FACADE TREATMENTS OF HISTORICAL BUILDINGS LIMITING THE RISKS

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Abstract

The usefulness of treatment of facades of historic buildings and especially those with the status of listed monument is often discussed. Surface treatments of facades comprise a range of treatments, from water repellents to consolidants and anti-graffiti coatings. Even facade cleaning can be considered a facade treatment.

Treatment of monuments and historical buildings is often subject to dispute for both ethical / aesthetical and for technical reasons. In fact, even though often advertised as reversible, surface treatments permanently alter the characteristics of the materials they are applied upon.

Treatments of buildings can therefore be seen as a change of the original characteristics of the materials, thus leading to loss of information and affecting their historical value and their aesthetic appearance.

During the 20th century chemistry has become increasingly important for conservation and research has been addressed towards the in-situ treatment of materials,

with the aim of delaying their natural decay process.

In this scenery, at the beginning of the 1960's, the first synthetic polymers (water repellents and consolidants) appeared on the market.

Figure 1: Historical 'protectives' on facades in Amsterdam. Use of linseed oil. This kind of treatment was often applied from the beginning

Classes of Treatments and Products

Water repellents

Water repellents are intended to prevent or reduce water penetration into stonework and so reduce the rate of decay. Nowadays water repellents are mainly siloxane or silan/siloxane products (Roos et al 2008).

The water repellent treatment can also contribute to limit the sulfate attack from environmental pollution. And finally a water repellent treatment can also have the aim of preventing microbiological growth and quick soiling after a cleaning operation. Water repellents may, even though the water vapor diffusion of the material is hardly altered, have a considerable influence on the drying behavior of the treated material and construction (Figure 2 and Van Hees 1998).

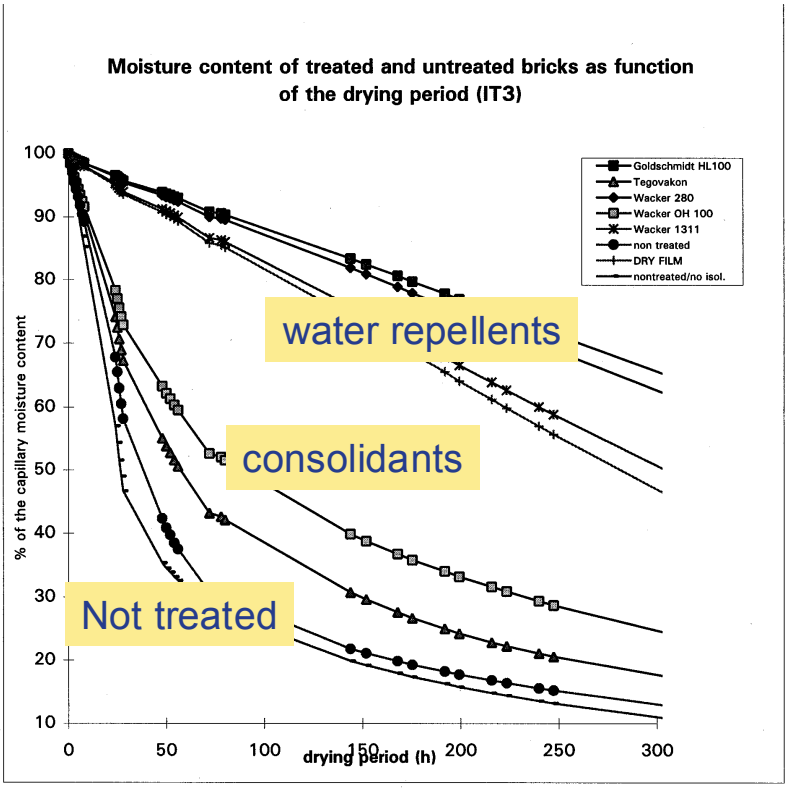

Figure 2: Drying behavior of treated (water repellents and consolidants) and not treated brick

Consolidants

The consolidant treatment works by (partially) filling the pores and the openings between grains of a de-cohesioned material. Most diffused products are ethyl silicates.

Consolidants are normally applied in a fluid state to allow penetration into the substrate. The filling of the pores has an effect on the drying behavior: drying of consolidated material is slower than the drying of the untreated one, but faster than in case the material would have been treated with a water repellent. Consolidants can not be applied successfully on materials showing delamination or scaling (Figure 3).

Figure 3: Detail of a natural stone showing scaling.
In this situation a consolidation treatment is not suitable

Anti-graffiti coatings

Anti-graffiti coatings work by the formation of a protective layer on the surface of the treated substrate. This layer avoids the penetration of the graffiti in the substrate and makes the removal of graffiti easier.

Anti-graffiti barriers and coatings fall into three distinct categories.

a) *Permanent coatings*: these coatings are generally based on epoxy or polyurethane.

b) *Sacrificial coatings*: are mostly based on acrylates, polymer waxes, biopolymers

c) *Semi-permanent coatings*: These systems can be of two types: (i) a combination of a permanent base layer and a sacrificial top-layer or (ii) a semi-permanent

Figure 4: Clearly visible (transparant) antigraffiti coating in the lower part of the facade of a listed monument

Also anti-graffiti coating may have a clear influence on the drying behavior (Figure 5 - Lubelli et al 2008).

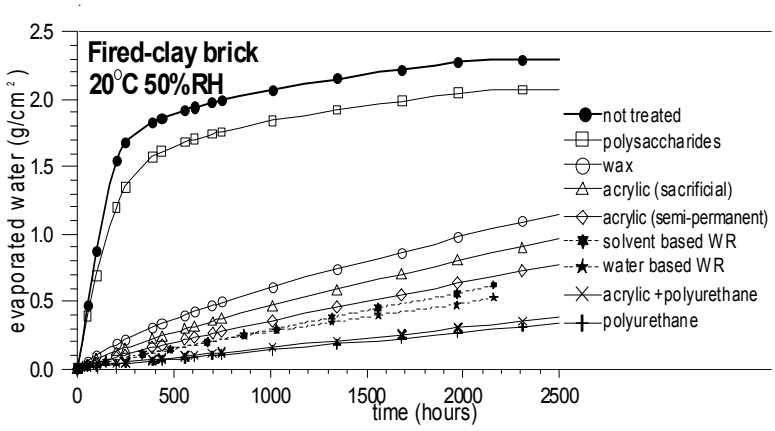

Figure 5: Drying behavior of treated (anti-graffiti coatings) compared with untreated brick

Discussion – Risks

In case of water repellents, there is a certain risk for the historical materials, that is most outspoken in the presence of salts in the substrate (Figure 6). Further, a distinct change in drying behavior will occur (Figure 6).

Figure 6: Spalling of a salt loaded brick treated with a water repellent

In the case of anti-graffiti coatings, the effect on the aspect of the façade may be quite dramatical: a glossy aspect may result and sometimes the color will be clearly changed even in case of a transparent coating (Figure 4); the choice has to be made between the risks for the materials -due to graffiti and cleaning- on one hand and the possible negative effects like change in color and risks related to the effects of change in drying behavior on the other hand, as shown in figure 5.

A clear general problem is the fact that documentation of treatments is generally very poor and inadequate, thus preventing a sound evaluation of both success and failure of treatments.

A checklist is proposed hereafter for a cautious treatment of historical facades.

How to proceed in case of a foreseen surface treatment of a historical building; following steps are proposed:

- Pre-investigation
- Risk assessment
- Choice of most adequate product (if any) and way of application
- Consider also alternative (non surface treatment) solutions
- Try-out on test panels in situ

- Assess effectiveness on test panels
- Application
- Assessment and control of effectiveness
- Documentation with motivation of choice and decisions
- Maintenance and monitoring
- Feed-back (heritage authorities)

Conclusions

Risks and dilemma's related to the application of surface treatments have been discussed. A very clear effect is most surface treatments lies in their distinct influence on the drying behavior of the materials and thus of the façade.

A guideline (checklist) was proposed for cautious façade treatment for historic buildings and monuments.

One of the main problems encountered with respect to surface treatments on historic buildings is the lacking or insufficient dissemination of the information about the effects of surface treatments.

Documents and publications are often too abstract and complex for people involved in conservation to refer to when facing practical problems.

Another problem is given by the inadequate documentation of the interventions. This makes it difficult to relate eventual failure to the type of treatment applied, hindering in such a way a sound feed-back process. A systematic use of the proposed checklist could improve this situation.

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