

Beth Haim preservation-project

Report on the second test with cleaning-products



Bureau Funeraire Adviezen, Amsterdam
Monument Conservation Collaborative, Massachusetts (USA)

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Introduction

On November 20th 2008 the board of the cemetery Beth Haim at Ouderkerk aan de Amstel gave permission to Bureau Funeraire Adviezen and the Monument Conservation Collaborative to start testing on removal of biological growth. This was done for several reasons:

- to prevent the use of inexperienced high-pressure cleaning, especially on the soft marbles;
- to see whether the covering of marbles with tarpaulins was really necessary;
- to remove the biological growth and keep it from returning for a longer period;

It was expected that the marbles would now be visible all year, and the surfaces would be cleaner. In order to archive these goals the first test was done in November 2008 and monitored for more than three months. The objects of this first test were a small piece of marble and a Belgian limestone (hardstone), similar to stones that can be found in the cemetery. These pieces were brought in from other locations. The cleaning-products that were donated for the test are available in Europe; ProSoco Biowash (provided by Fisher, Enfield, England) and BFA (provided by Remmers, Loeningen, Germany).

The initial results of the first test showed successful removal of biological growth with both treatments. While both products seem to work successfully, the Biowash showed continued improved "cleaning" and removal. It appeared that the results with Biowash went beyond the treated area, perhaps due to run-off and rinsing. The placement of the test stones in the cemetery may have interfered with the results slightly; the marble was left under a hedge in a shady spot.

The cleaning was even more distinct on the piece of hardstone. It is clear that the Biowash had a wider cleansing result than BFA.

The objects on which the first test was carried out in November 2008 were left in place after the tests ended. In November 2009, after rinsing the samples with tap water, the following can be noted:

* The Belgian hard stone, still looked very clean. Both ends where the products were applied looked clean. Growth was starting again in the middle, which was not treated.

* The piece of marble was left under a hedge and was eventually covered up with leaves. This condition may contributed to more biogrowth and staining. Even so, it appeared that the area that was treated with Biowash looked better than the area treated with BFA.



The marble after being covered up with leaves. Even under these conditions the ends appear cleaner than the middle that was not treated.

Additional testing on actual grave markers was now proposed. On



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November 12th 2009 at a meeting at Beth Haim with Hans van Veggel (chairman), Jacques Senior Coronel en Géke Beek (secretary) the Board agreed on the new testing and also on not covering up the stones as they had done for many years. Also in attendance was Hendrik Tolboom, a stone specialist and representative of the Agency for Cultural Heritage. He also agreed on the suggested approach.

The same day the testing was carried out. The discription of this test is the subject of this report.



New tests

As is proposed in the first report the next stage of tests should be done on the actual monuments. Two groups of monuments are ideal for this stage of testing the cleaning materials. Both groups exhibit similar soiling characteristics but have different characteristics. The first group consists of six slabs of marble on top of a brick foundation, each about 30-40 cm. above ground level. The surface of the stones is almost level so water can't run off easily, especially from the deep carvings.



First test group as it appeared in 2008

The biological growth on the six stones above is quite similar, with significant existence of the red alga called trentepohlia. This alga thrives in slightly salty air, especially on wet surfaces.

The second group of monuments was chosen for their different shape and soiling characteristics.



Second test group as appeared in 2008. Notice the different type of soiling.



These sarcophagus-shaped monuments readily shed water and no red alga could be detected. The surfaces were totally blackened by biological growth. This group of stones was last cleaned in 2004, probably by high-pressure cleaning.

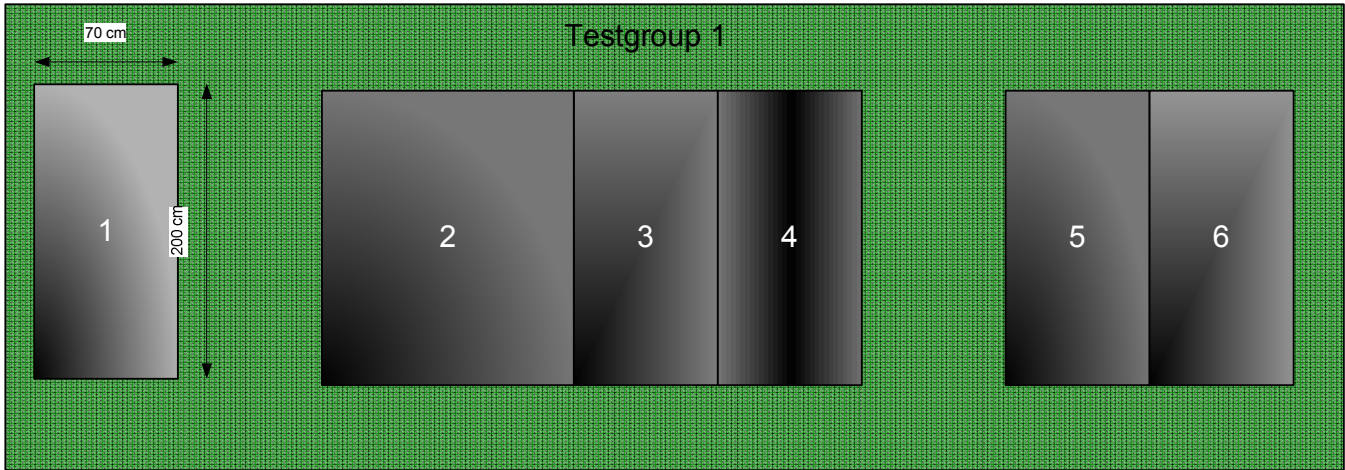


The second testgroup at October 19th 2004, not long after they were pressure-washed.

First group

In the first group there was an outline of six stones. They were numbered according to the situation in the field from left to right. According to the proposal the stones were treated as follows:

- 1. Treatment with Biowash
- 2. No treatment
- 3. Cleaning with tapwater and brushed
- 4. Treatment with BFA
- 5. No treatment
- 6. Only sprayed with BFA



Because of the wet weather the monuments were saturated before the start of the treatments. There was a drizzle when the work started but the weather soon cleared, with occasional sun. The wind was mild. Temperatures rose to about 13° Celsius.

The surface water was cleared with sponges before testing began.

On stones 1 and 4 the products were sprayed on with a dwell time of a few minutes. Additional product was applied and the surface was then brushed with a soft natural bristle brush. The stone treated with Biowash had considerably more foam which was colored with the removal of soiling. That showed that alga was broken down by the product instantly.

After all over brushing both stones were hosed down in each group with tap water. After drying them again with sponges and short air drying, treatments were repeated as above with the same result. This time the foam produced from the BFA product was more significant.



At the first cleaning round (left) the BFA did not foam as much as with the second round (right).

The monuments were fully rinsed with water and left to dry.



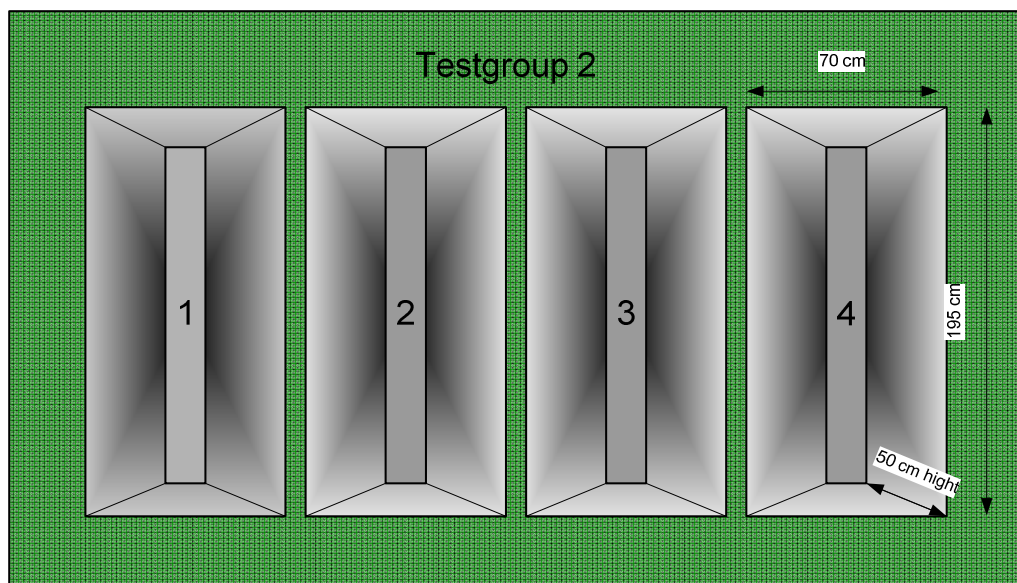
Stone 3 was then hosed off and brushed with water only and rinsed. Stone 2 and 5. were not touched and will be used as controls.

Stone 6 was dried with a sponge and air dried. The surface was then sprayed with BFA. This was done to see the effect on a slightly dryer surface with no scrubbing. The treatment should kill any bio-growth by itself, and the soiling should be slowly removed by rainwater over a period of several months. If this simple treatment is succesfull, stones could be simply sprayed with the treatment every few years with no other physical attention.

Second group

This second group consisted of four stones in a row. Here the testing was carried out in a slightly different way. Again the stones were numbered, according to what had to be done. From left to right;

1. Treatment with Biowash, and mildly pressure washed
2. No treatment
3. Cleaning with mild powerwash only
4. Treatment with BFA, and mildly pressure washed



Stones 1 and 4 were sprayed with the products with a longer dwell time (45-60 minutes). Before brushing, the stones were sprayed with additional treatment and brushed with wet bristle brushes. The stone treated with BFA appeared to have better results removing the black coloration than the Biowash.

The treatment was repeated with additional brushing and at the end the final rinsing was done with a mild pressure wash. For that purpose we used a Stihl RE 142 K pressure washer (see appendix B). A fan shaped tip was used and the distance of the nossle from the stone was kept well back to limit the pressure.

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Pressure washing in progress at the nr. 1 stone that has been cleaned with Biowash.



Initial assessment

After the testing was ready the first group was assessed for result (see photo caption in appendix A). It seemed at this point that the BFA left the surface of the marble more white than the Biowash. At the stone number 1 (Biowash) the surface seemed to be more brown-red. It was also noted that the stones were drying up very rapidly. Large portions had already dried.

The second group dried as well, after the work, but the surface showed limited cleaning.

Remarks

Past experience has shown a very dramatic increase in the removal of biogrowth with time. The biological soiling should be eradicated after treatments but it can be firmly attached to the grains of the stone. It takes time for them to dry out and weather off. It should be stated that the conditions of the stones under which the tests were carried out were at the beginning very wet. This might effect the outcoming of the tests. Starting out on a dry surface might alter the result slightly.



From left to right: Irving Slavid, Hendrik Tolboom, Leon Bok and Norman Weiss.

Aknowlegdement

The testing was carried out by Irving Slavid and Leon Bok, supervised by Norman Weiss (professor Columbia University) and for the first group also by Hendrik Tolboom, specialist on stone from the Agency of Cultural Heritage. Documentation was made by Leon Bok. Pictures were taken by Norman Weiss, Dennis Ouderdorp and Irving Slavid.



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For the work there was help from four volunteers from the foundation "Boete en Verzoening" and the caretaker, Dennis Ouderdorp.

All used products were donated by the manufacturers, Remmers and Prosoco.



Work in progress at the first test site. To the right caretaker Dennis Ouderdorp.



Future assessment

Digital images will be taken at monthly intervals to evaluate the progress of the cleaning. If, after 3-6 months, the results prove to be satisfactory, it is possible that the caretaker enlarges the test area and sprays more monuments in different areas, with documentation and photos of his actions.

The final evaluation will determine how succesful the biogrowth has been removed and if there is a difference between application of treatment only and treatment followed by hand brushing.



Result at November 20th, one week after the test, for both testgroups



Appendix A

Photo-caption First Group



Nr. 1 stone before treatment



Nr. 1 stone after first treatment with Biowash



Result after finishing testing on nr. 1 stone.

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Nr. 4 stone before treatment.



Nr. 4 stone after first treatment with BFA.



Stones nr. 3, 4 and 5 after finishing the test.



Photo caption second group



Second group before testing, nr. 1 on the left, nr. 4 on the right.



After finishing the testing, stone nr. 1 and 4 looked better than 2 and 3 but the result differed from the first testgroup.



Appendix B

Products used

During the testing two products for cleaning marbles en Belgian Fossil (hardsteen) were used. These seconds tests were done on marble stone.

The products are;

- ProSoco Biowash (Fisher – England):

BioWash helps remove a broad spectrum of biological deposits from vertical or horizontal masonry, stone and tile surfaces. Simply dilute with clean water as directed, and apply BioWash to the surface. A short contact time, gentle scrubbing and a water rinse are normally enough to remove light-to-moderate deposits of fungi, algae, lichen and bacteria typically encountered on building surfaces and monuments. It's safe for landscape plantings and grass. Effective on all types of stone, concrete and brick masonry. Nonfuming, low-odor formulation. Needs no substrate neutralization. Minimal precautions required for handling and storage. Easy to apply with brush, roller or coarse spray. Biodegradable.

- BFA (Remmers – Germany):

Impregnation BFA (Alkutex BFA Remover) is a heterocyclic compound with a bactericide, fungicide, algicide effect, phenol and formaldehyde-free. No surface active effect and free of heavy metals. Used to promote cleaning, particularly before hydrophobizing impregnations are applied. For removing biological infestation on building materials such as natural stone, sand-lime brick, render, brick, clinker, concrete, exposed aggregate concrete, fibrated cement, bonded heat insulation systems and for restoring painted substrates on facades as well as in interior rooms. Subsequent hydrophobic impregnation of mineral substrates with Funcosil Impregnation Agents protects the surfaces from further soiling. These types of impregnation agents reduce the absorption of water in treated substrates and therefore also reduce the tendency to become infested with alga, lichen and moss.

Stihl Re142K Plus High Pressure Washer

Description of the pressure washer, from <http://www.stihl.co.uk/>
Practical Cold water high pressure for demanding cleaning tasks in workshops garages or around the home. Compact nozzle system with bayonet coupling. Hose drum for tidy storage. Fan jet nozzle with pressure adjustment. 12m Steel reinforced high pressure hose. Adjustable pressure gauge and pressure flow control. Integrated cleaning agent tank. Ceramic coated piston and brass pump head.

The nossle used was the Fan-jet nozzle, variable pressure: with the variable pressure fan jet nozzle, larger areas are cleaned quickly and effectively, with control over the pressure to suit different tasks.





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Technical data

Working pressure	10-140 bar
Max. water throughput	610 l/h
Power output	2.9 kW
High-pressure hose length	12.0 m
Weight	23.5 kg
Mains voltage	230 V
Max. water feed temperature	60 °C