

## Headstone Cleaning With D-2

**D/2 Biological Solution is specially formulated to remove environmental pollution, dirt, and staining from biological soils such as mold, mildew, lichen, and algae from indoor and outdoor structures. Available in 1 gallon size, 5 gallon size, and 6 gallon case (which contains 6 one gallon containers).**

Staining and soiling caused by mold, mildew, algae, lichens and air pollutants contribute significantly to the degradation and disfiguring of many types of construction surfaces. D/2 can be utilized to safely resolve this problem on all wood, stone, masonry, metal, vinyl, and roofing surfaces. D/2 works best when used at 45 degrees F or above.

### Methods For Use

#### ○ **No Scrub/No Rinse Method**

1. Using a sprayer (pump-up, low pressure, or other,) wet the entire surface with D/2.
2. Allow to air dry. D/2 works with the elements and results occur within one week to one month, depending on severity of soil. Reapply if rain occurs within 12 hours of application.

#### ○ **Immediate Results Method**

1. Apply D/2 with a brush, roller, or sprayer.
2. Allow the undiluted D/2 to remain on the surface for 5 to 10 minutes.
3. Apply additional D/2 to maintain a wet surface.
4. Scrub the surface thoroughly with a non-metallic, short fibered scrub brush.
5. Lightly mist with water and continue scrubbing.
6. Rinse thoroughly with fresh water using a hose or sprayer.

### Treatment and Maintenance Program

After initial treatment of substrate, a once-a-year light spraying will help maintain a clean, stain-free surface.

**NOTE:** Heavy biological deposits may require repeat applications of D/2 to achieve complete cleaning after detachment. Alternatively, heavy growth can be detached by manual scraping using wooden or plastic tools immediately after application. In the event of excessive plant exposure, rinse all plants and water-in all planted ground areas contacted by D/2.

### Where to Use

**D/2 Biological Solutions is designed to treat masonry, stone, concrete, wood, asphalt shingles, vinyl & aluminum siding, fiberglass, metal, paint, canvas, etc.**

# CLEANING

## Why are you Cleaning?

The first question should always be, "does this stone truly need cleaning?" Often people mistake the patina of age for "dirt." They want marble stones, for example, to be as white as when originally purchased – and this is a tragic mistake. Not only does such aggressive cleaning cause irreparable damage, but it destroys the stone's patina – and history – making it look like the stone was placed in the cemetery only yesterday. Moreover, the cause of much biological growth is the shade created by the dense foliage of trees that usually can't – or shouldn't – be removed from the cemetery. Consequently, once you begin a program of washing you find that you must clean the stones every few months. And every cleaning, no matter how gentle, has the potential to cause additional damage to the stone.

So, you may decide that a soiled stone is best left in that condition.

There are times when biological growth may be causing deterioration of the stone. In such circumstances it may become necessary to clean the stone. Many professional conservators will also clean the stone in order to get closer to the original stone color for infill matching.

- *Algae, lichen, fungi* -- that may be green, black, gray, yellow, red, orange, brown, or blue -- can be hazardous to gravestones because they trap moisture on (and under the surface of) the stone. They also secrete acids that can dissolve limestone, marble, sandstone, concrete, and mortar. And they may insert their "roots" into the pores of the stone. These growths will swell and shrink in response to moisture, leading to cracking and spalling of the stone.
- *Plant life* -- such as ivy, ferns, and moss, may be hazardous to the gravestone because they have roots that will penetrate the stone and also because they trap moisture.

## Removal of Organic Materials

On smooth, stable surfaces, algae, lichen, and fungus may sometimes be easily brushed or scraped off before washing (*always use scrapers that are softer than the stone, such as wood popsicle sticks or bamboo skewers*). Most surfaces, however, require wetting the growth before gently brushing, prying, or scraping them off the stone. Plants should be **gently** pulled out of cracks or clipped, and then the soil or debris they were rooted in should be brushed away



from the stone. The plant's root system should be removed with the soil and debris. If there is a mass of plant life, **don't just yank it from the stone** -- you'll almost certainly damage the stone. Carefully clip or pull away each section, to prevent pulling away any loose or weakened fragments of stone.

## Basic Cleaning

1. Remove any loose debris or plant life (see above)
2. Thoroughly wet the stone with a hose and running water. The water will wash away some of the dirt or biological material, and also is essential to prevent the stone from absorbing the detergent you will be using as the next step in cleaning. **If you don't have a source of running, potable water – don't attempt to clean the stone!**



3. Gently scrub the stone with very light pressure in a circular motion using a soft-bristle brush to dislodge soil/biological growth from the stone. **Work from the bottom of the stone up toward the top** -- this prevents staining and streaking as clean water drains downward. **Do not use a dry brush!** A dry brush can damage the gravestone by removing the upper layers of the stone, causing it to deteriorate faster or by opening small holes or pores for future biological growth.

Constantly dip your brush in a bucket of water, or better, allow a water hose to run on the stone as you brush. Remember, *less abrasion on the stone surface is best.*

4. **Rinse the brush frequently!** Use a clean brush to clean with; don't abrade the gravestone by dragging dirt, sand, particles of broken stone, twigs, etc. across the surface you are supposed to be protecting.

5. Use clean water. If the gravestone is particularly dirty, change your bucket of water frequently, so that you are not dipping your brush into a suspended solution of the grit and biological matter you are removing. This is another convenience of having water running over the stone throughout the cleaning.

6. Rinse the stone thoroughly with water.

## Cleaning with D/2 Biological Solution

1. Thoroughly wet the stone with running water from a hose. This, of course, isn't necessary if this step follows basic water cleaning since the stone will already be wet.

D/2 Architectural Antimicrobial is a proprietary combination of octyl dimethyl ammonium chloride, dioctyl dimethyl ammonium chloride, oidecyl dimethyl ammonium chloride, and alkyl dimethyl benzyl ammonium chloride with surfactants, wetting agents, and buffers. It has a pH of 9.5. It is noncombustible. There are no specific hazards in handling either the concentrate or diluted solutions. You should avoid splashing the liquid in your eyes. Ask the supplier for a Material Safety Data Sheet (MSDS) for additional safety information.

2. Heavy growth should be cleaned with undiluted D/2. For lighter deposits D/2 can be diluted with potable water from 1:1 to 1:4 parts water by volume.
3. The D/2 can be applied to the stone using a brush, roller, or pump sprayer. Scrub the surface thoroughly with a soft-bristle brush and allow the D/2 to remain on the surface of the stone for 1 to 2 minutes (up to 10 minutes for optimal action when there is heavy growth). Then apply additional D/2 to maintain a wet surface.

Lightly mist with water and continue light scrubbing. Complete cleaning may require multiple applications.

4. If at any time you feel that the stone you are working on is unstable -- it flakes, spalls, or sugars (produces lots of grit) -- **STOP IMMEDIATELY** and get assistance.

5. When the stone is clean, rinse it **thoroughly** with water. This means allowing water to run over the stone for at least an additional five minutes -- about the time it will take you to locate the next stone to be cleaned and get set up.

6. Never undertake cleaning if freezing temperatures are anticipated within the next 24 hours.

## Examples of Cleaning using D/2 Biological Solution





These photos show before (left) and after (right) cleaning of two granite monuments that had very heavy lichen growth.



This marble tab in socket stone was leveled, reset, and cleaned. The before photo is on the left; after is on the right.

## What NEVER to do to Stone

There are some "cleaning" approaches that should **NEVER** be used on cemetery markers.



cause identical problems.

Also be aware that many pool corrosive. Many may also be very environment. We do not recommend the use of ANY such products. The only biocide that we recommend is D/2.



### Use of bleach.

Sodium hypochlorite (common bleach) contains salts that damage stone. Stone "cleaned" with bleach, upon careful inspection, reveals erosion and yellowing. Pool bleach (calcium hypochlorite) will

algaecides are very damaging to the

**Use of acid cleaning.** Acids on marble and limestone dissolve the stone, leaving an inappropriate glossy and crystallized looking surface. This damage cannot be undone and the use of acids is also dangerous to you and surrounding vegetation.



**Use of sand blasting.** This approach (even if "soft" materials like glass spheres are used) is

very harsh and will dramatically abrade the stone surface. This has the potential to actually accelerate further deterioration of the stone. Once done, there is no way to undo the extreme damage caused by sandblasting. The patina, or historical beauty of the stone, is entirely destroyed.

**Use of high pressure water.** Water pressure over 90 psi has the potential to significantly damage any stone that isn't sound, increasing spalling, and accelerating sugaring.





**Recarving inscriptions.** While not actually a cleaning technique, this is sometimes done to "improve" the readability of faint inscriptions. But it does irreparable damage to historic stones, destroying their original artistry and beauty -- and destroying the historic significance of the stone itself. There are other approaches if a family wants to ensure that the grave continues to be clearly marked, such as setting a new stone horizontal on the ground (such as the example to the left).

## Sources for Products

<p>D/2 Architectural Antimicrobial</p>	<p>Cemetery Preservation Supply, LLC at <a href="http://www.gravestonecleaner.com/">http://www.gravestonecleaner.com/</a></p> <p>Granite City Tools at <a href="http://www.granitecitytool.com/d2-biological-solution">http://www.granitecitytool.com/d2-biological-solution</a></p> <p>Limeworks.us at <a href="http://www.limeworks.us/blog/index.php/d2-biological-solution/">http://www.limeworks.us/blog/index.php/d2-biological-solution/</a></p>
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