

Common Causes of Mortar Color Variations

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Many variables come together to produce high quality masonry. Mortar is one of the only job site materials made by hand and as needed. Whether the mortar is made by breaking bags of cement and lime in the mixer and adding sand by the shovel, or using pre-blended materials in 80-pound bags or in 3,000-pound bulk bags through a dispensing system, the importance of achieving the desired mortar color and aesthetic cannot be forgotten. After all, the mortar is the “framework” of the masonry unit.

Look at the four groupings of colored mortar channels. How many colors do you see? Although there are 12 channels total, there are only four different colors. Each of the four sets of mortar channels represents one color. Each of the color sets meets the fundamental requirements to maintain color uniformity. They are:

1. Sand from the same source.
2. The same cement/lime or prepared masonry cement.
3. The same pigment and a uniform measurement from batch to batch.

Furthermore, the color sets represented are each formulated with the same amount of sand, cement and pigment. As evidenced, this alone does not ensure uniformity in color. These samples demonstrate that water demand and striking times matter.

Water Demand

Water demand in masonry mortars is going to be a function of the mason's needs. How loose or stiff a mortar is made will be a function of the masonry unit. With this said, brick that has a high initial rate of absorption (IRA) requires a 'looser' mortar. A hard brick requires a stiffer mortar. A glazed brick requires a stiffer mortar as there is limited ability to draw out and suck moisture from the mortar. Block mortar needs to be wet enough to be workable and carry the weight of the block.

Water demand will vary due to daily weather conditions. Cool mornings require a mortar that is a little stiffer. As a warm day develops, water demand will increase. For these reasons, a prescribed amount of water can not be necessarily adhered to. Due to varying water requirements, it is important to tool the joints when the mortar is thumbprint hard.

Striking times

In each group, the center channel is the correct and desired mortar color. The center channels were struck when the mortar was thumbprint hard. A mortar joint which is struck, or tooled, at this time seals the joint with a slight paste, thus closing the mortar joint to water and weather penetration.

The lighter channels in each grouping show joints that are tooled before being thumbprint hard, bringing excess water and paste to the surface. Joints that are tooled in haste have a weaker surface paste that will come off over time. This could be compared to a concrete which is finished too quickly leaving a weak thin surface that will pop off, or “spall”. In addition, joints that are struck in this manner often leave a drag mark from the jointer.

The darker channels were struck after the mortar set slightly too hard. When mortar joints are struck beyond the initial set, there is not enough water present to bring a paste to the joint surface, leaving the joint slightly porous and dark.

Other Factors and considerations

Colored mortars are usually chosen from a reference colored mortar channel kit assembled by a pigment company. The owner or architect of the newly proposed building will usually chose a color to best compliment the masonry units on the job from one of these kits. The raw materials available to the mason contractor, be it field mix or factory pre-blended mortars, are not (usually) the same that the pigment company used when making the channels for their color kits. Also, pigment companies typically finish the joints in their color kits to expose a weathered look. Typically, the color channels will not have the same textured, tooled joint that will be used in the field.

For this reason, and prior to construction, a mock test panel should be erected using the raw materials and masonry units that will be used on the project. It is simply not good enough to pick colors from a pigment companies color kit and expect those colors to match the masonry wall exactly.

If the walls are to be washed, the test panel should also be washed in the same manner as it will in construction. Prior to washing, the wall should be wetted down. If walls are not wetted the masonry joints will absorb the cleaning agent and result in the etching or “burning” of the joint. In addition to leaving a dark appearance, it can leave the joint porous and subject to moisture penetration. For this reason, use cleaning solutions that are recommended for colored masonry and follow the manufacturer’s guidelines.

As seen in the reference channels, the appearance of colored mortar can vary even when materials are measured precisely. After the desired mortar colored mortar is chosen, erect a test panel prior to construction to ensure that owner, architect and mason are all on the same page prior to construction. As evidenced throughout this article, water demand will vary throughout the course of a project so always tool mortar joints when mortar has a uniform hardness- when joints are thumbprint hard.