Preventive Conservation in Historic Houses and Palace Museums: Assessment Methodologies and Applications

SilvanaEditoriale

Preventive Conservation in Historic Houses and Palace Museums: Assessment Methodologies and Applications

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Climatic Monitoring of the South Central Body of the Palace of Versailles. Identification of the Collections Risk Thresholds

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Abstract
The identification of the risk thresholds related to the collections environment as well as easily observable deterioration indicators on the collections represents a fundamental element of preventive conservation assessment methods. The scientific literature concerning the deterioration process of the collections is very rich, nevertheless it is often very difficult to extract simple information for the monitoring of the conservation conditions of the collections. The application and the simplification of these principles, given the time constraints and the need for pragmatism that the collections manager faces everyday, is therefore essential. This principle guided the EPICO team's work whose first results were exploited in the context of the monitoring of the conservation conditions of the South central body of the Palace of Versailles, closed to the public in 2015 to 2018 for the renovation of the technical network, for fire safety and improvement of air treatment. Among the controlled parameters, climate was an essential element for monitoring the conservation conditions of the protected collections in situ and of the construction work.

Keywords
Preventive conservation, historical houses, climate control, risk threshold.

We present here the parameters taken into account for the identification of the thresholds for exceeding the temperature and relative humidity values that can be a risk for the collections kept in situ in the space of the work area. Climate regulation was carried out by an air handling unit (AHU) that provided heating in winter with a target of 13°C and all season continuous ventilation without the addition of humidifiers/dehumidifiers. The results of this treatment during the three years of the construction work were very satisfactory, it guaranteed the conservation of the collections which were inspected regularly and was a big energy saver.

Temperature and relative humidity control, objectives:

– be alerted only in the event of a real danger to the collections and avoid the risk of "desensitisation" resulting from repeated, irrelevant alerts for which corrective actions are not necessary (e.g.

MAX. THRESHOLDS: RH 90% or T 25°C

- The threshold of 90% RH is based on the minimum time for mould germination (24 h) on organic substrates at 25°C.
- At 90% the differences are more dangerous than in the intermediate ranges between 40% and 60% RH (mechanical deteriorations).

MIN. THRESHOLDS: RH 30% OU 5°C

- The threshold of 30% is based on the reaction time of the hygroscopic materials

Ex. unpainted wood/varnish reacts after 5/7 days of exposure at RH < 30%
30% is the breaking point for traditional paintings (canvas system, glues, film), a network of cracks is likely to develop.
Alarm time: 60 minutes – if the T C° or RH% exceed these thresholds, the alarm is triggered after 60 minutes.

FLUCTUATION THRESHOLDS: 6°C or 10% HR

Alarm time: 60 minutes – if the T C° or RH % exceed these deviations in a period of 60 minutes, the alert is triggered. These thresholds complete the warning system on rapid fluctuations related to possible malfunctions of CTAs

COMFORT THRESHOLDS: RH 40-75%; T°C 10-20°C

- Compliance range based on T and RH limits below mould germination conditions (75% of RH and 25°C for 15 days).

Alarm time: 24 hours – if the ranges of T°C and RH% exceed these thresholds, the alarm is triggered after 24 hours. This setting is based on:

- response time of the collections most sensitive to climatic fluctuations conserved in situ: 5-7 days at RH rates of less than 30%
- Reaction time to the alert by the team of preventive conservation and corrective action brought by CTA technicians: 2 days
- Return time to the desired values after the correction of the instructions (taking into account the capacity of the CTA, the inertia of the building, the sensitivity of the materials to the deviations of RH%): 2 days

The alert is therefore sent beyond 24 h of compliance ranges, which allows a return to correct climatic conditions (5 days) before the estimated reaction time of the materials of the most sensitive collections (5-7 days for unpainted wood or varnish/paints).

Fig. 1
Setting of alert thresholds.

exceeding the threshold of 75% RH ±5% and a permanence of this rate for 3 hours).

– React before an irreversible modification of the materials of the collections occurs following a deterioration of the climatic conditions.

Thanks to a telemetry system it was possible to ensure real-time climate monitoring of the construction site with an email/SMS alarm report in case of exceeding the risk thresholds for the collections.

Identification of the Temperature and Relative Humidity Thresholds

Several factors were taken into account:

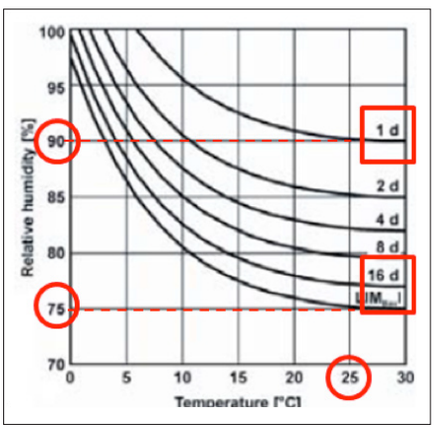
– the results of the studies carried out on the response of the collections' materials exhibited in real conditions of climatic fluctuations.

– The risk of mould development.

– The building's inertia and the performances of the CTAs.

– The average response time to the alert: return to the ideal climatic conditions ≤ time for raising doubt on the alert by the conservation team + time for care and application of the new directive by the teams in charge of the regulation of the CTAs.

Fig. 2
Prediction of mould fungus formation on the surface of and inside building component [Sedlbauer, Martens, 2001].



Bibliography

Roche A., *Comportement mécanique des peintures sur toile: mécanismes de dégradation,* Cnrs Editions, 2003.

Strojecki M., Łukomski M., Krzemień L., Sobczyk J., Bratasz Ł., 'Acoustic Emission Monitoring of an Eighteenth Century Wardrobe to Support a Strategy for Indoor Climate Management,' in *Studies in Conservation,* n. 59, 2014, pp. 225-232.

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