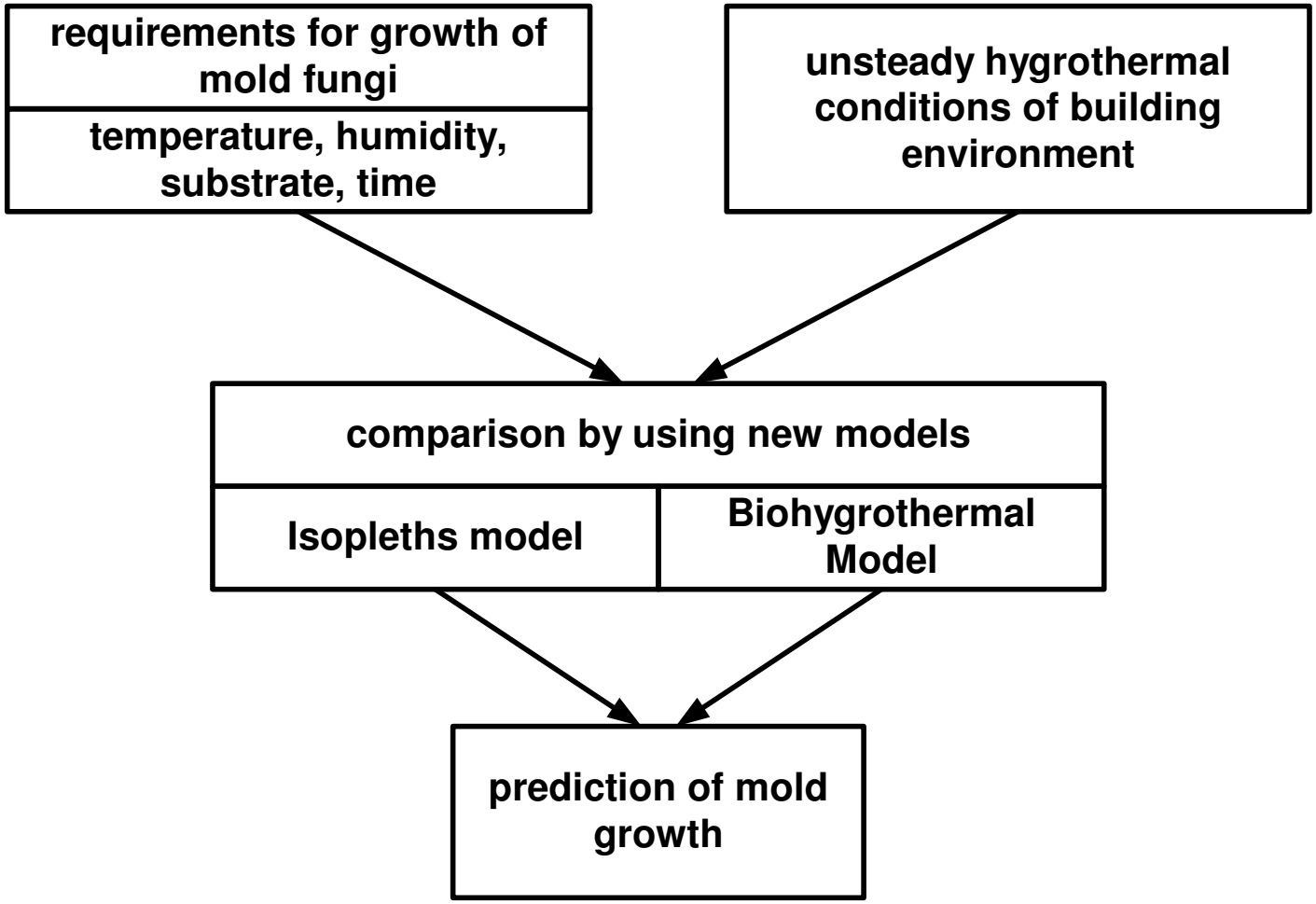
Aims

- Planning tool for prevention of mould growth
- Consideration of transient boundary conditions

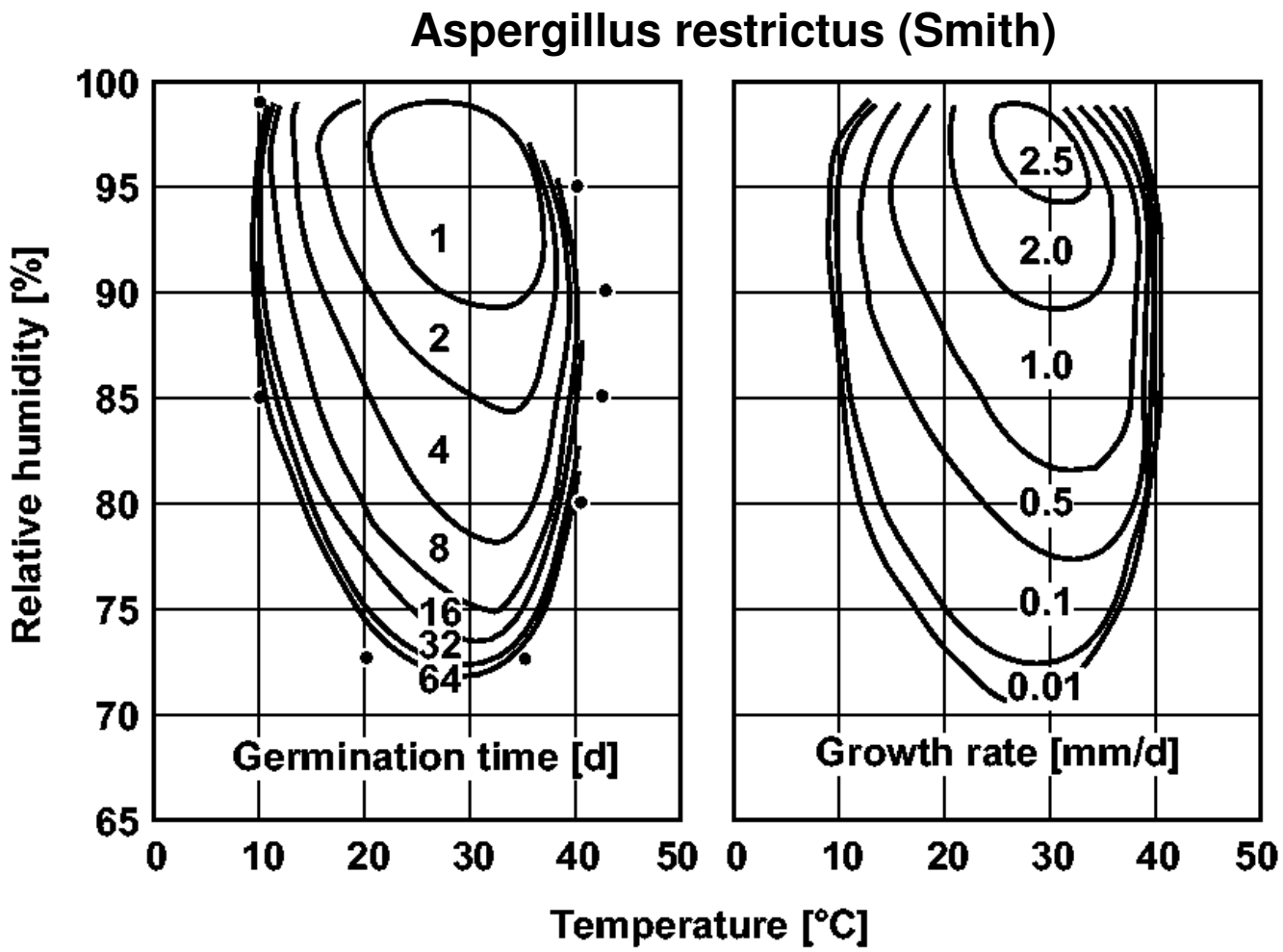
additional Requirements

- Consideration of all fungal species found on building surfaces
- Consideration of different substrate classes

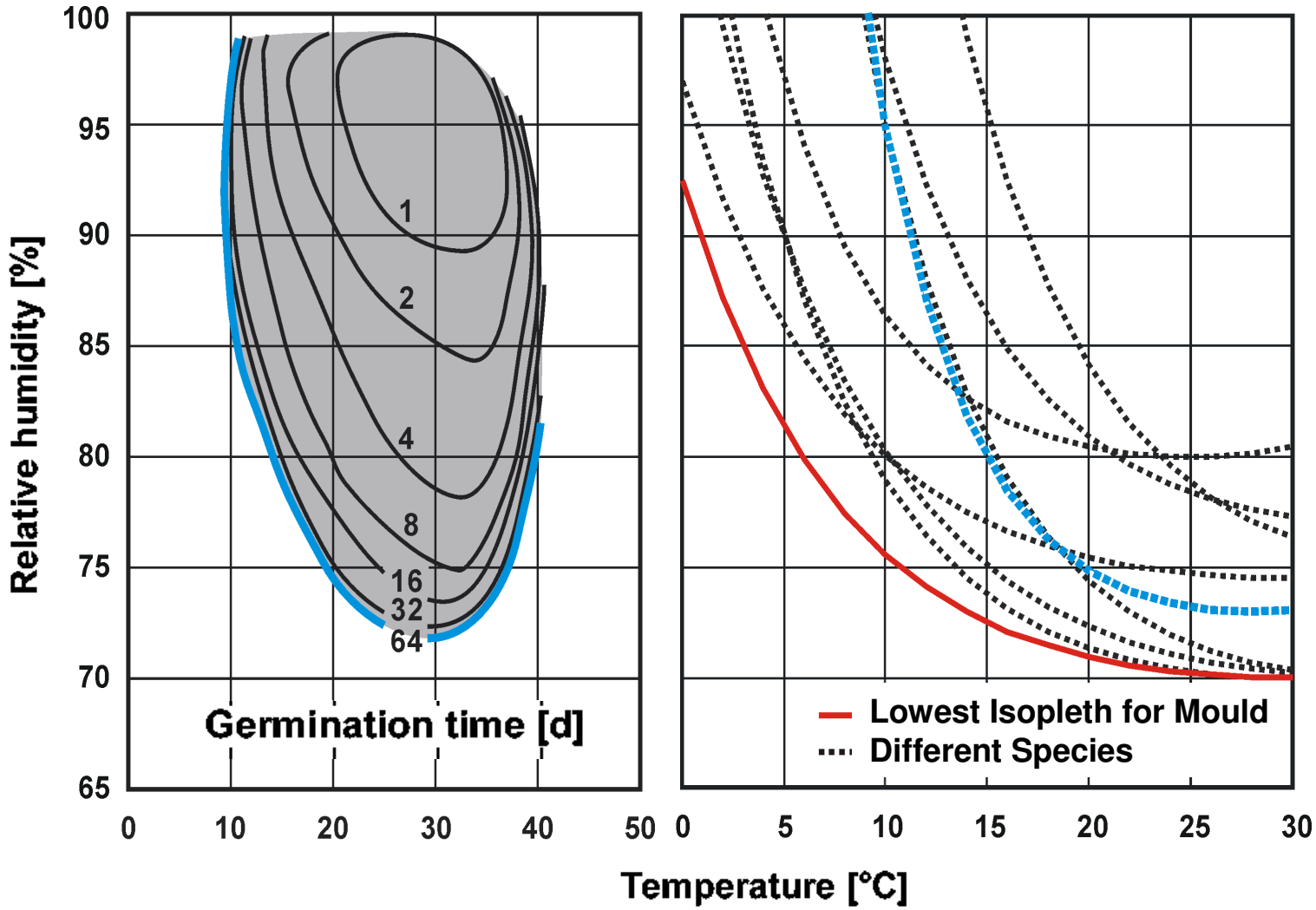
Methodicals



Isopleth systems



Development of the Lowest Isopleth for Mould (LIM)



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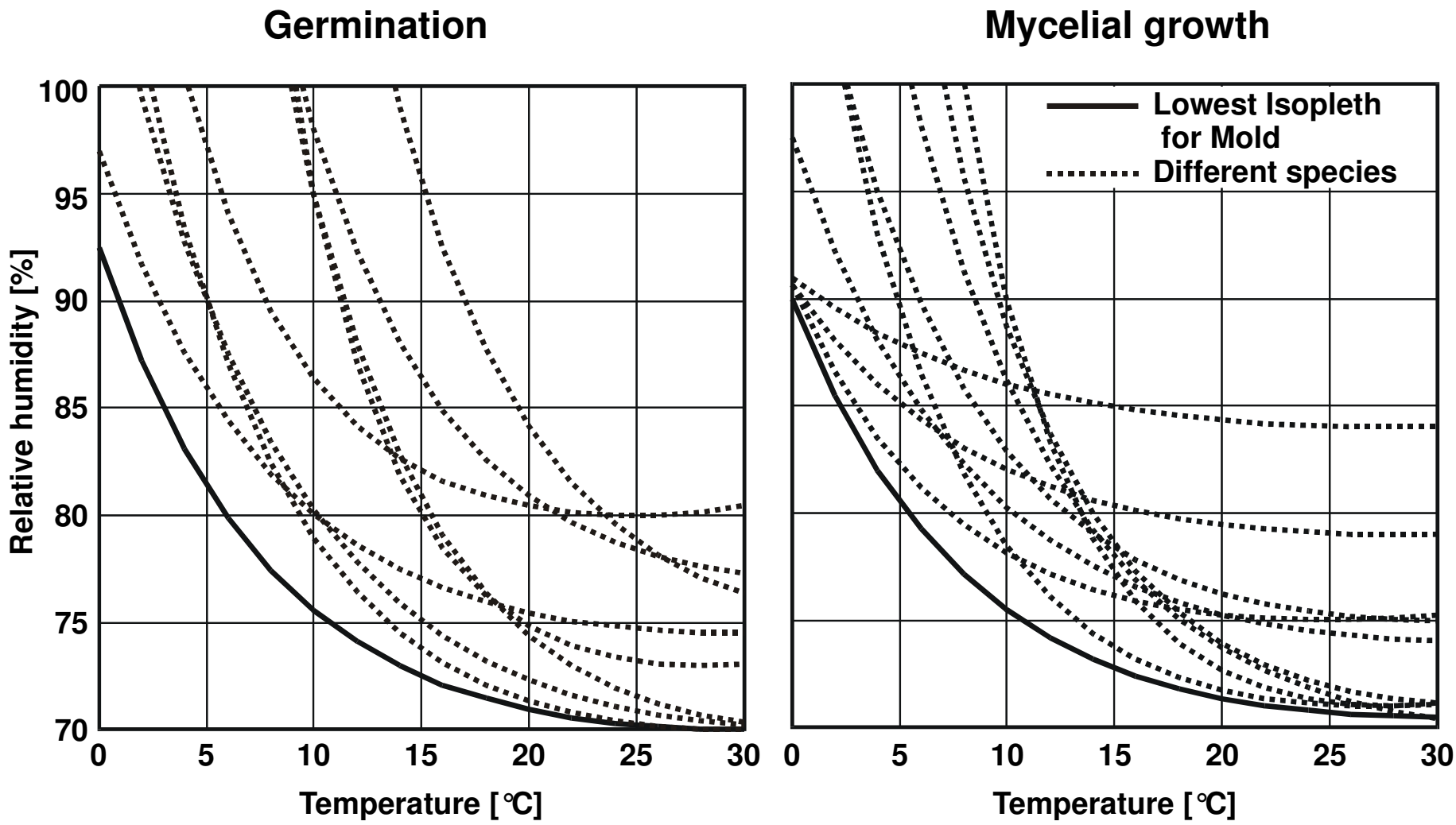
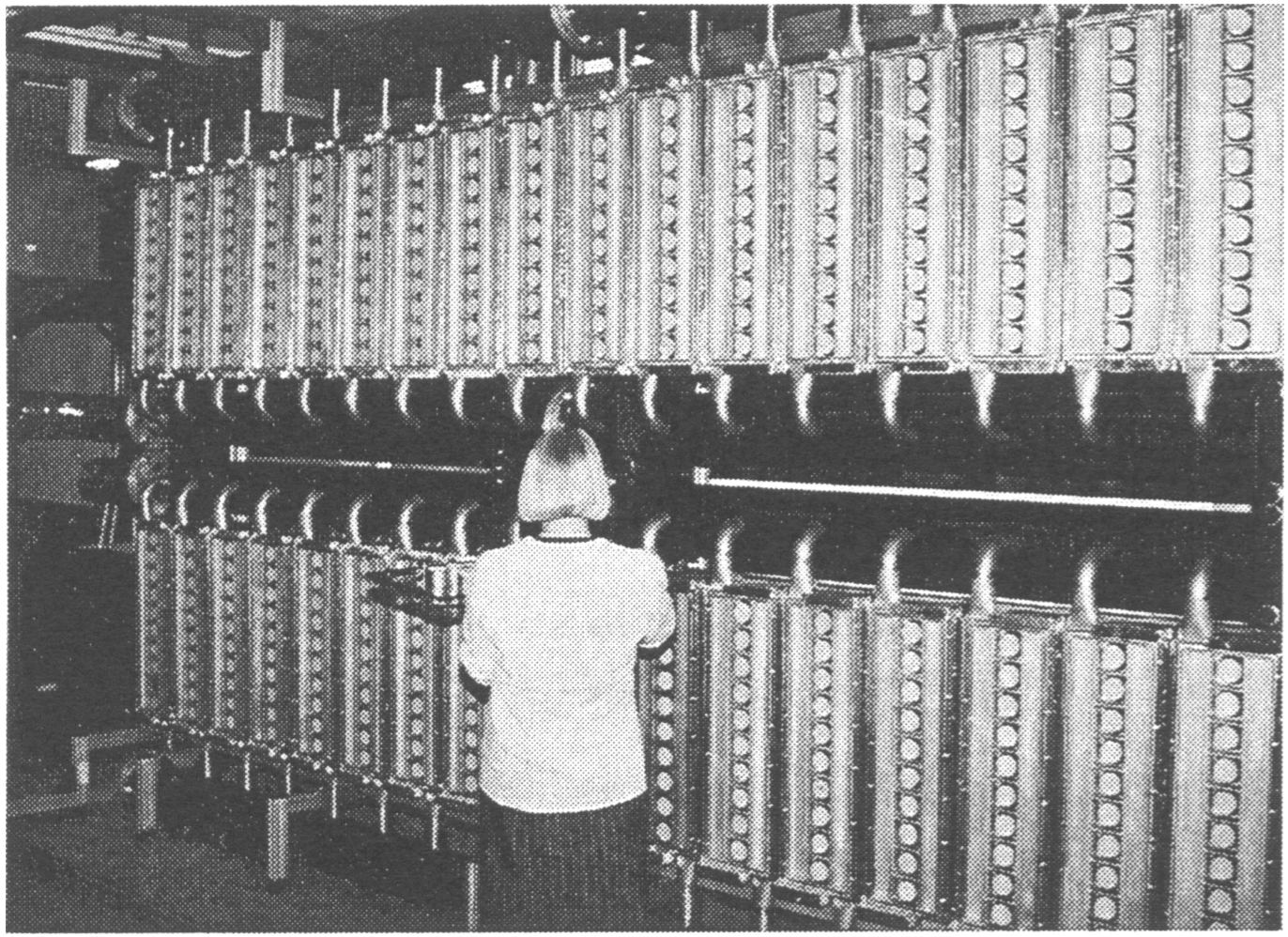
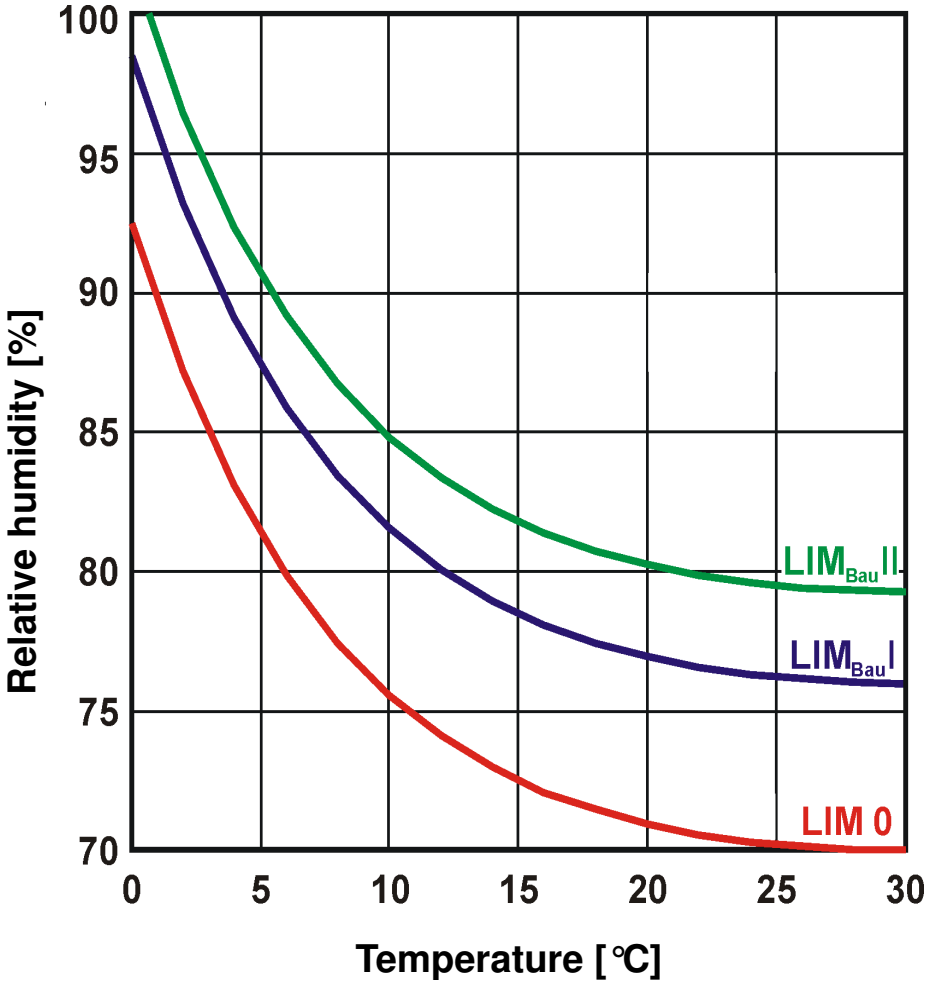


Test station for mould fungi



LIMs for different building products



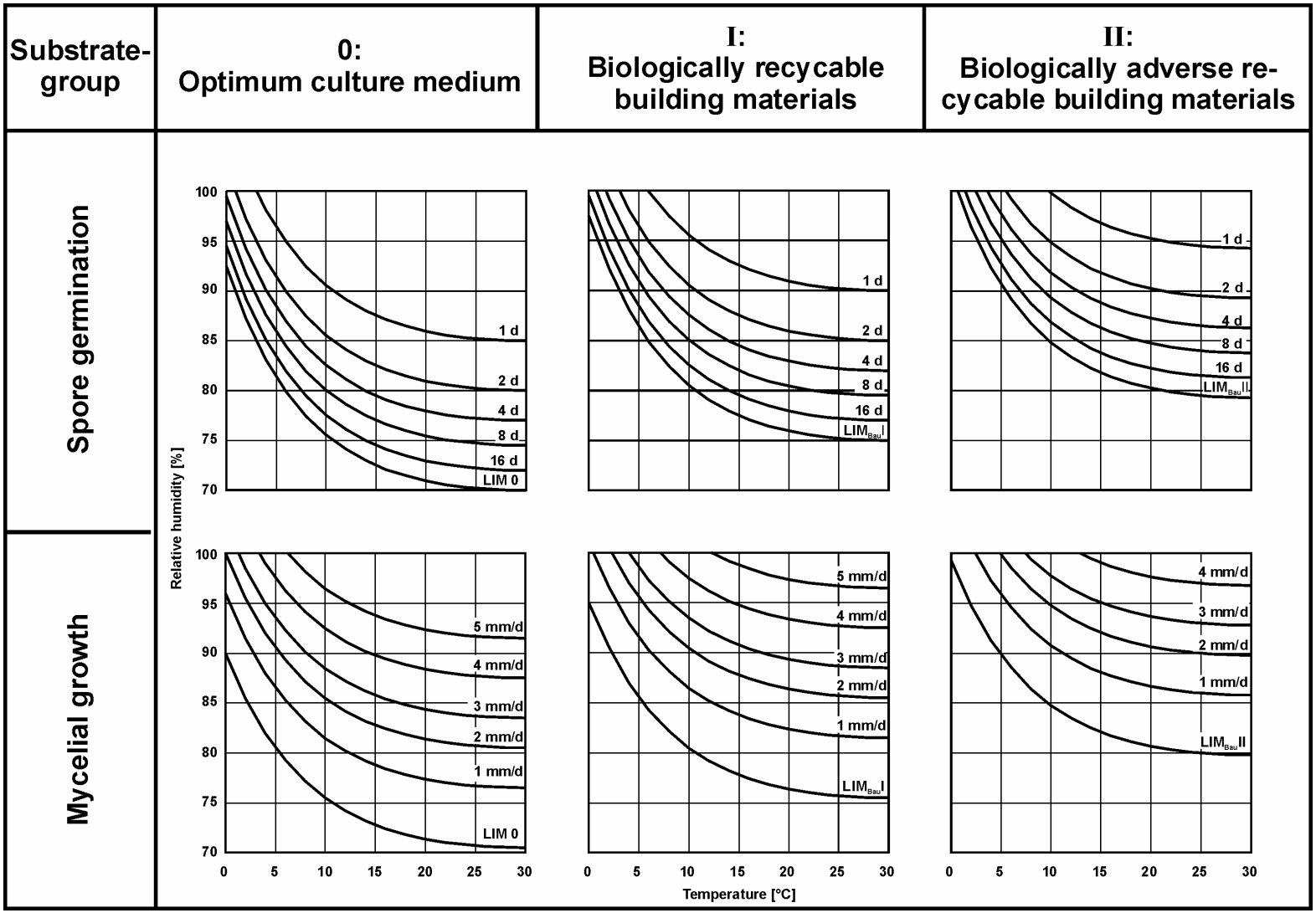
Substrate Groups

II biological adverse recycable materials

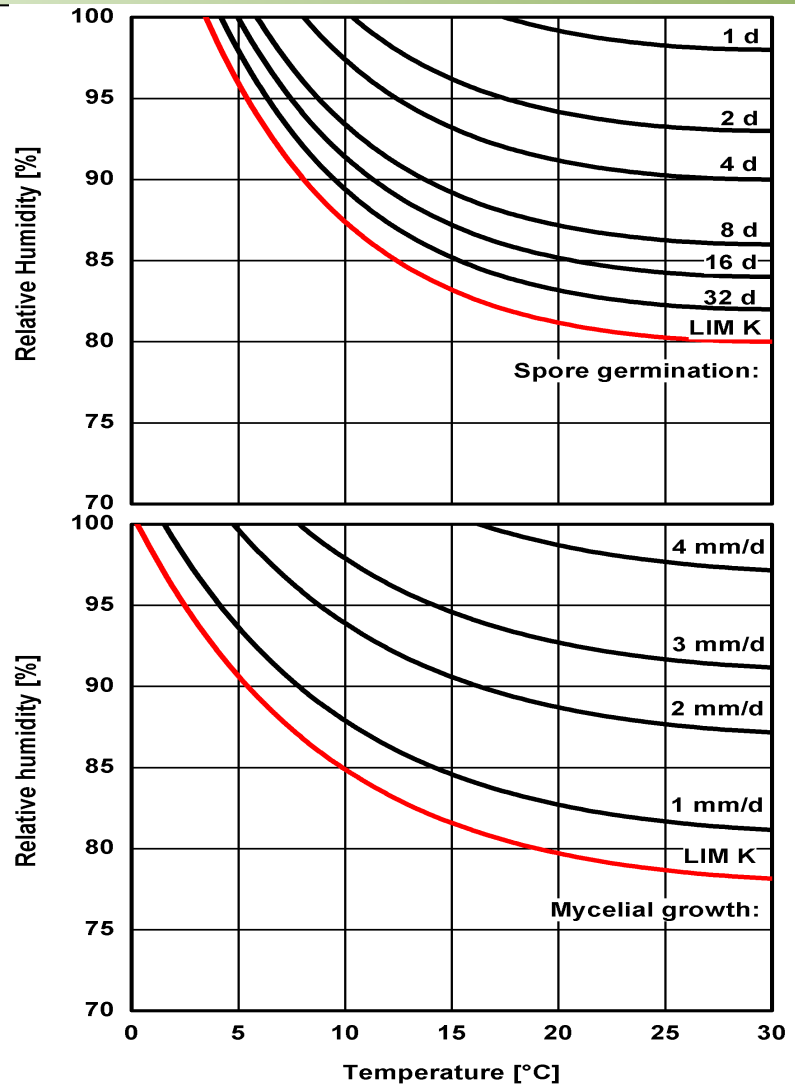
I biological recycable materials

0 optimum cultures medium

Isopleth systems for different building products



Isopleth system for the critical fungus species



Critical fungus species:

Aspergillus fumigatus

Aspergillus flavus

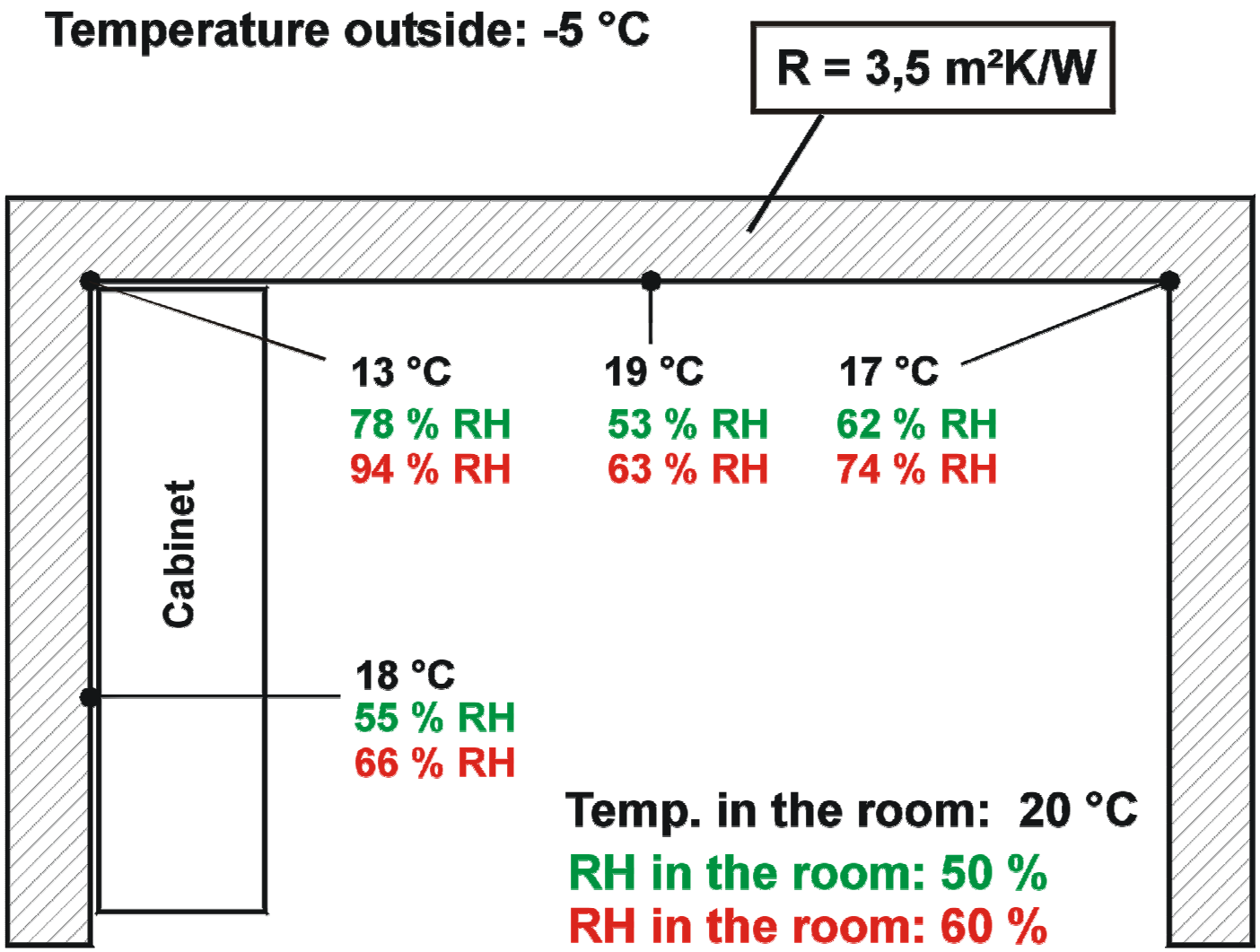
Stachybotrys chartarum

Humidity in Rooms

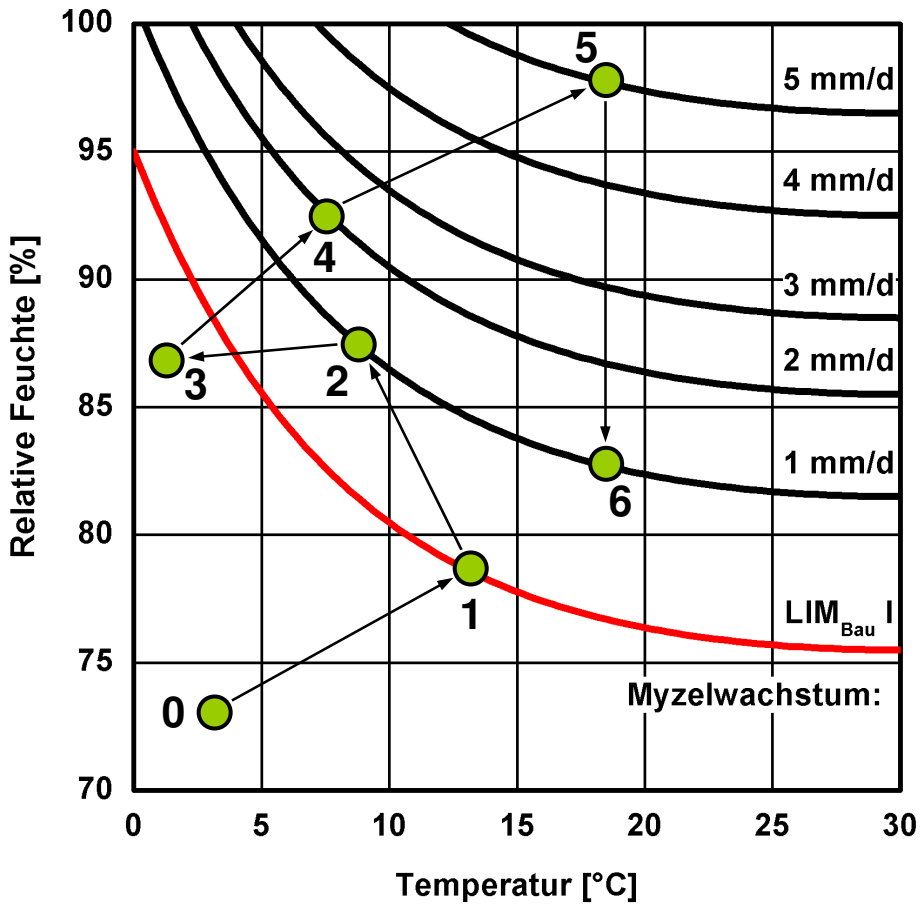
Source of humidity		Delivery of humidity per hour [g/h]
Flowers	Violets	2 - 10
	Rubber plant	5 - 20
Person, light activity		30
Total flat (100 m²)		500 - 1500 (min. 12 liters/day)

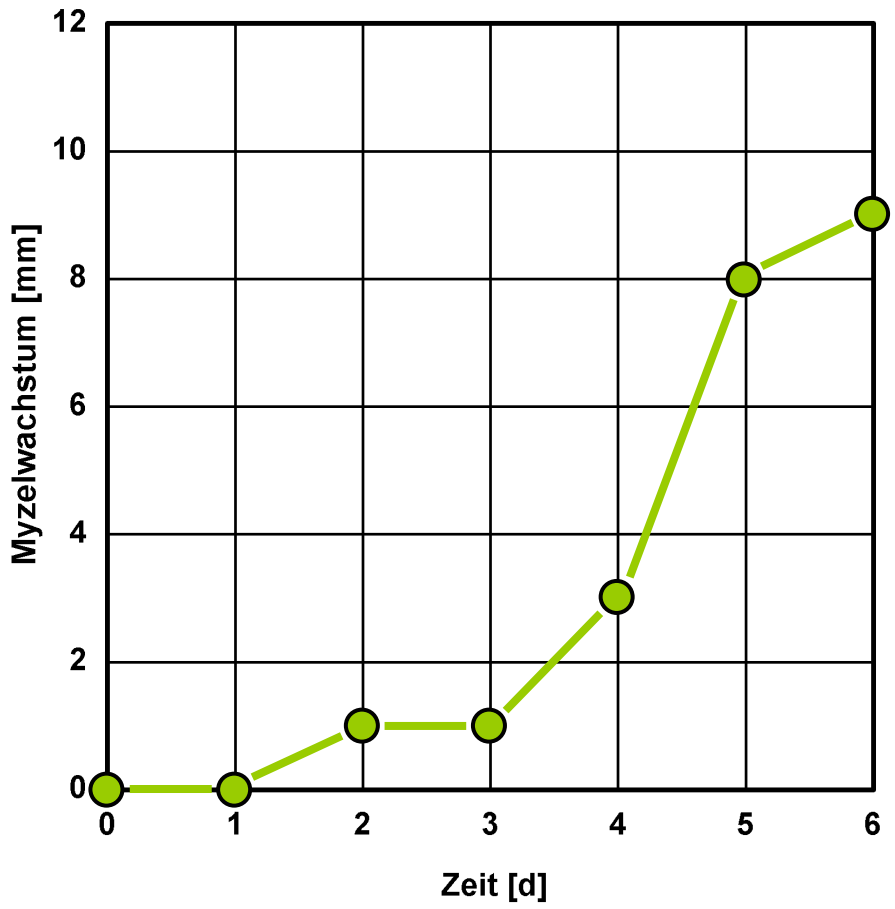
Ventilation by Windows?

Surface temperature on outer walls

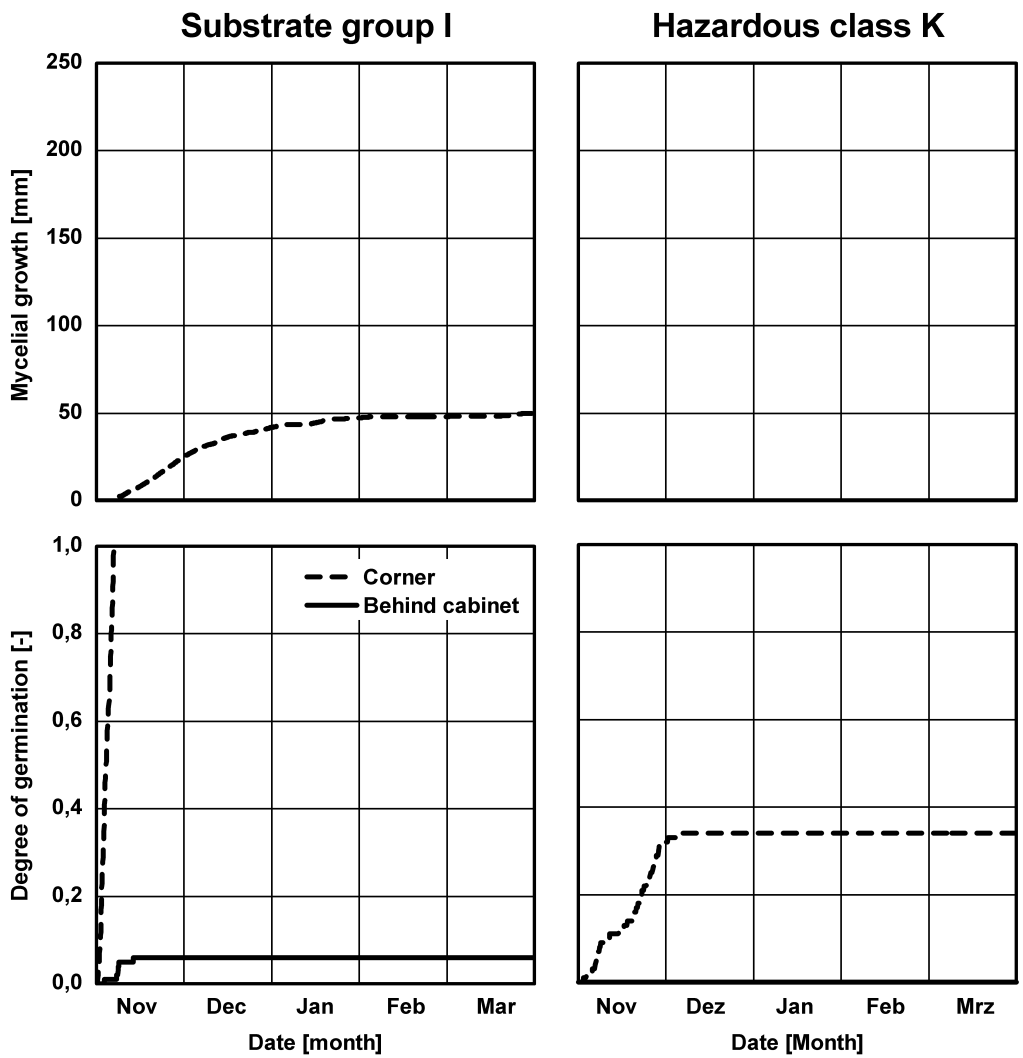


Use of the Isopleth System

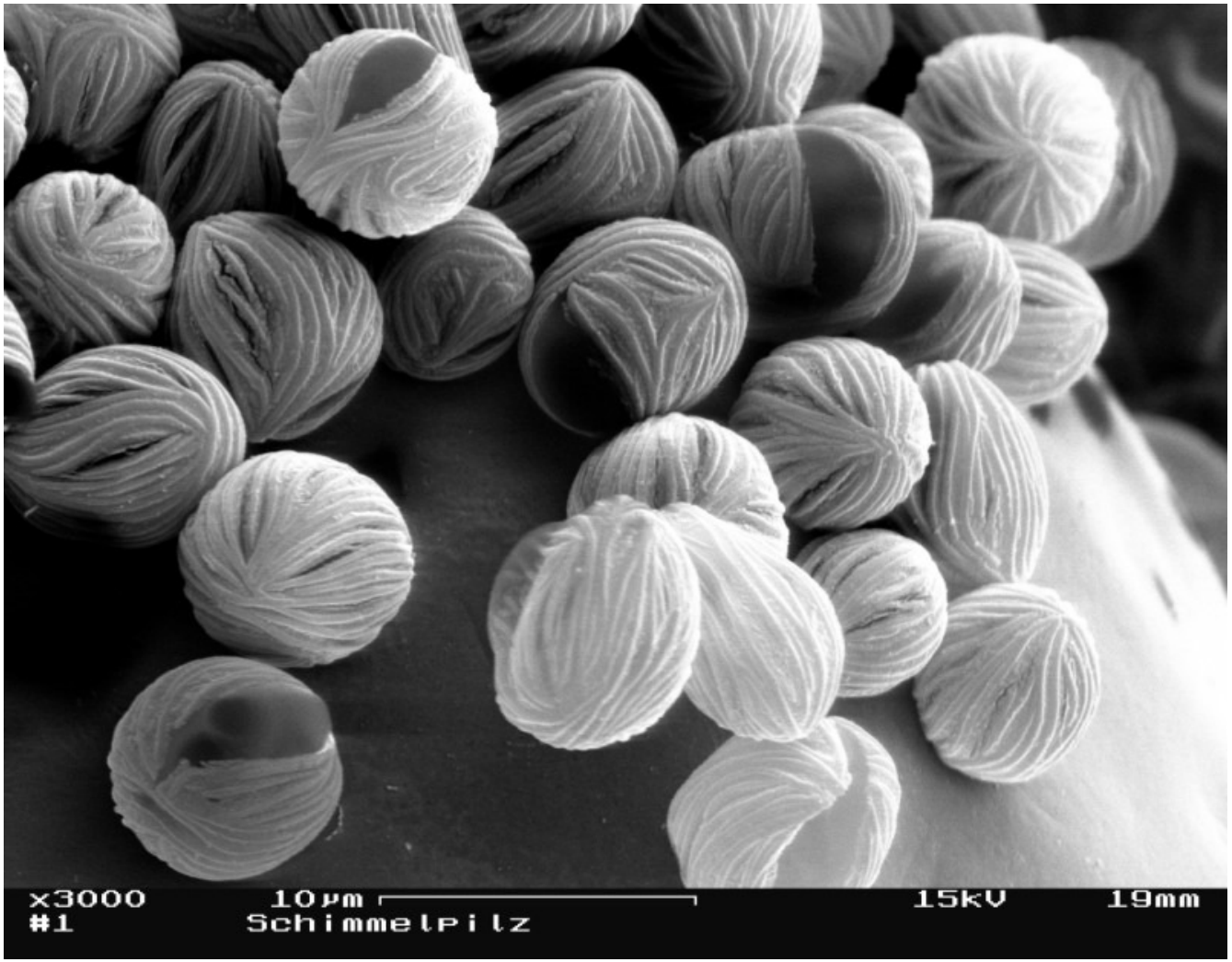




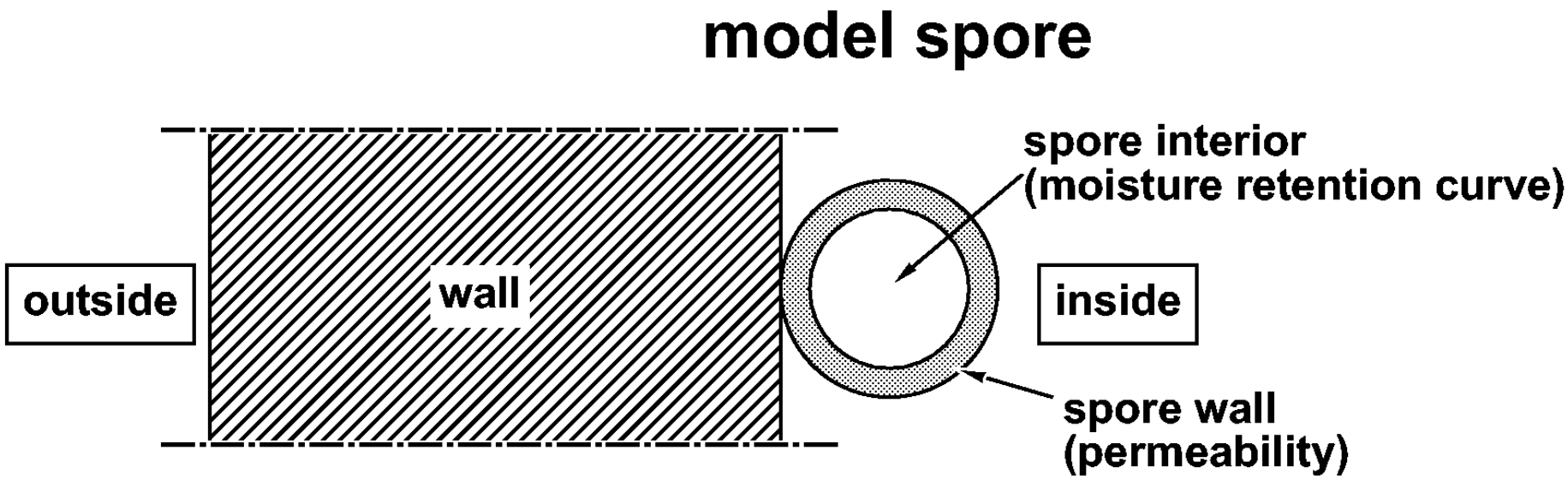
Germination and mycelial growth



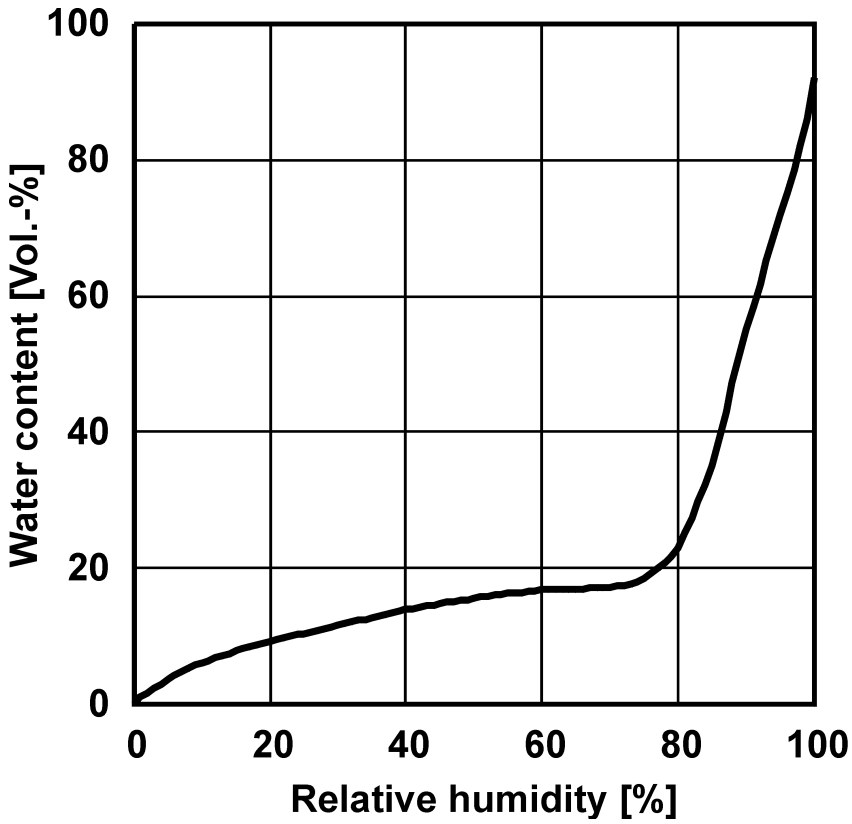
REM-Picture of Mould Spores

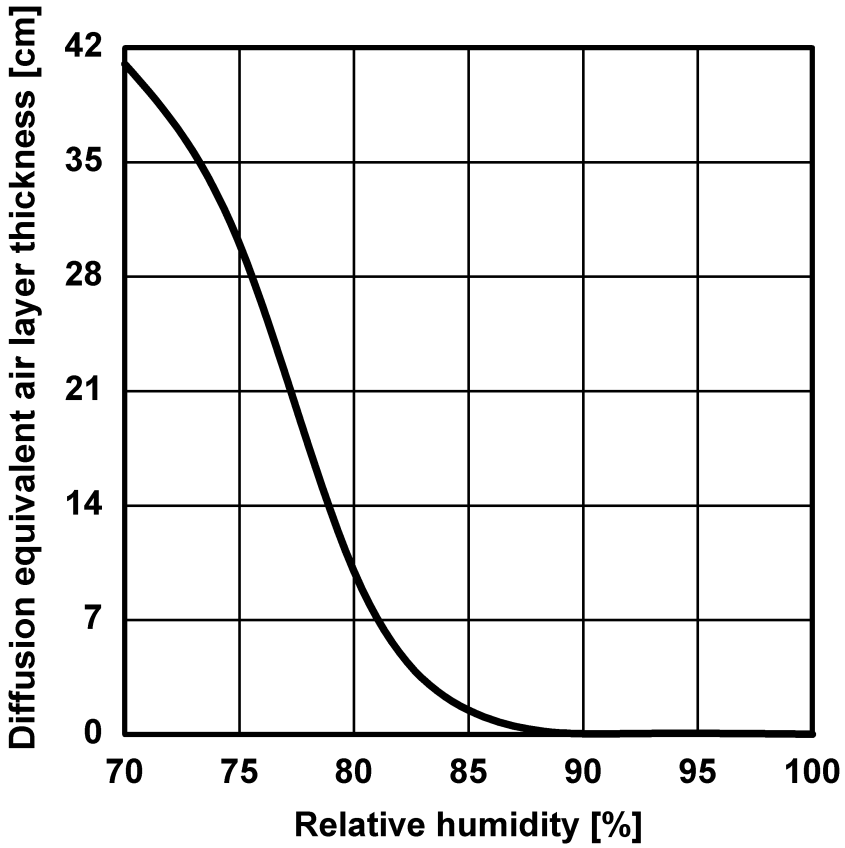


Biohygrothermal Model



Hygrothermal "material properties" of the model spore





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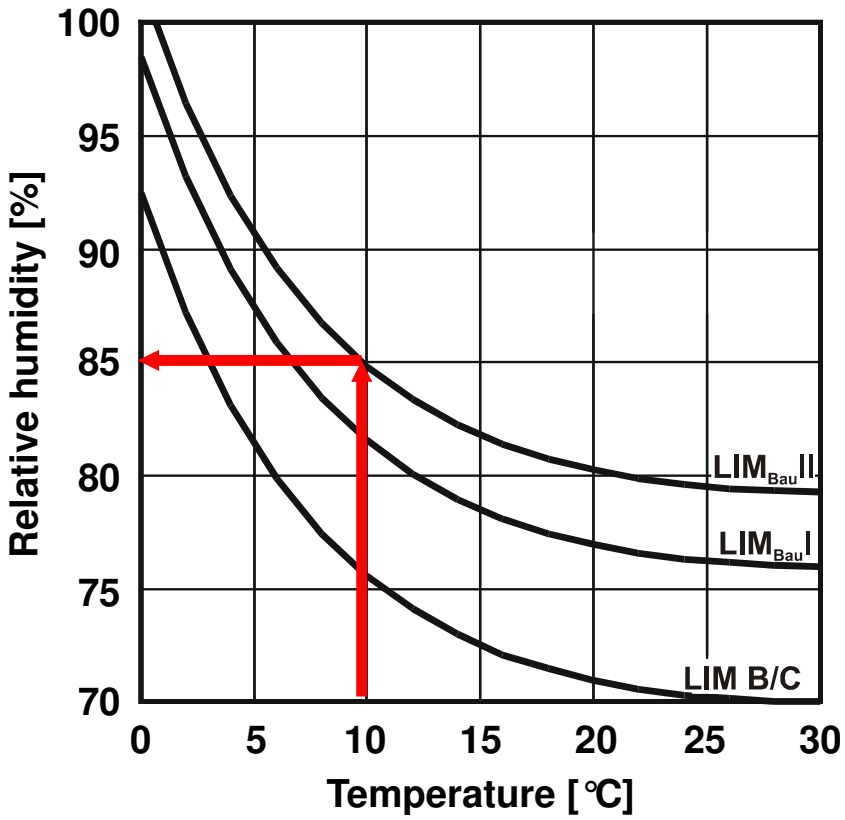
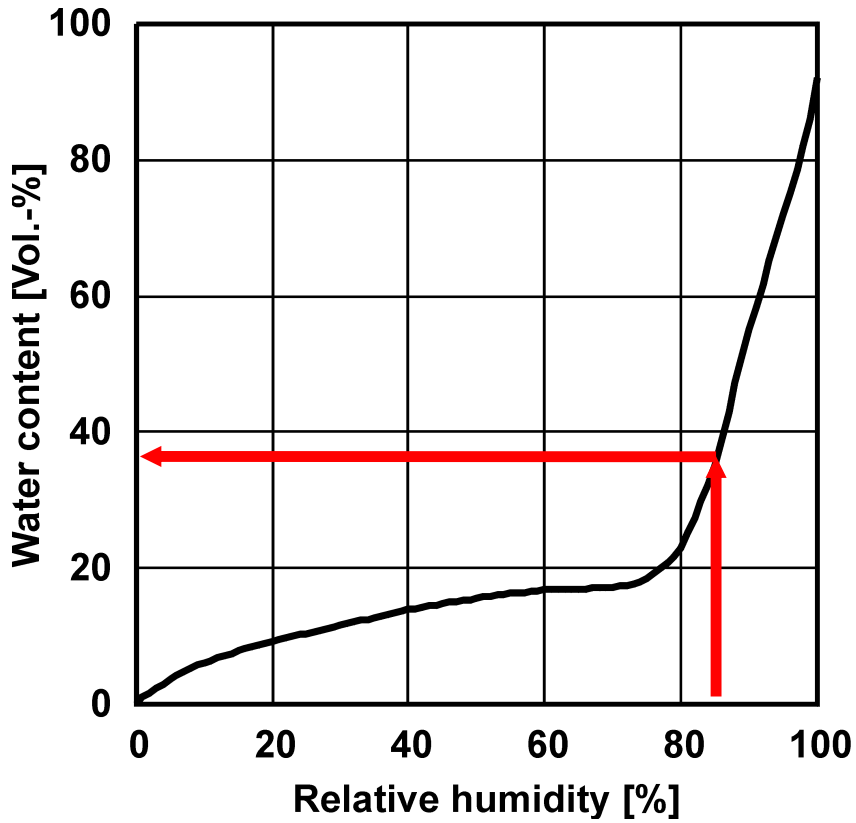


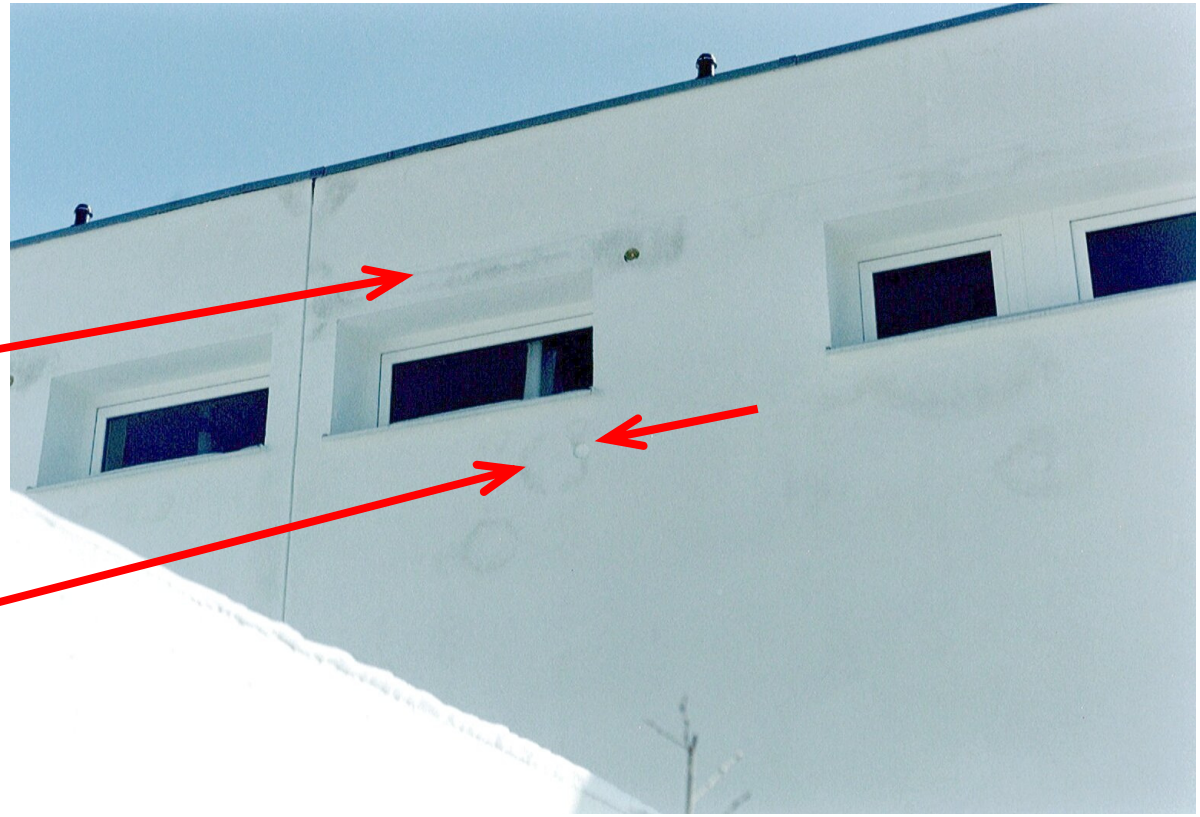


Example: new buildings with mould on outer surfaces

Mold in all 4 orientations

broad infestations at the lintels

circular infestations



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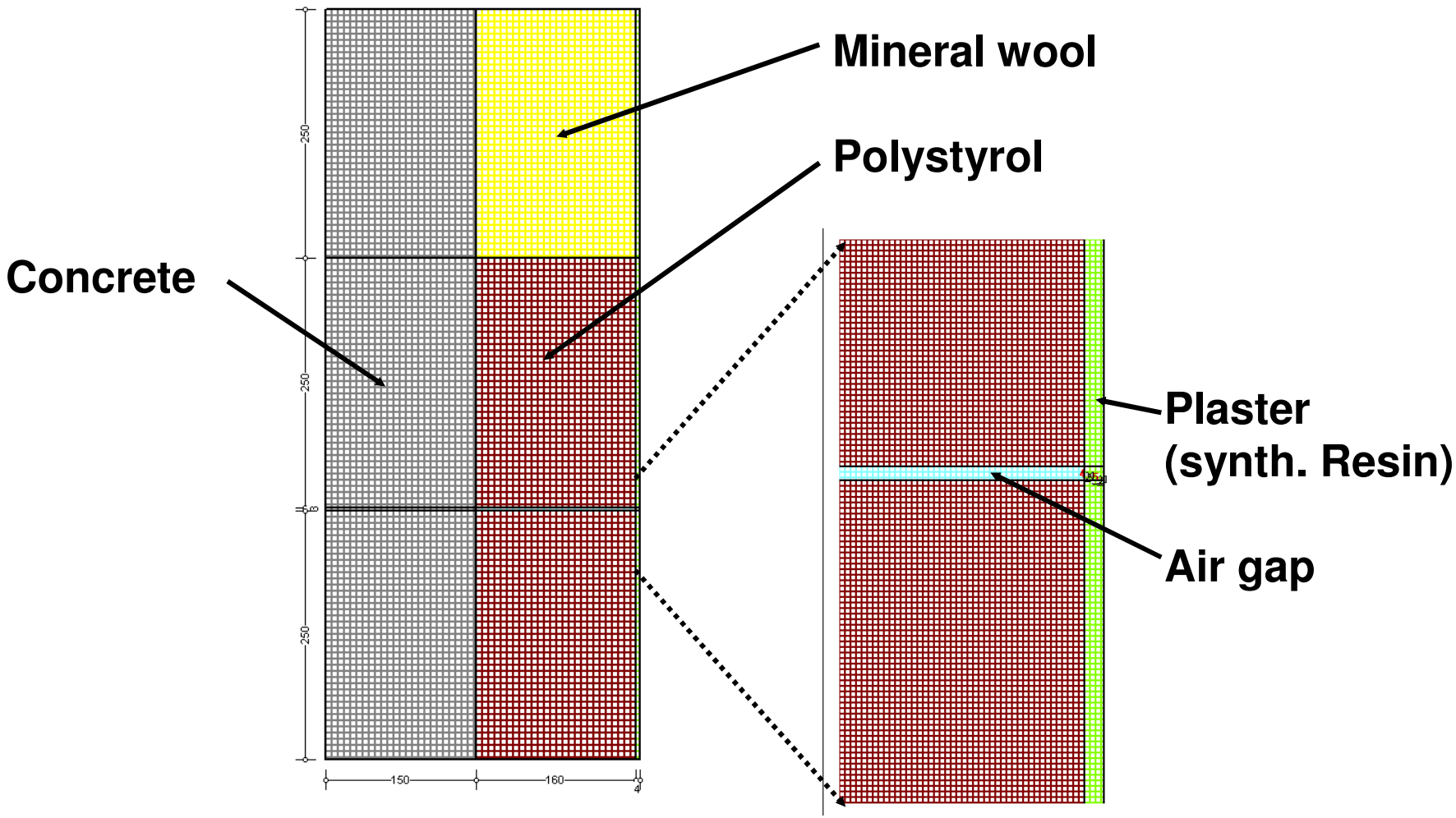

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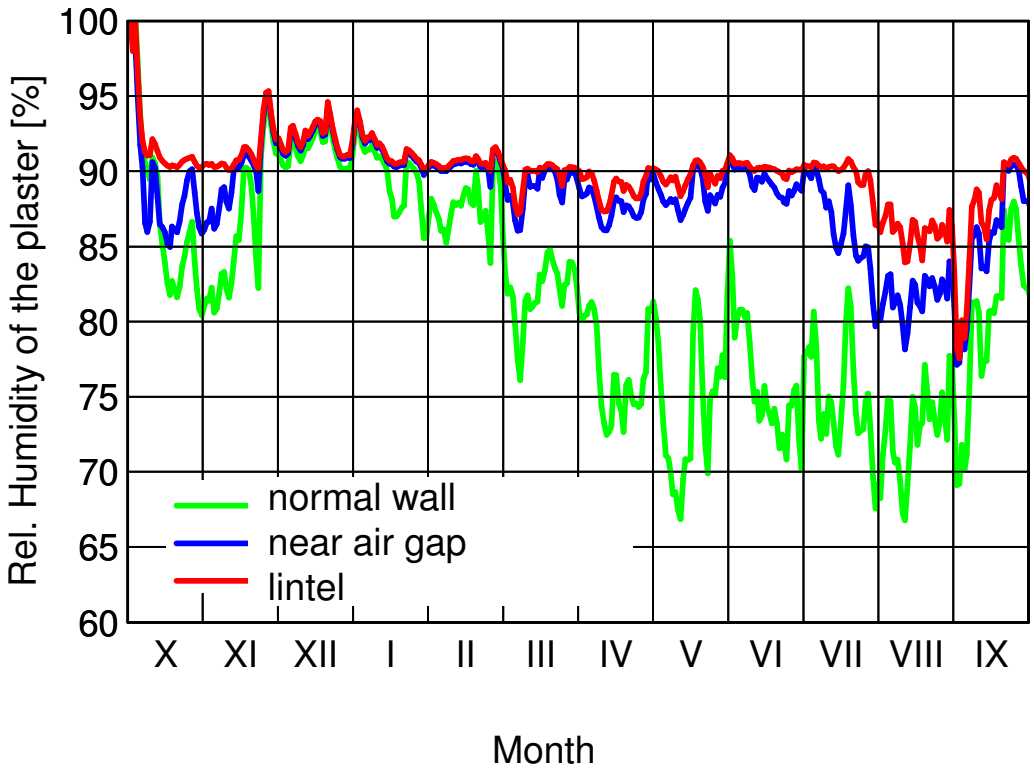

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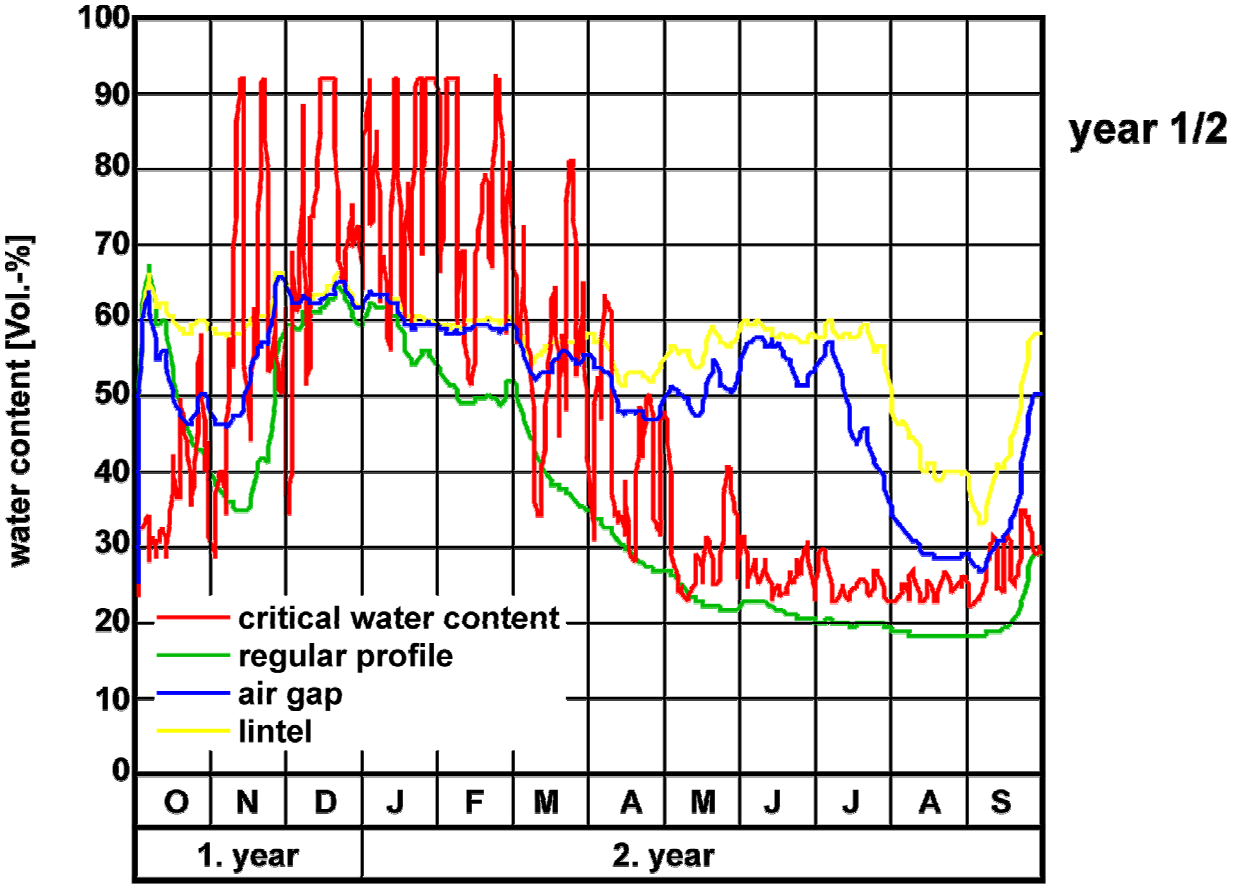

Summary

model for prediction of mold growth

- Isopleths model
- biohygrothermal system

innovations

- health risk classes
- substrate groups
- unsteady implementation

validation

good agreement

- with experiences
- with laboratory experiments
- with test field results

general characteristics

- usable as design tool for practitioners
- preventive aspects

Field test area in Holzkirchen, Germany