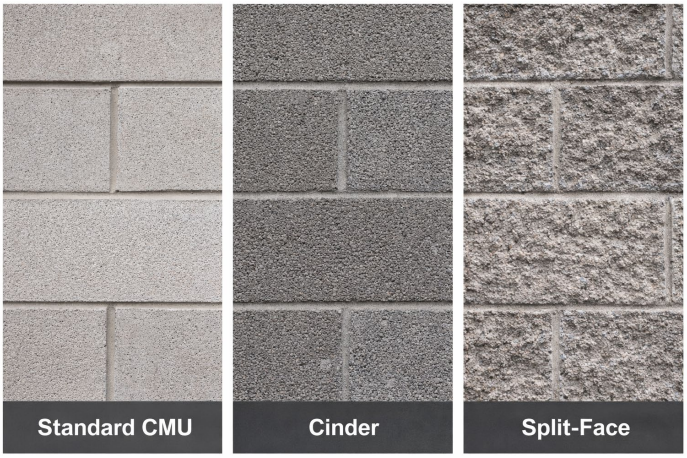
PAINTING CONCRETE MASONRY UNITS (CMU)

Concrete masonry units (CMU), commonly referred to as concrete block, are widely used in commercial, institutional, and residential construction due to their strength, durability, and fire resistance. CMU walls are commonly found in schools, warehouses, retail buildings, and utility structures. While these substrates provide a stable structural system, their porous and variable surface characteristics can present challenges when applying architectural coatings. Achieving durable coating performance on CMU requires understanding the material's properties, identifying potential issues, and selecting appropriate surface preparation methods and coating systems.

Characteristics of CMU

CMU is manufactured from a mixture of cement, aggregates, and water that is molded and cured to form blocks of uniform size. Unlike poured concrete, CMU walls consist of individual units joined together with mortar joints. The resulting surface typically contains open pores, capillaries, and surface texture variations that can significantly influence coating performance.



One of the defining characteristics of CMU is its high porosity and absorbency. The interconnected pore structure allows the material to absorb water, coatings, and other liquids. As a result, coatings applied directly to CMU may penetrate unevenly into the surface, leading to inconsistent film thickness, appearance variations, or reduced coverage rates.

CMU walls also contain mortar joints, which often differ in density and porosity from the block itself. This variation can cause coatings to dry at different rates across the surface, resulting in differences in sheen or color uniformity after painting.

Another important characteristic is alkalinity. Fresh masonry materials typically have a high pH due to the presence of cement and lime. Elevated alkalinity can affect certain coatings if applied before the substrate has adequately cured or if moisture migration carries alkaline salts to the surface.

Common Challenges

Because of its porous structure and exposure conditions, CMU can present several challenges when painting.

One common issue is uneven absorption, where coatings penetrate the block surface at different rates. This can cause variations in sheen, color uniformity, and overall appearance. Without proper priming, topcoats may also require additional coats to achieve adequate coverage.

Another challenge is efflorescence, which occurs when moisture within the masonry dissolves soluble salts and carries them to the surface. As the moisture evaporates, the salts remain behind as a white crystalline deposit. Efflorescence can interfere with coating adhesion and may cause staining or premature coating failure if not addressed before painting.

CMU surfaces may also exhibit pinholes, voids, or surface irregularities from the manufacturing process or from mortar application. These surface imperfections can create localized areas where coatings fail to fully cover the substrate.

Moisture intrusion is another factor that can affect CMU coatings. Because CMU walls are permeable, water infiltration from exterior exposure or internal moisture sources can migrate through the wall assembly. When trapped behind coatings, this moisture can lead to blistering, peeling, or efflorescence.

Surface Preparation Best Practices

Proper surface preparation is essential when coating CMU surfaces. The goal of preparation is to ensure that the substrate is clean, dry, structurally sound, and free of contaminants that may interfere with coating adhesion.

The surface should first be inspected for dirt, dust, oils, curing compounds, efflorescence, or other contaminants. Cleaning methods may include pressure washing, scrubbing with appropriate cleaning solutions, or other approved methods depending on the condition of the surface.

If efflorescence is present, it should be removed prior to coating. This may involve dry brushing, washing, or other cleaning techniques designed to remove salt deposits from the surface.

Surface defects such as cracks, voids, or damaged mortar joints should be repaired using compatible patching materials. Addressing these defects prior to coating helps ensure a more uniform surface and improved long-term coating performance.

New masonry should be allowed to cure adequately before painting, typically for at least 28 days, to allow moisture levels and alkalinity to stabilize.

Coating Systems for CMU

Because of the porous nature of CMU, primers play a critical role in achieving successful coating performance. Primers help seal the substrate, equalize surface porosity, and improve adhesion of the finish coat.

Block fillers are primers specifically designed for use on CMU surfaces. They are high-build primers designed to fill surface voids and create a more uniform surface prior to applying finish coats. These materials can significantly improve the appearance of the final coating system by reducing surface texture irregularities.

For topcoats, high-quality acrylic coatings are often recommended due to their flexibility, durability, and resistance to weathering. In situations where moisture management is a concern, breathable coatings that allow vapor to escape while resisting liquid water intrusion are typically preferred.

In some applications, elastomeric coatings may be used to provide additional crack-bridging and water resistance. However, these coatings must be applied carefully and only when the substrate and building conditions are appropriate.

Key Takeaways

CMU substrates can provide long-lasting performance when properly prepared and coated. However, their porous structure, alkalinity, and susceptibility to moisture movement require careful consideration during the specification and application of coatings.

Successful CMU coating systems rely on thorough surface preparation, proper primer selection, and the use of coatings designed for masonry substrates. By understanding the inherent characteristics of CMU and addressing potential challenges before painting, contractors and specifiers can significantly improve coating durability, appearance, and long-term performance.