

Evaluation of an interior air barrier system with dynamic water vapour control

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2nd Industry Webinars – October 8th, 2013

Introduction

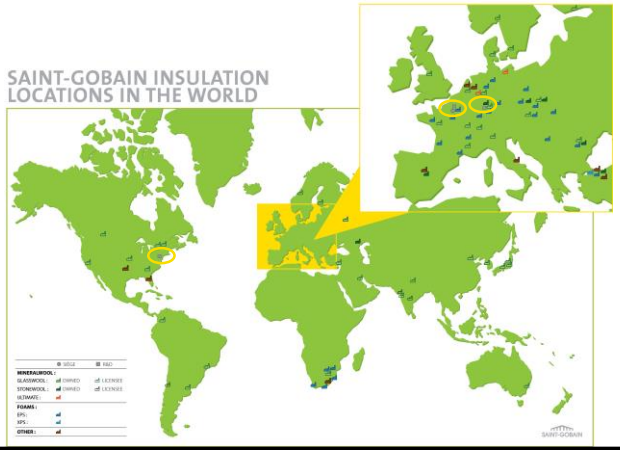
➤ **Saint-Gobain ISOVER and airtightness solutions**

- SG ISOVER, a producer of mineral wool?
- ISOVER presents itself as an expert of energy performance and comfort
- ISOVER solutions for airtightness and moisture control
  - Ex: Vario range
- ISOVER Vario: a complete system
  - Membrane
  - Tapes
  - Sealant
  - Special components
- **Necessity: product characterization**

ISOVER characterization facilities

➢ 3 Laboratories

- France, CRIR (near Paris; manager GP)
- Ladenburg, Germany
- Blue Bell, PA, USA



ISOVER characterization facilities

➢ Measurements in CRIR lab

- Metrology
  - Calibrations
  - Study of the influence of different parameters on the measured results
  - Link with standardization work
- Internal and external benchmarks
  - Comparisons of methods and results
  - Other SG labs for best practice exchanges
  - Reference institutes, suppliers…
- Characterization
  - ISOVER products
  - Competitors watch

ISOVER characterization facilities

- **Equipment in CRIR: 3 main types of tests**
  - Mechanical strength
    - Use of a traction machine
    - Membrane traction strength and nail tear strength
    - Shearing and peeling strength of adhesives
  - Airtightness
    - Airtightness system characterization setup
    - In situ measurements (Blower Door, Isov'Air test)
  - Water permeability
    - Measurement of Sd values
- **+ Others…**
  - Ageing
    - Oven, climatic chamber, UV test
  - "Exceptional" measurements
    - Mechanical resistance of metallic fixations.
    - …

Examples of applications: Adhesives quality control

- **ISOVER adhesives must be controlled before being sold**
  - Control must be on par with certification organisms
  - Checking the metrology by successive internal and external comparisons
- **Some of the parameters whose influence has been checked**
  - Machine speed (very high)
  - Room temperature and humidity (high)
  - Direction in which the membrane is cut (moderate)
  - Material on the machine grip (moderate)
  - Number of days before the test (low)
  - Method and weight used to press the adhesives (low)
  - Sensor sensibility (negligible)
  - **…**
- **Even following standards to the letter, there is room for differences**
  - Importance of communication, standardization, exchange of best practices

Examples of applications: Integra$_2$

➤ **Integra$_2$ fixations development**

- Customer: ISOVER France
- Objective: define components geometry
- Action: control leakages

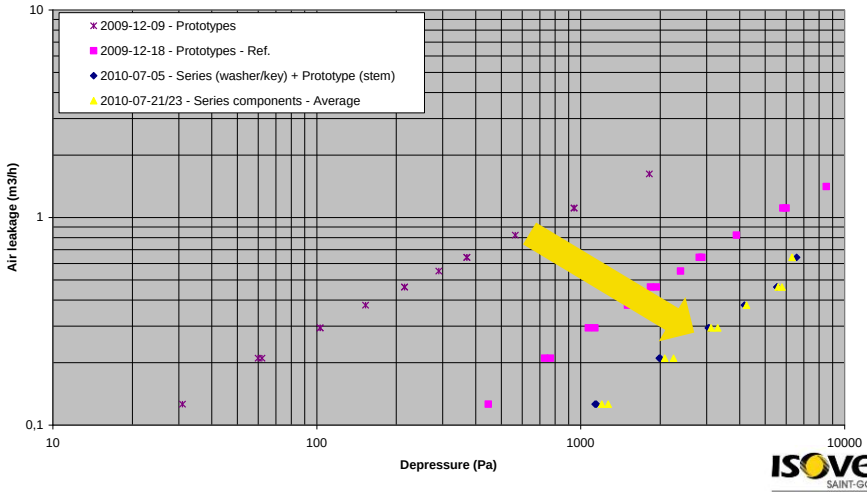
➤ **Activity**

- Device construction
  - Check suspensions in real conditions
  - Sample under depression
  - Flow rate control
- Setup calculation method (EN12114)
  - $V = C\Delta p^n$
- Calculate leakages at 4 Pa and 50 Pa

Examples of applications: Integra$_2$

➤ **Progressive reduction of leakages (by about 95% eventually)**

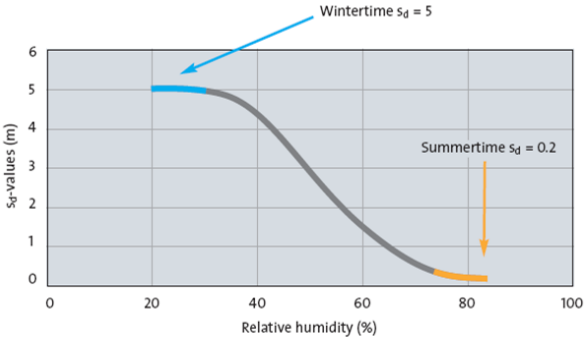
- Validated by measurements at CSTB: no leakage with 64 fixations

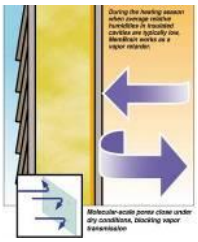


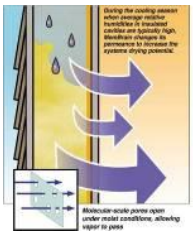
Examples of applications: Vario Xtra

➤ **Vario is a Smart Vapor Retarder**

- Humidity-dependant moisture diffusion
  - Higher at low humidities (usually in winter)
- ➔ Variable Sd value (equivalent air layer thickness)
  - Prevents moisture condensation in winter (low Sd values)
  - Allows moisture dry out in summer







Examples of applications: Vario Xtra

➤ **Technical validation of achieved solutions with WUFI program**

- Hygrothermal simulation software, couples heat and moisture transfer
- Control: Study of R&D solutions when applied to real configurations
  - Hygrothermal analysis: heat flow and water/moisture content
  - Critical moisture conditions (punctual observation)
  - Microbial growth (moisture in wood < 20% @ T > 10°C)

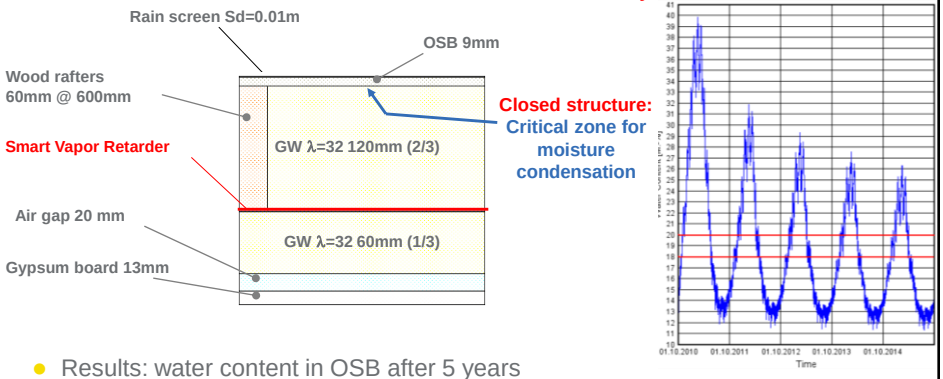
➤ **Some of the cases studied**

- Climates
  - Climate 1 : Germany (Holzkirchen) – Continental - Central EU
  - Climate 2 : France (Nancy) – Cold/humid winter – Extreme case
- Construction modes
  - 1. Temperate application: Pitch roof – Climate 1
  - 2. Critical application: Green/flat roof – Climate 1
  - 3. Extreme critical application: Wooden frame house (1/3 - 2/3) – Climate 2

Examples of applications: Vario Xtra

➤ **Wufi output – Case 3 – Extreme conditions: out of Vario KM range**

- Wood frame house, North-oriented wall, shaded, Nancy climate

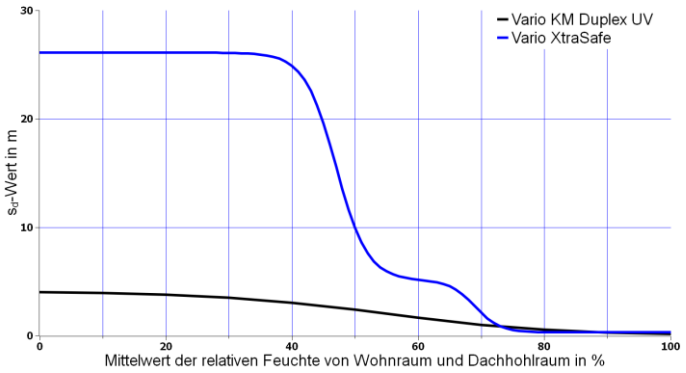


- Results: water content in OSB after 5 years
  - Probable mould growth
  - **Vario KM not prescribed for this combination of climate and construction type**

Examples of applications: Vario Xtra

➤ **Experimental and numerical study of a new prototype**

- Sd measurements of several prototypes, choice of the best one
- Drawing of the Sd curves ➔ inputs for Wufi model
- Best prototype validated ➔ Vario Xtra on the market



Conclusion

- **Saint-Gobain ISOVER is the leader in Energy Efficiency of Buildings**
- **Importance of the quality of its solutions**
  - Product development
  - Quality control
  - Standardization
- **Common basis for these axes: a good metrology**
  - Awareness of the importance of the metrological process
  - Improving constantly the metrology
- **Perspective: Influence of the products ageing**
  - How do different products react to high temperatures, humidity, cycles… ?
  - What tests are the more representative of reality?

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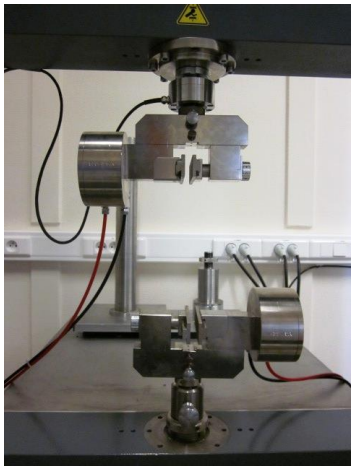
Traction machine



Airtightness characterization setup

Water vapour permeability