

Repointing Masonry Walls

The durability and longevity of masonry is greater than that of any other building material, as evident in the thousands of old brick buildings throughout our neighborhoods and towns. When designed and constructed properly, masonry can last hundreds of years or more. To maximize the life of a masonry building, the mortar joints will need periodic maintenance during the building's life cycle. As with any building product continuously exposed to the elements, the joints are susceptible to weathering, acids in the rain, seismic movement, building settlement, freezing and thawing cycles, impact damage, and dirt. When visual inspection reveals that the mortar joints are cracking or otherwise deteriorated, restoration is necessary to help maintain the integrity of the wall system. Commonly known as tuckpointing, "repointing" is the preferred term used to describe the process of cutting out deteriorated mortar joints in a masonry wall and filling in those joints with fresh mortar.

The goals of a repointing job should be to remove and replace mortar in a way that will maintain the structural properties of the wall, improve the appearance of the wall, and form weathertight joints. To accomplish this, the architect should produce drawings and specifications that will clearly state the requirements for mortar removal, joint preparation, preparation of pointing mortar, and placing mortar in the joints. For best results, use only contractors employing trained, skilled tuckpointers.

Determining Scope

The architect should determine the scope of the work with the assistance of the tuckpointing contractor. Begin by inspecting the wall to determine which joints are to be replaced. Mortar that can be easily scratched out with a sharp object, such as a chisel or line pin, may be deteriorated enough to need repair. A number of other questions should also be addressed:

- Are all the mortar joints on the building to be tuckpointed, or only those joints where the mortar has eroded to a particular depth?
- What about areas where there are hairline cracks between the masonry units and the mortar?
- Does the building need to be cleaned before the real condition of the mortar joints can be observed?
- Will the tuckpointing contractor be left to determine which joints need to be repointed?

It is also important to determine the age of the building to be repointed. If it dates back to the early 1900's or older, more care must be taken in selecting and mixing mortar. It wasn't until after the 20th century began that portland cement was combined with the traditional sand and lime to make mortar. Older mortars without portland cement are far weaker than modern mortars and have less compressive strength. A stronger repointing mortar deforms less under load than older, weaker mortar, concentrating the load in the area of the stronger mortar. This stress can lead to spalling of the masonry units.

Mortar Removal/Joint Preparation

Perhaps the most important step in a repointing job is the removal of deteriorated mortar. If all of the deteriorating mortar is not removed, the new mortar being placed will not properly bond in the joint. Qualified tuckpointing contractors will always devote attention to mortar removal.

The amount of wall area needing repair will help determine which tools should be used to remove the mortar. Hand tools, such as a hammer and toothing chisel, may be used for small wall areas. Large wall areas may be more efficiently removed by using a pointer's grinder or a power saw with a carborundum blade. While mechanical tools are faster than hand tools, power tools may damage the masonry units surrounding the mortar. Additionally, if an historic building is being restored, saws, grinders, and other mechanical tools may not be allowed without obtaining special permits. In all cases, the craftworkers should wear safety glasses to prevent mortar and masonry particles from getting into the eyes. A respirator should also be worn to protect against inhalation of dust particles.



Union tuckpointers are trained to use care when using mechanical tools such as this grinder to remove deteriorated mortar, as not to damage the adjacent masonry units.



All deteriorated mortar must be removed so resultant joints have a uniform depth of 1/2" to 3/8", or until sound mortar is reached.

The craftworker should remove old mortar to a depth of 3/8" to 1/2", or until solid mortar is reached. Do not remove mortar in excess of one third the depth of the masonry unit above. The mortar being removed should be raked out the full width of the joint to the proper depth so that the void formed is in the shape of a rectangle, *not* a "U" or "V" shape. Unless the void is the proper shape, a good bond will not be formed, and the new mortar may fall out or not be weathertight. After raking out the old mortar, loose particles should be removed from the joint by brushing, rinsing with water, or blowing with air.

Preparation of the Pointing Mortar

The mortar used for pointing should serve at least three purposes: It should be strong enough to meet any structural requirements, while not being so strong as to inhibit movement of the masonry; it should be weathertight; and, for architectural purposes, it should match the color and texture of the original mortar.

According to ASTM C 270, the mortar used in pointing should be prehydrated in order to reduce the amount of shrinkage that can occur after it is placed in the joints. Hydration, a chemical action, results when water is added to cement. It can be greatly reduced if the mortar is allowed to shrink before it is placed in the joint. This is achieved by the following steps:

- 1) Place all dry ingredients in a tub or mixing box.
- 2) Thoroughly mix all dry ingredients (sand, cement, and lime).
- 3) Add half the amount of water that would be used for mortar in new construction.
- 4) Mix the mortar until it will hold shape when formed into a solid ball; there should be no flow or spread of the mortar at this stage.
- 5) Let the mix hydrate for one to two hours, per ASTM C 270.
- 6) Add more water to make the mix workable, but still relatively stiff, which results in good workability and minimum smearing.

In most cases, a prehydrated type N mortar, or prehydrated mortar made from type I cement, is suitable for pointing. Refer to ASTM C 270 for specifications by proportions or properties.

Placing Mortar in the Joints

Before the pointing mortar is forced into the raked out joints, the joints should be moistened with a hose and sprinkling nozzle, or with a brush and bucket of water. The water that is applied should be allowed to absorb into the masonry units before placing mortar into the joints. Pre-wetting the joints serves at least three purposes: It removes any small, loose particles left in the joint; it improves the bond between the masonry units and the mortar; and, it keeps the new mortar in the joint soft longer, allowing the craftworker more time to do a good job of tooling the joints.

After premoistening, mortar is placed into the joints with a narrow tuckpointing tool, sometimes called a backfiller. Trained craftworkers will choose a backfiller slightly narrower than the joint to be filled, enabling them to completely fill the joint in less time, while keeping mortar off the face of the adjoining units. The supply of mortar is held on a hawk or the back of a trowel.



Apply the new prehydrated mortar in 1/4" lifts to minimize voids and air spaces that could lead to shrinkage of the mortar.

The mortar should be forced into the joints in layers not to exceed 1/4" layers, or lifts. Placing the mortar in lifts helps fill any voids and minimizes shrinkage of the new mortar. Subsequent lifts should be applied when each previous lift is thumbprint hard. Depending upon the depth of the joint that has been raked out, several lifts of mortar may need to be applied to bring the new joint even with the surface of the wall.

The direction of mortar placement is also critical. Avoid air pockets and voids by pressing or forcing the layers of mortar into the joint in one direction only. Right-handed bricklayers usually point from right-to-left. The layers should always be pushed back upon the previous layer underneath. This will force out air pockets and leave no voids. Head joints can be completely filled if the mortar is worked from the bottom of the joint up, pressing mortar back on top of itself by striking the joints in a downward motion.

Since prehydrated mortar will harden faster than regular mortar, the bricklayer or pointer should adjust his work schedule to assure that the joints are tooled when thumbprint hard. For the greatest resistance to moisture penetration, concave-tooled joints are recommended due to the compression of the mortar as the joints are tooled. Vee joints also provide good resistance against moisture penetration.

Excess mortar and tags can be removed by brushing or wiping the work after the mortar has set up enough to prevent smearing. If brushing or rubbing is done while the mortar is too wet, it will be forced into the pores of the units and be hard to remove. If the units are porous, they should not be cleaned by rubbing with a cloth, but may be rubbed with a piece of brick or block after the mortar is stiff, or scraped with a trowel or other sharp edged tool to remove any excess mortar. After the larger particles have been removed, a cleaning solvent may be needed to remove mortar stains and complete the job of repointing.

When properly done by union contractors and skilled craftworkers, repointing provides strong, weather resistant mortar joints that match the appearances of the original mortar joints, and helps extend the commercial life of the building.



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