# An evaluation of the leakage rate and relative humidity buffering capacity of drop-spine boxes

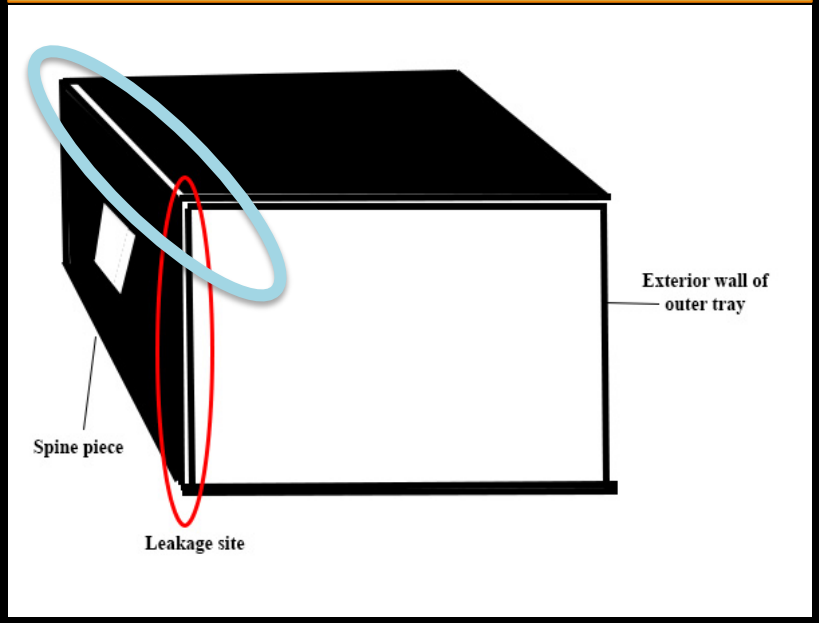
Lydia Aikenhead, NYU  Advisors: Hannelore Roemich and Steven Weintraub

Is it possible to analytically assess the capacity of the drop-spine box to buffer against environmental fluctuations in relative humidity?

Is the buffering capacity a result of a sealed case or the hygroscopic materials used in construction?

NYU THE INSTITUTE OF FINE ARTS

## Leakage sites




## $CO_2$ Leakage Testing


## $CO_2$ Leakage Testing in High RH

**$CO_2$** is an ideal tracer gas because it is safe and already present in the environment.

The leakage rate is calculated based on half-time decay, and measured in air exchanges per day.

## Results:

- The drop-spine box has a poor leakage rate of up to **13.5 air exchanges** per day
- Buffering capacity against relative humidity is good, with a **gradual increase of 1.6 – 3.9 %** per day.
- The **leakage rate decreases** as the box absorbs moisture

Image source: http://www.printfile.com/

## Further Questions:

- Can the box design be improved?
- How do other types of boxes compare?
- Are exchange rate and buffering capacity affected by storage on library shelf?
- How do hygroscopic materials affect air exchange rates?
- How would a rapidly fluctuating relative humidity affect leakage rates?

# Thank you to:

**Hannelore Roemich**, Conservation Center of the Institute of Fine Arts, NYU
**Steven Weintraub**, Conservation Center of the Institute of Fine Arts, NYU

**Laura McCann**, Barbara Goldsmith Conservation Department, NYU
**Jessica Pace**, Barbara Goldsmith Conservation Department, NYU

**Andy Wolf**, Conservation Center of the Institute of Fine Arts, NYU
**Joy Bloser**, Conservation Center of the Institute of Fine Arts, NYU
**Shannon Mulshine**, Conservation Center of the Institute of Fine Arts, NYU

NYU | THE INSTITUTE OF FINE ARTS