



## Hygrometric treatment in cultural heritage display cases

Innovation: passive hygrometric control, what can we guarantee?

## Preventive conservation and hygrometric control: where do we stand?



AN INCREASINGLY  
DEMANDING MARKET



A PHENOMENON  
ACCENTUATED BY THE LOAN  
OF COLLECTIONS FOR  
TEMPORARY EXHIBITIONS



A DEMAND FOR  
TEMPERATURE CONTROL  
OFTEN ASSOCIATED



A DRAFT REVISION OF THE  
EN-15999-2 STANDARD

## The importance of the prerequisites

- ✓ **Environmental Control**

No hygrometric control without knowing the climatic conditions of the room

- ✓ **Monitoring Humidity**

No humidity control without a data logger

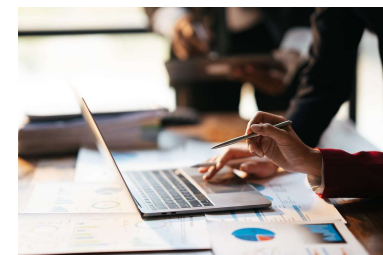
- ✓ **Quality of the material**

No humidity control without good airtightness

- ✓ **Preventive conservation of the object**

What target value? what resolution?

- ✓ **Data analysis**



## Definition of Relative Humidity (RH)

Relative Humidity is defined as “a ratio, expressed in percent, of the amount of atmospheric humidity present relative to the amount that would be present if the air were saturated”, according to the National Oceanic and Atmospheric Administration (NOAA).

So what’s that mean in simple terms?



Relative humidity is how we describe how much humidity is in the air vs. the maximum amount air could hold at any given temperature.



Warmer air holds more water vapor.



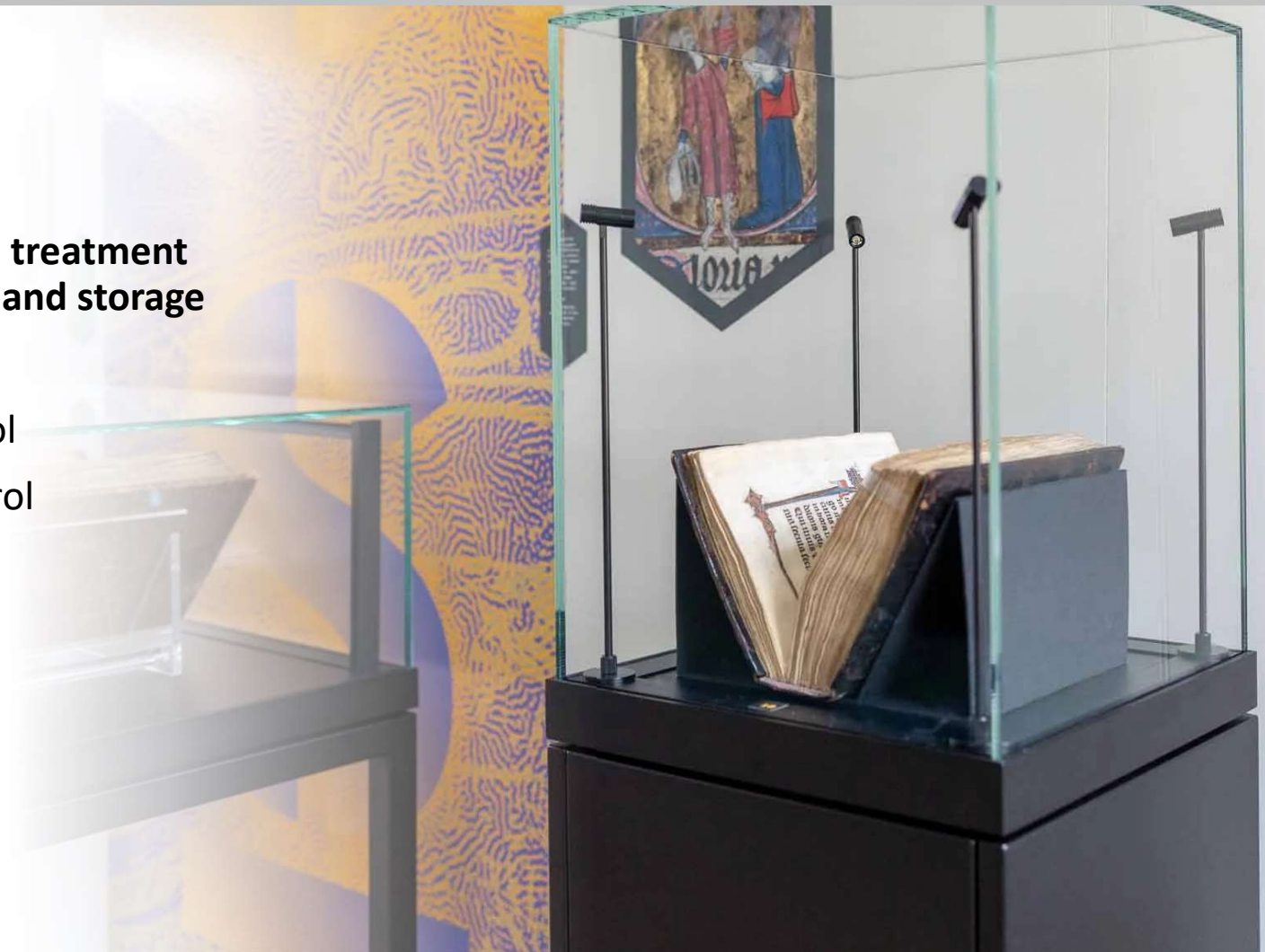
RH is written as a percent. For example 0% RH means the air is completely dry. 100% RH means mist or dew is about to form as the vapor condenses.



When temperature drops below the dew point, water vapor becomes precipitation such as rain, snow or dew.

## How to ensure hygrometric treatment during exposure, transport and storage

- Active hygrometric control
- Passive hygrometric control



## How to ensure hygrometric treatment during exposure, transport and storage

- Active hygrometric control
- **Passive hygrometric control**

Passive humidity control systems are designed to be effective without the need of external power or manual activation, making them ideal for use in exhibitions, in logistics or storage environments where humidity control is crucial for the protection of sensitive products.



## Passive hygrometric control

- ✓ Passive hygrometric control is available in several solutions :
- Desiccants (silica gel or clays)
  - Preconditioned absorbers (silica gel)
  - Humidity stabiliser and buffer materials (absorber/desorber)

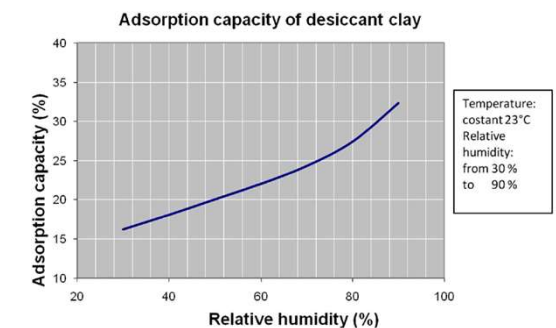
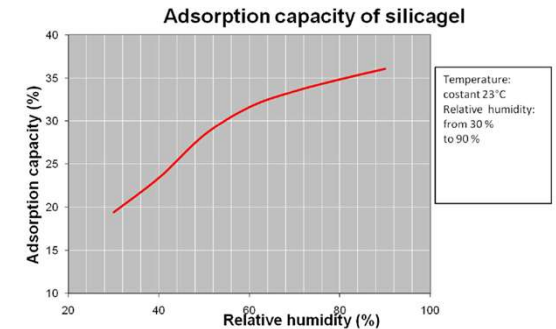


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### Desiccants (silica gel or clays)

- Desiccant products like silica gel or clays attract the humidity and reduce the RH at the minimum level till they are saturated.
  - Silica gel has a maximum power absorption of 37/40% of its weight and can be saturated in few days
  - Clay gel has a maximum power absorption of 33/35% of its weight and can be saturated in few days





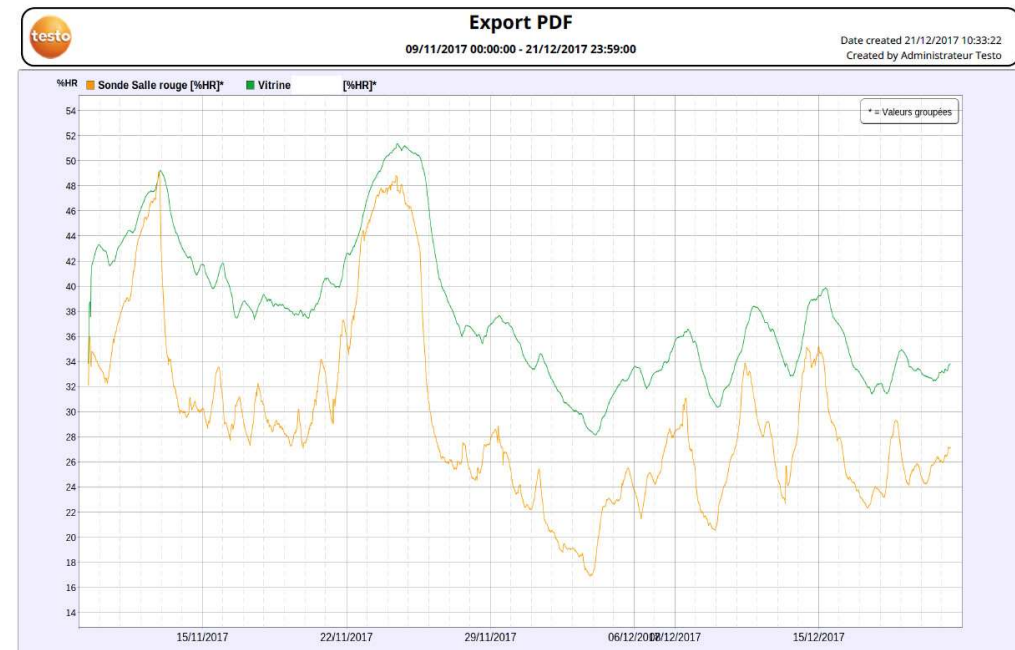
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### Principle of pre-conditioned absorbers

- If the humidity level is too low, the beads release moisture.
- If the humidity level is too high, the beads absorb excess water vapor.
- Accuracy and resolution :  $\pm 7\%$
- Guideline values are:
  - $2 \text{ kg/m}^3$  for glass hoods or large showcases  $> 2 \text{ m}^3$
  - $4 \text{ kg/m}^3$  for very tall or small showcases  $< 0.2 \text{ m}^3$

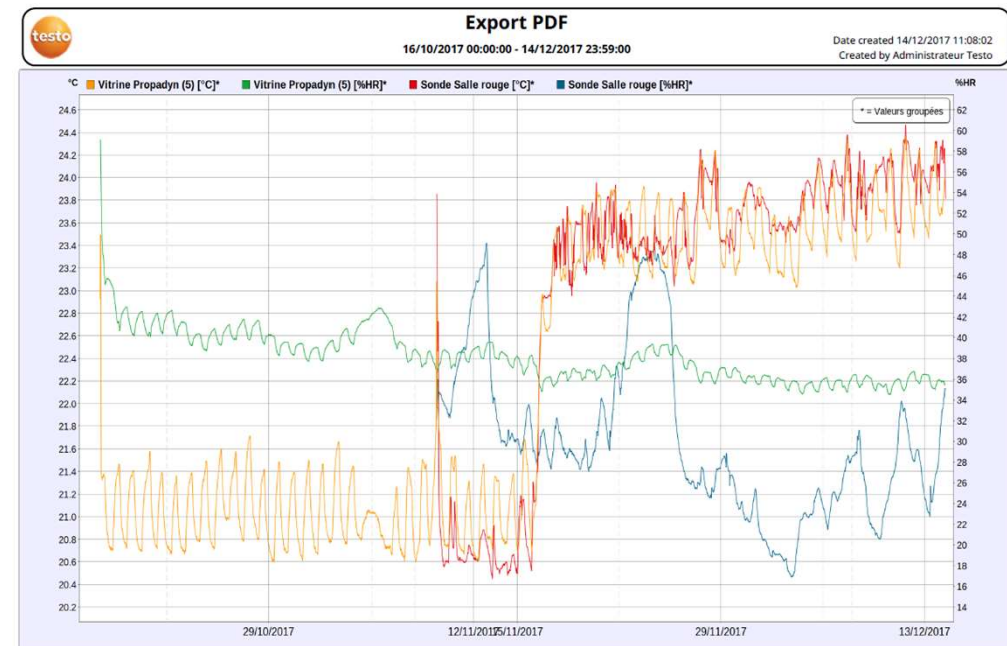


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### Principle of humidity stabiliser and buffer materials

- If the humidity level is too low, Propadyn® Museart releases moisture to immediately restore the RH level.
- If the humidity level is too high, Propadyn® Museart absorbs excess water vapour to return to the preset level.
- Reactivity : immediate
- Accuracy and resolution  $\pm 3\%$
- Common guidelines are
  - $0,8 \text{ kg/m}^3$  for glass hoods or large showcases  $> 2 \text{ m}^3$
  - $1,6 \text{ kg/m}^3$  for very tall or small showcases  $< 0.2 \text{ m}^3$



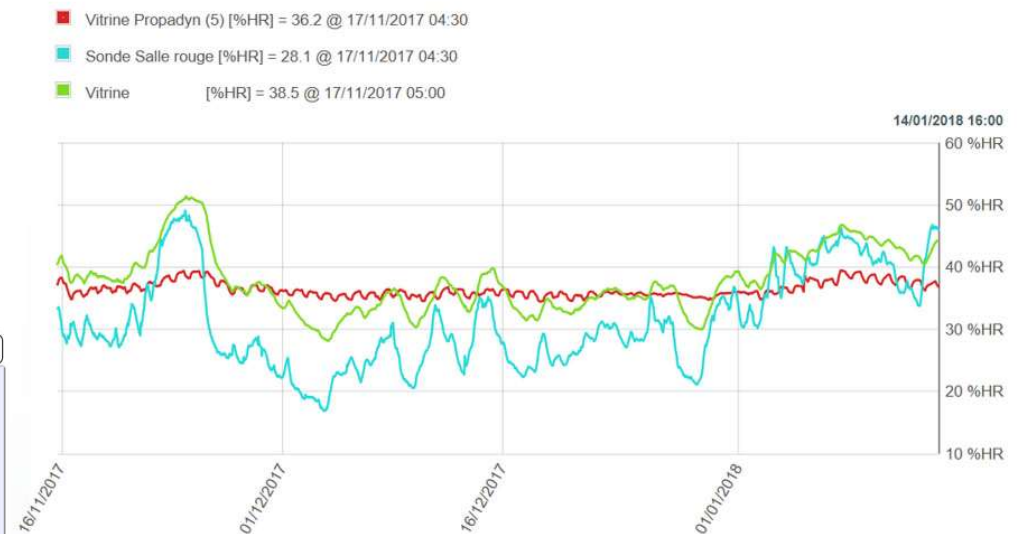
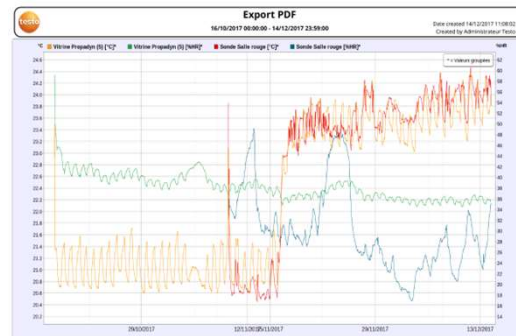
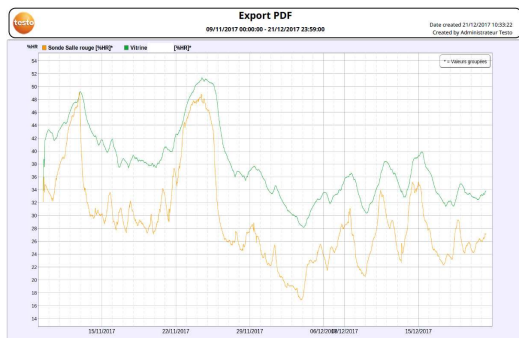
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### Differences between

- Preconditioned absorber (silica gel)
- Humidity stabiliser and buffer materials (absorber/desorber)

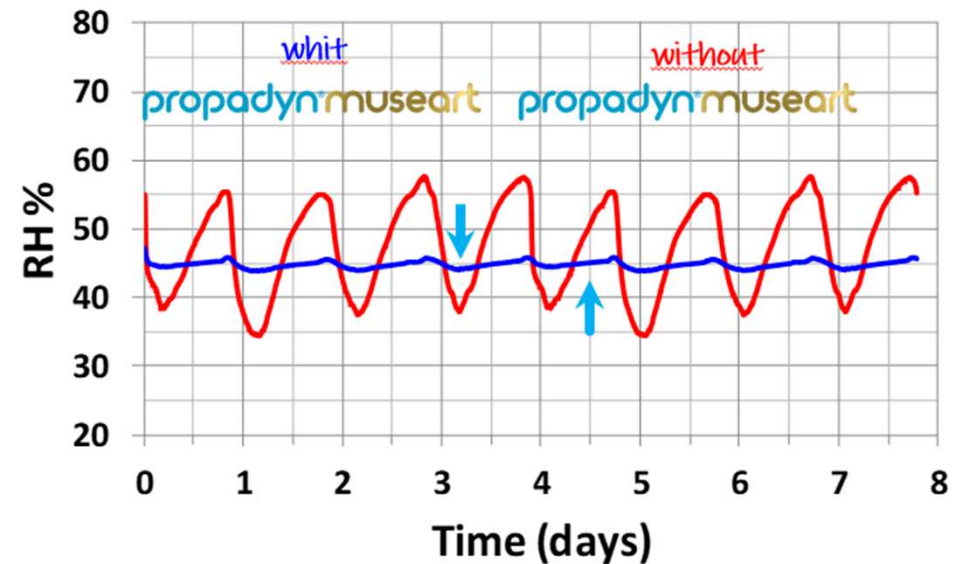


## Focus on PROPADYN® MUSEART

Propadyn® Museart is a passive yet dynamic, humidity regulator produced with **organic and biocompatible materials**, designed to stabilize the relative humidity (RH) inside sealed display cases.

Highly effective over the long term, this product **reacts immediately** to the slightest variation in humidity, avoiding any risk of damaging variations.

**Exceptional efficiency** minimizes the amount of space required for desiccants.





Propadyn® Museart is **capable to stabilize for longtime of absorbing up to 160% of its weight** with great responsiveness.

This high-performance product releases no particles, dust or liquids.

**It resists and absorbs VOCs.** It can also be regenerated in a climatic chamber.

*Propadyn® Museart has been tested and approved by:*

*Le Louvre (Fr), Service Historique de la Défense (Fr), Bibliothèque National de France (Fr), Royal Mouseum of Turin (It), Galleria degli Uffizi (It), Historisches Museum der Pfalz (De), Haus der Kulturen der Welt (De), National Museum of Finland (Fi), Museum of Central Finland (Fi) and many others.*

Available in two formats :

- ✓ Cassettes of 200g and 400g ideal for showcases and display cases
- ✓ Divisible sheets 330x330 mm ideal for frameworks, drawers, boxes...



Preconditioned from 35 to 80% RH



How many Propadyn® Museart should I use?

How long will it last?

$$Q = (C_{eq} D V N t) / (M_H F)$$

$C_{eq}$  = saturated vapour tension at the temperature of use

$D$  = RH difference between inside and outside of the showcase

$V$  = Volume to protect

$N$  = daily AER (showcase airtightness)

$t$  = time of protection

$M_H$  = M

$F$  = RH tolerance acceptable by the artwork

## What are the benefits of using Propadyn® Museart



### ECOFRIENDLY

Made with organic ingredients suitable for food contact



### SAFE

Dust and liquid free thanks to Tyvek outer protection



### GREATER EFFECTIVENESS

You use less but get more protection for longer



### READY-TO-USE

No pre-conditioning required



### ACCURATE

It reacts immediately with a resolution of  $\pm 3\%$



### REGENERABLE

It can be regenerated after use