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# Cleaning Concrete Masonry Walls

More than any other task performed by a mason contractor, cleaning is a “means and methods” function. Building codes and contract documents will spell out performance requirements, however in most instances it should be left to the mason contractor to determine the process to follow to achieve the requirements.

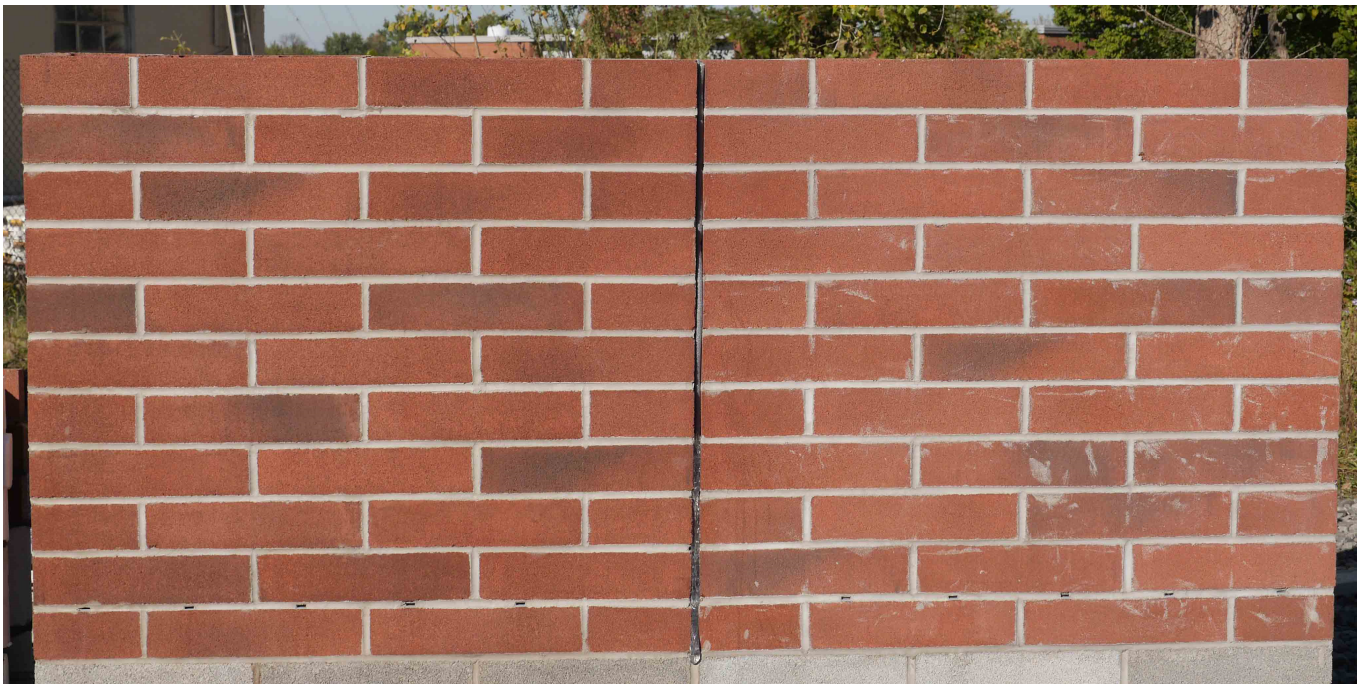
Masonry producers, chemical manufacturers and equipment companies can all provide valuable suggestions. However there are many variables and only the mason is in a position to evaluate conditions and make adjustments. Only one step should never be varied: test your means and methods before you start. The consequences of not testing first can cost a mason contractor a tremendous amount of money if the wall is damaged.

Listed below are some considerations to combine with your experience that we hope will help you successfully clean concrete masonry walls. When we reference the “code” in this document, we are referring to TMS 402/602 “Building Code Requirements and Specifications for Masonry Structures.”

TMS 402/602 “Building Code Requirements and Specifications for Masonry Structures” states:

> “Clean exposed masonry surfaces of stains, efflorescence, mortar and grout droppings and debris using methods that do not damage the masonry.”

The code has such decisive requirements for cleaning because architects and building owners simply want to receive a clean attractive masonry wall. Otherwise, we shouldn’t expect masonry to be their choice in the future. Given there has never been a masonry wall completed without some insignificant stains left on the wall, what is the meaning of “clean” and how is it decided if the wall is clean enough? The answer is the sample panel.



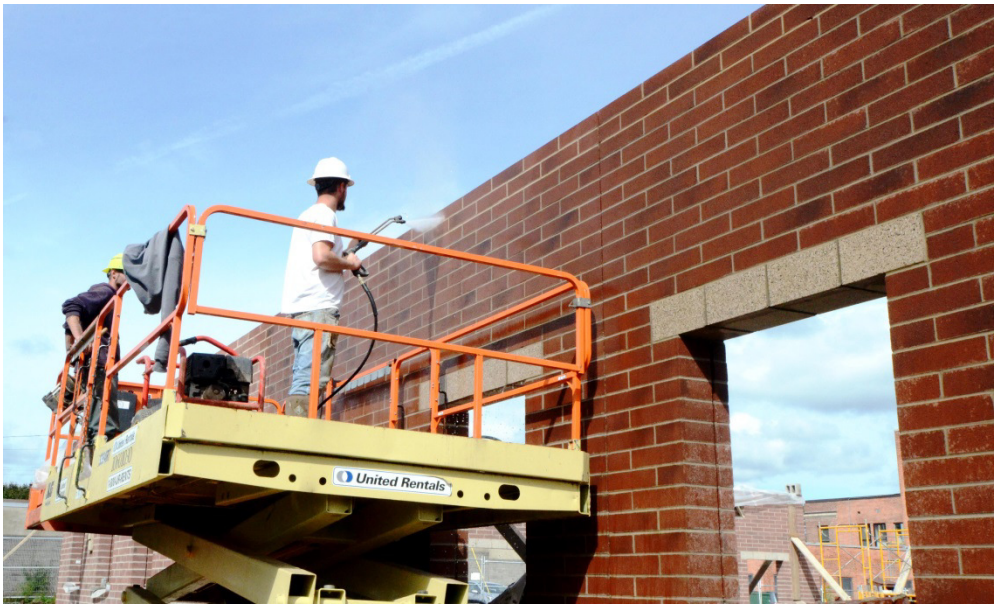
Left side of the sample panel, cleaned and coated  Right side of the sample panel, before cleaning

TMS 602 “Specifications for Masonry Structures” states:

> “The acceptable standard for the work is established by the accepted panel.”

Sample panels are a particular type of submittal with one of its functions being verification of aesthetics. The sample panel establishes the acceptable standard of quality for the project and as such defines what clean means. Therefore if the walls of the project will have insignificant stains when you are done, the sample panel should reflect the finished wall and also have insignificant stains. It is helpful to have this conversation during a preconstruction meeting before the sample panel is built.

Concrete masonry units and mortar joints react differently to various cleaning methods. The texture, color, shape and surface strength of the masonry you are attempting to clean all contribute to the sensitivity of the surface to damage from the cleaning process. Testing the cleaning products and your application method before using it on the walls of the building is the only safe means of determining the best methods to use. The cost of testing your means and methods first, is a fraction of the time and money it will take to wash the walls a second time if the first attempt wasn’t successful. Or worse, your cleaning method was too aggressive and the wall was damaged. Because you have been successful on past projects using a specific cleaning product and method, doesn’t mean you will successfully clean the walls on your current project unless all the variables are exactly the same. There are too many variables to take this risk and not test first. If you want to test your methods early, most masonry manufacturers will provide units free for you to test your cleaning process even before the sample panel is built. Starting early facilitates evaluating a variety of products for both labor and cleaning efficiency.



Jobsite lifts can reduce the cost of labor and position the crew to do the best job.

A high percentage of liquid cleaning products are acidic. The chemistry in acidic solutions is typically effective breaking down cement based stains and most forms of efflorescence.

When using a wet cleaning method, success or failure cannot be seen until after the walls have dried. Many jobsite stains and surface damage cannot be seen when the wall is wet. For this reason, it is critical to evaluate your means and methods before construction starts and it is helpful to review your plan during the preconstruction meeting. This plan is then demonstrated on the jobsite sample panel as the "Code" requires. If your means and methods were successful on the sample panel, repeat the process on the masonry walls of the building during construction. Never wash the actual walls of the building without testing your process first for two reasons:

1. If your means and methods did not successfully clean the walls, all the labor and materials you used would have been wasted: you'll have to make a second attempt at cleaning.
2. Most importantly, if the cleaning process is tested on the walls of a building instead of the sample panel, you can permanently damage the walls. This can be devastating to the mason contractor economically.

It is critical that adequate water is available for cleaning before masonry construction begins. The architect should have required this in project specifications. Totes of water are typically not adequate to clean masonry walls. If municipal water is not available, the architect and general contractor should be informed during the preconstruction meeting that masonry construction shouldn't start before municipal water is available.

The manufacturer of the masonry products used on the project can provide guidance on cleaning products and application methods that have been used successfully on their products in the past. Manufacturers of cleaning products usually test their materials on a wide variety of masonry walls and conditions and should be consulted on the proper application. However, nothing can be a substitute for testing your own means and methods before trying them on the building. There are plenty of variables within masonry that could require a unique cleaning approach on the job you are about to start. Listed later in this document is a description of some of variables that can be encountered.

Stains

If industry best practices are followed during construction, the majority of the construction stains you will clean off the wall are from mortar sticking to the surface when excess mortar was scrapped off head and bed joints before tooling. If excess mortar is cut off once the mortar has stiffened and the mortar is tooled when thumb print hard, the mortar stains are likely to be on the surface of the masonry units and will be relatively easy to clean off the wall.

Mortar is thumbprint hard when the image of your thumbprint can be left in the mortar

However, if the excess mortar was cut off with a trowel when the mortar was too wet or the joints were tooled too early, before they were thumb print hard, the mortar is more fluid and can be smeared into the pores on the surface of the masonry unit. If this occurs, it is important that cleaning the walls proceed as quickly as practical before the mortar stain fully cures and creates a strong bond in the masonry unit.

This mortar was tooled too early. Mortar smears and gaps at the bond line can occur.

If masonry grout stains the walls during reinforcement activities, a similar condition exists and cleaning should proceed as quickly as practical. Mortar and grout are cement based materials and the longer they sit on the surface of the masonry unit, the cement continues to cure, the bond increases and the stains become increasingly difficult to remove. Cleaning shouldn't proceed until the mortar joints are cured enough to withstand the cleaning process without damage. Depending on weather and mortar type, it is common that the mortar joints are strong enough to clean after just two to three days of curing. Testing your cleaning process first will provide the insight on the earliest mortar joints can be cleaned without damage. The focus of the cleaning process should be to remove mortar and grout stains without also removing a significant amount of the cement paste on the surface of the concrete masonry unit.

Here are a few additional points to consider:

Temperatures

When using most wet acidic cleaning methods, it is critical to rinse the acidic solution off the wall before it dries. There are some high temperatures and wind conditions during which cleaning should not be attempted. When temperatures and winds are high enough to dry the water and cleaning product before it can be rinsed off, the cleaning solution can create its own stain. Keep in mind, the surface of dark masonry walls often have a much higher temperature than the temperature of the air. In general, the higher jobsite temperatures are, the smaller the area you should clean before rinsing. Most cleaning product manufacturers suggest the maximum number that should be cleaned before rinsing.

This wall was over 100 degrees when the detergent was applied- flash set

Cold temperatures also directly affect cleaning products. Certain cleaning products aren't as effective in lower temperatures. Water can't be applied to walls in certain temperatures. Closely read the cleaning product manufacturers directions and hot and cold weather building code requirements.

Prewet

Wetting the wall with water before applying a wet acidic masonry cleaner is common. However, the degree that the wall should be wet and whether the wall has to be maintained wet, varies with specific cleaners. Closely read the cleaning product manufacturers directions.

Dilution of acidic cleaners

If you are using a wet acidic cleaning product, often the manufacturer recommends a water to cleaning solution ratio. However, manufacturers almost always recommend that you test the mixture and application method first. The reason

is there are too many variables in the types of masonry units, application methods and jobsite conditions. Never simply apply the cleaning solution without first trying it. There are times a lower water/cleaner dilution rate is required to clean stains off the wall and often a higher water to acidic cleaner addition rate is necessary. That is why if you are following the manufacturers recommendations, you are always testing the solution and method before experimenting on the wall of a building.

Application

Some masonry cleaners are designed to be applied with a special application tool that automatically regulates the pressure and dilution of the cleaner. Others are designed to be applied by brush. Some cleaners are designed to be scrubbed after application, others simply rinsed. There are cleaning products that are designed to be applied from the top of the wall going down, others from the bottom up. Some cleaning products are designed for one application, others multiple applications. The point here is that most of the producers of masonry cleaners have "designed" their products for a specific application. There are times your own means and methods have shown a more successful method on certain masonry surfaces, however be careful if you deviate from their manufacturers recommendations and test your method on the sample panel, not on the masonry wall of the building.

Dwell Time

Different acidic masonry cleaning product manufacturer's use different terms; however, all should give general recommendations on how long the cleaning product should remain on the wall, or dwell, before being rinsed off. Typically dwell time is designed to soften stains like mortar, grout and efflorescence, before the next application or rinse. Some cleaning product manufacturers recommend removing buildup of mortar and grout with a plastic scrapper, softening between applications or before rinse. Closely read the cleaning product manufacturers directions and test your method on the sample panel, don't experiment on the masonry wall of the building.

Suggestion: Use a loud timer to alert you when the dwell time you have tested has been reached. It is easy to lose track of time when you are washing a wall.

Water pressure

Be extremely careful using a water pressure washer. Too high of a pressure can:

- Etch cement paste off the mortar joint and masonry unit surface.
- Drive water into the wall system creating a potential for efflorescence
- Rip mortar from the joints

Both of these walls have been damaged cleaning with a water pressure washer that was too aggressive

If you are going to wash using a pressure washer, test your means and methods first. Some of the means and methods to evaluate: the water pressure, tip, spray angle and distance from the wall.

Abrasive cleaning

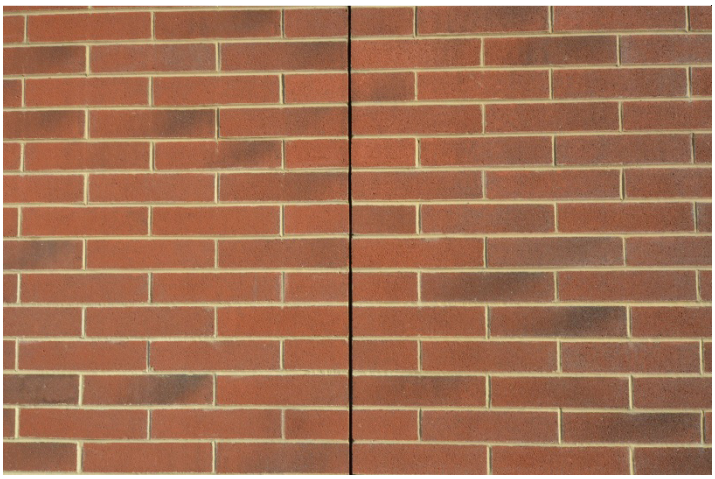
Abrasive cleaning is not as common as wet cleaning methods, however in certain situations it can be very effective. Abrasive cleaning with slag products often works well cleaning split face or weathered textured cmu. Abrasive cleaning with baking soda can be successfully clean many types of masonry.


Jim Harrison, a pioneer of cleaning masonry with baking soda

Regardless of what cleaning process you employ, follow the safety and environmental regulations for the product you are using and the location you are working in.

A final point on cleaning. Everyone's goal is to finish a project leaving beautiful masonry walls that owners, designers, contractors and manufacturers are all proud of. Another goal is to accomplish this as cost effectively as practical.

The longer stains remain on a masonry wall the more time it takes to remove the stains which sometimes leads to use of aggressive cleaning methods that can damage walls. If it is practical to mobilize your cleaning crew two or three days after the wall has been laid, you can often reduce the cost of cleaning and the finished walls will look like everyone hoped they would.



They are many more considerations when cleaning concrete masonry than can be listed in this short document. This is simply meant to provide limited insight on some of the conditions and variables we have experienced. Please use your own judgement and if any of the suggestions listed in this document conflict with projects specifications, do not procede with these considerations without first receiving approval from the architect.