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Guide to Portland Cement-Based Plaster

Reported by ACI Committee 524



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Guide to Portland Cement-Based Plaster

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This guide provides information on the plastering process, including prequalification of materials, plaster tool and equipment suggestions, mixture proportions, application procedures, finish types, and troubleshooting and repair. This guide is intended for architects, engineers, designers, specification writers, contractors, plasterers, laboratory personnel, and public authorities. Portland cement-based plastering processes and properties differ in many ways from those used in the concrete trade. The equipment used to mix plaster, the methods of curing, preparation of substrates, mixture design components, material application, finishing techniques, and methods of controlling cracking are only applicable to plaster and are not appropriate for concrete. Likewise, literature specific to concrete trade practice should not be assumed exchangeable or applicable to common plastering trade practice. Differences in plastering terminology are of key importance and, therefore, an extensive list of them is provided in this guide.

Keywords: base; bonding agents; brown coat; cracking; finish coat; fresh plaster; furring; hardened plaster; scratch coat; sheathing; stucco; texture.

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CHAPTER 1—INTRODUCTION AND SCOPE**1.1—Introduction**

Portland cement-based plaster is a versatile and weather-resistant surfacing material. Portland cement-based plaster can be applied to flat, curved, or rusticated bases made from concrete, clay masonry, concrete masonry, woven or welded-wire mesh, or expanded metal lath. It can be applied by hand or pumped directly from a mixer hopper and sprayed onto a vertical or horizontal surface. Portland cement-based plaster has a long history of satisfactory performance ([Technical Services Information Bureau 2015](#)). Proportions and workability of the plaster mixture allow for a variety of shapes, designs, and textures to be created. When plaster hardens, these features are preserved in a rigid, permanent form.

Plaster is categorized by the type of cement binder, number of coats, and total thickness. Traditional materials include portland cement and lime, blended cement and lime, masonry cement, or plastic cement mixed with sand and water. Additives to control setting time, reduce shrinkage cracking, increase workability, or increase durability can also be present.

Portland cement-based plaster is intended to perform as a coating and not as a load-bearing element of the structural system. The terms “stucco” and “portland cement-based plaster” are often used interchangeably in the trade. This guide, however, refers to stucco as plaster that is applied to an exterior surface, and Portland cement-based plaster as plaster that is applied to either an interior or exterior surface.

1.2—Scope

This guide provides information and recommends minimum expectations for satisfactory lathing and plastering. Architects, engineers, designers, specification writers, contractors, plasterers, and public authorities can use this guide to familiarize themselves with the plastering processes and also as an aid in specification writing. Stricter requirements based on long-term successful field service or controlled laboratory experimentation and documentation can be imposed when warranted. This guide also addresses the prequalification of plaster materials, tool and equipment requirements, mixture proportions, application procedures, types of finishes, and troubleshooting and repair.

Exterior insulation and finish systems are exterior wall-cladding systems that consist of an insulation board covered with an integrally reinforced base coat and a textured

protective finish coat. Portland cement may be used in these systems, but their application and suitability are not covered in this guide. Robert (1997) provides useful information on this class of product.

The use of one-coat portland cement-based plastering systems and other such proprietary portland cement-based systems are acknowledged; however, they are beyond the scope of this document, which addresses only traditional two- or three-coat portland cement-based plastering systems. Alternative nontraditional and proprietary portland cement-based plastering systems are addressed by ICC Evaluation Service, Inc. (2006). One-coat systems and other proprietary systems typically rely on a proven performance history within the environment and region in which they are intended to be used. Where required by code, proprietary products can get special approval with a published evaluation services report that specifies the installation procedure and allowed locations for its use.

Swimming pool plastering is considered an alternative, nontraditional form of portland cement-based plastering in this guide. While many aspects of this guide are relevant to swimming pool plastering, information specific to swimming pool plastering can be found in the American National Standard for the Plastering of Pools and Spas (ANSI/APSP/ICC/NCP-12) and in reports by the Portland Cement Association (PCA EB049) and the National Plasterers Council (2011).

CHAPTER 2—DEFINITIONS

ACI provides a comprehensive list of definitions through an online resource, “ACI Concrete Terminology,” <https://www.concrete.org/store/productdetail.aspx?ItemID=CT13>. Definitions provided herein complement that resource.

acid etching—partial removal of a cementitious surface through controlled dissolution to expose sand or aggregates, roughen a smooth cementitious surface in preparation for cementitious coating material application, or create art or an architectural finish.

acid washing—cleansing of the plaster surface through controlled dissolution of surface deposits to remove efflorescence, dirt, or other unwanted stains.

adhesion—ability of a fresh plaster coat to adhere to a plaster base.

arch corner bead—corner bead designed so that it can be job-shaped for use on arches.

atomizer—device that introduces air into plaster during machine-applied plaster placement; can be adjusted at the nozzle of the gun to regulate the spray pattern, which in turn alters the texture or pattern of the plaster that is sprayed onto the surface.

bedding coat—thick plaster coat that receives aggregate or other decorative materials that are manually placed or shot into the surface; used to produce exposed aggregate finish or seeding (marblecrete) finish.

blended cement—hydraulic cement essentially consisting of portland cement, slag cement, or both, uniformly mixed with each other or a pozzolan through intergrinding or blending.

blocking—1) method of joining or filling between two intersecting planes of plaster from the base coat plaster or substrate up to the outer surface of the finish coat; or 2) a method of joining, reinforcing, securing, or providing thermal protection between two intersecting planes; fastening a membrane or metal flashing that covers over the space between two intersecting planes.

brown coat—leveling coat plaster used as the second coat of plaster in a three-coat application or the entire base coat of plaster in a two-coat application.

buckles—1) large lifted areas of a plaster coating that failed to properly bond to the substrate or to the plaster undercoat; or 2) raised hollow spots under a plaster, usually visible before rupture by tensile stress cracks within the portion of plaster over the buckle.

bullnose—external angle that is rounded to eliminate a sharp corner; can be tool-formed during the plaster application or an accessory that is fastened to the plaster base before plastering.

butterfly reinforcement—strips of metal reinforcement placed diagonally over the plaster base at the corner of openings before plastering.

carrying channels—main runners that are supported by hangers attached to the building structure and support the furring channels or pencil rods that support the lath.

casings bead—fabricated shape preinstalled where plaster terminates, or around openings such as doors, windows, tops of walls, or dissimilar materials, to provide a stop or separation; sometimes called a plaster stop.

ceiling track—1) formed metal section anchored to the ceiling into which metal studs, or hollow or solid partitions, are set; 2) structural reinforcement section or member to which lath is attached for studless partitions; or 3) the metal channel or angle used for anchoring the partition to the ceiling.

channel—cold-rolled steel section used as structural reinforcement in construction that attaches to studs, furrings, or joists of the walls or ceilings; structural rolled metal that is attached to other channels or runners as a furring or stud, made of varying gauges of thickness that correlate directly with each channel’s structurally intended use in construction.

cohesion—ability of a cementitious mixture to hold together and remain consistent during mixing, pumping, placing, and finishing processes.

combing tool—1) used to scarify, cross-scratch, or score the surface of a scratch coat or undercoat of plaster; or 2) a tool used to create the combed plaster finish and other scored texture finishes.

control joint—1) separation joint that limits cracking of plaster by reducing stress using a designed joint that allows dimensional reduction of the plastered area or a designed joint that allows complete separation of the plaster and a dissimilar material, including the interruption of the metal lath; or 2) formed, sawed, or tooled groove in a concrete structure to create a weakened plane to regulate the location of cracking resulting from the dimensional change of different parts of the structure.

corner lath—inside corner reinforcement section for interior plastering or exterior plastering where the corner bead