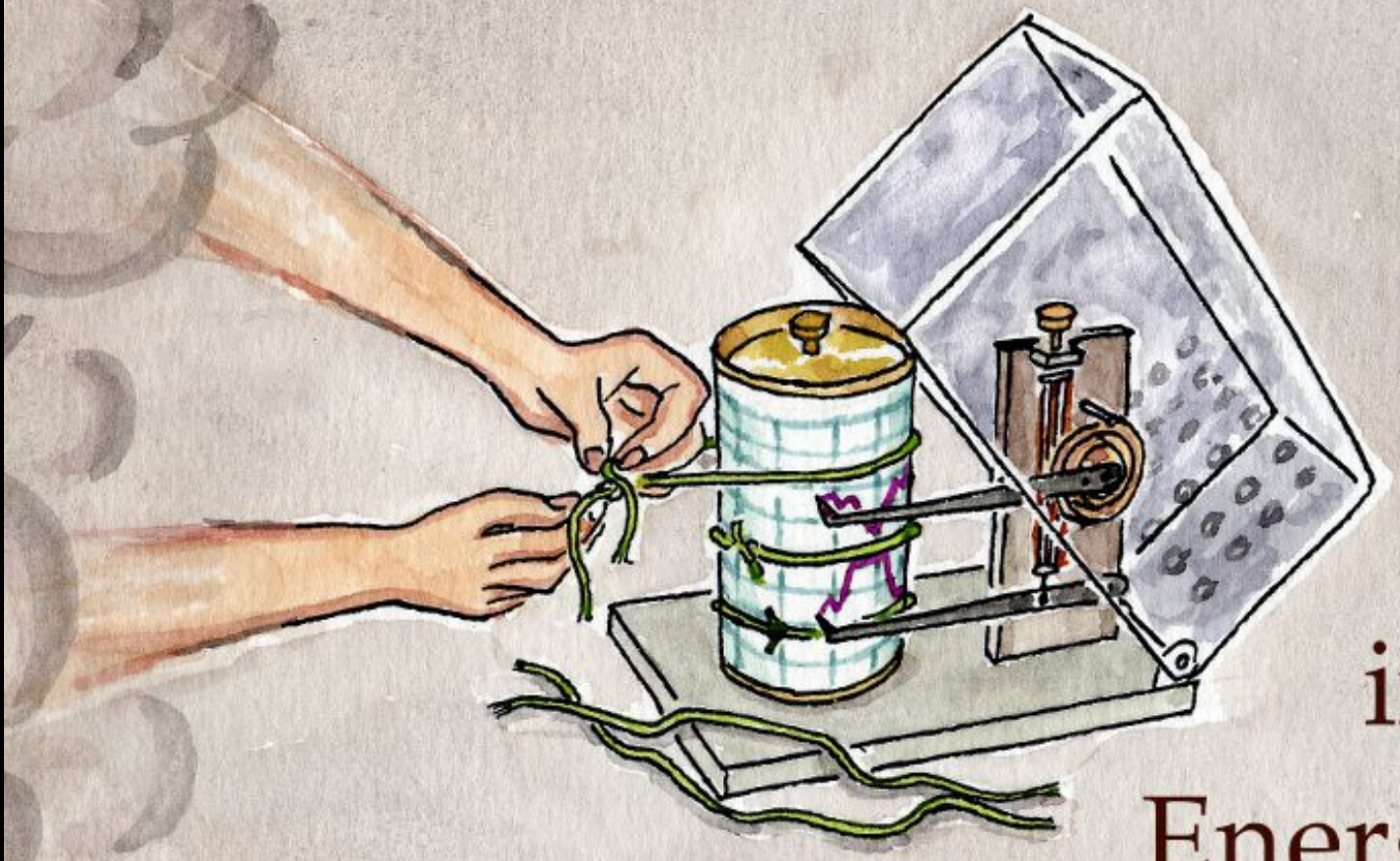
# Museum environmental standards



# in an age of Energy Anxiety

Tim Padfield

May 2014

Chauvet cave
France

(photo of replica)

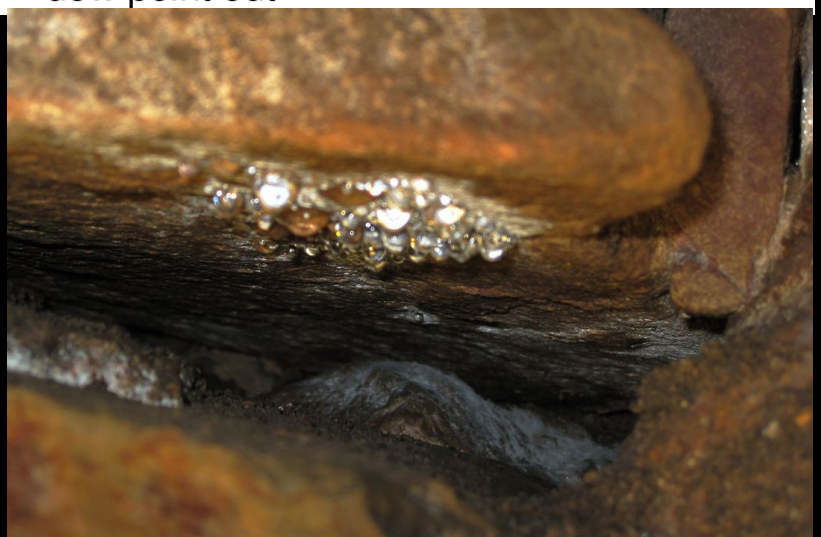
Original dated
to about
30,000 y BP

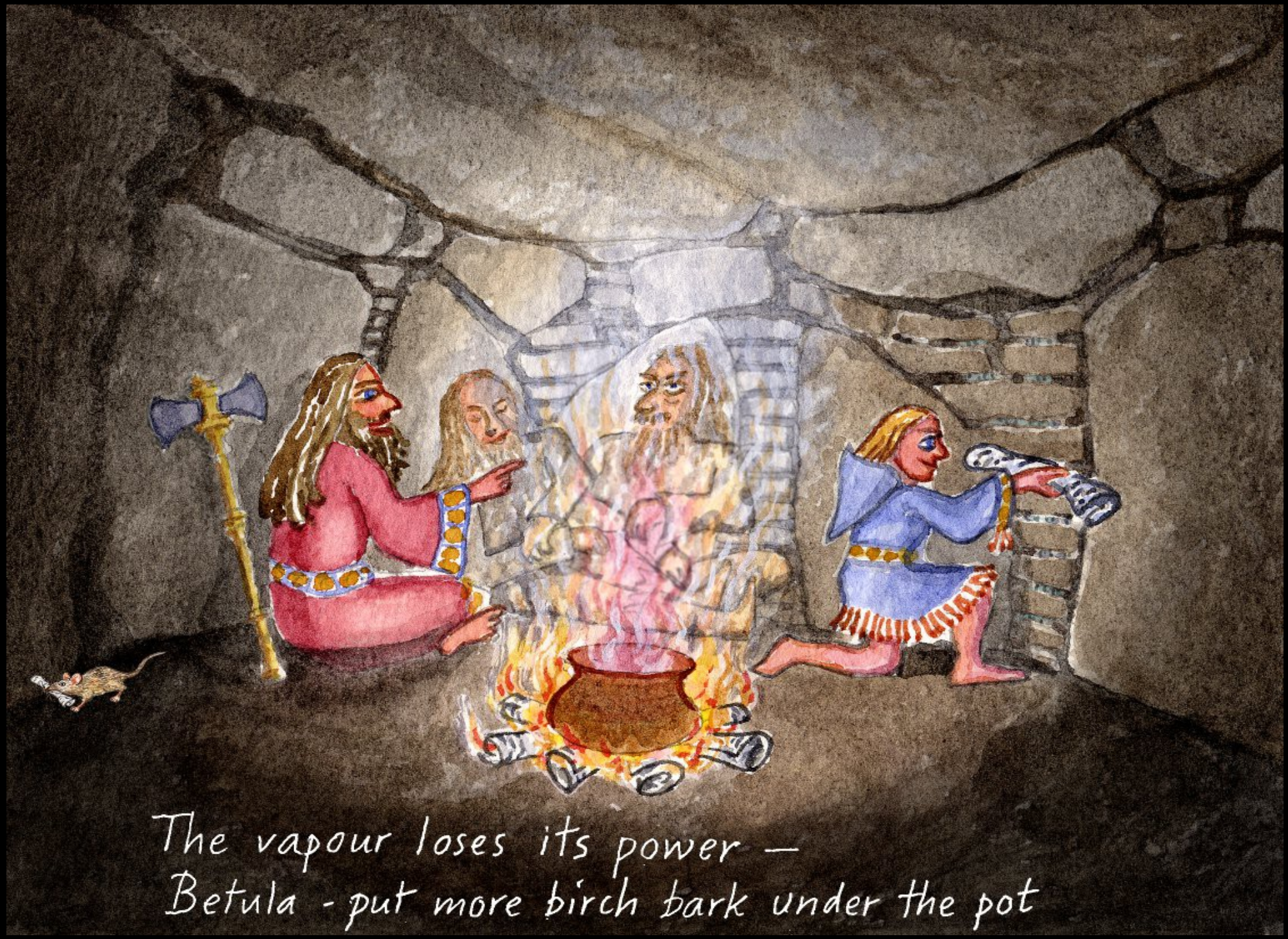
T = 13°C
RH = 99%
(approx?)

Maglehøj, Denmark. A 5000 year old passage tomb

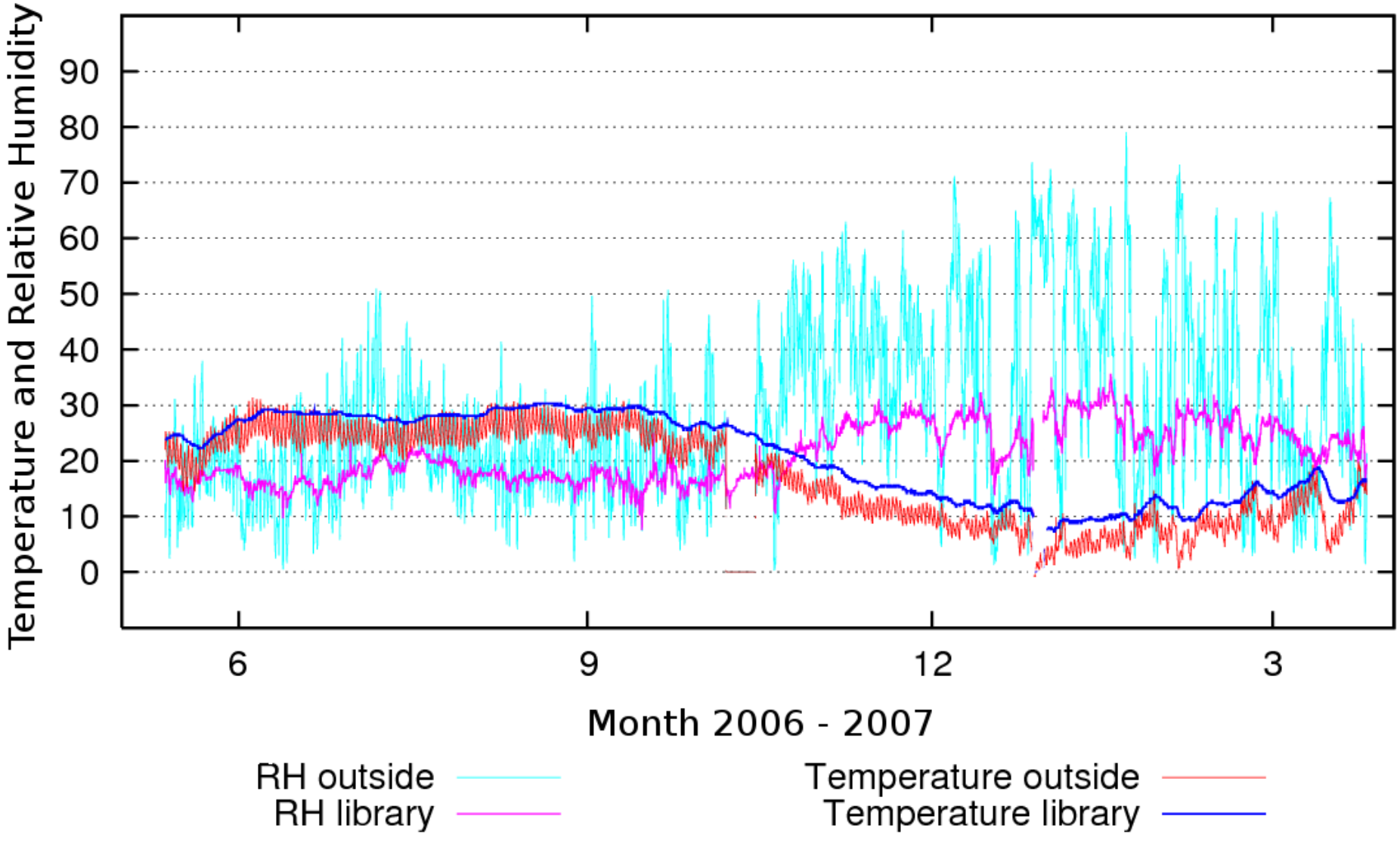
Maglehøj, Denmark. 5000 year old birch bark

Maglehøj: condensation within the ventilated chamber, in graphic and photographic images.




The vapour loses its power —
Betula - put more birch bark under the pot

# St Catherines Monastery, Sinai, Egypt



Gierslev Church
Zealand, Denmark

A painting which
hardened at very high RH
cannot endure the
standard museum climate

| Source | Media | Temper-ature | Maximum Temp. Gradient | Relative Humidity (RH) | Maximum RH Gradient |
|---|---|---|---|---|---|
| ISO TC 171/SC<br>Jan. 2002 | CD-R<br>CD-ROM | +5°C to 20°C<br>(41°F to 68°F) | 4°C /hr<br>(7°F /hr) | 30% to 50% | 10% /hr |
| IT9.25 and ISO 18925<br>February, 2002 | CDs<br>DVDs | -10°C to 23°C<br>(14°F to 73°F) | | 20% to 50% | Cycling no greater than:<br>±10% |
| NARA, FAQ About Optical Media, April, 2001 | CDs<br>DVDs | 68°F<br>(20°C) | +/- 1°F /day<br>(+/- 0.6°C /day) | 40% | 5% /day |
| National Archives of Australia, April, 1999 | CDs | 18°C to 20°C<br>(64°F to 68°F) | | 45% to 50% | 10% /24 hrs |
| Library Technical Report<br>Nov.-Dec. 1997 | CDs | -10°C to 50°C<br>(16°F to 122°F) | | 10% to 90% | |
| DVD Demystified, Second Edition, Jim Taylor, 2001 | DVD-R<br>DVD-ROM | -20°C to 50°C<br>(-4°F to 122°F) | 15°C /hr<br>(27°F /hr) | 5% to 90% | 10% /hr |
| | DVD-RAM | -10°C to 50°C<br>(16°F to 122°F) | 10°C /hr<br>(18°F /hr) | 3% to 85% | 10% /hr |
| | DVD+RW | -10°C to 55°C<br>(14°F to 131°F) | 15°C /hr<br>(27°F /hr) | 3% to 90% | 10% /hr |
| National Library of Canada, 1996 | CDs | 15°C to 20°C<br>(59°F to 68°F) | 2°C /24 hrs<br>(9°F /24 hrs) | 25% to 45% | 5% /24 hrs |
| Media Sciences, Inc.<br>Jerome L. Hartke | CD-R | 10°C to 15°C<br>(50°F to 59°F) | | 20% to 50% | |

PD5454: Optical discs (compact discs and digital video discs) should not be frozen (sic)

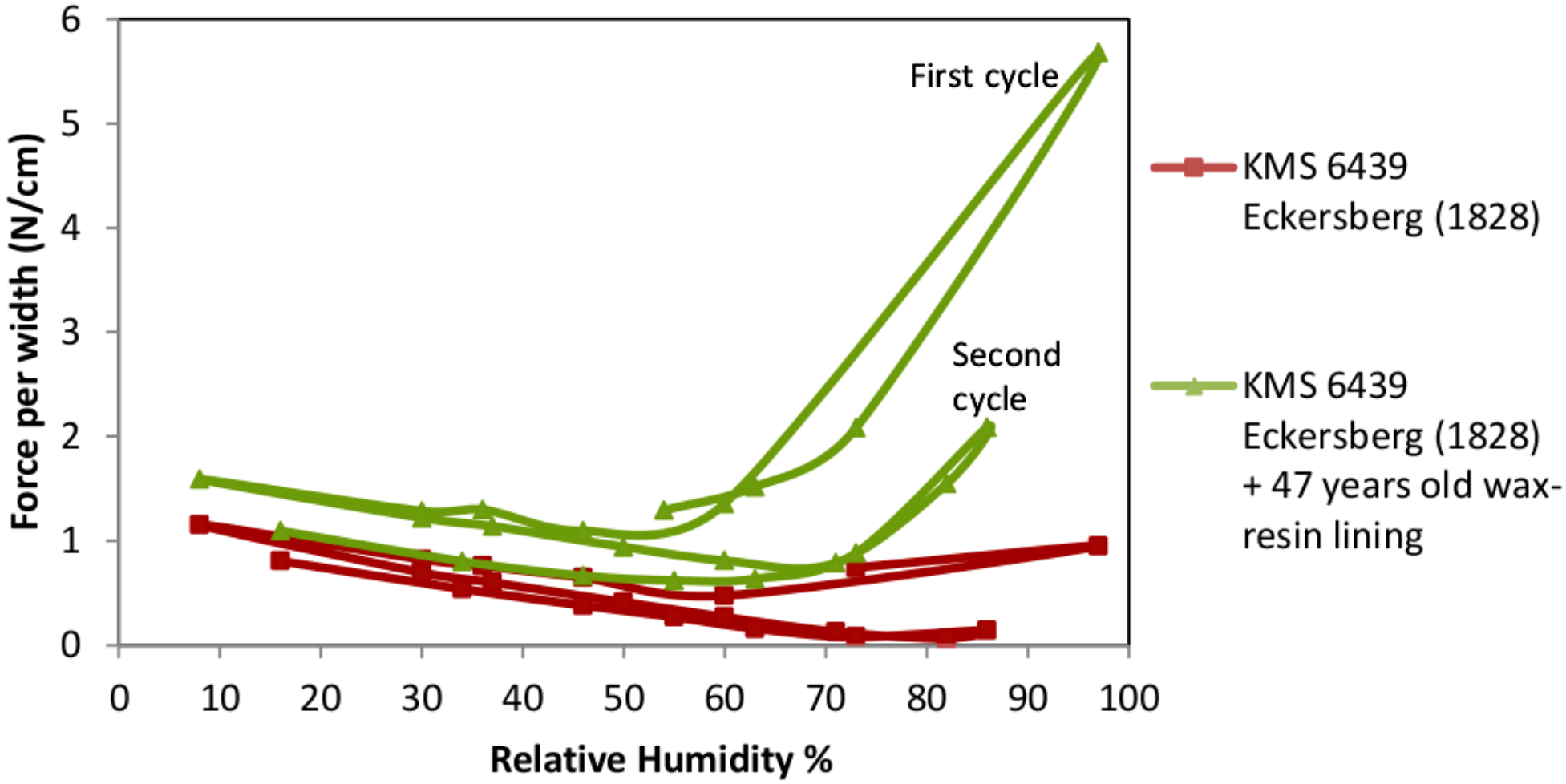
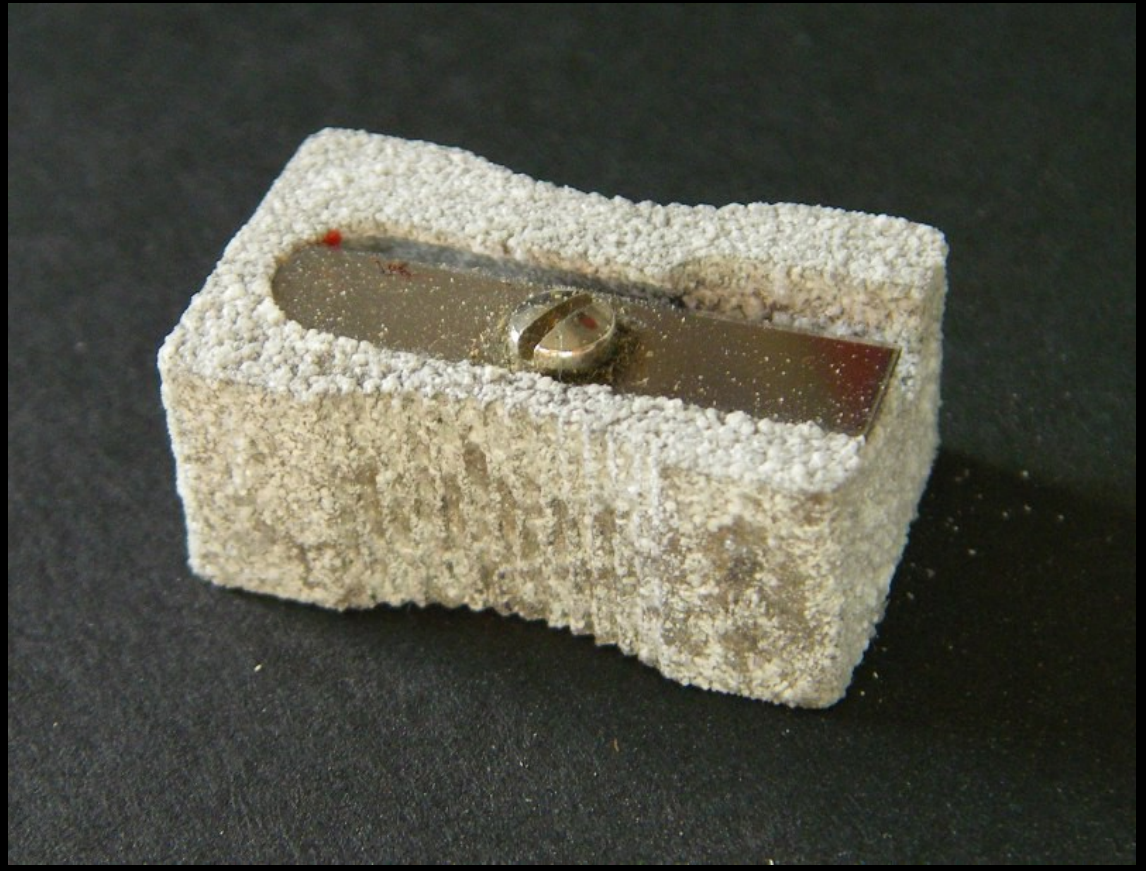



**Figure 58. Restrained tests of Eckersberg sample (SMK6439) before and after lining. The lining has a wax-resin lining from 1965. The painting had not been lined prior to the wax-resin lining. The wax-resin lining causes a marked contraction of the lined sample in high RH. In the second cycle the response is lower and the sample has lost some tension.**

From Cecil Krarup Andersen



Some objects have "Inherent Vice" and cannot be preserved in air. This is a zinc die casting alloy, only used for a short time until its instability became known.

The 13 °C temperature limit in PD5454 is set mainly by the result of a single published article about pure wax seals

Museums need to find ways to reconcile
the desirability of long-term preservation
of collections with the need to reduce energy use.

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A conservator’s evaluation is essential
in establishing the appropriate environmental
conditions for works of art requested for loan

(The Bizot statement)


# Saltholm Museum - Denmark

(most easily reached by kayak)

Queen Victoria's bathing machine,
Osborne House, Isle of Wight

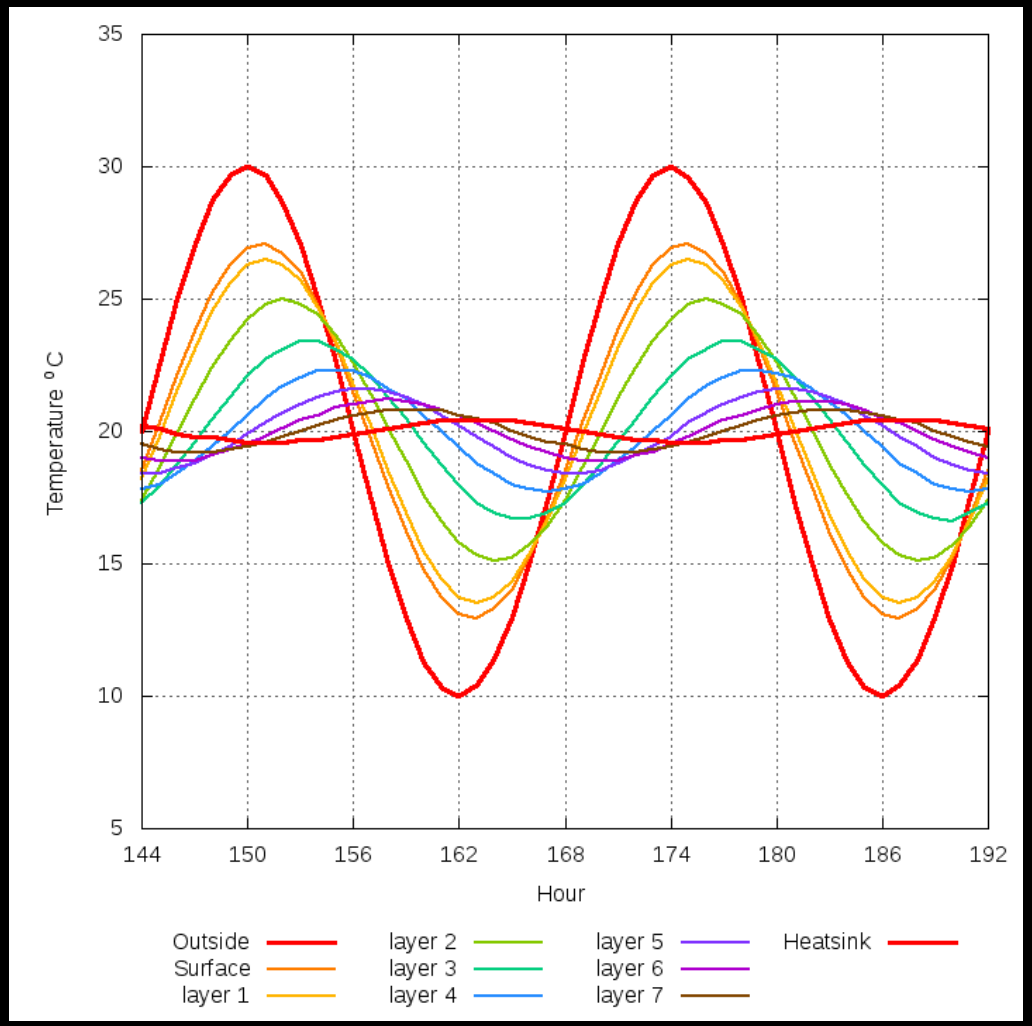

For loans between museums, a stringent legal specification trumps scientifically based evaluation of individual objects' requirements


RH
T
RH
T
Low energy air conditioni
Tim Padfield

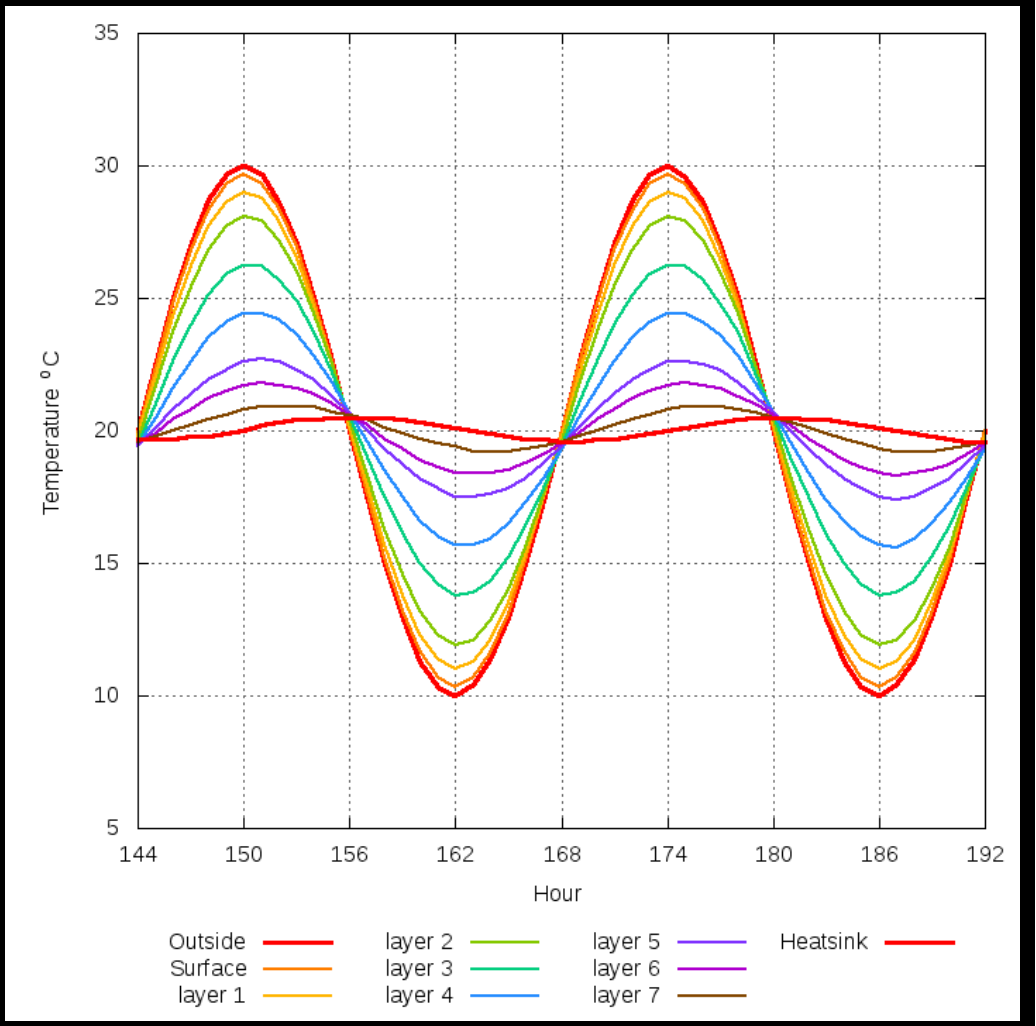
Cologne City Archive,  1971 -

(photo - Der Spiegel)

- 2009




Brick wall
240 mm




Foam wall
100 mm


We must find a better retrieval system – Dogma can't smell in the cold.
FILM ARCHIVE
–20°
wear protective clothing


PD5454

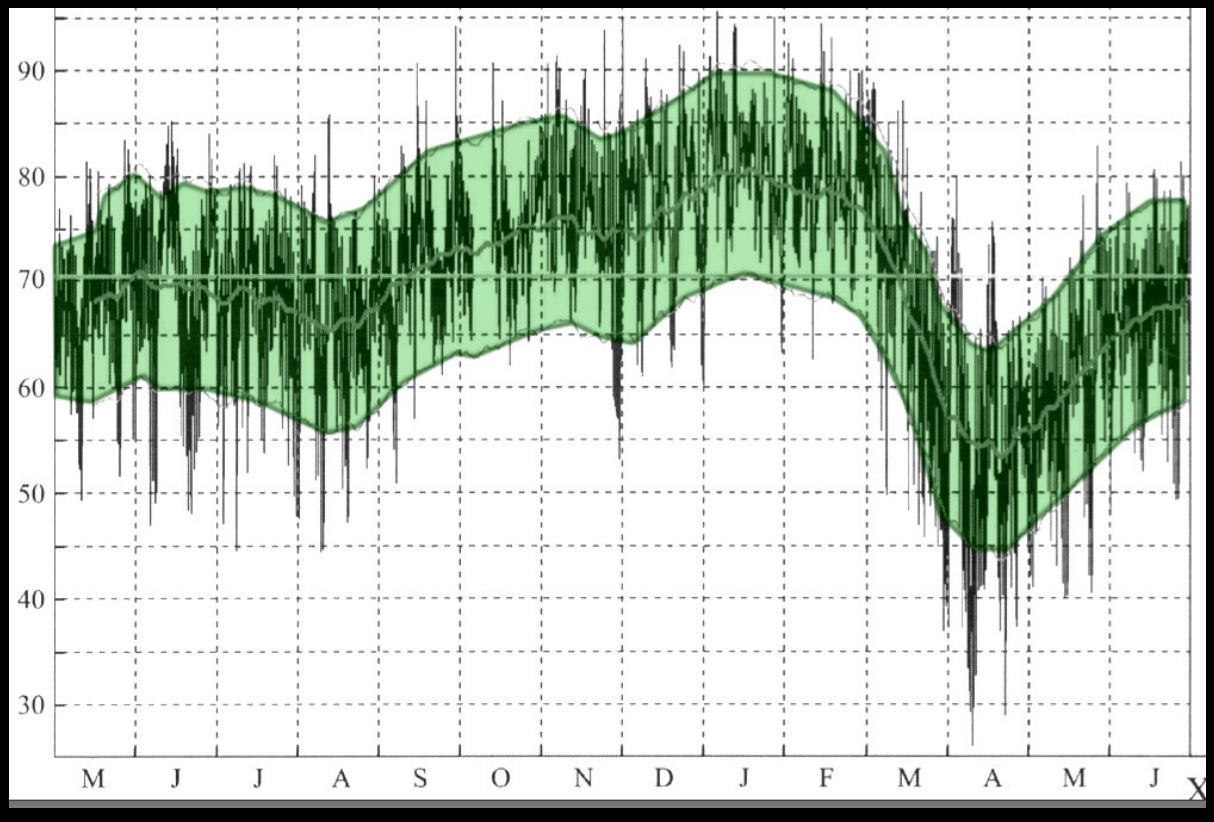
# 4.3.3 Cold Storage

[There is no RH specified because:] All materials ...should be ... packaged [in] sealable and airtight bags or boxes. Humidity indicators should be incorporated

Frost forming inside a film can after insertion in a cold store. Moisture from the still-warm gelatin film is the source of the condensation

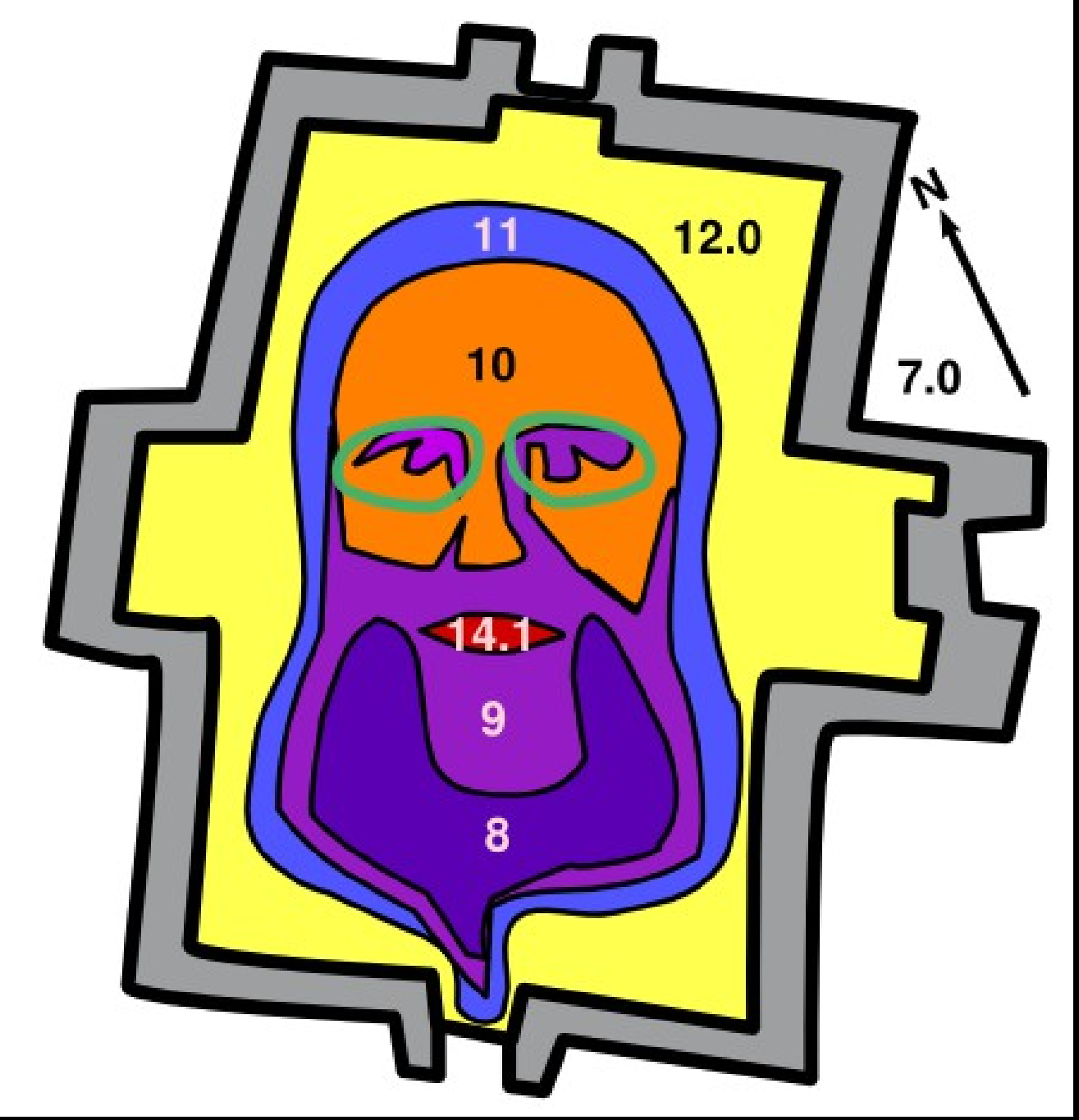
# EN 15757:2010

T & RH to limit mechanical damage to organic hygroscopic materials in historic structures without air conditioning




A complicated manipulation of measured data results in a permitted variation less than the normal variation but greater than that provided by air conditioning – but it requires some form of air conditioning.


Now to CEN 16242:2012 -




Many standards reveal in their words and images the identity of their single author

A wiki style of collaborative writing is surely a better way to construct a standard

**References**:

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Mechanical properties and structural response to fluctuating relative humidity, exemplified by the collection of Danish Golden Age paintings at Statens Museum for Kunst.
PhD thesis 2013