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Overview of masonry cleaning techniques

The following overview highlights the primary systems available today, concentrating on applications for exterior surfaces composed of stone, brick, terracotta, concrete, and stucco. Masonry cleaning techniques available today include traditional methods (e.g. water and steam) as well as new techniques that have come into use in the past two decades (e.g. microabrasive systems). In addition, systems initially designed for use in other industries (e.g. pelletized carbon dioxide cleaning), or for use with objects and sculpture, (e.g. laser cleaning) are increasingly being applied to the cleaning of building façades.¹⁶

Current cleaning systems used on masonry buildings can be characterized in four categories: water, abrasive, laser, and chemical techniques. Depending on the nature and condition of the substrate, and on the character of the soiling to be removed, systems or a combination of systems may be appropriate for a specific cleaning campaign. Other criteria to be considered include protection requirements, environmental constraints, special application requirements, and cost.

In addition to the stated goals of the cleaning programme, other factors in selection of a cleaning system include the nature and condition of the substrate, contaminants to be removed, site and temperature constraints, protection and disposal requirements, and cost. Also, the level of cleanliness desired may be a factor in identifying the cleaning systems that can be used in a particular application. For example, if some remaining soiling produces an acceptable cleaning result, then it may be possible to use a gentler cleaning system than would be needed if more thorough removal of soiling is required. Variables in cleaning systems include formulations and dilutions of cleaning chemicals, materials used in abrasive techniques, and application pressures for cleaning materials and for water used in prewetting, cleaning, and rinsing, among other factors, which are further discussed below.

Water and steam systems

In water cleaning techniques, loosely bonded atmospheric dust and dirt, soot, and other deposits can be softened or dissolved by brushing, soaking, or mist spraying, and the surface then rinsed to remove the residual dirt. An important factor in the use of water systems is the pressure at which the water is applied to the wall. This consideration must also be given to chemical systems, many of which involve application of water for prewetting and rinsing. Depending on the substrate, the definition of low, medium, and high pressures varies widely; an application water pressure that is considered high for masonry may in turn be low for use on some metals.

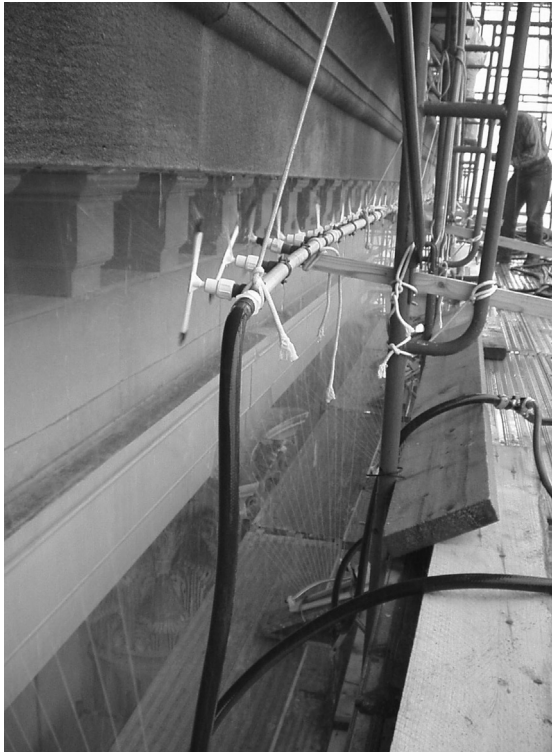


Figure 1 For low pressure water soak and rinse cleaning, spray racks with multiple nozzles are used. The spray rack can be configured to reach complex and difficult profiles on the building façade. This technique has been found to be very effective on limestone and marble substrates.

Gentle water cleaning methods based upon intermittent misting or continuous soaking use very low pressures (less than 50 psi), followed by a low (100 to 200 psi) or medium (200 to 400 psi) pressure water rinse. Moderate to high pressure water washing (400 to 800 psi) is generally safe for use on stone such as granite.¹⁷ However, water washing at these higher pressures can potentially erode soft or fragile stone surfaces.¹⁸ The effect of the water spray or stream on the substrate is also related to the volume of water, the aperture of the nozzle, and the distance of the nozzle from the wall surface. For example, low pressure water cleaning techniques often involve the use of multiple fan-spray nozzles attached to a spray rack suspended adjacent to the wall surface being cleaned. Specialized rack systems can be built to clean complex surface profiles, and low pressure sprays may be continuous or intermittent. In contrast, high pressure water cleaning is typically performed from a single nozzle with a very narrow fan spray. A narrow aperture or a lower water volume at a given application pressure will generally result in higher pressure as water reaches the wall. Low pressure water misting systems are typically most successful on calcareous materials such as limestone and marble, as atmospheric soiling is readily loosened from these surfaces by gentle methods. Also, water (or microabrasive) systems are preferred to chemical cleaners for use on

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Figure 2 For very fine mist cleaning, adjustable nozzles are conformed to reach many areas of delicate stone crevices. Each nozzle is equipped with an arm that can be adjusted to reach difficult areas of access where soot and carbon build-up can occur.

marble and limestone because siliceous components of the stone are dissolved by certain acids.

Successful water cleaning depends on proper selection of application techniques and pressures, proper protection methods prior to cleaning, and skill of the operative in maintaining a controlled application. In addition to issues related to water pressure, problems associated with improper water