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Ministry of Labor and Skills

FINISHING CONSTRUCTION WORKS Level III

Based on, October 2023 Curriculum Version II,

Module Title: Special Plaster Surfaces

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Prepared By: Ministry of Lobar and Skill

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Acronym

ACT.....American Concrete Institute

ASTM ..... American Society for Testing and Materials

SBR .....Styrene Butadiene Rubber

BS ..... British Standard

BWT..... Boiling Water Proof Plywood

CB .....Cement Based

GPR .....Ground Penetrating Radar

OHS..... Occupational Health and Safety

PPE .....Personal protective equipment

PVA .....Poly Vinyl Acetate,

PVCU..... Poly Vinyl Chloride Un-plasticized

SP .....Superior Product

UN .....Un Insulated

UV .....Ultra Violet

Contents

Introduction to Module

This module guides To provide an even, smooth, regular, clean and durable finished Plaster is the process of covering rough walls and uneven surfaces in the construction of houses and other structures with a plastic material, called plaster, which is a mixture of lime or cement concrete and sand along with the required quantity of water

This unit covers knowledge , skills and attitudes required to carry out planning work and preparing surface area; mix and apply materials; apply floating and rendering to flat and curved surfaces, coats to piers, coat within metal beading prepare and finish specialized plasterers surfaces; finish and cure the texture coat; and prepare templates for curved work

This module covers the units:

- General concept of special plastering
- Prepare surface
- Prepare and mix materials
- Float and render
- Finish rendering coats on flat walls, piers, curved work
- Prepare and finish special plasterers surfaces
- Templates for curved work or circular columns

Learning Objective of the Module

At the end of the module the trainees will be able to

- Understand General concept of special plastering Prepare surface
- Confirm Prepare and mix materials
- Implement Float and render
- Apply Finish rendering coats on flat walls, piers, curved work
- Apply Prepare and finish special plasterers surfaces
- Finish and cure the texture coat
- Prepare Templates for curved work or circular columns

Module Instruction

For effective use this modules trainees are expected to follow the following module instruction:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below.
3. Read the information written in the information Sheets
4. Accomplish the Self-checks
5. Perform Operation Sheets
6. Do the “LAP test”

UNIT ONE: GENERAL CONCEPT OF SPECIAL PLASTERING PREPARE SURFACE

This unit is developed to provide you the necessary information regarding the following content coverage and topics:

- Introduction to plastering surface
- OHS, Plans and policies
- Solid plastering terminology
- Signage's
- Select material, tools and equipment
- Calculate material quantity
- Environmental protection

This unit will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Introduction to plastering surface
- Follow OHS, plans and policies
- Solid plastering terminology
- Implement signage's
- Select material ,tools and equipment

1.1Introduction of plastering surface

Plaster is a building material used for the protective or decorative coating of walls and ceilings and for molding and casting decorative elements In English, "plaster" usually means a material used for the interiors of buildings, while "render" commonly refers to external applications.] The term stucco refers to plasterwork that is worked in some way to produce relief decoration, rather than flat surfaces.

The most common types of plaster mainly contain Either Gypsum, lime, or cement, but all work in a similar way. The plaster is manufactured as a dry powder and is mixed with water to form a stiff but workable paste immediately before it is applied to the surface. The reaction with water liberates heat through crystallization and the hydrated plaster then hardens.

Plaster can be relatively easily worked with metal tools and sandpaper and can be molded, either on site or in advance, and worked pieces can be put in place with adhesive. Plaster is suitable for finishing rather than load-bearing, and when thickly applied for decoration may require a hidden supporting framework.

Forms of plaster have several other uses. In medicine, plaster orthopedic casts are still

often used for supporting set broken bones. In dentistry, plaster is used to make dental models by pouring the material into dental impressions. Various types of models and molds are made with plaster. In art, lime plaster is the traditional matrix for fresco painting; the pigments are applied to a thin wet top layer of plaster and fuse with it so that the painting is actually in color plaster. In the ancient world, as well as the sort of ornamental designs in plaster relief that are still used, plaster was also widely used to create large figurative reliefs for walls, though few of these have survived. Tile layout on floors/walls shall follow the layout on floors/walls as per approved shop drawing.

1.2 OHS plans and polices

Safety requirements are those requirements that are defined for the purpose of risk reduction. Like any other requirements, they may at first be specified at a high level, for example, simply as the need for the reduction of a given risk. Then they must be refined so that their full details are provided to designers. The totality of the safety requirements for all risks forms the safety requirements specification. At the design stage, the safety requirements are provided by means of safety functions. These are implemented in "safety-related systems"

1.2.1 "OHS" Occupational health and safety

Health: is the protection of the bodies and minds of people from illness resulting from the materials, processes or procedures used in the workplace.

Safety: is the protection of people from physical injury. The borderline between health and safety is ill-defined and the two words are normally used together to indicate concern for the physical and mental well-being of the individual at the place of work.

Accidents: is defined as an unexpected and desirable event resulting in damage.

1.2.2 Protective clothing and equipment

Personal protective equipment (PPE) is protective clothing, helmets, goggles, or other garments or equipment designed to protect the wearer's body from injury or infection. The hazards addressed by protective equipment include physical, electrical, heat, chemicals, biohazards, and airborne particulate matter. Protective equipment may be worn for job-related occupational safety and health purposes, as well as for sports and other recreational activities. "Protective clothing" is applied to traditional categories of clothing, and "protective gear" applies to items such as pads, guards, shields, or masks, and others.

- **Benefits of PPE**

The purpose of personal protective equipment is to reduce employee exposure to hazards when engineering controls and administrative controls are not feasible or effective to reduce these risks to acceptable levels. PPE is needed when there are hazards present. PPE has the serious limitation that it does not eliminate the hazard at the source and may result in employees being exposed to the hazard if the equipment fails.

Table1.1types of personal protection equipment

Type of PPE		**Use**
Safety Helmet		Safety helmets/hard hats are used to protect the head from falling objects and to prevent the head from striking off objects. They should be replaced periodically.
Safety Boot/Hi-Vis		Safety boots are required on all construction sites. They should have steel toecaps and sole protection to prevent the toes from being crushed and any object from penetrating the sole. High-visibility vests and high-visibility jackets help to ensure that a worker can be seen by drivers and operators of plant and other vehicles.
Eye Protection		Eye protection in the form of glasses/goggles/visors protects the eyes from dust, flying objects, and splashes (e.g. when cutting and grinding).
Safety Gloves		Safety gloves protect the hands from cuts and from contact with harmful substances, sharp objects, etc.
Ear Protection		Ear protectors help to protect hearing from loud sudden noise or from continuous loud noise. There are two action levels. Where noise exposure is at or exceeds 80 BA (decibels), individual hearing protectors must be made available. Where noise exposure is at or exceeds 85 BA.

Dust Masks		Dust masks protect workers from inhaling harmful dusts
Respiratory Equipment		Respiratory equipment protects workers by filtering out harmful substances from the air breathed in. To work effectively, they must be well maintained
Face Protection		Face-protection visors protect the face from flying objects, sparks, and splashes from hot or harmful substances.

1.2.3 Hazard control/Elimination

If a hazard cannot be eliminated altogether, there are several other ways to limit worker exposure to the hazard. Some of these ways are more effective than others. When all of these different hazard control methods are put in a chart, going from the most effective to the least effective way to control the hazard, the chart portrays the "hierarchy of hazard controls".

It is considered good occupational safety and health practice to follow the hierarchy of controls.

Hierarchy of hazard controls

1. Elimination Most Effective Control
2. Substitution
3. Engineering Controls (Safeguarding Technology)
4. Administrative Controls (Training and Procedures)
5. Personal Protective Equipment Least Effective Control

1.2.4 Safe operating procedures

All plasterers are required to wear personal protective equipment (PPE) when carrying out any job - big or small. This usually includes an odor mask, shoes that are suitable for use on ladders and protective eye wear that are designed to protect your eyes from airborne debris and particles

- **Pre-operational safety checks**

Locate and ensure you are familiar with all machine operations and controls.

Ensure all guards are fitted, secure and functional. Do not operate if guards are missing or faulty. Check for loose/missing nuts, bolts and screws. Tighten and/or replace as needed.

Look for signs of damage to tillage tines. Replace if required.

Inspect fuel lines, tank and area around carburetor for fuel leaks. Do not operate if leaks are found.

- **Operational safety checks**

Clean the surface

Do Surface preparation for rendering the required durability of plaster. Thus it creates a satisfactory bond between the plaster and the surface. The surface should be clean and free from loose particles. Dust removed by water or by scrapping tool or by using wire brush.

Roughness

Raking on the brick wall gives roughness to the surface for adhesion. To have good bonding, the surface should be rough. Sprinkling water or plain grout on the surface helps bonding. Hack smooth concrete surface to have good adhesion.

Surface unevenness

To minimize the plaster thickness the surfaces of plaster have to be free of undulations. Otherwise depending on the surface unevenness, the thickness of plaster will vary.

Discontinuity of surfaces

Discontinuity in plastered surface forms cracks. For instance, change from concrete to brick surface, clay brick to cement blocks. Provide a layer of plastering mesh at junction of discontinuity before plastering which prevents formation of cracks.

Curing

To develop maximum strength and density of the plaster proper curing is necessary. Similarly, Curing shall be done as soon as the plaster has hardened and are not susceptible to damage. The plastered surfaces however are kept damp for a period of 7 days. Cured by Water sprayed on the plastered surface or by the use of wet gunny bags hanged to the surface.

Specification and standards

Sieve the sand as per specification and grade. The proportion of cement mortar should be as per standards. Above all, the mix of mortar shall be 1:4 for ceiling and 1:6 for walls. Water used in plastering should be of quality suitable for drinking and must be free from chlorides and organic impurities.

Check Levels and Undulations

The minimum thickness of mortar maintained by fixing button marks on plastering surface in addition, the distance of button marks should be within an aluminum straight edge. All marks on wall are to be in level from ceiling.

Check for smooth finish using spirit levels for undulations. Cracks and straightness in vertical and horizontal directions after plastering

1.3 Solid plastering terminology

Solid Plastering, also known as Wet Plastering, is a technique where the entire wall is covered in plaster without the use of plasterboard. A rough coat of plaster, known as "browning," is applied directly to brick or block walls, followed by a smooth skim coat.

Terminology Used In Plastering Work

Back ground: It is the surface to which the first coat of plaster is applied.

Blistering: This is the development of local swellings on the finished plastered surface due to residual un slaked lime nodules.

Cracking: This is the development of one or more fissures in the plaster due to movements in the back ground or surrounding structure.

Crazing: This is the development of hair cracks, usually in an irregular pattern, over the finished surface.

Dado: This is lower part of plastered wall, where special treatment is given to make it better resistance.

Dots: These are small projections of plaster, laid on background for fixing of screeds etc. The size of dots may be 15 cm x 15 cm.

Dubbing coat: This is the process of filling up hollow spaces in the solid background before applying the main body of the plaster..

Finishing coat: It is the final coat of plaster. Such a coat is also known as setting coat r skimming coat.

Flaking: It is the process of scaling away patches of plaster of previous coat, due to lack of adhesion with the under – coat.

Gauging: It is the process of mixing various constituents of plaster.

Grinning: It is the reflection or appearance on the surface of plaster, of the pattern of joints or similar patterns in the background.

Grounds: These are the wooden strips fixed to the back – ground to which primary finishing may be secured.

Hacking: This is the process of roughening the background to provide suitable bond or key for plastering.

Keys: These are openings or indentations or corrugations on the background or surface of under – coat, to which plaster will form mechanical bond.

Laitance: When freshly laid concrete or mortar is subjected to excessive trowelling a screen consisting of thin layer of fine cement particles is formed. This layer is known as laitance.

Peeling: This is the term applied to the dislodgment of plaster work from the background.

Under – coats: These are the coats of plaster applied under the finishing coat.

1.4 Signage

Means a physical barrier, usually temporary, erected or placed to restrict the entry of persons to an area and/or prevent personnel being exposed to a hazard. Barricades can be classed as either a soft barricade or a hard (solid) barricade.

Signs in conservation areas

1.4.1 Two types of signs are common in conservation areas.

- **Traditional Signs**

These take the form of carved timber panels with gold-painted Chinese characters sometimes combined with English translations, and letterings/characters formed in plaster relief or painted onto timber boards or metal panels. The degree of embellishment varies considerably. Traditional signs are not self-illuminating.

Owners are to retain existing traditional signs that have acquired significance e.g. plaster relief signs on the outer face of columns, beams, friezes and pediments. They are part of the cultural history of the building and cannot be removed. However, they can be covered over with a new sign panel, if necessary, without damaging the original plaster reliefs.

The original building date on the facade or pediment cannot be removed or replaced.

- **Contemporary Signs**

These are made usually of plastic with characters or words formed in contrasting colors, and can be lit from within their casings, ie self-illuminating. Some contemporary signs include painted metal panels and cloth banners to publicize events or promote sale.

Design, location and size of signs

Business signs are useful, interesting and attractive when thoughtfully and tastefully designed, and compatible with the character of the building and streetscape. As such, care is to be taken when designing such signs.

Signs are to be carefully positioned so that they are clear and easy to read from the street level and do not visually dominate the building. Most important of all, they do not cover or block any key architectural features.

A sensitively planned and designed sign will complement a building's heritage. The incorrect use of signage can severely compromise the character and unity of a building and its setting.

The following guidelines are applicable to business signs which also have to comply with the requirements of the relevant technical departments. Variations can be considered based on the merits of each case.

Table1.2 Guideline and their application of sign

Signage Guineans	
KEY ELEMENTS	LOCATION / SIZE
Forecourt Wall	Signs can be mounted on top or on the surface of a forecourt wall. They are to be confined within the width or surface area of the wall, and do not cover or block any architectural features.
Shop Front residential front	For a shop front (either full-width or with side staircase entrance), signs can be mounted within the transom panel. For an original residential front, signs can be mounted above the entrance door and are not to exceed the width of the door.
Five foot way	Signs can be suspended within the clear width between the column and the party wall. The underside of the sign is to have a minimum headroom clearance of 2500mm above the walkway level.
First Storey Column	Signs can be projected from a column or mounted on the surface of column. For signs projected from a column, the following are applicable : They are located at the left hand side of the building as viewed from the road. They do not exceed the height of the column shaft They do not project beyond existing roadside drain at first story

	The width is not more than 600mm. The underside of the sign is to have a minimum headroom clearance of 2500mm above the walkway level. For signs on the surface of column, individual letters or sign panel cannot be larger than the surface of the column and must follow the shape of the column.
Frieze	Individual letters or sign panel can be mounted within a frieze or suspended from a frieze.
Upper story façade	Signs can be projected from an upper story pilaster. They are to be located at the left hand side of the building as viewed from the road. The overall height of the sign (inclusive of the suspension brackets) cannot exceed the shaft of the pilaster. The width of the sign is not more than 600mm,and the width for brackets is not more than 200mm. For a building of Art Deco or Modern style, individual letters sensitively planned and designed, Can be mounted on the facade. They cannot cover or block any architectural features
End gable wall	Sign can be mounted within the width of an entrance to a five-foot way and a door to the upper story, where applicable.

1.5 Material, tools and equipment

Plastering Material

The process of applying plastic mortar on the surfaces of rough ceilings, walls, etc in order to obtain an even, smooth, and clean surface is known as plastering and the plastic mortar is called plaster. When plastering is done on external exposed surfaces, it is known as rendering. In this article, we will discuss different types of plastering used in construction

1.5.1 Types of plastering material

Cement Plaster

Cement plaster is the most common type of plaster in the construction industry. Cement plaster is a mixture of cement, sand, and suitable amount of water.

Proportions of cement and sand may vary according to the requirements of the plaster. But, the usual proportion is 1:3 and 1:4 which gives the best results.

Cement plaster is used on the interior walls and exterior walls, ceilings, and other building elements. For interior walls, a single coat of plaster is usually enough to achieve the desired surface.

For exterior walls, another coating is required depending on the thickness of the plaster and the nature of the surface. The thickness of cement usually ranges between 12 and 20 millimeters, depending upon the type of wall or ceiling surface.

The cement plastered surface requires proper curing with water for a minimum of 7 days. Improperly cured walls may develop cracks.

Figure1.1 cement plastering surface

Lime Plaster

Lime plaster consists of lime, sand. and water. The proportion of lime and sand is equal. Sometimes, little amount of cement may also be added to improve the strength of the plaster. In lime plaster mostly fatty lime is used. Hydraulic lime results in blisters on the plastered surface.

Gulal, a type of fragrant gum may be added at a rate of about 1.6 kg/m3 of mortar. It gives good binding properties to the mortar. Chopped hemp is also be used at the rate of about 1kg/m3 of mortar.

It provides improved adhesive and tensile properties to the plaster. Types of plaster are now being replaced with cement plaster.

Figure1.2 lime plastering surface

Mud Plaster

This is the cheapest type of plaster. It is made up of suitable proportions of clay and sand. The clay content should be free from grass, roots, organic matter, stone pebbles, etc.

Chopped straw, hay, or hemp is also used in the mixture at the rate of 30kg/m3 of earth content. Mud plaster is mostly used in villages and temporary constructions.

Figure1.3 mud plastering surface

1.5.2 Special Plastering Materials for Different Purposes Used in Building Construction

Waterproof Plaster

As the name suggests, this type of plaster protects the masonry wall from ingress of moisture and thereby eliminating or reducing dampness of the wall.

The mortar for waterproof plaster is prepared by mixing cement, sand (1:2), and pulverized alum at the rate of about 12 kg/m3 of sand content.

Water to be used in the mix is not normal water but the water is prepared by dissolving 75gm of soft soap per liter of water.

Stucco Plaster

Stucco plaster is a type of decorative plaster that provides excellent finishing. This type of plaster is usually done in three coats with a thickness of about 25 mm. Each coat needs to be dry completely before applying the next coat. The first coat in stucco plaster is called scratch coat.

Figure1.4 stucco plaster wall

The second coat is called finer coat or brown coat and the final coat is known as a white coat or finishing coat. Stucco plaster can be used for internal as well as external walls.

Gypsum Plaster

Gypsum plaster is a factory-made product produced by partial or complete dehydration of mineral gypsum. It is available in powder form and in white color.

Dry gypsum powder is mixed with a suitable amount of water to form a ready paste that can be easily applied to the ceiling and wall surfaces.

The thickness of gypsum plaster is usually 6 mm- 20 mm. It dries very fast, so painting on the plastered surface can be started 72 hours after application.

Figure1.5 Gypsum plastering wall

It gives a very good smooth finish and level surface with excellent proper angled corners. This type of plaster can only be used in the interiors of the building, not suitable for external plastering. It can also be used to fabricate ceiling cornices and moldings.

It is fire resistant and a good thermal insulator. Another good advantage is there is no shrinkage during setting and hence it does not develop cracks.

Keen's Cement

It is produced by calculating alum with gypsum. It is the hardest and densest form of gypsum plaster. It is pure white in color and gives a very fine glass-like polish. This type of plaster is mostly used for ornamental works.

Martin's Cement

Martin's cement, another type of special plaster material is produced by calculating peal as with gypsum. It also sets quickly and results in a hard and white surface.

Purina Cement

It is obtained by calculating borax with gypsum. It is an alternative to keen's cement and used for ornamental purposes.

Sirapite

This product is produced by slaking gypsum in petroleum. It is a good fire resisting plaster material.

Scagliola

When Kenee's cement and color pigments are dissolved in glue, the obtained plastering material is called as Scagliola plaster. It produces marble like finishing. This plastering material is used for column finishes, panel finishes etc.

Acoustic Plaster

It is a gypsum product that is mostly used as a final coat. During final coat finishing small pores are left on the surface to absorb sound.

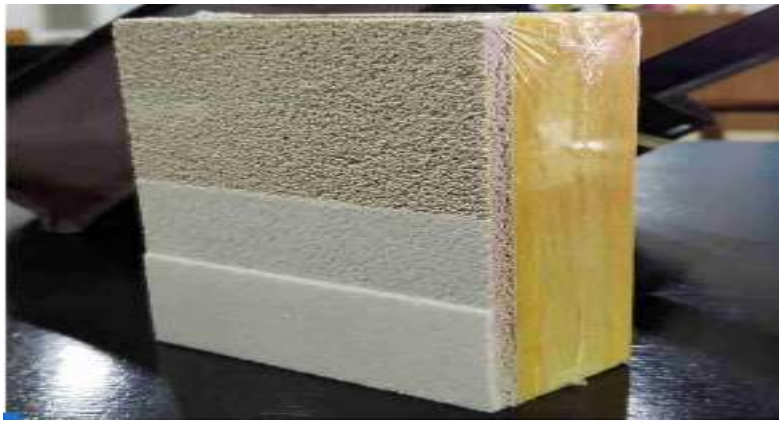

Figure1.6 acoustic plastering gypsum products

Barium Plaster

Barium cement plaster is obtained by adding barium sulphate to the cement and sand mix. It is used for X-ray room finishing. It absorbs radiations from X-ray machines without affecting the people.

Figure1.7 barium plastering types

Asbestos-marble plaster

It is prepared by mixing finely crushed marble, asbestos, and cement. It gives a beautiful marble-like finish on the surface.

Snow- Crete and Color-Crete cement

These are patented cement. They are mostly used on the exterior walls to create a very good appearance from the outside.

1.5.3 Types and uses of Tools

A well-plastered wall with a smooth finish can only be achieved by using certain tools known as plastering tools. Usually, one might have seen these tools but may disagree with tool names, as mentioned below

Every region worldwide has its name for these plastering tools that construction workers commonly use. So below, we have discussed some of the plastering tools with their commercial names.

Gauging Trowel

Gauging trowel tools are used to gauge small quantities of materials and apply cement mortar to corners, moldings, etc. The physical appearance of this plastering tool can either be pointed or bull-nosed on one end, as we can see in the below image.

Figure1.8 gauging trowel hand tools

Spackle Knife

A Spackle knife is small in size but can play a significant role in plastering work; before using this tool or any repair, one must ensure to run a sturdy knife on cracks and uneven surfaces to use this tool smoothly.

Following the above procedure will remove chips of old plaster and high points and give a clean and smooth surface to apply plaster evenly with a spackle knife.

Figure1.9 spackle knife hand tools

Spirit Level

This tool is essential and very useful during plastering work, As the spirit level helps to achieve an even and flat finish.

It consists of a water tube through which the surface level can be known. It also allows you to increase your work quality and attain evens from all sides.

Figure1.10 sprit level

Straight Edge

A straight edge is a plastering tool used to even off rendered floors that can cover a large area in a short period. Generally used for leveling the concrete surface or plastered surface and also used to measure distances.

This plastering tool is usually made of aluminum and is used in the final plastering stage to attain a smooth finish.

Figure1.11 Straight edge

Float

This tool is used for applying and spreading the cement mortar on the surface. It is a flat wooden or metal board with a handle on a flat surface. There are two types of floats based on the type of material used to make it.

Metal Float

As the name suggests, this type of float is made of thin tempered steel, also known as laying trowel. It is used for laying and troweling the plaster material to attain the desired finish.

Figure1.12 metal fl0at

Wooden Float

This type of float is generally known as skimming float. It is used while applying the finishing coat of plaster.

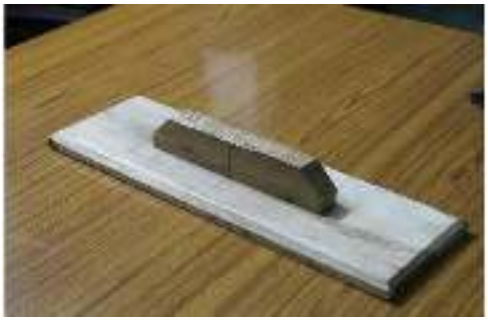

Figure1.13 wooden float

Plumb bob

Plumb bob is a level-checking tool that is used to check the vertical levels of the wall. The appearance of this plastering tool is usually a solid cone shape bob with a pointed one end and a thread tied on the other end.

Figure1.14 plumb bob

Floating Rule

The floating rule tool is used for checking the level of the plastered surface between successive screens.

Paddle Mixer

A paddle mixer is used for mixing the plastering ingredients in large quantities. Paddle mixers help break the clumps and allow plasterers and admixtures to adjust the consistency of their mix with ease.

Hammer

A hammer is one of the most useful tools during plastering work. There are two types of hammers, a Claw hammer, and a drywall hammer. Both hammers can help chip out chunks of plaster and are useful for hacking surfaces.

Figure1.15 hand hammer

Sponge

A sponge is used to make a smooth surface on the plastered surface. A square wet sponge is used to smooth out the unevenness on the plastered surface.

Figure1.16 sponge float for flat surface

Hawk

A hawk is considered one of the main plastering tools used by many professional plasterers or masons. The hawk helps the mason carry and hold the plaster as they move down the wall. It allows you to apply the plaster easily and rapidly across both ceilings and walls.

Figure1.17 hawk plastering tools

Tube level

A tube level is used to level the upper part of the plastered surface to attain an equal and clean finish. A tube level is a transparent plastic tube or small pipe filled with water without a bubble. It works on the principle that water seeks its level.

When both ends of the tube are held against each vertical surface, the water level always rests at the same vertical plane if the surface is equal

Figure 1.18 tube Level

Water brush

A water brush is often used in western countries as a substitute for a sponge.

Figure 1.19 water brush hand tools

Thread

A roll of thread is used for checking the level of plaster of different structures to attain evenness on both structures.

It is performed by holding the thread on the edges of both structures

Bucket or Putti

Figure1.20 wall threated bucket

As seen in the above image, this plastering tool is used to carry and hold the plaster mixture by masons during the plastering work.

Measuring tapes/rules

Tape is used to measure dimensions of building parts and distances in site. It is manufactured from steel, plastic or fiber in lengths of 1m, 2m, 3m, 5m, 30m, etc. and 50m. In using tapes for measurements, the two points should be aligned perfectly. In addition, when long horizontal measurements are needed, care should be taken to avoid sag on the tape meters.

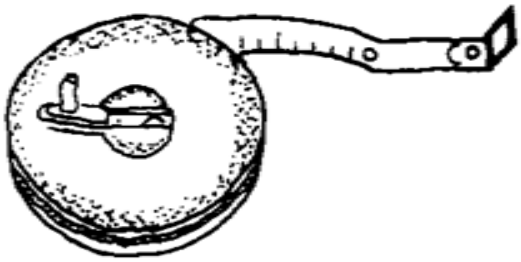

Figure 1.21measuring tools

Mortar spade

Buckets: It is used as an informal way or as slang and it is believed that the idiom comes from method of execution such as hanging.

Figure 1.22 mortar spade buckets

1.6 Calculate material quantity

Multiply the length and height of each surface to get its area in square meters. Determine the Thickness: Decide on the thickness of the plaster you want. It is usually specified in millimeters. Calculate Volume of Plaster: Calculate the volume of plaster needed by multiplying the surface area by the chosen thickness.

Common plastering mortar thickness and mix ratio

Table1.3 standard cement ratio for plastering

Location	**Thickness**	**Ratio**
External Wall	20mm	1:6
Internal Wall	15mm	1:4
Ceiling	12mm	1:3

- Make sure you have selected optimum cement mortar ratio
- Make sure you are using good quality of sand (less silt content).
- Make sure you know the required plastering thickness.
- Make sure to follow proper plastering work procedure

Example one

Plastering Calculation

Assume we need to calculate plastering material quantity for 10 X 10 m ceiling.

- Required Plastering Area = 10 x 10 = 100 m2 or Square Meter
- Plastering thickness = 12 mm
- Cement Mortar Ratio = 1:3 (1 Part Cement : 3 Part Sand)

Required volume of Cement Mortar = plastering area x plastering thickness = 100 x 0.012 = 1.2 m^3

Adding Bulking of Sand & Wastage

So to get 1.2 m^3 of wet cement mortar, we have to multiply the dry volume by 1.55.

What is 1.55 constant in the calculation?

1. Bulking of Sand – If the moisture is present in the sand, then it makes the sand look bulkier, which could result in inadequate sand proportion in the concrete ratio.

For Example, If we need to add 1m^3 sand in the concrete mix ratio, we take 1.3 m^3 (**30% more**). The reason for that is the moisture content present in the sand makes it a little bulkier. The 5% to 8% of surface moisture will increase the bulking of sand up to 20% to 30%. When we add more water (more than 8%) to the sand, the thin film will disappear, and volume decreases.

2. Wastage – Adding 20% wastage for joints and impressions filling

So if we need 1 m3 of cement mortar in wet condition we have to take consideration of the bulking of sand & wastage as (34%+20%) = 54%

Thus every time you need to calculate the volume of cement mortar you need to add the above percentage with dry volume

Wet Volume of concrete = Dry Volume of concrete + 54% of dry volume of concrete or

Wet Volume of concrete = Dry Volume of concrete x 1.54

So whatever volume we get from the above formula, we need to multiply the value with 1.54%

$$\text{Volume of Cement Mortar} = \frac{\text{Cement Part}}{\text{Total Parts}} + \frac{\text{Sand Part}}{\text{Total Parts}}$$

So total part of mortar = 1+3 = 4

Therefore,

Required Volume of Cement = 1/4 x 1.55 (Bulk age & Wastage) x Mortar Volume

= 1/4 x 1.55 x 1.5= 0.581 m^3

To convert into cement bags – (0.581 x 1440)/50 = 16.7 Bags

Unit weigh of Cement – 1440 Kg/m^3 1 bag cement – 50 Kg

- Required Sand Volume = 3/4 x 1.55 (Bulk age & Wastage) x Mortar Volume

= 3/4 x 1.55 x 1.5 = 1.74 m^3

So the required quantity of material for 100 sqm plastering with mortar thickness 15mm & mix ratio 1:3 is

- Cement = 16.7 Bags
- Sand = 1.74 m^3

Example two

Since you have not mentioned whether the 1:3 cement sand mortar is as per weight batching or volume batching, here I'll describe the process for both the types.

Weight batching:

Suppose 1 kg of mortar is to be prepared. Cement: sand ratio is 1:3 and suppose w/c ratio is 0.4

This means of 1 kg mortar, 0.4 part is water, 1 part is cement and 3 parts are sand.

1 part = 1 kg / (0.4 + 1 + 3)

This gives, 1 part = 0.227

Quantities of different constituents are,

Water = 0.4 * 1 part =0.4 * 0.227 kg = 0.09 kg

Cement = 1 part = 0.227 kg

Sand = 3* 1 part = 0.683 kg

If the sand used for this mix contained adsorbed water equal to 5% of weight of sand, the calculations would change as follows:

Suppose 1 kg of mortar is to be prepared. Cement: sand ratio is 1:3 and suppose w/c ratio is 0.4 this means of 1 kg mortar, 0.4 part is water, 1 part is cement and 3 parts are sand. The dry sand weighs only 1/1.05 times ie: .952 times of moist sand. Hence, to maintain 3 parts dry sand, moist sand will have to be added in 3*1.05 part = 3.15 part. Of the total 0.4 part water required in the mortar, 5% * 3 part = .15 part will be contributed from adsorbed water in sand and only 0.25 part water will be required to be added externally.

1 part = 1 kg / (0.25 + 1 + 3 + .15)

This gives, 1 part = 0.227

Quantities of different constituents are,

Water required = 0.25 * 1 part =0.25 * 0.227 kg = 0.056 kg

Cement = 1 part = 0.227 kg

Sand = 3.15* 1 part = 0.717 kg

Volume batching:

Suppose 1 kg of mortar is to be prepared. Cement: Sand Ratio is 1:3 by volume and suppose w/c ratio is 0.4 Assume bulk densities of water as 1 g/c, cement as 1.4 g/cc and fine aggregate as 1.6 g/cc. So, mass ratio of cement: sand is 1 part * 1. 4 : 3 part * 1.6 . This means of 1 kg mortar, 0.4 part is water, 1 part is cement and 3.43 parts are sand.

1 part = 1 kg /(0.4 + 1 + 3.43)

This gives, 1 part = 0.207

Quantities of different constituents are,

Water = 0.4 * 1 part =0.4 * 0.207 kg = 0.083 kg = 0.83 L of water.

Cement = 1 part = 0.207 kg = 0.207/ 1.4 = 0.1478 L of cement

Sand = 3.43* 1 part = 0.71 kg = 0.71/1.6 = 0.444 L of dry sand.

If the sand used for this mix contained adsorbed water equal to 5% of weight of sand, which also caused bulking of sand volume by 20% the calculations would change as follows

Suppose 1 kg of mortar is to be prepared. Cement: Sand ratio is 1 : 3 by volume and suppose w/c ratio is 0.4 Assume bulk densities of water as 1 g/c, cement as 1.4 g/cc and fine aggregate as 1.6 g/cc. So, mass ratio of cement: sand is 1 part * 1. 4 : 3 part * 1.6 . This means of 1 kg mortar, 0.4 part is water, 1 part is cement and 3.43 parts are sand. Of the total 0.4 part water required in the mortar, 5% * 3.43 part = .172 part will be contributed from adsorbed water in sand and only 0.228 part water will be required to be added externally.

1 part = 1 kg / (0.4 + 1 + 3.43)

This gives, 1 part = 0.207

Quantities of different constituents are,

Water = 0.4 * 1 part =0.4 * 0.207 kg = 0.083 kg = 0.83 L of water.

Cement = 1 part = 0.207 kg = 0.207/ 1.4 = 0.1478 L of cement

Changed bulk density of sand is 1.6 * 1.05/1.2 = 1.4 (because of both adsorbed

Sand = 3.43* 1 part = 0.71 kg = 0.71/1.4 = 0.50 L of moist sand.

1.7 Eenvironmental protection requirements

Uncontrolled environmental factors at a plastering job can reduce plaster system performance regardless of the quality of materials and workmanship. Job conditions should be investigated well before a project starts, to identify storage requirements and action needed to control environmental factors.

Absorption of moisture by gypsum plaster can cause lumping and partial setting of the plaster, both serious problems. If moisture-damaged materials are used, this results in quick set or early stiffening of plasters, quick set of gauging plaster or poor working qualities of lime putty.

Moisture absorption can occur from direct contact with water, by condensation of water on or within bags or by direct absorption of water vapour from the air when humidity levels are high.

Condensation occurs when warm moist air comes in contact with a cool surface. If material is covered by a waterproof plastic cover, moisture will accumulate in the warm air under the cover during the day, condense on the inside of the cover when it is cooled at night and dampen the plaster under the cover.

Bagged goods must be protected from four possible sources of moisture:

- Direct contact with rain, snow or splashing water.
- Direct contact with wet or damp surfaces.
- Condensation.
- Absorption from the atmosphere.

Material storage

The greatest hazards from moisture occur after plastering materials are delivered to the job. All plastering materials should be stored in a dry location, preferably inside the building under a roof. Stack plaster bags on planks or platforms away from damp floors and walls. Store gypsum plaster bases flat on a clean, dry floor.

All materials should remain in their packaging until used.

Where necessary to store materials outside, they should be stacked off the ground, properly supported on a level platform and fully protected from the weather and moisture absorption.

Temporary or emergency protection of materials on jobs with poor storage areas may be provided by the following procedure:

- Using pallets or planks make a platform to raise material off damp floors and the ground.
- Place a sheet of plastic or other vapour retarder material on the platform where the material is to be placed, extending about two feet beyond the platform edges. Note: This is recommended even when the time before use will be short.
- Place one or two layers of the bagged material on the plastic sheet.
- After the first or second layer of bags has been placed, fold in the overlap of the sheet over this layer of bags. Continue stacking to desired height. The following layer of bags will hold the bottom sheet in place.
- Cover the completed pile with another protective sheet (preferably waterproofed tarpaulin), extending it below the bottom sheet.

Ventilation

Veneer applications, like those of conventional plaster finish coats, are applied relatively thin (1/16" to 3/32") compared to conventional basecoat applications (1/2" to 7/8") and, therefore, are more subject to problems associated with evaporation due to excessive ventilation.

Conventional basecoat plaster applications require a large amount of air movement to remove the water once the plaster has set, while veneer and conventional plaster finishes require a minimal amount of circulation.

Humidity and Temperature

The rate at which the moisture from the plaster system is absorbed during application and removed upon drying also affects the performance of the gypsum panel. This is most noticeable in veneer plaster applications. Under normal conditions, as the veneer plaster is applied to the gypsum base, the surface paper absorbs moisture from the plaster. This causes the face of the board to expand slightly resulting in a slight outward pressure as shown by the force arrows in the diagram on below.

During the application of the plaster, the wet side of the plaster base expands and curves the panel. As the plaster sets, it also expands slightly, causing pressure which forces adjacent base panels together at the joints.

During normal drying, this pressure is relieved somewhat by minor shrinkage associated with the drying, but the pressure is still sufficient to keep the joints together. During rapid drying, excessive shrinkage occurs, eliminating the usual pressure at adjacent edges and causing joints to crack open. From the above, it is important to identify the environmental conditions present on a veneer plastering job so that the proper joint reinforcement system can be selected.

To ensure satisfactory job performance, temperature and humidity conditions should be considered along with ventilation. Optimum conditions for plaster application are 60 to 70 °F (min. 55 °F) and relative humidity corresponding to normal drying conditions (see diagram).

The drying conditions diagram illustrates the effect of humidity and temperature on normal and rapid drying conditions for veneer and conventional plaster finish coat applications.

Self -check -1

PARET ONE: Choose the best answer for the following questions

1. What is the purpose of safety requirements?
    A. To refine safety requirements
    B. To provide safety functions
    C. To reduce employee exposure to hazards
    D. To specify safety requirements
2. What is the main purpose of plaster in building construction?
    A. To protect walls and ceilings
    B. To provide load-bearing support
    C. To provide insulation
    D. To create decorative elements
3. What is the main difference between plaster and stucco?
    A. Plaster is used for interiors while stucco is used for exteriors
    B. Plaster is applied in a paste form while stucco is applied as a dry powder
    C. Plaster is made of gypsum while stucco is made of cement
    D. Plaster is suitable for load-bearing while stucco is suitable for finishing
4. What is the term used for plasterwork that is worked to produce relief decoration?
    A. Plasterboard
    B. Render
    C. Stucco
    D. Molding
5. What is the traditional matrix for fresco painting?
    - Cement plaster
    - Concrete plaster
    - Lime plaster
    - Gypsum plaster

PART TWO: Define and list the following questions

1. Analyze the importance of safety requirements and their implementation in the design stage?
2. Recognize the uses of plaster in medicine, dentistry, and art?
3. Identify the different types of plaster and their uses?
4. Explain the process of creating plaster and its reaction with water?
5. Define stucco and its purpose?
6. Determine the purpose of OHS plans and policies?

PARET THREE: Say true or false

1. A sprite level is used to level the upper part of the plastered surface to attain an equal and clean finish?
2. Float is used for applying and spreading the cement mortar on the surface?
3. Crazing is the development of one or more fissures in the plaster due to movements in the back ground or surrounding structure?
4. Waterproof plaster type of plaster protects the masonry wall from ingress of moisture and thereby eliminating or reducing dampness of the wall?
5. Plaster is a building material used for the protective or decorative coating of walls and ceilings and for molding and casting decorative elements?

UNIT TWO: PREPARE SURFACE

This unit is developed to provide you the necessary information regarding the following content coverage and topics:

- Materials and substrate surfaces
- Mixing dash coat
- Background surface
- Bonding coats
- Select metal beads for external
- Fix and check metal beads

This unit will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Prepare materials and substrate surfaces
- Apply and mixing dash coat
- Identify background surface
- Apply bonding coats
- Select metal beads for external
- Fix and checking metal beads

2.1 Materials and substrate surfaces

Plaster substrates are boards onto which a plaster system is directly applied. In timber construction these substrates are either fixed directly to the studs or they are installed as ventilated or unventilated cladding

2.1.1 Substrate requirements

Balaji Wall Textures can be applied on any absorbent substrate which is Sound and Smooth. Like two coats sand faced cement plastered brick or concrete surfaces. With proper surface preparation, Balaji Wall Textures can also be applied on already painted two coats smooth sand faced cement plaster, Plywood, Particle Board, Plaster of Paris, gypsum board etc. The dough of Balaji Textures (dry material + bonding agent + water) when applied on a substrate, part of bonding agents gets absorbed by the substrate and when water evaporates from the surface the tailor-made acrylic co-polymer gets keyed into the pores of the substrate resulting in binding of the Balaji Textures on the substrate.

2.1.2 **Substrate preparation** for old painted substrate, plywood, plaster of Paris and gypsum board substrates

Depending upon the type and nature of the substrates, the following substrate preparation methods should be adopted prior to the application of Balaji Texture Coatings.

- Old Painted Substrate

If the substrate is already painted with distemper, plastic emulsion, lime washes, primer etc., such coating should be scraped using wire brush (wet / dry) followed by water washing. When the substrate is dry apply “Balaji Base Coat” and after 8 to 10 hrs of drying apply Balaji Texture as per the recommendations. Please scrape the surface as thoroughly as possible. In any event do not leave stubborn paint patch which is difficult to remove. Check the quality of the base substrate during the scraping process and ensure that it is sound enough.

- Plywood Surfaces

Plywood when comes in contact with water leaches color and leaves stains on HST to avoid this, a thin coat of the bonding agent should be applied on the plywood surface and allow it to dry for 8 to 10 hrs prior to the application of Balaji Textures. Please ask for additional quantity of Bonding Agent in such cases and do not adjust the bonding agent which is supplied along with the dry material.

- Plaster Of Paris Substrates

Plaster of Paris surfaces are not sound, as they chalk out loose powder of Plaster of Paris easily, particularly when they come in contact with water. For all Plaster of Paris surfaces, Balaji Base Coat is applied and allow it to dry for 8 to 10 hrs, prior to the application of Balaji Textures. Gypsum Board Substrates : he joints of Gypsum Boards are normally sealed with “Plaster of Paris”. Hence, Balaji Base Coat should be used prior to the application of BWT.

2.2 Mixing dash coat

A thick slurry of Portland cement, sand, and water flicked on surfaces with a paddle or brush to provide a base for subsequent Portland cement plaster coats, sometimes used as a final finish on plaster

Dash-Coat Mix: 2 volume parts Portland cement to 3 volume parts fine sand, 1 part bonding agent to 3 part clean water mixed to a mushy-paste consistency shall be left un

troweled, undisturbed and moist cured for at least 24 hours after application and before plastering

2.2.1 Uses

As an internal & external scratch coat for plasters. Special Designed for Cement Board & No absorbing surfaces. Plaster bond enhancer and mechanical key on horizontal, vertical, and overhead application.

Figure2.1 spatter dash for special application surface

2.2.2 Product Description

Spatter Dash CB a cement-based coat composed of hydraulic binders, selected aggregates, and high-performance additives. It is supplied as a dry powder in pre-weighed bags ready to use on-site, which requires only the addition of clean water to produce easily workable mortar. Spatter Dash CB is a high-quality product for applications on cement board and non-absorbing surfaces and ceilings.

Advantages

- Factory-controlled pre-blend ensures consistently high quality.
- Requires only the addition of water on-site at the time of usage.
- Manual or spray machine application or by hawk & trowel techniques.
- Superior workability.

- Easy application with uniform workflow enables high productivity & superior finishing.
- Internal & external applications.
- Suitable for humid & dry conditions.
- Suitable for vertical & ceiling.

Packaging & Coverage

Spatter Dash CB is supplied in 50kg bags or Bulk.

Yield: Approx. 34 liters, 11M2/ bag.

Stated consumption data is for general guidance. Actual consumption depends on the nature of the substrate, method of application, and wastage.

Compliance Standard

- BS: EN 998-1
- ASTM C 926
- ASTM C150 Type 1

Shelf Life & Storage

Spatter Dash CB's original sealed bag has a shelf life of 12 months, provided it is stored clear of ground in a dry, shaded place, at temperatures between 5ºC - 35ºC.

Color & Appearance

Grey Powder

2.2.3 Application Information

Surface Preparation

The substrate should be sound, clean, free from loose material, grease, laitance, dirt curing compound, or any other substance that might impair the substrate's bond quality.

Limitation

Ensure the substrate is suitable for the application of Spatter Dash CB; in case of doubt, try on the sample area to assess its suitability.

Do not apply the product under direct rain, extreme wind, and temperatures below +5ºC or above +45ºC.

Instructions for use

Mixing

Add to the mixing container 13.5 - 16 liters of water for each 50Kg bag of Spatter Dash CB. Add the powder to the water and mix with a mechanical plaster mixer or low-speed electric drill fitted with a suitable paddle. Mix for 3-4 minutes until achieving a uniform, lump-free consistency.

Blend Spatter Dash CB manually for small quantities and maintain the correct amount of powder to water. Mix for approximately 1-2 minutes until achieving a homogeneous mix.

Application

Preferably, apply Spatter Dash CB in a single coat application to achieve the desired rough thickness of 4-6mm.

Apply the mixed material using a mechanical spray or manual spatter machine or hawk & trowel technique.

Cover 95-100% of the surface area to be plastered. Allow the installed application to remain undisturbed for at least 48 hours.

Curing

Cure Spatter Dash CB by spraying water on the applied materials' surfaces every 12 hours for a minimum of 3 days. During hot & dry conditions, allow curing for a minimum of 5 days. It will help to obtain high mechanical strengths and minimize the risk of surface cracks.

Cleaning

Clean tools and equipment with water immediately after use. Remove the hardened material using mechanical means.

2.3 Background surface

The type of plaster materials, as well as the application process, will vary depending on the background surface where it will be applied. Certain factors such as the suction of the surface will have an effect on the adhesion of the plaster.

For example, the higher the suction or water absorption capability of a surface, the better plaster will adhere to it. For surfaces that have low adhesion, it is recommended to spray liquid primer or water so that the plaster can adhere to the surface properly. Bonding agents can also be added to the plaster mixture as a solution to low adhesion.

Another technique used to ensure that plaster adheres to corners and joints are plastering beads. Galvanized plaster beads are placed in joints, angles, and corners to act as reinforcement for the plaster and helps it adhere to the surface. In some applications, it is often necessary to apply a thin layer of basecoat. Basecoat needs to dry properly first before the first layer of plaster is applied over it.

Bricks or blocks with rough and solid surfaces possess means of mechanical adhesion when plaster is applied to the background walls or ceilings. The mechanical keys which adhere hardened plaster to the surfaces is created after spread wet undercoat plaster is dried.

Some backgrounds need preparing in order to make sure there is good adhesion. In plastering, every step is important to have a great end result, including the preparation

A background is the surface that the first coat of plaster is being applied to. Some backgrounds need preparing in order to make sure there is a good fixing. In plastering, every step is important to have a great end result, including the preparation. If the background is not prepared properly, the plaster will not stick very well and will make the end result a very low standard.

Figure2.2 brick background surface

Two problems a plasterer may encounter when dealing with backgrounds are High suction backgrounds (the material may shrink and crack due to loss of water) Low suction background (materials can slide and move around.) Older buildings need preparation before rendering to make sure there is a good bond between the render and the background where as newer buildings require very little preparation due to the blocks that are used.

In new buildings, plasterboard, expanded metal lathing, wood wool slab background do not need any preparation. With brickwork, plaster can be applied straight on top as long as it is clean, and has a good key for the plaster to stick to. Sometimes, if the brickwork is dirty, smooth or dry then a bonding adhesive might need to be applied before the plaster.

Pre-cast concrete will always need preparing such as cleaning, hacking, a coat of bonding adhesive etc. If the adhesion is very poor, which is rare, expanded metal lathing is fixed in the concrete with nails into plugs.

Composite backgrounds that have a lot of materials in it can cause cracking or poor adhesion. If you have concrete or timber lintels above windows and doors, they need to be treated otherwise they can cause some trouble.
One, two or three coat work is for plain interior plastering and should be decided depending on the background, fire protection, strength, surface finish etc.

2.4 Bonding Coat

Bonding Coat is a lightweight undercoat plaster for use over smooth or medium suction backgrounds. It can be used over in-situ concrete when pre-treated with Thistle Bond-it. finer mix for improved workability and smoother consistency. easy to spread, rule and derby. Compatible with all Gyros finishing plasters

2.4.1 Composition / information on ingredients

General composition: Calcium sulphate hemihydrate. Natural constituents may include clay, limestone and minor amounts of quartz. Additives may include minor amounts (less than 4%) of hydrated lime.

Application of bond coat

Highway bond coats applied highways bond coats are most often applied by a road tank sprayer before the overlay is put down. Once an even coverage of the tack coat has been applied, it usually takes a few moments to cure. Once cured, it is tacky, and the overlay can be laid over it.

Difference between bonding coat and bonding 60

Thistle Bonding 60 provides a consistent 60 minute set time for a professional finish. The shorter set time allows patching and repair to be completed in half the time compared to standard Thistle Bonding Coat undercoat plaster. Working time of 45 minutes, set time of 60 minutes; ready to skim in 75 minutes

Ratio for bond coat

Prepare a consistent mortar with at-bond coat, cement and sand in the ratio of 1:1:2 by volume. Water may be used to achieve desired consistency for brush application. Apply the mortar onto the surface of the old concrete. Pour fresh concrete after an hour of application of the bond coat

Figure2.3 bonding coat with different material ratio

Description:

At-Bond Coat is a synthetic based bonding agent which provides good adhesion and water resistance.

Standards:

At-Bond Coat as a bonding agent complies with ASTM C1059

Uses:

- at-bond coat is use to bond old to new concrete
- Topping patches and leveling mortar
- Concrete repair and adhesive mortar
- As an admixture in cement injection mix etc.

Advantages:

At-Bond Coat is a highly effective multipurpose styrene butadiene rubber (SBR) admixture for bonding, waterproofing & repair. Key benefits are:

- Easy to use
- Non – toxic
- Increases the mechanical strength of the mortar
- Makes the mortar waterproof
- Extremely good bonding to bases like concrete, stone grout etc.

- Reduces viscosity of cement injection grout

Instruction for Use:

Surface Preparation

- Before application of At-Bond Coat check that surface(s) should be clean from loose particles, dust, oil, grease, acids, and other organic solvents. Absorbent surfaces should be thoroughly saturated with water.

Application

- Prepare a consistent mortar with At-Bond Coat, cement and sand in the ratio of 1:1:2 by volume.
- Water may be used to achieve desired consistency for brush application.
- Apply the mortar onto the surface of the old concrete. Pour fresh concrete after an hour of application of the bond coat.

Coverage:

The coverage depends on the type of the surface.

- Approximately 3-4 sqmtr. of area is covered by 1 kg of At-Bond Coat

Packaging & Storage:

- At-Bond Coat is available in the following packs:
  - 20 kg / 50 kg PACK
- Shelf life is 12 months in sealed containers as provided
- Protect At-Bond Coat from direct sunlight.
- Keep containers sealed and protect from frost.
- Store in clean, dry conditions and away from heat and cold in a well- ventilated area.
- Stir material well before use.

Health & Safety:

- Protect hands with rubber gloves and eyes with goggles.
- Accidental splashes to the skin or eyes must be rinsed immediately with clean.
- Store in well-labeled containers.

2.4.2 Use of bond coat

Generally, the use of bond coats is a matter of preference. However, industry organizations such as the American Concrete Institute (ACI) recommend using bond coats to avoid potential future aesthetic and structural damage and to achieve a strong bond. The previous article was based on the recommendations of key industry organizations, as well as the results of our own testing.

In most application scenarios (unless the fresh concrete is already modified with an appropriate polymer), fresh, wet concrete does not bond well to existing dry concrete. Extensive testing has demonstrated that a stronger bond between fresh concrete and existing concrete can be created by using bond coats that use acrylic resins, styrene butadiene (SBR) latex, polyvinyl acetate (PVA), or a wide range of copolymers and epoxies. These types of bond coats are preferred, especially in northern and temperate climates where they are proven to sustain a more durable bond during repeated freeze/thaw cycles.

2.5 Metal beads for external

Metal beads are used for internal and external applications of rendering and plastering. Beads such as Galvanized and Stainless Steel Plaster/Render beads are great for internal plasterwork or areas with exterior mild weather conditions.

Beading is a thin piece of metal that has a straight edge running along its length to ensure a smooth surface or angle for plastering over. It is most commonly used when applying plaster to a wall around corners, especially window and door frames. The beads allow for neat corners to be covered with ease

Figure2.4 metal bender for internal and external wall application

External Corner Beads

Studios' Trim90 plasterboard beads and corners are designed to strengthen and protect plasterboard installations, for curved or straight plasterboard details. The inclusion of perforated legs in the design of studios' External Corners allow for quick and easy stopping of walls.

Best beads for plastering

PVCu (Poly Vinyl Chloride un-plasticized) will not corrode, is impact resistant, is unaffected by weathering and resists chemical attack. As such it is versatile and can be used both externally, and internally where a higher level of humidity or moisture is present.

2.5.1 Types of Drywall Corner Beads

Corner beads are typically made of metal, vinyl or are "paper-faced," meaning they combine metal or vinyl and paper. Each material has its own unique strengths and weaknesses, but one type, in particular, is definitively the best corner bead for drywall.

Metal

The most common and traditional type of corner bead, metal corner beads, have been installed by drywall professionals and avid Dyers alike for generations.

Although contractors have used metal for outside corners longer than other materials, there are several reasons why it is not the best corner bead for drywall.

The outside corners are the most likely areas of your walls to sustain damage. whether from people, animals or furniture, your outside corners will likely take a beating.

Although metal corner beads will not shatter, they will undoubtedly dent upon significant impact. Unfortunately, you cannot repair a dented corner bead, and you will likely need to replace it.

- Metal corner beads can be prone to rusting in damp applications such as bathrooms and basements.
- In transport, metal corner beads are often dented, bent and damaged, which makes them difficult, if not downright impossible, to use.
- Metal corner beads can be the culprit of significant nail popping or cracking in a finished wall.

Paper-Faced

The drywall industry developed paper-faced corner beads to help prevent the irritating cracking and nail popping common with its metal counterpart.

The solution to this problem is to install a paper-faced corner bead by "mudding it in," a process by which the corner bead is held in place by a bed of joint compound. Paper-faced corner beads are available in both metal and vinyl—which means that all paper-faced corner beads are not created equally.

While paper-faced metal beads eliminate cracking and nail popping, they create new and different problems.

If installed incorrectly, a paper-faced corner bead can separate or peel away from the wall, which can compromise your corner and create an unsightly finish. To counteract the problem of peeling, a paper-faced vinyl bead like Fast Edge Paper features Mud Locks that grip into the mud.

Vinyl

Using vinyl to make corner beads creates a durable product that is immune to rust, dent-resistant and will not peel away from your wall.

Vinyl's superior flexibility allows it to quickly create curves and contours that would be painstakingly difficult to replicate with metal. In addition, vinyl is available in a much

more comprehensive range of shapes and profiles than its metal counterparts, and it's easy to see why vinyl is the best corner bead for drywall.

Best Drywall Corner Bead Material

Vinyl corner beads provide numerous advantages over metal and paper-faced alternatives, including resilience, elasticity, flexibility, the plentiful variety of product options, and the material's sustainability.

Resiliency

Whether during delivery from the manufacturer to the store or in the bed of your truck surrounded by tools and lumber, there is a good chance that your corner bead will be compromised somewhere along the line

Metal corner bead bends, dents and bows will leave you with a product that is not straight and is challenging to install. On the other hand, vinyl is immune to such transportation-related disasters and will always bounce back to its original shape.

Elasticity

One of the biggest reasons vinyl is the best corner bead for drywall is its elasticity.

Whether you're moving furniture, carrying groceries or moving a bulky item like a stroller around the house, the outside corners of your walls are going to take a beating. Metal corner beads can dent irreversibly on impact. Vinyl corner beads, on the other hand, take the hit and bounce right back which prevents annoying and costly repairs.

The Ability to Curve

The ability to curve is one of the many characteristics that sets vinyl apart from other types of corner beads.

Although you can use metal corner beads to finish curves using relief cuts and bending, creating the required smooth, consistent radius can be tedious and challenging.

Unlike metal, vinyl corner beads have no problem bending and curving to whatever contour your project requires.

Wide Range of Options

The sheer number of product options available in vinyl compared to metal is another reason vinyl is the best corner bead for drywall Vinyl is available in multiple sizes of soft, sharp, bullnose and chamfered profiles, as well as reveal beads, shadow beads, J beads, L beads and much more.

Sustainability

Vinyl isn't just the best corner bead for drywall — when produced using sustainable practices, it can be the best corner bead for the planet.
Vinyl corner beads made by Trim-Tex are predominantly made from recycled Materials which keeps millions of pounds of plastics out of our landfills each year.

2.6 Fix and check metal beads

A corner bead allows outside corners where two materials meet each other to be seamlessly joined without having to repeatedly cut and fill in the gap between them. Not only do corner beads provide a quality finish, they also improve the durability of your drywall.

Fix a metal wall corner

Instructions

- Mark the Damaged Section. Mark the section of the corner where you want to replace the corner bead. ...
- Cut Out the Damaged Section. ...
- Remove the Corner Bead. ...
- Cut the New Metal Bead. ...
- Secure the New Corner Bead. ...
- Mud over the Bead. ...
- Let It Dry and Apply Another Layer. ...
- Sand the Compound

Self –check -2

PART ONE: choose the best for the following questions

1. What is the recommended ratio of bonding agent to water for a dash coat mix?
   A. 1 part bonding agent to 2 parts water
   B. 1 part bonding agent to 3 parts water
   C. 2 parts bonding agent to 3 parts water
   D. 3 parts bonding agent to 2 parts water
2. What is the recommended curing time for a dash coat mix?
   A. 72 hours
   B. 48 hours
   C. 24 hours
   D. 8-10 hours
3. What is the recommended use for Balaji Wall Textures?
   A. As a bonding agent for substrates
   B. As a base coat for subsequent plaster coats
   C. As a final finish on plaster
   D. As a decorative coating for walls
4. What are the advantages of using Spatter Dash CB?
   A. It is a high-quality product for all types of surfaces
   B. It is suitable for both internal and external applications
   C. It is a pre-blended product for consistent quality
   D. It is a cost-effective alternative to other coatings
5. What should be done to plywood surfaces before applying Balaji Wall Textures?
   A. Leave the surface untreated
   B. Scrape the surface with a wire brush and apply Balaji Base Coat
   C. Apply a thin coat of bonding agent and let it dry for 8-10 hours
   D. Wash the surface with water and apply Balaji Texture

PART TWO: Define and list the following questions

1. Formulate the steps for applying and mixing a dash coat?
2. Evaluate the effectiveness of Balaji Wall Textures in binding to different substrates?
3. Compare the use of Spatter Dash CB on different types of surfaces?
4. Identify the different types of substrates used in construction?
5. Analyze the advantages of using Spatter Dash CB for specific applications?
6. Understand the relationship between the type of substrate and the preparation required for the application of Balaji Wall Textures?

PART TRHEE: say true or false

1. Tack Coat is a lightweight undercoat plaster for use over smooth or medium suction backgrounds?
2. Plaster substrates are boards onto which a plaster system is directly applied?
3. The ability to curve is one of the many characteristics that sets vinyl apart from other types of corner beads?
4. Corner beads are typically made of metal, vinyl or are "paper-faced," meaning they combine metal or vinyl and paper?
5. Plywood when comes in contact with water leaches color and leaves stains?

UNIT THREE: Prepare and Mix Materials

This unit is developed to provide you the necessary information regarding the following content coverage and topics:

- **Texture coat materials**
- **Texture coat surface finishes**
- **Cure surface for texture finishes**
- **Toweled texture coat finish application techniques**
- **Ridged and flexible casting molds**
- **Produce running molds**

This unit will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Apply texture coat materials
- Implement Texture coat surface finishes
- Apply Cure surface for texture finishes
- Apply Toweled texture coat finish application techniques
- Set out Ridged and flexible casting molds
- Set out Produce running molds

3.1 Texture coat materials

Texture coating is applied over rendering to provide extra protection for the building and to deliver a selection of different finishes that can vary in color and texture. Many homeowners and residential builders will opt to use it for the many benefits that it can provide.

Figure3.1texture for coating

Handling And Application

Preparation:

Lightly Sand Area to Be Textured With 320-400 Grit Sandpaper.

Mixing:

Texture Coating Aerosol:

Agitate thoroughly! Texture Coating will initially dispense a thick clear liquid from the spray tip. This is normal and will stop after a few seconds of steady pressure on the spray tip.

3.1.1 Texture Coating Quart

SP Texture Coat is a mixture of high-performance ceramics and acrylics specially blended for breathability, adhesion, flexibility, and toughness. Additional lightweight aggregate compound is added into the formulation to insure a texture yet having added characteristics not found in standard dry mix ratios of stucco. SP Texture Coat is tested to show a low permeability and is not affected by water or moisture-penetration. It is designed to stay down for a long bonding life. It will not crack and peel. It is UV-

protected for long life and durability against weathering whether in hot or cool climates, or whether in high humidity or very dry environments.

Application:

Textures ranging from a very fine, almost undetectable pattern to a heavy or wavy effect can be achieved simply by altering the distance from the surface sprayed or by changing the speed of application. When applied with a spray gun, texture may also be altered by air pressure or fluid tip size. Apply adequate coats to achieve desired texture.

3.1.2 Typical Uses

SP Texture Coat was designed to coat a variety of surface structures on metal, wood, stone, concrete, fiberglass or composites. SP Texture Coat breathes, and unlike standard stucco, can flex with the substrate without cracking, giving years of maintenance-free service. SP Texture Coat will not allow water to penetrate and damage substrates. It has a mildew resistant agent in the formula to guard against the growth of mold and mildew. When top-coated with Super Thermo to guard against solar radiation heat absorption, the system created provides an insulating effectiveness on exterior walls and will not detract from the texturing.

Note: Achieving desired texture often requires practice and experimentation.
Allow proper flash times to avoid losing texture. Also, when applying texture, never pull or release the trigger or valve over the surface being textured. This can result in an inconsistent texture varying the look of your work. Once the texture is dry to touch, lightly sand area with a gray scuff pad or 400grit sandpaper to achieve a uniform texture. Blow off dust and clean with Plastic & Leather Prep. Texture Coating is compatible under most top coats, but for best results, use Color Coat or Bumper Coater.

Mix Material

Mixing the plaster slurry is the most important step in producing plaster molds or casts with optimal strength, absorption, hardness and other important properties. Changes in mixing procedures will have a great effect on the finished product.

Mixing disperses plaster particles in the water. Along with water-plaster ratio, the final strength of the plaster cast is also determined by mixing. There is a direct relationship between energy input during mixing and strength development of the cast. Fig. 3 shows how mixing times affect strength development. As mixing time is continued, strength of the cast increases. However, long mixing time will adversely affect other properties such as porosity.

Therefore, mixing time must be based on properties most needed in the finished cast. If strength is the primary requirement, then longer mixing times are desirable. Care must be taken, however, not to mix into the setting action of the plaster since this will decrease strength.

Effect of mixing time on set-time of the plaster slurry . However, the practice of varying mixing times to control setting is not an acceptable practice. Under mixing can lead to separation or settling out of the plaster from the water prior to set. Conversely, over mixing can result in a decrease in strength. It is highly recommended that a mixing time suitable for the application be developed and followed as standard procedure.

Large batches are difficult to handle promptly, and a reduction in efficiency and performance of the mold may result. Generally, batch size should permit pouring to be completed no later than 5 minutes after the slurry has been mixed.

To mix plaster properly for uniform molds or casts, follow these steps:

- Weigh plaster and measure water accurately for each mix.
- Follow timed soaking and mixing cycles. Use an accurate interval timer.
- Use a mechanical mixer and a mixing bucket which are both of proper size and design.

Direction of mixing material

Sift or strew plaster into water slowly and evenly. Do not drop large amounts of plaster directly into water. Allow to soak for 2 to 4 minutes, then mix as required—generally 2 to 5 minutes—to obtain a creaming of the plaster slurry.

Hand mixing is generally acceptable for small batches up to 5 lb. and a minimum consistency of 50 cc. However, since optimum physical properties are in direct relation to energy input in mixing, hand mixing will not result in a plaster cast with the best properties.

Mechanical mixing can be done with a high-speed, 1750 rpm direct-drive propeller mixer mounted in a stand with mixing shaft set at an angle of 15° from vertical. The propeller should clear the bottom of the container by 1 to 2 inches and the shaft should be about half-way between the center and the side of the container. Propeller rotation should force mix downward. Be careful not to form a vortex in the middle of the slurry. Keep all equipment clean to avoid acceleration of plaster set

3.2 Texture coat surface finishes

The simple fact is that a smooth surface is, generally, a boring surface. We are creatures of detail. tactile creatures. The rough surface of a cut stone is infinitely more pleasing that a painted plasterboard panel. That is why one of the first decorative elements to be developed for plaster as a building material was simple texturing.

Merely varying the pressure of the trowel as the surface is applied or using a variegated material can be enough to change the entire personality of a wall. But, like any decorating technique, the devil is in the details. Choosing the right texture is a much longer-term commitment than the right color, after all.

3.2.1 Different Textured Plaster Finishes

There are, of course, a wide range of textured plaster wall finishes to choose from. Here, we've listed a few of our most popular options. Please click on any one you'd like to explore more deeply, but also don't hesitate to ask about any kind of texturing – we can handle almost anything!

Directional texture – This class of textures includes any pattern with elements pointing in the same direction. Often this is accomplished with a trowel or specialty tool when the plaster is first applied.

Contrasting texture – A contrasting plaster texture is not directional – it may have many scattered elements, or it may have a variety of forms without any particular bias. Contrasting textures are typically applied after the plaster is applied, but before it can dry.

Stone effect – Stone effect plaster work got a bit of a bad reputation due to some questionable techniques that were popular in the 1980s. However, the technology hasn't been standing still. Some really amazing cast stone and stone effect plaster work is possible today.

Wood Grain texture – Wood Grain texture is usually not about pretending to be wood, but using the natural grain of wood to give plaster a pleasing texture. This can often be accomplished by pressing large, heavily textured boards to the plaster.

Specifically, our Pitted, Dragged, Relief and Cast Stone textured plaster wall finishes are very popular right now. You can, view our range of decorative plasters below or contact us directly

3.3 Cure surface for texture finishes

Curing the surface for texture finishes, there are several methods and techniques that can be employed. The goal of curing is to ensure that the texture finish adheres properly to the surface and achieves the desired appearance and durability.

Curing aids in reducing surface cracking and should be done 24 hours after the plastering. The surface must be kept wet for a full week. In addition, there should be a 7-day wait between the first and second layers of plaster. The first/ scratch coat should be evenly dampened before the next coat is applied.

3.3.1 Types of Wall Texture and the Techniques

Modern trends have tended toward flat, blank walls and a focus on color to bring a room together, but adding a unique wall texture to a room, or even to a single accent wall, can bring a personality to your home that a color choice simply cannot. Texturing can even help hide architectural errors, saving you costly repairs by allowing an uneven wall or ceiling to simply fade into an attractive textured pattern.

- **Comb**

The comb texture is produced using techniques that create lines of various widths and shapes in drywall compound. This technique is often used to produce a repeated series of rainbow patterns on the drywall and is one of the more simplistic texturing techniques. This method requires drywall compound, a roller, and a drywall trowel that has evenly spaced teeth (or uneven teeth if you are going for a less organized pattern). Apply the drywall compound to the wall using the roller, then use the teeth of the trowel to gently apply lines in the wet compound. If you are aiming for perfect concentric circles, practice your artistic skills on a spare piece of drywall before attempting them on your wall. Let the texture dry for 24 hours before priming and painting.

- Popcorn

The popcorn texture is a dry mix of drywall mud and polystyrene, and it comes in a standard white color, so it's best to prime the wall or ceiling before use. Mix the popcorn texture with water, following the instructions on the package. Make sure to securely

cover all surfaces and items that are not to be sprayed. Once the rest of the room is properly covered, spray away. The texture can be painted any color you want after it has dried.

- Orange Peel

An orange peel texture looks exactly as it sounds—it resembles the peel of an orange. You will need to prime the walls ahead of time so that the texture has a smooth, dirt-free surface to stick to. Pick up a hopper gun with an air-adjustable valve, an air compressor, and drywall compound. Mix the drywall compound with water until it becomes the consistency of thick paint or a soupy pancake batter, then pour it into your hopper. Spray a small amount from the hopper onto a test piece and adjust the air valve to suit the spray pattern that you want. You should be shooting small splatters of compound onto the wall to create the desired texture but not fully covering the primed drywall underneath. Try both heavy splatters and light splatters, and when you are confident in the spray pattern, begin to apply it to the walls. After drying, prime and paint the textured walls.

- **Knockdown**

The knockdown technique creates a unique, rustic pattern, akin to stucco. Knockdown can be achieved by adding a step to the orange peel technique: After applying an orange peel texture to the walls, flatten the peaks and bumps that form in the drywall compound using an 18-inch or wider knockdown knife. Smaller rooms will likely require a wait period of about 10 to 15 minutes after spraying before the peaks can begin to be flattened,

- **Sand Swirl**

Sand swirl adds a feel of individuality to a room without stealing the show. This style of texturing is easy to do using a compound known as perlite (primer with sand mixed into it) and a 7-inch-wide paint brush. Hold the paintbrush by the base, as this will give you more control than holding the handle. Dip the brush a few inches into the perlite, giving it a wipe on either side of the bucket to remove loose drips. Practice making a swirl pattern on a spare piece of drywall before moving onto your wall. Using the brush, start at the

very top of the wall, making a big loop with an open bottom. Each row of this swirl pattern will cover up the bottom of the previous row

Slap Brush

The slap brush texture creates a random pattern of thin lines on your walls that add an eccentric flair to any room. This type of wall texture is a great choice if you aren't confident with a spray gun. All that is needed for this technique is a roller, a double crows foot drywall texture brush (also known as a slap brush,

- **Slap Brush Knockdown**

A slap brush knockdown texture combines the slap brush technique with the flattening step of the knockdown texture to create a random pattern of flatter, wider lines, instead of peaked, thin lines. To apply this texture, you will need a roller, slap brush, knockdown knife, and drywall compound. Using the slap brush technique, work your way around the room until each wall is evenly covered in a slap brush texture. For smaller rooms, wait 10 to 15 minutes before beginning to knock down the peaks using the knockdown knife.

Figure3. 2 Types of Wall Texture

3.4 Toweled texture coat finish application techniques

Toweled texture coat finish is a popular technique used in the construction industry to create a textured and visually appealing surface on walls and ceilings. This technique involves applying a special texture coat material onto the surface and then manipulating it with a towel to create various patterns and textures. The result is a unique and decorative finish that adds depth and character to the space.

To achieve a successful toweled texture coat finish, there are several application techniques that can be employed. These techniques involve the proper preparation of the surface, the application of the texture coat material, and the manipulation of the material with a towel.

3.4.1 Commonly used techniques:

1. Surface Preparation:

Before applying the texture coat, it is essential to prepare the surface properly. This involves cleaning the surface thoroughly to remove any dirt, dust, or grease. Any existing paint or wallpaper should be removed, and any imperfections such as cracks or holes should be repaired. Once the surface is clean and smooth, it should be primed with a suitable primer to ensure proper adhesion of the texture coat material.

2. Application of Texture Coat Material:

Once the surface is prepared, the texture coat material can be applied. This material is typically a premixed compound that comes in various consistencies, such as heavy-bodied or thin-bodied. The choice of consistency depends on the desired texture and pattern.

To apply the texture coat material, start by loading a trowel or hawk with an appropriate amount of material. Begin at one corner of the wall or ceiling and apply the material in even strokes, working in small sections at a time. It is important to maintain a consistent thickness throughout the application process.

3. Manipulation with a Towel:

After applying the texture coat material, it is time to manipulate it with a towel to create the desired texture and pattern. The towel can be folded or crumpled to create different effects. Lightly press or drag the towel across the surface in various directions to create texture and remove excess material. This process can be repeated until the desired texture is achieved.

It is important to note that the timing of the manipulation process is crucial. The texture coat material should be manipulated while it is still wet but not overly wet. If the material starts to dry, it may become difficult to achieve the desired texture.

In addition to these techniques, there are a few tips that can help ensure a successful toweled texture coat finish:

- Practice on a small sample board before applying the texture coat to the entire surface. This will allow you to experiment with different techniques and patterns.

- Work in small sections at a time to ensure that the texture coat material remains workable.

- Use a light touch when manipulating the material with a towel. Applying too much pressure may flatten the texture or remove too much material.

- Clean tools and equipment promptly after use to prevent the texture coat material from drying and hardening.

3.5 Ridged and flexible cast molds

Molds can be made of a rigid material, such as plaster or plastic resin or more commonly, a flexible material such as rubber. The material to use should be chosen considering the material of the model, the material to be used to make castings, and whether there are any undercuts.

Molds and casts are often used to replicate a variety of natural and man-made objects. A mold is a negative impression or peel of the original object. A cast is a "positive" replica made from the mold, having the same contours the original object. A wide variety of materials are available for making molds and casts. Most common molds are made of rubber or other flexible materials, whereas most casts are made of of rigid-setting materials, although this is not always the case. Some materials can be used for both molds and casts, and are available in a variety of flexibility and firmness properties. Among the most commonly used mold materials are liquid latex, silicone rammer, urethane rubber, and al giants. Common cast making materials include Plaster-of-Paris and Gypsum cement, concrete, plastics (resins and epoxies), waxes, metals.

Molds can be made from a variety of materials. Generally, they fall into two category is rigid or flexible. Among the rigid molds, including plaster and fiberglass, there are the Vacuum-formed plastic molds.

Vacuum-formed molds are used when a low cost, shallow detail, two- dimensional mold is desired. If carefully handled, they can produce up to 100 castings. These molds require a back-up shell when used in casting, which can be fabricated from either plaster or sand. Often a clean and dry sand bed is used. The mold is pressed carefully into the sand until it is completely supported, and the plaster is poured directly into the mold.

Flexible molds may be made from gelatin, latex, cold compounds, hot melt, polysulfide, urethane elastomers, and other materials having good strength and elasticity. Flexible molds are a necessity for art work involving complicated figurines or detail.

They are expensive and they may require days, or weeks, to complete. A back-up shell (or mother mold) is almost always necessary to support their shapes while pouring.

Latex rubber has a low raw material cost, and less material is used than in other flexible substances. If cared for, latex molds can last for years and survive hundreds of castings.

The most common way to apply latex is with a brush; however, it can also be sprayed or dipped. Dipping is quicker, but only seamless (glove mold) one-piece molds can be completed in this way. Spraying is equally limited, but can be used on very large

3.6 Produce Running Mold

Running Mold is a bench made by blowing up the technique of making plaster cornices on a big scale. The shape of the bench was built up gradually by scraping layers of wet plaster with a former pivoting around the center of the gallery. It was a physical process that took a team of six people three days to complete, mixing two tons of plaster by hand.

3.6.1 **Running mold decorations in plaster on facades**

The main cornices, the architrave and horizontal friezes, the window- and door casings and possible half columns are typically made by running mold. But also ashlars can be constructed this way.

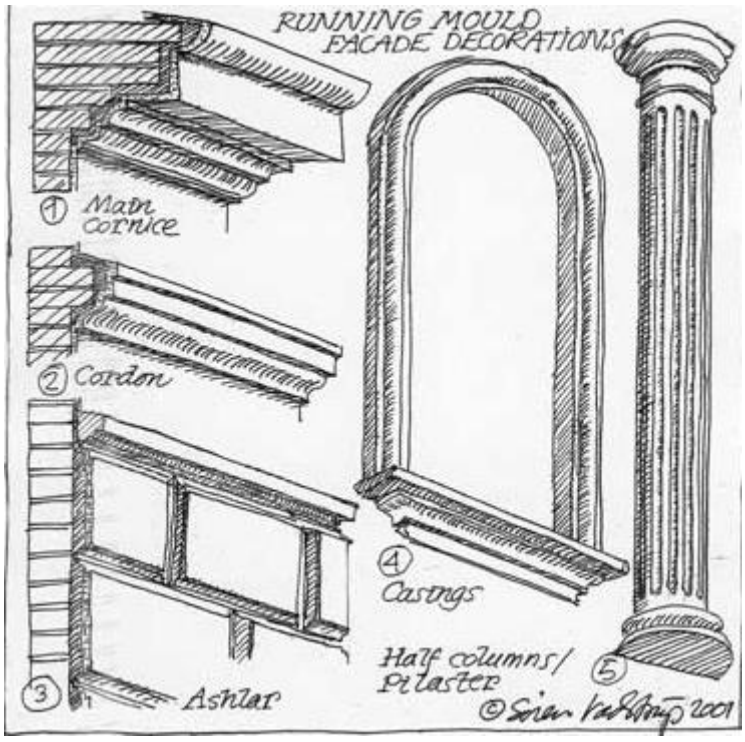

Figure3.3 running mold for curved surface

Materials

Running mold decorations on facades are constructed of air lime mortar or hydraulic lime morta. After 1860 also Portland cement mortar is used.
Today we recommend the use of air lime mortar (1:3) or hydraulic lime mortar (1:1:6 or 2:1:9) both for making new Running mold decorations and for the repair of old

decorations, even if they are originally made of cement. The old remaining cement materials are right now so weakened that insertions with new, modern cement mortar is not appropriate.

3.6.2 Making running mold main cornices and friezes

At first it is necessary to make an exact drawing 1:1 of the profile or mold of the cornice or frieze. If an existing cornice is repaired or replaced, the old and original profile must be painstakingly measured and recorded - on a place, where the profile is most best preserved

To verify the exact shape, a accurate template is made in paperboard, and tested and corrected at the spot. Note that the main cornice are often made with a little oblique drip (under carved) internally, to prevent water drops from "hanging". This must be carefully copied.

3.6.3 Making vertical running/turning mold for columns

It is also possible to fabricate a plaster column or a half column in the running mold - here vertical turn mold - technique.

The column is constructed in masonry, including the necessary corbellings, leaving approximately 4 - 5 cm to a finishing coat of plaster - constructed of two layers of hydraulic lime mortar. As the turning mold can be moved outwards, by adjusting the slide pieces, there is no need for two different mold sizes to obtain the previously described two coat construction of the plaster.

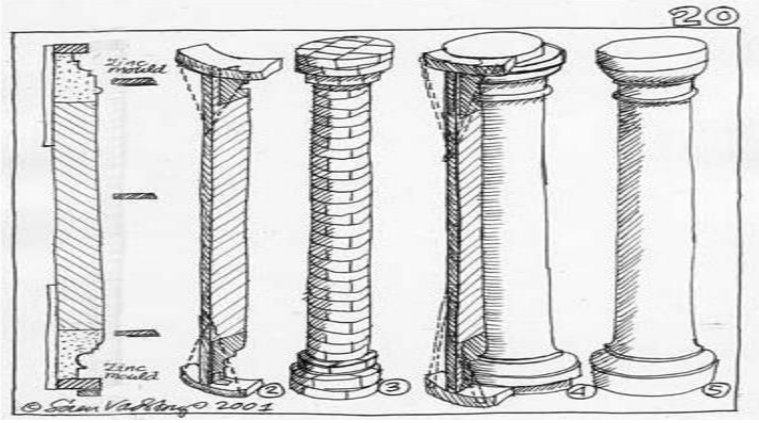

Figure3.2 running mold for making column

Self – Check

PART ONE: Choose the best answer for the following questions

1. What is the main benefit of using SP Texture Coat on exterior walls?

    A. It improves the appearance of the walls.

    B. It reduces the cost of maintenance.

    C. It makes the walls more durable.

    D. It provides insulation against heat absorption.

2. What is the effect of longer mixing times on porosity of plaster casts?

    A. It decreases porosity.

    B. It makes the plaster more brittle.

    C. It increases porosity.

    D. It has no effect on porosity.

3. What is the main purpose of mixing plaster slurry?

    A. To make the plaster thicker.

    B. To remove air bubbles from the plaster.

    C. To improve the color of the plaster.

    D. To disperse plaster particles in water.

4. What is the recommended method for achieving a fine texture with texture coating?

A. Applying a thinner coat of coating.

B. Applying the coating from a closer distance.

C. Applying the coating at a slower speed.

D. Using a smaller spray tip.

PART TWO: Define and explain for the following questions

1. Define the components of SP Texture Coat and their functions?
2. Determine appropriate mixing time for desired properties in a plaster cast?.
3. Identify the purpose of texture coating materials?
4. Explain the process of handling and applying texture coating?
5. Argue the relationship between mixing time and strength development in plaster casts?

PART THREE: say true or false

1. The popcorn texture is a dry mix of drywall mud and polystyrene, and it comes in a standard white color?

2. Toweled texture molds are used when a low cost, shallow detail, two-dimensional mold is desired?

3. Textures Rock cote Trowel On is a flexible acrylic based coating that uses pebbles to create a unique patterned finish?

4. The knockdown technique creates a unique, rustic pattern, akin to stucco. Knockdown can be achieved by adding a step to the orange peel technique?

5. Texture coating is applied over rendering to provide extra protection for the building?

UNIT FOUR: FLOAT AND RENDER

This unit is developed to provide you the necessary information regarding the following content coverage and topics:

- **Screen line**
- **Float and Float coat rules**
- **Square head reveals and sill walls**
- **Float and render coats to piers**

This unit will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- **Establishing screen line**
- **Use and Apply float and float coat rules**
- **Finish square head reveals and sill walls**
- **Apply float and render coats to piers**

4.1 Screen line

A screen line is an imaginary line on a map, composed of one or more straight line segments. Screen line analysis provides a means of comparing the results of a traffic assignment with traffic count data.

Tolerances in construction are generally a variation in a dimension, construction limit, or physical char- act eristic of a material. They are a practical variation related to the function of the material or finished work and commonly accepted standards of the construction industry.

For positional or layout tolerances (i.e., location of elements): The Handbook of Construction Tolerance suggests +/- 1/4″ for light-frame construction and +/- 1/8″ for heavy timber construction. Echoing this, the UFGS suggests a 1/4″ tolerance limit for layout of walls and partitions, relative to intended location.

For slabs, no sample may be more than ¾ inch thinner than specified and the average of all samples can't be more than 3/8 inch thinner than specified. Use of multiple tolerance items to yield tolerance result

Tolerance level of a floor it gives a recommendation that, 'Floors up to 6m across can be a maximum of 4mm out of level per meter and a maximum of 25mm overall for larger spans'.

4.1.1 Standard tolerance

Standard tolerances are the most widely used machining tolerances for most fabricated parts today. These tolerances typically fall within the range of **±0.005" and ±0.030"**, and machinists usually apply them when customers do not specify tolerance levels.

Table3.1 standard tolerance most fabrication

Processes	Standard Tolerance
CNC lathe cutting	±0.005"
3-Axis CNC milling	±0.005"
5-Axis CNC milling	±0.005"
CNC routing	±0.005"
3D printing	±0.004"
Engraving	±0.005"
Gasket cutting	±0.030"

4.2 Float and Float coat rule

A plaster or render float is a flat, rectangular tool used to smooth and finish the surface of plaster or render. It's usually made of metal, wood, or plastic and has a handle on one end. The float is used to smooth and level the plaster or render as it is applied to the surface, with the flat surface facing downward

Floating plastered walls

Smoothing plastered internal wall with a plastic float

Floats are used during the plastering process to make sure that every part of the wall is as flat and smooth as possible – known as floating.

Floating plastered ceilings

Floating ceiling with metal float

A float is often used to make sure a ceiling is as flat as possible. If plastering a whole room, do the ceiling before the walls in case of any drips. Ceiling plaster should be thinner than on the walls – about 2mm for the first coat, and 1.5mm for the second. A damp sponge float will help stop the plaster drying out too quickly, which tends to be the biggest problem with ceilings.

Floating render

Floating repaired crack on exterior wall the plaster on external walls is called render, also known as stucco. Render may be floated in order to:

- Flatten the surface
- Blend in patches that have been repaired
- Add texture

Floating concrete

Floating concrete with magnesium float Magnesium floats are designed to smooth over and flatten newly laid concrete surfaces. for more information see: How to float concrete.

Finishing pointed walls

Floating cement mortar pointing Sponge floats can be used to achieve a good finish on outside walls that have been freshly pointed (where gaps between bricks or stones have been filled with mortar). You can use them to add mortar to any remaining crevices, smooth over ridges and remove excess material.

Grouting tiles

Grouting bathroom wall tiles rubber and sponge floats are a popular choice for grouting wall and floor tiles.

Keying plastered walls

Wooden devil float you can use a use a wooden float with screws or nails driven into it, called a devil float, to key the wall before applying the final coat. Keying involves making shallow scratches all over the wall to create a good gripping surface for the top layer of plaster

4.2.1 Types of float

Plastic floats are both lightweight and strong, making them a general purpose choice.

Large heavy duty floats are available for concrete and render, while smaller ones can be used on plaster.

Plastic floats can have either textured or smooth faces. The more heavily textured ones are meant for use with render and concrete, while the smoother ones are best for floating plaster.

The surfaces on plastic floats are non-absorbent, so won't suck plaster or render off the wall.

Figure4.1plastic float hand tools

Sponge Plastering Floats

Sponge floats are ideal for walls that are drying out too quickly. We have an extensive range of top brand sponge plastering floats, all handpicked by our expert team who have years of experience and try and test all our tools.

Our Soft Grip Sponge Floats are ergonomically designed and a great choice for finishing your walls with ease.

Figure4.2 sponge plastering floats

Angle floats

Angle floats are smaller than normal floats. They are usually made of stainless steel and are designed to let you get right into the corners of the room when trimming off pieces of uneven plaster.

The reason angle floats can fit into the corners is because they have lipped edges that form a 90° angle with the base plate, with a slant on both ends of each lip.

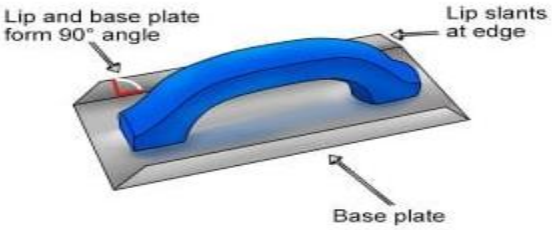

Figure4.3 angle floats

Bull float

A bull float is similar to a magnesium float but on a bigger scale. Its long detachable handle – often sold separately – allows you to reach across a large area of concrete without having to walk on it.

Most are made out of magnesium, but you can also get aluminum, plastic and wooden ones. Although bull floats are expensive, they are also available to hire.

Figure4.4 bull floats

Floating Coat

Floating coat of neat cement if specified in schedule of quantities shall be carried out as follow immediately after the surface has been plastered and while the plaster is still green a floating coat of neat cement shall be applied on it and the surface rubbed smooth with steel trowel**.**

In the 3- coat plaster, the first coat is known as rendering coat second coat known as floating coat and the third coat is known as setting coat or finishing coat. The first coat is known as rendering coat. The Second coat is known as floating coat. The third coat is known as setting coat or finishing coat.

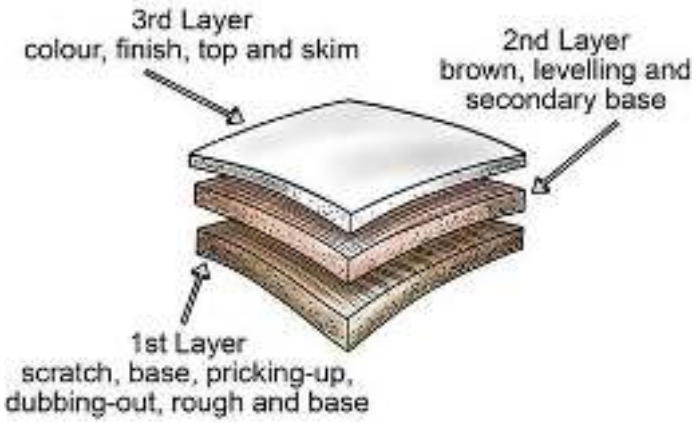

Figure4.5 types of layers coat finishing

Floating coat means the second coat in a three coat plaster work, to bring the rendering coat to a true and even surface before the setting or finishing coat is applied. second coat is called the floating coat and is the coat which is straightened to ensure a flat and even surface. After this coat has been straightened, the surface of this coat is scoured up with a timber or polyurethane float. The purpose of the scouring is to compact the plaster and counteract shrinkage.

4.2.2 Plaster a Wall with a Float

Step 1 Wait for Plaster to Set

A first step of floating concrete is to wait. after applying the plaster, wait around 20 or 30 minutes for it to start firming up (also known as going off) before using the float.

You need to time it just right. If you start too soon, the float will pull bits of wet plaster off the wall and spoil the finish. If you wait too long, the plaster will have set hard. You should be able to make just a slight dent in the wall with your finger when it's ready to float.

Figure4.6 wait for minimum time

Step 2 - Use Darby to Level Plaster

Many plasterers use a darby on the wall at this stage to begin leveling the plaster. Start at the bottom and pull the darby slowly up to the top, keeping it pressed firmly against the wall at an angle of about 45 degrees.

Repeat all along the wall, scraping excess plaster off the darby with your trowel after each pass.

Figure4.7 placing darby at right angle to wall

Step 3 - Float Plaster

Now it's time to start floating the plaster to get it smooth. Apply firm, even pressure to the float to ensure it remains flat on the wall at all times while moving in either a figure of eight or a circular motion.

This will flatten the plaster by pushing the high points into the troughs, and will also help fill in small holes.

Use the float to add plaster to any holes and cracks that are left.

If you're using a sponge float, keeping it damp by dipping it periodically in water will help prevent the plaster drying out too soon. You can also use a decorator's sponge for this.

Figure4.8 use float plaster

Step 4- Cutting Back Plaster

It's important to get the edges of the wall straight and square at the corners, which floating can leave slightly rounded. This is known as cutting back.

You need to make sure that the wall is straight both at the top, where it meets the ceiling and at the bottom, so that the skirting boards will sit flat when they're added later on. The corners must also be completely straight vertically, otherwise, the whole wall will look shoddy.

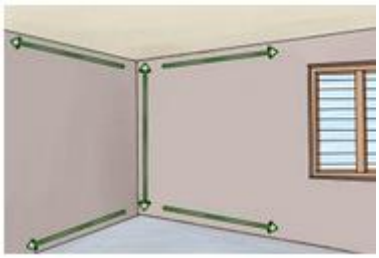

Figure4.9 cutting block plaster

An angle float makes it easier to cut back the plaster on the corners, although you can also use a stainless steel trowel. This needs to be done when the plaster has firmed up a little, but before it sets.

Keeping the float completely flat on the plaster, slide it into each corner and angle it so that just the tip cuts into the plaster to slice off any bulges.

4.2.3 Rendering

Rendering is used to coat exterior surfaces of buildings, and contains a higher percentage of cement within its composition. Rendering is applied to the outside of buildings to not only make the outside facade more visually appealing, but also provides waterproofing and fireproofing efficiencies.

Rendering is made up of a composition of lime gypsum, sand and cement, bonding agents, drying additives and coloring. Lime gypsum is key to giving the coating its creamy appearance and smooth finish. Finer sand must be used in the rendering mixture to create the coveted finish.

Render is layered onto exterior walls in sheets, applied with a trowel and finished with a number of different tools, dependent upon the desired finished appearance. Rendering can either have a smooth, flat finish or a textured, patterned appearance, determined by the homeowners personal taste.

It is best recommended to use the services of a qualified plasterer to complete rendering work for your home, as it takes a skilled hand to achieve professional results.

Plastering and rendering are both the process of covering walls. The main difference in the two practices is that plastering refers to coating the interior walls, whilst rendering is the coating of exterior walls. The major distinction between plastering and rendering is the strength of the materials used in each. Nonetheless plaster and render are both made from the same building materials including, cement, sand, water and lime gypsum.

4.2.4 Types of rendering

Cement Rendering

Cement rendering is a traditional finish for exterior walls. It combines hydrated cement, sand, water, and additives to form a paste that can be applied with either a trowel or paint roller. The product used will determine the finished texture of your wall surface.

Clay-Based Render

Clay render is made by combining clay aggregate (often clay dust or clay shingle), an emulsifying agent, and additives to create a mortar-like paste that can be applied with either a trowel or paint roller. It is suitable for both interior and exterior applications on most texture surfaces such as brick, stone, or wood.

Lime Render

Lime render is made by heating limestone in a kiln at temperatures over 1,500 degrees Fahrenheit to create quicklime. This process results in a white powder known as lime putty, which can be mixed with sand and water to create a plaster-like paste that can be applied to surfaces with a trowel.

Lime renders are suitable for exterior and interior applications, but they must be protected from the elements immediately after application before achieving full strength.

Acrylic Rendering

Acrylic render is a water-based material that can be applied using a trowel or paint roller. It is most often used on smooth surfaces such as plaster walls and ceilings, but it is also suitable for textured surfaces where a thin coat of paint covers any bumps.

Acrylic rendering provides your home with a durable, weather-resistant surface that can also be applied to most textured surfaces such as brick walls or plaster-covered walls. The acrylic render will not damage any surface finishes when applied correctly over an appropriate substrate.

Polymer Rendering

Polymer rendering is a water-based material that can be applied using a trowel or paint roller. It is most often used on smooth surfaces such as plaster walls and ceilings, but it is also suitable for textured surfaces where a thin coat of paint covers any bumps.

Like acrylic render, polymer renders provide you with an exterior membrane that is durable and weather resistant. This finish allows the render to adhere well to the substrate and prevent flaking or peeling.

The polymer additive in resin render ensures it can be applied to interiors and exteriors alike, including wood cladding due to its smooth texture.

Silicon Render

Silicon render is an exterior plaster-like material with good weather resistance properties. It comes in powder form and once mixed, the silicon additive creates a hard-wearing surface similar to concrete or clay renders. This can be applied on plastered walls and ceilings but is not suitable for projecting parts of buildings because it does not have good

adhesion properties. As a result, some silicon renders require more than one coat for best results while others are self-leveling.

Plaster Render

Plastering is a traditional method of finishing interior surfaces with plaster mixed from sand, cement, and lime. This mixture dries harder than most other types of resin so it can be sanded down to achieve a smooth finish ready for decoration.

Plaster was traditionally made using a mixture of sand, cement, and lime that dries very hard. Over time, different additives were added to this basic recipe to create renders with improved adhesion properties and hardness upon drying. These mixes could be applied in one or two coats depending on the desired finish

Chalk Render

The advantages of chalk renders include their high insulation and fire resistance and they can be applied to both old and new buildings. They do not require additional processing like natural stone or aggregates, so they are inexpensive to use compared with other alternatives.

Concrete Render

There are two main types of concrete render – cast-in-situ and precast. Both are heavy-duty materials with high levels of weather resistance but they have significant differences in terms of application, suitability for different structures, and appearance.

The first precast concrete render was developed in France during the early 1960s, to reduce labor intensity and improve quality by creating a product that could be applied more easily without compromising on performance.

Color Coat

Color coat consists of fine pigments which add texture and color to the resin rendering mixture. Depending on how much color coat powder is used, this can make your finished

surface less smooth. It also means the resin has good weather resistance properties without affecting its flexibility or adhesion properties.

4.2.5 Rendering Techniques

Rendering can be done via a variety of techniques. The most common techniques are:

- Pebble-dash has traditional pebble shapes that are attached to a rough coat of render.
- Pargetting involves creating patterns by sticking cut pieces of material onto the surface of an outside wall with mortar.
- Rowlock is achieved by embedding small stones into the first few layers of wet cement or plaster.
- Buccleuch lime renders and scumbles, are not finished but techniques of surface preparation. They involve using layers of lime and/or cement to create a textured effect.
- Weather-boarding is achieved by brushing dissimilar materials such as tarred felt or straw over the top of render to imitate wood panels on exterior walling.

4.2.6 Types of Render Finishes

The most common finishes for rendering are; cement, acrylic, and polymer rendering. Different rendering techniques can be used to get a variety of different appearances. A rendering technique that is suitable for one type of application may not be suitable for another.

Rendering is usually done by hand and it's important to make sure that all materials used are compatible with each other and the substrate to avoid problems like shrinking, cracking, and water penetration.

These rendering techniques can be used for both internal and external finishing but different types of render suit specific applications. An exterior render finish may not be suitable for interior walls due to the humidity inside buildings.

There is no 'best' render finish because different render finishes are used for different purposes. For example, stone-faced rendering is an attractive but durable finish that can be used on exterior applications where more solid renders like mechanical rendering would not be suitable

4.3 Square head reveals and sill walls

In its simplest form, a window reveal is the timber surround of the window unit; you might refer to it as the windowsill (although technically, only the bottom horizontal component of a window is called a 'sill').

While it sounds straightforward, reveals come in a range of specifications to help you achieve different aesthetic and functional goals throughout the home.

Before we get into the complexity of different reveal configurations and materials, let's cover off some of the basics.

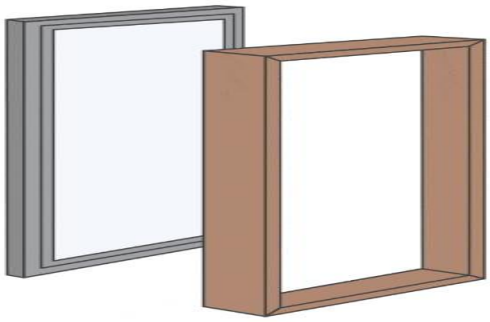

Figure4.10 head reveals and sill walls

While that's a basic description of a reveal, the appearance of a window reveal can change depending on the *type* of reveal you use; they come in a range of different styles for various applications.

Window reveal

A window reveal is used to fix the window itself into the stud wall frame. The main purpose of a reveal—regardless of which type you choose—is to provide extra support to the aluminum frame of the window unit.

There are some instances where you can install a window without needing a window reveal for additional stability. For example, if you're putting a window into a single skinned brick wall—commonly used in residential garages—you can use 'brick piers' to stabilize the installation, rather than a reveal. However, around 90% of the time you see a window, there'll be some kind of window reveal in the configuration.

While the fundamental purpose of all window reveals is to provide stability, each type is suited to a different function.

4.3.1 Main types of window reveal

Boxed window reveal

The most common type of reveal is ‘boxed’. In this configuration, there is a window reveal fitted to all four sides of the window. That is, the flat timber surface jutting out from the glass exists on every ‘side’ of the window.

Use a boxed window reveal

A boxed window reveal is generally used when you intend to fit architraves around the full perimeter of the window. A boxed reveal is available on all A&L Window products.

Doors and windows

- Doors and windows shall be installed to appropriate tolerances, including openings in walls and external openings viewed from the inside.
- Be flat along the length of sills and window boards, with a maximum deviation of ±3mm in every 2m be level within 3mm across the sill measured from the frame (tiled sills, in bathrooms, for example, may be intentionally laid sloping away from the window)
- Have level heads and sills, a maximum of 3mm from level for openings up to 1.5m, and 5mm where longer.
- Be square with the window, with a maximum deviation of ±5mm for reveals up to 250mm deep.
- Have plumb reveals, a maximum of 3mm from plumb for openings up to 1.5m high, and 5mm where higher

Internal doors

Internal doors and frames should always be installed in accordance with the manufacturer's recommendations, not be distorted in the opening, and:

- Frames should be within 5mm of plumb over the height of the frame and not out of plumb in two directions
- The gap between the door and head or jamb should be a maximum of 4mm (for double doors, the gap at the meeting stiles should be within 4mm) and uniform
- Distortion across doors should be limited to a maximum of 5mm in height, and 3mm in width
- The gap between the underside of the door and unfinished floor should be between 10mm and 22mm. The ventilation requirements for the building need to be taken into account when determining the gap beneath internal doors.

Fire doors

Fire doors should be installed in accordance with the manufacturer's recommendations. The tolerances in this clause are without prejudice to satisfactory performance for ventilation and fire resistance.

External doors

External doors and frames should be installed in accordance with the manufacturer's recommendations, not be distorted in the opening, and:

- Frames should be within 5mm of plumb over the height of the frame and not be out of plumb in two directions
- Distortion across the door should be limited to a maximum of 5mm in height and 3mm in width.

4.4 Float and render coats to piers

The procedure of applying three-coat plaster is similar to two-coat plaster only difference is that an intermediate coat is known as a floating coat. The purpose of this coat is to bring the plaster to an even surface.

In the case of 3-coat plaster, the first coat is known id rendering coat, the second coat is known as a floating coat, and third coat is known as setting coat or finishing coat.

Three Coat Plaster

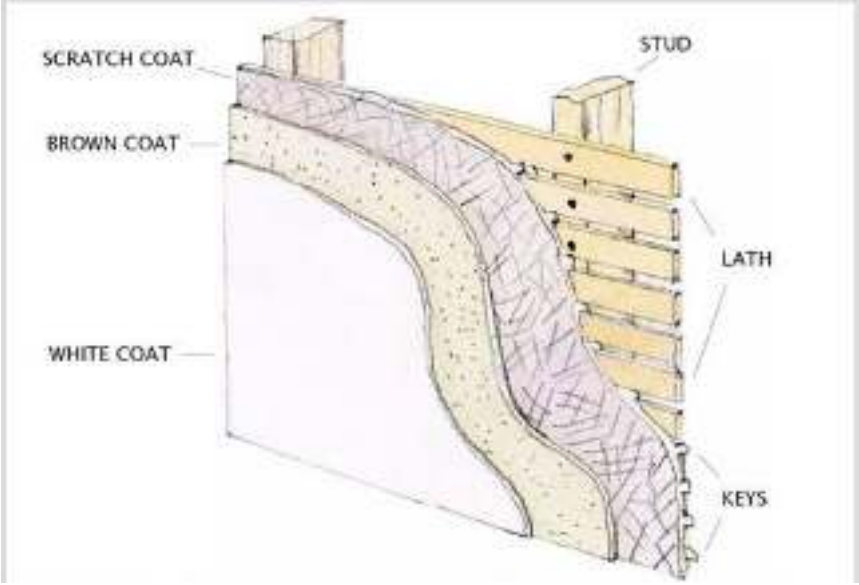

Figure4.11three coat plastering

4.4.1 The rendering coat is applied, and scratches are made. The floating coat is applied, and after seven days finished coat is applied, after 6 hours of applying a floating coat.

- Application of Rendering Coat

The mortar is applied forcibly on the surface of wall. with masons trowel and pressed well into joints and over the surface. The thickness of the coat should be such as to cover all inequalities of the surface normally this thickness is 12mm.

This coat is allowed to harden slightly a then scratch marks are made on the surface with the help of trowel ledge. During this period, the surface is curved and then allowed to dry completely.

Application of Floating Coat

The first coat is prepared properly to apply the second coat, i.e., a floating coat. All dirt and dust are cleared. It is wetted properly. 10 cm wide strips or 15 cm x 15 cm patches are applied at a suitable distance. These patches or strips act as a gauge for thickness or floating coat.

The mortar is dashed with mason's trowel, spread, and rubbed to the required plain surface with a wooden float. The floating coat is beaten with floats edge at the close spacing of cm. Then it is allowed to dry completely. The thickness or floating coat is 6 to 9 mm.

Application of Finishing Coat

The third coat is called a finishing coat. In the Case of lime-sand mortar, the finishing coat is applied immediately after the floating coat cream of lime and sand in 4:1 are applied with a steel trowel and rubbed and finished smooth.

The rubbing is done till the finishing coat is quite dry. Then curing is done after one day for seven days.

Two Coat Plaster

The joints are ranked at a depth of 20 mm. The surface is cleaned, and water is sprinkled property on it.

- Before the first coat is applied preliminary coat is applied to make an uneven surface in le.
- Then, the first coat is applied. The first coat is racked as a rendering coat. The thickness first coat is kept 2 to 3 mm less than a total thickness of plaster.

To maintain interim thickness and vertically of plaster 15 cm * 15 cm dots or are provided, Then a vertical strip of mortar known as the spread is formed at a distance of 2 m. spacing.

Then the spaces between screeds are filled with mortar and properly finished.

- Scratches are made on rendering coat to provide mechanical key before it hardens. The rendering coat is watered for 2 days and then dried.

Before applying the final/coat, the rendering coat is damped well. The final coat is applied with wooden floats to a true even surface with steel trowels. The thickness of the final coat may vary from 2 to 3 mm.

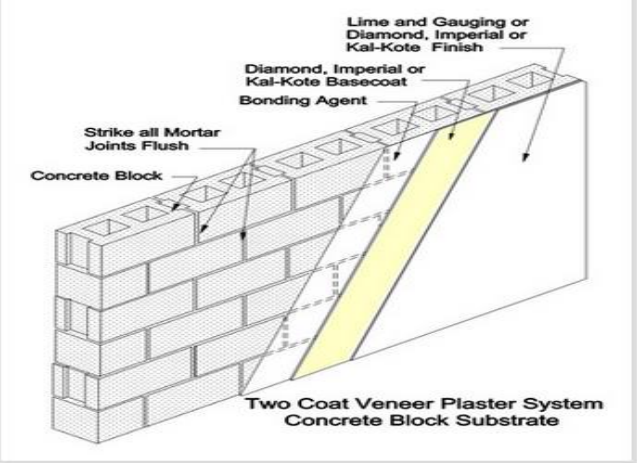

Figure4.12 applying two coat before the final

Single Coat Plaster

This is used only in interior quality work. It is applied similar to two coat plaster except that the rendering coat as applied for two-coat plaster is finishing off immediately after it has sufficiently hardened.

Figure4.13 first coat or single coat plastering

Self – Check -3

PART ONE: Chose the best answer for the following questions

1. When should the ceiling be plastered in relation to the walls?
   A. It doesn't matter
   B. Before the walls
   C. After the walls
   D. At the same time as the walls
2. What is the purpose of using multiple tolerance items?
   A. To increase the overall tolerance level
   B. To decrease the overall tolerance level
   C. To determine the average tolerance level
   D. To yield a tolerance result
3. What is the recommended thickness for the first coat of plaster on a ceiling?
   A. 5mm
   B. 4mm
   C. 2mm
   D. 3mm
4. What is the purpose of floating concrete?
   A. To add texture to the surface
   B. To flatten the surface
   C. To remove excess material
   D. To mix the concrete
5. What is the purpose of a plastic float?
   A. To add texture to the surface
   B. To create a good gripping surface
   C. To remove excess material
   D. To smooth and finish the surface

PART TWO: define for the following questions

1. Compare and contrast the use of different types of floats in construction?
2. Explain the concept of tolerances in construction and their practical application?
3. Recognize the use of multiple tolerance items to determine overall tolerance levels?
4. Identify the purpose of screen line analysis in traffic assignment?
5. Define positional or layout tolerances and their recommended limits?

PART THREE: say true or false

1. The most common finishes for rendering are; cement, acrylic, and polymer rendering?
2. Before the first coat is applied preliminary coat is applied to make an uneven surface?
3. The most common type of reveal is ‘boxed’?
4. The procedure of applying three-coat plaster is similar to two-coat plaster only difference is that an intermediate coat is known as a floating coat?
5. Frames should be within 5mm of plumb over the height of the frame and not out of plumb in two directions

Operation title: plaster a wall with a float

Instruction: Implement Plaster a wall with a float

Purpose: To acquire the trainees with plaster a wall with a float

Required tools

- Finishing Trowel. In a similar way to the pointing trowel, the finishing trowel is another crucial tool in any plasterer's kit. ...
- Inside and Outside Corner Trowels. ...
- Mortar Stand. ...
- Bucket Trowel. ...
- Mixing Bucket. ...
- Hawk. ...
- Snips.

Procedures

1. Step 1 Wait for Plaster to Set
2. Step 2 - Use Darby to Level Plaster
3. Step 3 - Float Plaster
4. Step 4- Cutting Back Plaster

Precautions:

- Before application of the plastering, the surface must be clean and free of dirt, oil, or other elements which may interfere with bonding.
- Smooth or non-absorbent surfaces should be prepared.

Quality criteria:

- It should be hard and durable.
- It should be possible to apply it during all weather conditions
- It should possess good workability.

LAP Test-3

Name: _____ Date: _____

Time started: _____ Time finished: _____

Instruction I:

1. Apply site and equipment safety rules
2. Access tools and equipment appropriate to testing materials
3. Take appropriate samples material for a given task
4. Apply mathematical procedure/solution

Time allowed: 6houres

Task 1: Implement curved wall plastering surface

Task 2: identify different types of hand tools for special plastering surface

UNIT FIVE: Render Coats on Flat Walls And Piers And Curved Work

This unit is developed to provide you the necessary information regarding the following content coverage and topics:

- **Fill walls slacks and voids**
- **water to hand float systems**

This unit will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- **Implement Fill walls slacks and voids**
- **Apply water to hand float systems**

5.1 Fill walls slacks and voids

The process for filling voids is similar to slab jacking. High-density polyurethane foam injected into voids quickly fills the open space and tightly seals the area. This can be done above the void through an injection port or the foam can be spayed along any open sides.

5.1.1 Types of wall

- Solid external walls

External walls can be of solid or cavity (hollow) construction. In houses built before the 1920s, you'll usually find solid external walls are made of natural stone or brick. They're usually at least 225mm thick (the length of a standard brick), and are often a brick and a half-thick where the house is exposed to severe weather. Today, solid walls are usually made from concrete blocks. This type of wall generally gives good sound insulation, but doesn't retain heat very efficiently.

- Cavity external walls

Most modern houses have external walls constructed with a cavity in the middle. Typically, the leaves (walls) are each about 100mm thick, separated by a gap of at least 50mm, and tied together with metal wall ties to make them stable.

Cavity walls are built from bricks, concrete blocks or timber framing, or a combination of these. They're more effective than solid walls at preventing moisture penetration and heat loss. Un insulated cavity brick walls can also have insulating material blown between them - which makes your house much cozier and more energy-efficient.

- Internal walls

There are two types of internal wall in a house: party walls and partition walls. Party walls are shared walls between detached or semi-detached houses. Partition walls divide up the floor space within a property into rooms, and are usually (although not always) non-load-bearing.

Internal walls can be made from a variety of materials including stone (in older houses), brick and concrete blocks, and plasterboard or wallboard fixed to frames made from timber or metal. Lightweight internal walls can even be made from glass blocks.

5.1.2 **Concrete Void**s: The reason behind a bad structure

A major problem nowadays are the uneven surfaces like the voids and cavities on the floor, inside walls or around the sideways are occurring due to improper construction works or soil erosion and it affects the foundation badly leading to building collapse and losing the magnificence of the structure. Void concrete filling is the best way to minimize the risk of soil erosion.

Our task is to fill voids, re-levels, re-supports, and stitch the affected and designated concrete slabs.

Detect voids

In a concrete floor voids can be seen in form of cave-ins or bowls. Talking about the extreme cases, concrete floor can sink and becomes uneven that cause accumulation of rainwater around it.

There are some techniques to detect the voids and perform Void concrete filling:

- Using Ground Penetrating Radar (GPR):-Various forms of GPR can be used for detecting voids or cavities. Namely, Single and two-channel system that are mostly used for foundations, bridges, buildings, and short road sections.

Multi-channel and phased array systems are used for high speed long sections of highways.

- Impact Echo:-In this method sound wave propagating through concrete are reflected by internal flaws and external surfaces. It can locate voids directly beneath slabs and pavement.

- Core Drilling:-This method is effective in locating a suspect location but it requires many holes in order to survey an area for voids. Also, not gives the exact indication of void size.

5.1.3 Repair the Voids

Urethane Injection: It is the most common type of injection used for repairing basement leak, water stopping and stopping leaks in concrete foundation walls.

Urethane Foam Concrete Foundation Crack Repair Advantages:

- Closed cell foam stops basement water leaks.
- Water stays outside of the basement.
- Strong bond to foundation concrete.
- Fills the basement wall crack entirely.
- Easy to use.
- No drilling or chiseling.

Grout Injection: In injection grouting a flow able plastic material having negligible shrinkage is injected to fill the gap or voids completely and remain stable from cracking and crumbling.

Various injections grouting for concrete crack repair:

- Polymer Injection Grout
- Fiber-Reinforced Injection Grout
- Cement-Sand Grout
- Gas-forming Grout
- Sulfo-Aluminate Grout

Mud Jacking Also named as Slab jacking is a concrete repair technology in which the sunken concrete slab is lifted to pump a grout through the concrete, effectively pushing it up from below. mud jacking works for a variety of applications, including securing sidewalks, pool decks and porches. It works equally well with large or small slabs of concrete and can even lift large support structures or housing foundations back into place for repairs.

Better construction techniques and proper information about the construction site helps in avoiding such voids and cavities that makes the foundation slack. And above are some appropriate techniques of void concrete filling that helps to overcome the problem of gaps, voids and cavities.

5.1.4 Repair cracks and holes in plastering

Fill a deep crack with screwed-up newspaper, which makes a good base for the filler. For larger holes, you might need to build up several thin coats of filler rather than one thick one, making sure to let each coat dry before adding the next.

Preparation

You can choose from a wide range of fillers for minor repairs:

- Interior filler - a general-purpose filler that comes ready-mixed or as a powder to mix with water
- Fine-surface filler - an ultra-smooth filler for minor cracks and surface imperfections
- Deep-repair filler - a ready-mixed lightweight filler for holes up to 20mm deep
- Fast-setting filler - a filler that sets in 10-20 minutes
- Flexible acrylic fillers - for gaps between plaster and woodwork
- Foam or expanding filler - for large holes or gaps If you're tackling a more extensive repair, there are two main types of plaster:
- Gypsum plasters - requiring two coats and often used by professional plasterers, these fillers are economical and set quickly, but are quite difficult to use
- General plasters - available in two coats, these come ready-mixed or as powder to mix with water. If you're papering your wall, plaster undercoat will give a good enough finish. But if you're painting it too, you'll need a plaster finish (or 'skim') as well.

5.2 Water to hand float systems

When applying water to hand float systems, it is important to consider several factors to ensure effective and efficient operation. Here are some key points to keep in mind:

5.2.1 Types of Water Applications

There are several types of water applications used in hand float systems, including:

a. Freshwater

Freshwater is the most common type of water used in hand float systems. It is suitable for most cleaning tasks and is relatively inexpensive. However, it may not be effective in removing heavy grease or oil-based substances.

b. Saltwater

Saltwater is a more aggressive cleaning agent than freshwater and is often used to remove heavy grease or oil-based substances. However, it can be corrosive to certain materials and may require special equipment to handle.

c. Chemical Cleaners

Chemical cleaners can be used in hand float systems to remove stubborn stains or residues. These cleaners can be applied as a solution or as a powder, and they can be effective in removing a wide range of substances. However, they can be hazardous if not handled properly, so it is important to follow all safety precautions when using them.

5.2.2 Factors Affecting Water Application

Several factors can affect the effectiveness of water application in hand float systems, including:

a. Water Pressure

Water pressure is an important factor to consider when applying water to hand float systems. Higher water pressure can provide better cleaning results, but it can also damage the system or the surface being cleaned if not controlled properly.

b. Water Temperature

The temperature of the water used in hand float systems can also affect the cleaning results. Hot water can be more effective at breaking down grease and oil-based substances, while cold water can be better suited for cleaning delicate surfaces.

c. Water Flow Rate

The flow rate of the water used in hand float systems can also impact the cleaning results. A higher flow rate can provide better coverage and penetration, but it can also cause splashing and waste.

5.2.3 Best Practices for Water Application

To ensure effective and efficient cleaning with hand float systems, here are some best practices to follow:

a. Use the Right Type of Water

Use the appropriate type of water for the specific cleaning task at hand. For example, use freshwater for general cleaning tasks and saltwater for heavy grease or oil-based substances.

b. Control Water Pressure

Control water pressure to prevent damage to the system or the surface being cleaned. Use a pressure regulator or a low-pressure nozzle to adjust the water pressure.

c. Adjust Water Temperature

Adjust the water temperature based on the specific cleaning task. Hot water may be more effective for breaking down grease and oil-based substances, while cold water may be better suited for cleaning delicate surfaces.

d. Optimize Water Flow Rate

Optimize the water flow rate to achieve the best cleaning results. A higher flow rate may be necessary for larger areas or tougher stains, while a lower flow rate may be more effective for smaller areas or delicate surfaces.

Self – Check

PART ONE: Choose the best answer for the following questions

1. What is the main purpose of internal walls in a house?
   A. To prevent moisture penetration
   B. To provide structural support
   C. To retain heat efficiently
   D. To divide the floor space into rooms
2. What is the recommended material for filling voids in walls?
   A. Epoxy
   B. Polyurethane foam
   C. Concrete
   D. Grout
3. What is the main purpose of filling voids in concrete structures?
   A. To prevent soil erosion
   B. To improve the structural integrity
   C. To make the surface even
   D. To reduce the risk of building collapse
4. What is the main difference between solid external walls and cavity external walls?
   A. Construction material
   B. Thickness
   C. Heat retention
   D. Sound insulation
5. What is the main advantage of using urethane foam for filling voids in walls?
   A. It can be used for any type of void
   B. It is less expensive than other methods
   C. It creates a strong bond with the wall
   D. It is easy to use

PART TWO: define and list the following questions

1. Formulate a plan for repairing voids in walls using urethane or grout injection?
2. Compare and contrast methods for detecting voids in concrete structures?
3. Determine appropriate materials and techniques for repairing voids in walls?
4. Identify the different types of walls and their construction materials?
5. Explain the process of filling voids in walls using high-density polyurethane foam?

PART THREE: say true or false

6. General plasters - available in two coats, these come ready-mixed or as powder to mix with water?
7. The process for filling voids is similar to slab jacking. High-density polyurethane foam injected into voids quickly fills the open space and tightly seals the area?
8. Fill a deep crack with screwed-up newspaper, which makes a good base for the filler?
9. Mud Jacking Also named as Slab jacking is a concrete repair technology in which the sunken concrete slab?
10. Most modern houses have external walls constructed with a cavity in the middle?

UNIT SIX: PREPARE AND FINISH SPECIALIZED PLASTERERS SURFACES

This unit is developed to provide you the necessary information regarding the following content coverage and topics:

- **Polish plasterers finishes**
- **Terrazzo work , mosaic work, scalable work**

This unit will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- **Produce and polish plasterers finishes**
- **Produce terrazzo work , mosaic work, scalable work**

6.1Polishing plasterers finishes

A polished plaster finish is a thin coating of plaster – often just 1-3mm thick – which can be applied to almost any interior and most exterior surfaces. These are very durable and easy to maintain, and can even incorporate colors or pigments to alleviate the need for painting and repainting the surface.

6.1.1 Five Polished Plaster finishes

Polished plaster gives the appearance of highly polished stone. Which stone it mimics depends on its composition, which also determines its finish. As you might have expected, there are several types of polished plaster out there. Some are more popular than others, though, which is reflected by our own range.

Most polished plasters originated in Italy. It is here where the polished plasters we see today were first produced. The capital of manufacturing today is Venice, although plaster powders are produced elsewhere around the world.

Different finishes are created by increasing the amount of fine or coarse stone powder in the plaster mix. the finer the powder and the higher its content, the higher the level of polish that can be achieved. By adding different types of stone to the mix, such as marble, you can alter the natural tone and color of a lime-based plaster.

Venetian plaster

Venetian is our most popular finish. Venetian plaster is a traditional Italian plaster with marble dust, modernized with some agents to make it more durable. It is a very highly polished plaster that mimics the appearance of marble. It reflects light better than any other plaster and is the perfect finish for walls, archways and columns. Check out our recent work with Venetian plaster for the Luis Vuitton store in Leeds here.

Marmorino metallic plaster

Marmorino metallic is our most popular decorative finish. Marmorino plaster is a lime-based plaster with a high marble powder content. The metallic finish comes from metallic elements in the plaster. It is tinted gold, silver or copper. The uneven distribution of metallic elements gives it an exclusive look – perfect for hotels and restaurants. Check out our recent work with Marmorino plaster for the Italian cocktail bar Porco Rosso

Lucidato plaster

Lucidato plaster is a traditional Italian plaster with a high gloss shine. It is composed of ultra-fine lime putty and can be tinted with different colors, although most applications keep things simple with neutral tones. The finish of Lucida to plaster is less grained than Venetian although it is just as smooth to the touch. Lucida to plaster is a popular material in restaurants, bars and shopping centers.

Stone-look plaster

This plaster is something a little different. Stone-look plaster is a lime plaster with aggregates that give a darker, stone-like appearance. This is a popular material in wet rooms and swimming areas. The plaster can be polished to a high gloss or it can be finished mid sheen, making it perfectly suited to dimly lit areas. This plaster is best-suited to industrial buildings and conversions, such as mill-flat conversions.

Intone plaster / stucco

Intone is a classic, traditional stucco. It has a grainer appearance than Venetian plaster with the characteristics of lightly polished limestone. It doesn't polish to as high a sheen as the polished plasters listed above, but this stucco is perfect wherever a subtle quality is needed. Art galleries and walkways are perfect applications for this stucco.

6.1.2 The Application Process

The application of polished plaster involves several steps that contribute to its unique look and texture. It all starts with the surface being prepared. The surface must be clean, smooth, and free of imperfections. A primer or base coat is applied to enhance adhesion and create an even base.

Next, the polished plaster mixture is prepared according to the desired color and texture. The mixture is applied in thin layers with a trowel, with each layer carefully smoothed

and leveled. After the desired number of layers are applied, the plaster is allowed to cure. Once it's completely dry, the plaster is burnished, which involves vigorous rubbing of the surface to create a polished finish.

Finally, a protective layer of sealer or wax is applied to make the plaster durable and make it more shiny

6.1.3 The Benefits of Polished Plaster

What makes polished plaster so popular? Check out these benefits that go with this fine, elegant finish.

Aesthetics: people love polished plaster for its beauty. They want a smooth, glossy finish and natural color and texture variations to add sophisticated elegance to any room. Polished plaster can also be customized with a broad range of effects, making this a versatile wall finish for any interior design style.

Durability: when properly applied and maintained, polished plaster can be highly durable. The lime content in the plaster makes the finish resilient, allowing it to withstand minor impacts along with normal wear and tear. In addition, the sealer or wax coating applied to the finish adds more protection against scratches and stains.

Breathability: polished plaster is a breathable material that allows moisture to pass through it. This characteristic is especially beneficial in spaces that have high humidity levels, such as a bathroom. The plaster works to regulate moisture and prevent the build-up of bacteria and fungus. For these reasons, polished plaster creates a healthier indoor environment.

Versatility: polished plaster can be applied to various surfaces, including walls, ceilings, columns, and furniture. This adaptability makes the plaster suitable for residential and commercial settings, such as living rooms, bedrooms, bathrooms, restaurants, hotels, and more.

6.2Terrazzo work, mosaic work, scalable work

Terrazzo artisans create walls, floors, patios, and panels by exposing marble chips and other fine aggregates on the surface of finished concrete or epoxy-resin. Much of the preliminary work of terrazzo workers is similar to that of cement masons. Marble-chip, cementations terrazzo requires three layers of materials.

6.2.1 Types of Terrazzo

Terrazzo installation is called a system because it includes multiple layered materials, which ultimately determine the thickness, weight, and gloss of the product. For flooring, the system choice is important to determine the desired weight and style for your space. Here are some common terrazzo systems:

- **Epoxy/thin-set epoxy:** Thin and durable; ideal for commercial or residential settings.
- **Poly acrylate:** Breathable material that uses small chips. Ideal for outdoor use.
- **Sand cushion:** Wire enforced, heavy; ideal for high-traffic areas.
- **Monolithic:** Lightweight and affordable; ideal indoors for schools, malls, and busy areas.
- **Bonded:** Thin and heavy. Professional install recommended. Limited colors and sizes.
- **Rustic:** Outdoor installation. Rough surface is slip resistant; ideal for pools and patios

Mosaic work

A mosaic is a picture made up of small parts which are traditionally tiny tiles made out of terracotta, pieces of glass, ceramics or marble and usually inlayed into floors and walls

Classical

This main type is named after the classical period in history when the Greeks and Romans created astounding works of mosaic art still around today. They are labor intensive in that the tesserae are typically hand-cut on the job site one tiny bit at a time.

Organic

This classification is also known as "Pebbles." Pebbles were used by the Greeks in some of the earliest organic forms of mosaics. However, mosaics aren't just limited to types of

stones, they can also be made with shells and seeds, and any other form of organic material.

Industrial

This can include contemporary and modern art movement principles where glass and metal can also be used within mosaic designs. Glass and mirror bits are not new materials for mosaics, and can even be found in classical works of mosaic art, but the way they are used is different. There are subway tiles made of pure glass laid out style that is clean-cut and minimal in nature.

Artisanal

In essence, almost all mosaics are hand-made, thus artisanal, because a stonemason lays them down, even if they aren't all cut by hand. However, tiles cut by a modern water jet are obviously not hand-made nor made in a traditional manner. The interesting part of this style is that hand-made mosaic works of arts aren't limited to floors and walls

Self- check

PART ONE: Chose the best answer for the following questions

1. What is the purpose of incorporating colors or pigments into polished plaster?
   A. To decrease the durability
   B. To make it more difficult to apply
   C. To alleviate the need for painting
   D. To make it more expensive
2. Which type of polished plaster is best suited for industrial buildings and conversions?
   A. Venetian plaster
   B. Stone-look plaster
   C. Lucidato plaster
   D. Marmorino metallic plaster
3. What is the purpose of adding different types of stone to the polished plaster mix?
   A. To increase the level of polish
   B. To decrease the durability
   C. To change the color
   D. To make it more difficult to apply
4. Which type of polished plaster is best suited for a traditional stucco look?
   A. Venetian plaster
   B. Intone plaster / stucco
   C. Marmorino metallic plaster
   D. Lucidato plaster
5. Which type of polished plaster is best suited for wet rooms and swimming areas?
   A. Stone-look plaster
   B. Venetian plaster
   C. Marmorino metallic plaster
   D. Lucidato plaster

PART TWO: Define and explain for the following questions

1. Determine appropriate uses for different types of polished plaster finishes?
2. Define polished plaster and its composition?
3. Identify the different types of polished plaster finishes?
4. Recognize the characteristics and uses of different types of polished plaster?
5. Formulate the steps involved in the application process of polished plaster?

PART THREE: say true or false

6. This main type is named after the classical period in history when the Greeks and Romans?
7. Brick installation is called a system because it includes multiple layered materials, which ultimately determine the thickness, weight, and gloss of the product?
8. The application of texture plaster involves several steps that contribute to its unique look and texture?
9. Polished plaster gives the appearance of highly polished stone?
10. A polished plaster finish is a thin coating of plaster – often just 1-3mm thick – which can be applied to almost any interior and most exterior surfaces?

UNIT SEVEN Templates For Curved Work Or Circular Columns

This unit is developed to provide you the necessary information regarding the following content coverage and topics:

- **Materials and templates**
- **Shapes for curves**

This unit will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- **Identify Materials and templates**
- **Determine shapes for curves**

7.1Materials and templates

The temporary replication with cardboard plywood, or other similar material, of a glass size, or any other type of construction item, such as a countertop sink. Templates are used to order replacement glass, or to position fasteners for an application such as a sign in the correct location. Templates are normally made to accurately describe a piece of complicated replacement glass or to duplicate any complex item. In many instances any attempt to accurately identify a shape or a replacement piece with dimensions is almost impossible. The use of a template will allow the exact tracing of the replacement piece and will allow a perfect reproduction to be made. Templates are used to accurately install anchor bolts for structural steel, inserts for miscellaneous metal as well as even the proper placement of fasteners to mount hand dryers and toilet accessories within bathrooms and washrooms.

Curve Templates

Cutting curves with a router, like round arches and free curling forms, is a real job and needs a fair amount of preparation. It is particularly difficult when you cannot derive a complex shape you want using a compass, and must rely on a series of only more-or-less suitable curves. Different radii are combined skillfully, the shape is drawn and roughed out with a jigsaw, and then further shaped with all kinds of other tools, perhaps best with a table spindle sander, to produce the desired template. The preparatory work is enormous and so often hardly worth while for single pieces.

Plywood formwork is a lightweight, durable and eco-friendly system that provides high quality concrete cast surface. It is prepared by combining the specially prepared three layers on top of each other. Plywood formwork is applicable wherein a large surface needs be coated with a light and durable material.

Steel template for Column

Well made's column formwork could be steel, steel-plywood, and timber types. The steel formwork for the column formwork is a type of strong and durable column formwork. In construction, it is able to be recycled 25-35 times.

There are round (circular) column steel formwork, square column steel formwork, and adjustable steel column formwork for your choosing. In addition, we custom sizes and specifications for your column steel formwork.

More than the steel column formwork panels and angles you can have complete steel and aluminum column and formwork accessories in well made. Include formwork wing nut, anchor nut, wedge clamps, universal lock (aligner clamp), wedge lock, spring clamps, water stopper (barrier), shuttering tie rod (bar), etc. Send us your steel formwork for column requirement to get a prompt price now.

7.2Shapes for curves

Circles, ellipses, parabolas, and hyperbolas, as well as arcs, sectors and segments, are two-dimensional curved shapes. Whereas, shapes such as spheres, cylinders and cones are referred to as three-dimensional curved shapes.

Curved Walls

Many homes have curved walls, a circle- shaped balcony or an area that differs from the rest. In the Room Sketcher App you can create these just like they are in real life.

Curved walls and divider lines can all be customized just like a standard wall. Paint them, add wallpaper, or add materials like brick and paneling. You can even add balcony railings and make curved stone pathways in the garden. Make the floor plans in your listing reflect the home how it actually is.

Figure7.1curved wall

The most complex part of framing a curved wall is the creation of a lower and two upper plates for the framing.

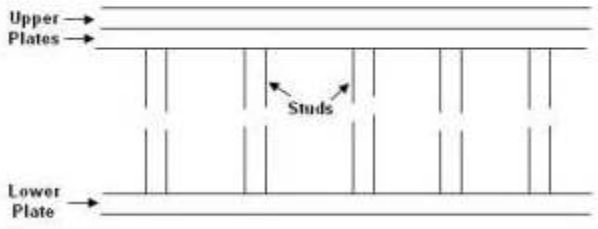

Figure7.2 Framing for a straight stud wall

With a curved wall the studs basically remain the same as in a straight wall. However, the upper and lower plates must relate the curve of the wall to be constructed

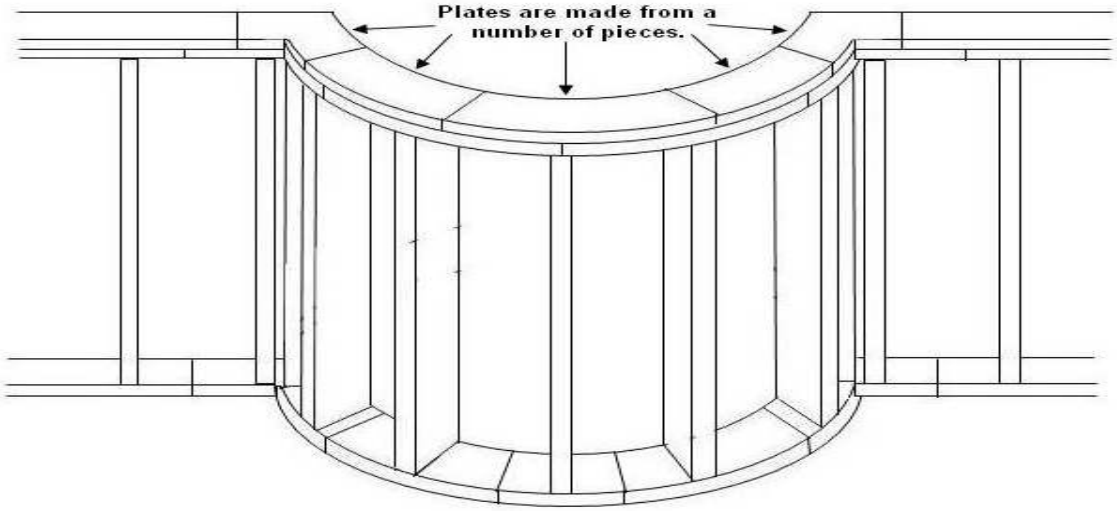

Figure7.3 Framing the upper and lower plates for a curved stud wall

The most efficient and easiest method of creating the plates for a curved wall is to create a template of the curve made out of a piece of 1/4 inch plywood

Place the template on the floor or large work bench and cover the template curve using pieces of 2 × 6, 2 × 8, and 2 × 10 lumber

Figure7.4Template for upper and lower plates made from 1/4 inch plywood

Self – Check -7

PART ONE: Chose the best answer for the following questions

1. What is plywood formwork and what are its advantages?
   A. A type of strong and durable column formwork
   B. A combination of three layers
   C. A durable material for large surfaces
   D. A lightweight and eco-friendly system
2. What are the different types of steel formwork for columns?
   A. Steel, aluminum, and timber
   B. Recyclable, reusable, and durable
   C. Steel, steel-plywood, and timber
   D. Round, square, and adjustable
3. How are curved walls used in home design?
   A. To create a circle-shaped balcony
   B. To add balcony railings
   C. To customize walls and divider lines
   D. All of the above
4. What is the purpose of templates in construction?
   A. To position fasteners
   B. To create complex shapes
   C. To order replacement glass
   D. To accurately identify dimensions
5. What shapes can be created using curves?
   A. Circles, ellipses, and parabolas
   B. Spheres, cylinders, and cones
   C. Arcs, sectors, and segments
   D. All of the above
6. What is the most complex part of framing a curved wall?
   A. Creating the upper and lower plates
   B. Creating the studs

C. Creating a template of the curve

PART TWO: Define and Explain for the following questions

1. Determine the steps involved in framing a curved wall?
2. Define plywood formwork and its advantages?
3. Define the purpose of templates in construction?
4. Recognize the different shapes that can be created using curves?
5. Explain the process of creating templates for complex shapes?

PART THREE: say true or false

1. Curved walls and divider lines can all be customized just like a standard wall?
2. Shapes such as spheres, cylinders and cones are referred to as three-dimensional curved shapes?
3. The steel formwork for the column formwork is a type of strong and durable column formwork.
4. Templates are normally made to accurately describe a piece of complicated replacement glass or to duplicate any complex item?

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