Bar Bending & Concreting

Level-II

Learning Guide-#47

Unit of Competence: Lay Smooth and Rough Cement Screeds

Module Title: Laying Smooth and Rough Cement Screeds

LG Code: EIS BBC2 M13 1019 LO2-LG-47

TTLM Code: EIS BBC2 M13 TTLM 0919v1

LO2. Place Screeds

Instruction Sheet	Learning Guide #47

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

- Cleaning sand and cement screeds
- Preparing backgrounds to receive screeds
- Installing DPM
- Laying sand and cement screeds
- Forming drainage outlets and skirting

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

- Remove defective sand and cement screeds
- Prepare backgrounds to receive screeds
- Install DPM
- lay sand and cement screeds
- form drainage openings and skirting according to plan

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below 3 to 6.
3. Read the information written in the information “Sheet 1, Sheet 2, and Sheet 3”.
4. Accomplish the “Self-check 1, Self-check t 2, and Self-check 3”
5. If you earned a satisfactory evaluation from the “Self-check” proceed to “Operation Sheet 1, Operation Sheet 2 and Operation Sheet 3 ”
6. Do the “LAP test” (if you are ready).

Information Sheet-1	Cleaning sand and cement screeds

1.1. Cleaning sand and cement screeds

Listed below is some important information to help you install your material and to achieve its full potential.

- **Sand Cement Screeds**

This material has one or more of the following purposes, and requires good site practice and workmanship: -

- To obtain a defined level
- To carry the final flooring
- To provide a wearing surface

Furthermore, you will need to specify all performance requirements to obtain the appropriate grade of material and to consider the requisite thickness to be laid; this is related to screed type and service conditions.

Self-Check -1	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What is the purpose of cleaning sand and cement screeds? (5 points)

Note: **Satisfactory rating - 5 points** **Unsatisfactory - below 5 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information Sheet- 2	Preparing backgrounds to receive screeds

2.2.1. Preparing the base concrete

The base concrete should be prepared in such a way that it is left with a surface that is uniformly hard, clean, and free of dust, oil or other contamination.

Any screeds or toppings applied previously to the base should be removed completely.

The laitance on the base concrete should be entirely removed by mechanical scrabbling or scarification in order to expose cleanly the coarse aggregate. All loose debris, dirt, and dust should be removed using vacuum equipment.

These operations should be delayed until shortly before the screed or topping is laid, in order to prevent any contamination or accumulation of dirt.

2.2.2. Base-concrete requirements

The concrete on which the screed or topping is to be laid should be hard and strong (i.e. characteristic strength of at least 20 MPa). Weak, friable concrete is not suitable as a base for a screed or topping as the achievement of adhesion between such material and the screed or topping is not possible.

The base concrete should be free of random cracking. Floor screeds or toppings are unable to bridge over cracks in the base and such cracks will in time reflect through the screed or topping. The surface of the base concrete should be reasonably accurate to the required level so that it is possible to place the screed or topping to a uniform thickness

Fig. 2.1: floor screed/topping

Self-Check -2	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What are the base concrete requirements? (5 points)

Note: **Satisfactory rating - 5 points** **Unsatisfactory - below 5 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information Sheet- 3	Installing DPM

3.1. Damp Proof Course/Material (DPC/M)

Damp proof course (DPC) is generally applied at basement levels which restricts the movement of moisture through walls and floors. Selection of materials for damp proof course and its various methods of applications in buildings is discussed.

3.2. Materials for Damp Proof Course (DPC)

Properties of Materials for DPC: An effective damp proofing material should have the following properties;

- It should be impervious.
- It should be strong and durable, and should be capable of withstanding both dead as well as live loads without damage.
- It should be dimensionally stable.
- It should be free from deliquescent salts like sulphates, chlorides and nitrates.

Types of Materials for Damp Proof Course: The materials commonly used to check dampness can be divided into the following three categories:

- **Flexible Materials:** Materials like bitumen felts (which may be hessian based or fiber/glass fiber based), plastic sheeting (polythene sheets) etc.
- **Semi-rigid Materials:** Materials like mastic, asphalt, or combination of layers.
- **Rigid Materials:** Materials like first class bricks, stones, slate, concrete etc.

Selection of Materials for Damp Proof Course in Buildings

The choice of material to function as an effective damp proof course requires a judicious selection. It depends upon the climate and atmospheric conditions, nature of structure and the situation where DPC is to be provided.

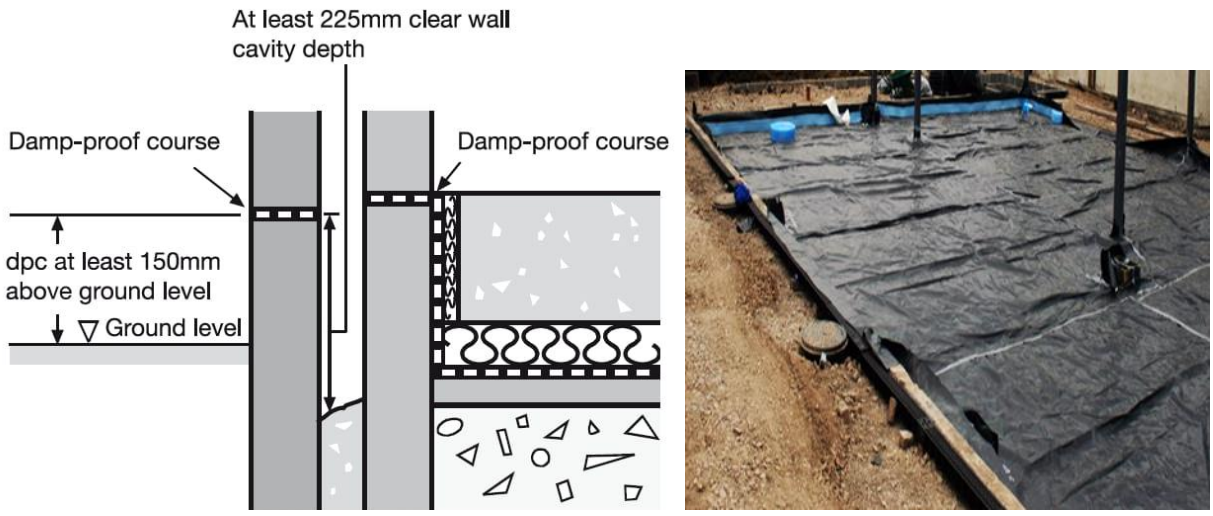


Fig. 3.1: applying DPM/C

The points to be kept in view while making selection of DPC materials are briefly discussed below:

1. DPC above ground level

For DPC above ground level with wall thickness generally not exceeding 40 cm, any one of the type of materials mentioned above may be used. Cement concrete is however commonly adopted material for DPC at plinth level, 38 to 50mm thick layer of cement concrete M15 (1:2:4 mix) serves the purpose under normal conditions.

In case of damp and humid atmosphere, richer mix of concrete should be used. The concrete is further made dense by adding water proofing materials like Pudlo, Impermo, Waterlock etc. in its ingredients during the process of mixing. It is used to apply two coats of hot bitumen over the third surface of the concrete DPC.

2. DPC Material for floors, roofs etc.

For greater wall thickness or where DPC is to be laid over large areas such as floors, roofs, etc., the choice is limited to flexible materials which provide lesser number of joints like mastic, asphalt, bitumen felts, plastic sheets etc.

The felts when used should be properly bonded to the surface with bitumen and laid with joints properly lapped and sealed.

3. DPC Material for situations where differential thermal movements occur

In parapet walls and other such situations, materials like mastic, asphalt, bitumen felts and metal (copper or lead) are recommended.

It is important to ensure that the DPC material is flexible so as to avoid any damage or puncture of the material due to differential thermal movement between the material of the roof and the parapet.

4. DPC material for Cavity Walls

In cavity wall construction, like cavity over the door or window should be bridged by flexible material like bitumen felt, strips or lead etc.

3.3. Methods of Damp Proof Course Installation in Construction

- **General principles to be observed while laying damp proof course are:**
  - ✓ The DPC should cover full thickness of walls excluding rendering.
  - ✓ The mortar bed upon which the DPC is to be laid should be made level, even and free from projections. Uneven base is likely to cause damage to DPC.
  - ✓ When a horizontal DPC is to be continued up a vertical face a cement concrete fillet 75mm in radius should be provided at the junction prior to the treatment.
  - ✓ DPC should be placed in correct relation to other DPC so as to ensure complete and continuous barrier to the passage of water from floors, walls or roof.

Figures 3.2 to 3.8 explain provision of damp proof course under different conditions

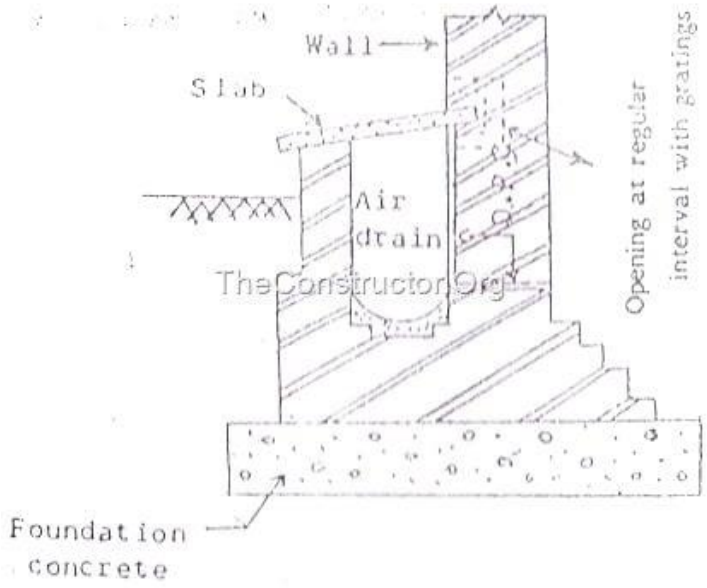


Figure 3.2: Air Drain

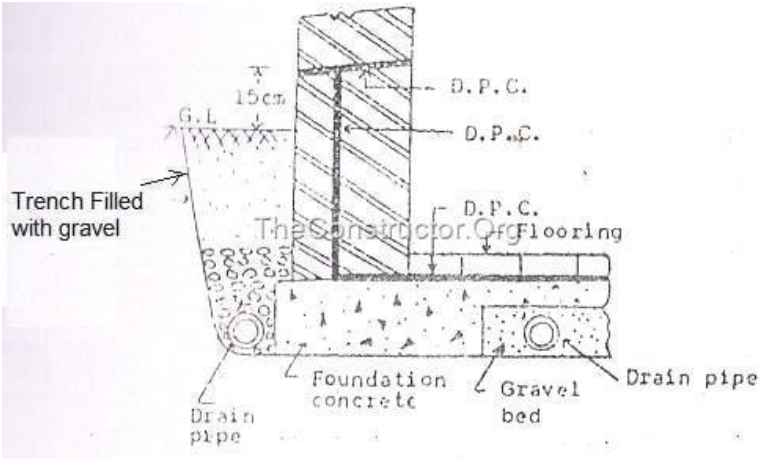


Figure 3.3: Damp Proof Course Treatment for basement on undrained soils

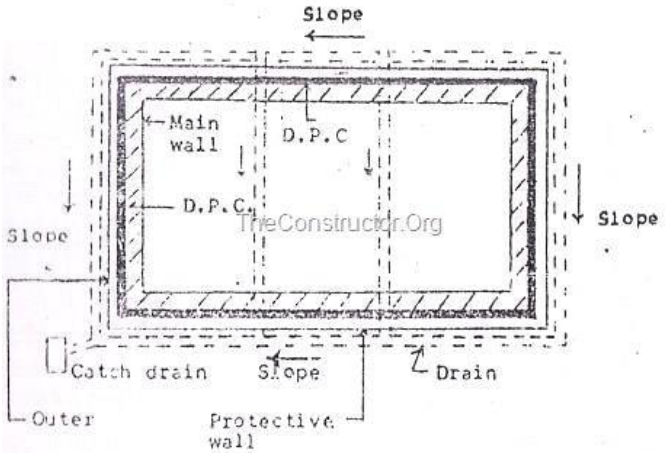


Figure 3.4: Plan of building showing DPC

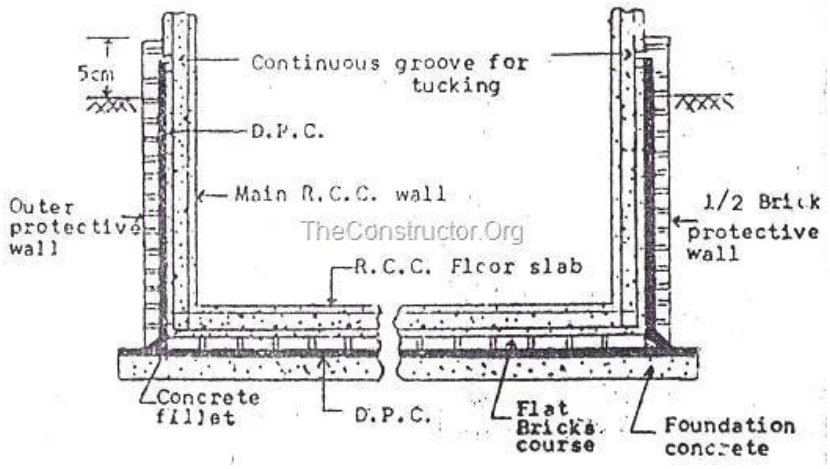


Figure 3.5: Damp Proof Course Treatment for Basement in Damp Soil

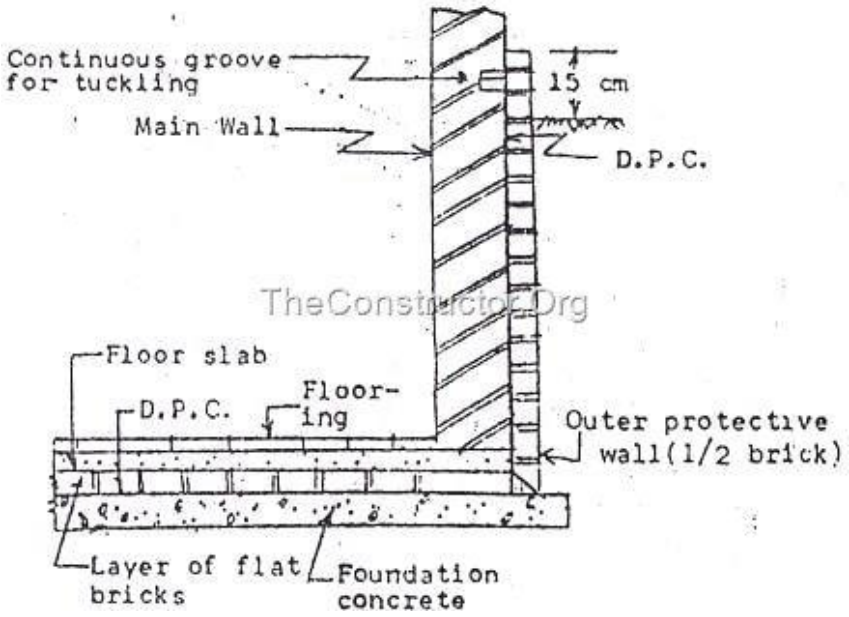


Figure 3.6: Asphalt tanking for basement

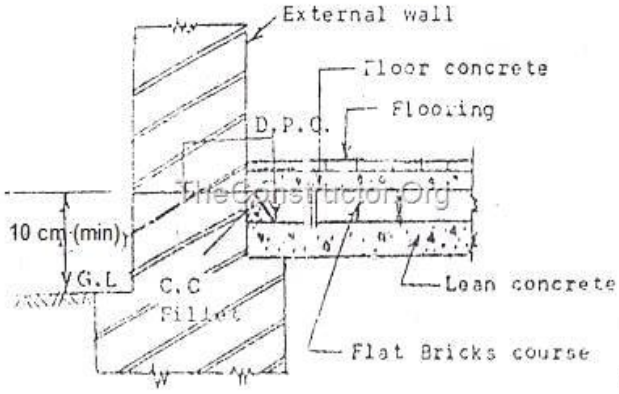


Fig. 3.7: Damp Proof Course for Flooring

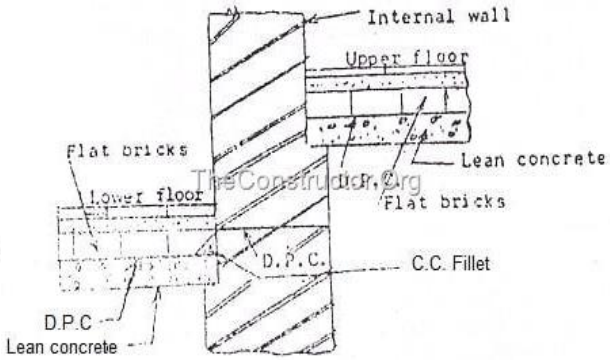


Fig. 3.8: Damp Proof Course for Internal Walls

Self-Check -3	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What is Damp Proofing Material/Course? (3 points)

2. What are properties of materials for DPC/M? (5 points)

3. List types of Materials for Damp Proof Course/ Material. (5 points)

Note: **Satisfactory rating - 3 and 5 points** **Unsatisfactory - below 3 and 5 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information Sheet- 4	Laying sand and cement screeds

4.1. Laying sand and cement screeds

- **Screed**

Concrete screed is a construction element laid in a range of thickness whose purpose is to bring the installation surface of the concrete flooring to the design height and to provide a surface suitable for installing the specified flooring.

Screed in concrete construction is a flat board used to smoothen the concrete after it has been placed over a surface. Properties and composition of screed in construction is discussed.

Screeds are made from pre-blended mortar which is mixed with cementitious binders or anhydrite-based binders. They are set as guides for straight edges which helps in bringing the surface of the floor of concrete to the desired elevation.

The screed must be sufficiently rigid in nature. This helps them to resist the stresses and the distortion that is caused during the spreading and leveling of the floor topping. The metal strips or the pipe spaced not more than 10 feet apart make effective screeds.

Types of screeds and toppings

In this publication three types of screeds and toppings are discussed:

- **Monolithic screeds and toppings** which are applied to the floor while the concrete in the base is still in a plastic state.
- **Bonded screeds and toppings** which are applied to hardened concrete floors.
- **Unbounded screeds and toppings** which are used when it is impossible to ensure a good bond between floor and screed or topping.

In this case the screed or topping is separated from the floor by insulation boards or an impervious membrane.

While all three types have many characteristics in common, they also differ in some important ways.

- **Monolithic screeds and toppings**

As defined above, these are screeds and toppings that are applied at the time when the underlying concrete floor is placed.

Screed thickness should be approximately 25 mm but not less than 15 mm or more than 40 mm. The minimum thickness of a monolithic topping at any part should be 20 mm. The actual thickness required may depend on structural requirements. In some circumstances, the design thickness of a topping may have to be increased to more than 40 mm, but then there will be an increasing risk of loss of adhesion to the base, due to differential shrinkage stresses.

In attempting to achieve good adhesion between screed/topping and base concrete, it is important to take cognizance of the phenomenon of bleeding of fresh concrete.

Bleeding causes water to accumulate on the top surface of the fresh concrete and the presence of this water layer may impair adhesion unless suitably dealt with.

laying screed/topping stages:

Either immediately the concrete has been compacted and leveled off and before bleed water appears on the surface (“immediate placing”); or after bleeding of the concrete has ceased and bleed Water has evaporated or has been removed completely by mopping up (“delayed placing”).

Immediate placing requires careful timing but has the advantage that no preparation of the concrete surface is required.

Timing of delayed placing is not as critical but the surface of the concrete does require some preparation: laitance should be loosened by light brushing, with a wire brush or a brush with stiff bristles, and thoroughly removed by sweeping, or preferably, by vacuum cleaning. Delayed placing should however be done within an hour or two after the end of the bleeding period.

- **Bonded screeds & toppings**

As defined previously, bonded screeds and toppings are applied to hardened concrete. The hardened concrete is also known as the base concrete. Screed thickness should be not less than 25 mm or more than 50 mm. The minimum thickness of a bonded topping at any part should be 35 mm. The actual thickness required may depend on structural requirements.

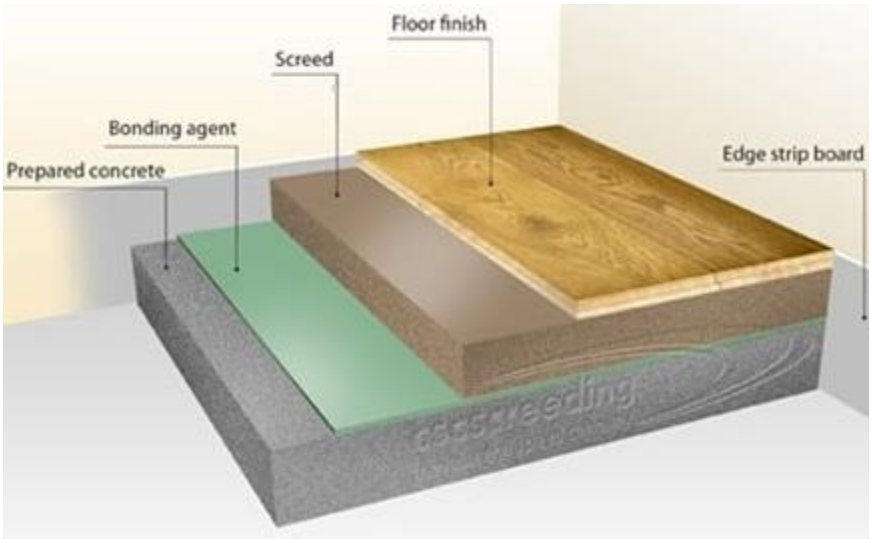


Fig.4.1: Bonded Screed Floor

- **Unbounded screeds and Toppings Screeds**

Where screeds are, or have to be laid on a damp-proofing membrane or separating layer, the minimum thickness of the screed should be at least 50 mm. Where they are laid on a compressible layer, such as insulation boards, the minimum thickness should be at least 70 mm.

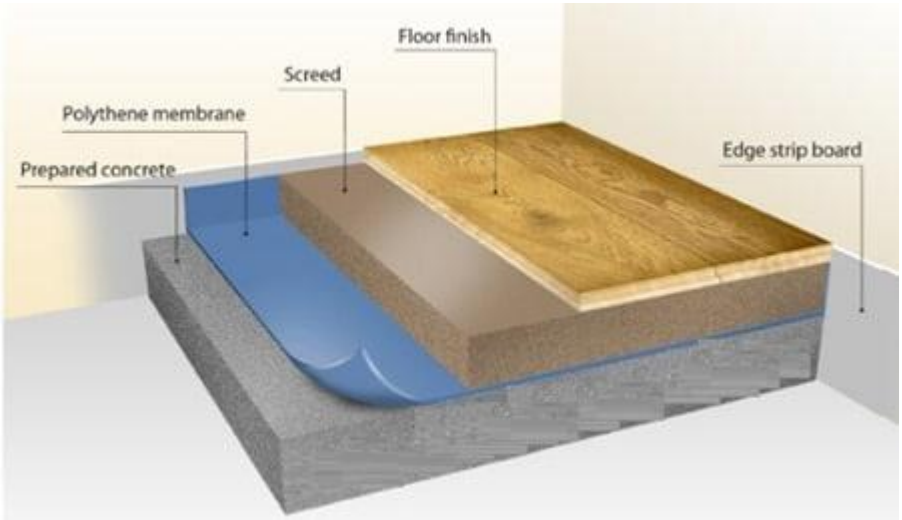


Fig.4.2: Unbonded Screed Floors

2.4.3. Laying

After screed battens surrounding the panels on which the topping is to be applied have been attached to the prepared base and the bonding agent has been applied as described above, the topping should be spread, compacted, screed and bull floated as for a concrete floor

- **Method of laying cement screed**
  - ✓ **Assessing the surface of the base**

The base surface onto which the screed is to be bonded should be well cured, sound and durable. This can be checked by drawing a steel nail or other sharp steel across the surface. If the surface crumbles or dusts, then mechanical preparation may be required.

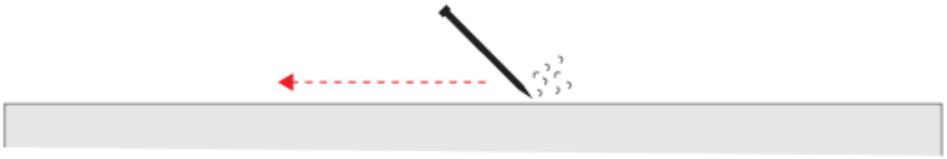


Fig. 4.3: assessing the surface of the base

- ✓ **Calculating the materials**

Estimation of materials required can be calculated by PPC Builder's app are multiply the length (in meters) by width (in meters) to calculate the area of the floor and multiply this by the thickness of the screed (in mm) to calculate the volume of screed mix required in liters. ***(Length x Width x Depth = Volume^3)***

As a guide, 1bag of surebuild cement mixed with 2 wheelbarrows clean, coarse sand and water will yield 110 liters, which is sufficient to screed 4.4m^2 at 25mm thick.

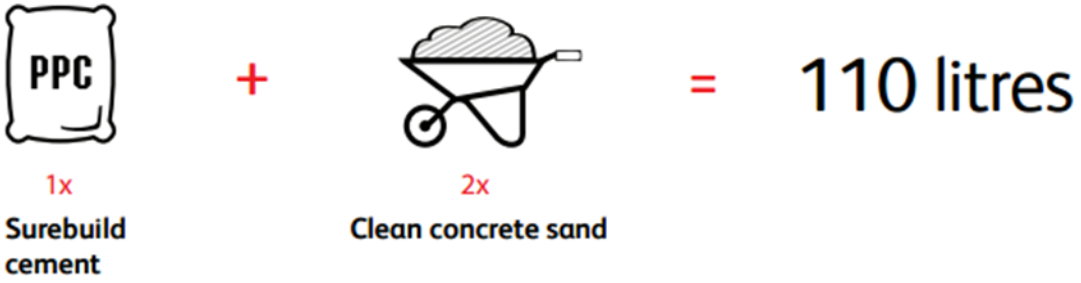


Fig. 4.4: estimating materials required

- ✓ **Preparing the base**

The entire base should be prepared to result in a rough surface, suitable for bonding. Use a chipping hammer, pick or other suitable equipment to break the surface, remove mortar, plaster, paint etc. remember, the entire surface must be roughened to ensure a good bond. If the surface of the base was wood floated or struck rough, mechanical preparation may not be necessary.

Clean the entire surface with a stiff bristled brush or broom, sprinkling clean water as you work to keep the dust to a minimum.

Fix 30mm wide soft-board, closed-cell foam or polystyrene strips to the perimeter walls to isolate the screed.

Wet the prepared surface with clean water for at least l hour before applying the bond coat'

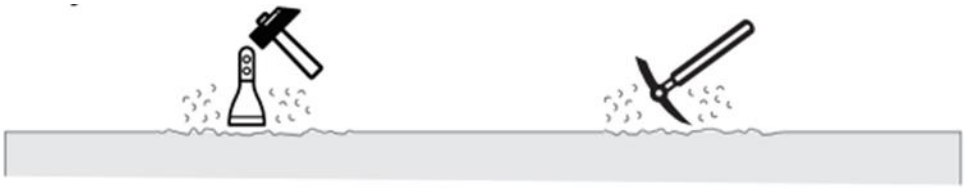


Fig. 4.5: a) roughening the surface

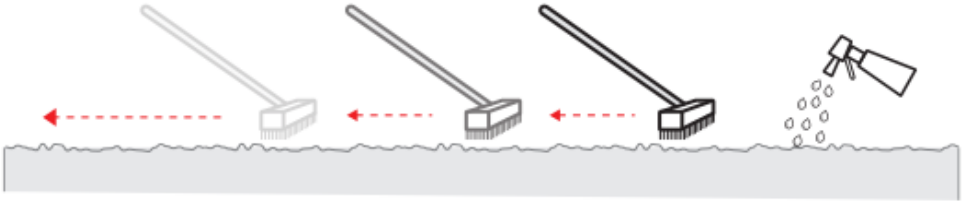


Fig. 4.5: b) cleaning the surface and sprinkling water

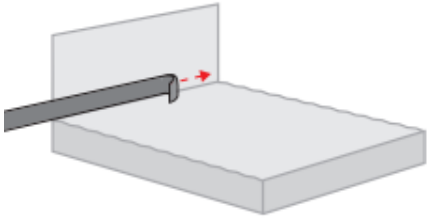


Fig.4.5: c) fixing strips

fig. 4.5: d) wetting the prepared surface

Fig. 4.5: preparation of the base

- ✓ **Preparing the screed mix**

Either use a mechanical mixer or a wheelbarrow and shovel to mix. Mix 1part sure build cement with 4 parts clean, coarse sand (1:4) with sufficient water until a plastic consistence similar to cement plaster is achieved. Excess water should be avoided as this will reduce the strength and will increase the risk of cracking. A stiff mix with too little water will not allow full compaction, and the screed may crumble over time.

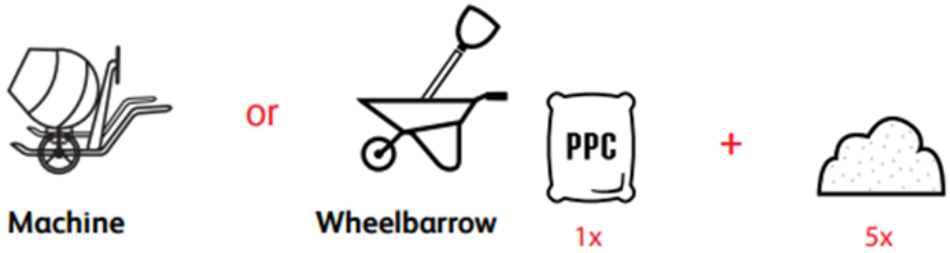


Fig. 4.6: screed mix preparation

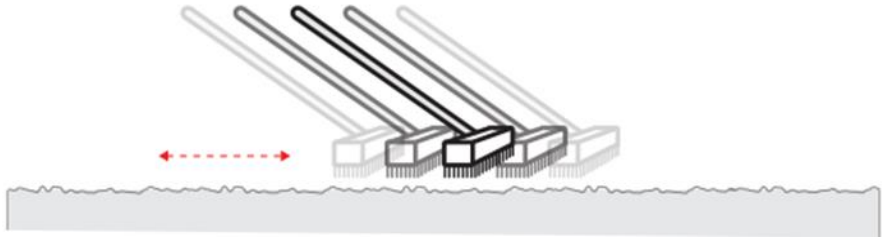
- ✓ **Preparing and applying the bonding slurry**

Mix 2 parts water with 5 parts surebuild cement until a smooth, thick slurry of paint consistancy is achieved. An acrylic bonding agent may be added in accordance with the manufacturer's instructions to assist with bonding to the base.

Fig. 4.7: a) bonding slurry mix ratio ***fig. 4.7: b) acrylic bonding agent***

Remove excess water from the prepared surface and using a stiff bristled brush or broom. Scrub the bonding slurry into the surface immediately ahead of the screed mix placement.

The screed mix mist be cast onto the wet bonding slurry within 10 to 15 minutes.



Fif. 4.7: c) cleaning excess water by brush or broom.

Fig.4.7: preparation and application of bonding slurry

Self-Check -4	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Write the three types of screeds and toppings. (5 points)

Note: **Satisfactory rating - 5 points** **Unsatisfactory - below 5 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information Sheet- 5	Forming drainage outlets and skirting

2.5. Forming drainage outlets and skirting

Patios, paths and drives are built with a slight slope (or 'fall') that lets any surface water drain away. But sometimes, it might not be enough simply to let the water drain onto a lawn or planted bed (particularly if you have a large paved surface or live in an area with heavy clay soil). In these cases you may well need to build a drainage channel to collect the surface water, and direct it to a dispersal point which leads to an existing surface water drain or into a soak away.

An easy way to create a drainage channel along its edge is by molding a concrete strip using a length of plastic guttering.

Top tip - Drainage in the middle of a patio You can fit a drainage channel in the centre of a paved area. The paving either side should slope towards the channel edges and the channel should have a fall of 1 in 80**.**

fig.5.1: drainage

Put a length of timber the required distance from the paved surface (in this case, slightly wider than the guttering used to mold the channel). Then hammer in wooden pegs at intervals and nail them to the timber. The channel should run at right-angles to the fall of the paving. Use a one-meter-long straightedge and a 12.5mm shim to set a fall of 1 in 80 along the drainage channel.

Fig.5.2: guttering timber mold

Next, mix some concrete using four parts mixed aggregate to one-part cement. Then fill the channel with the concrete to a level slightly lower than the edge of the timber, and smooth it with a float.

Fig. 5.3: filling the channel with concrete

Press the guttering into the wet concrete to leave a clear imprint. After this, remove the guttering and smooth any ridges in the concrete. Use a spirit level to make sure the fall is set at the correct angle.

Fig. 5.4: pressing the guttering into wet concrete

Self-Check -5	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Write the procedure to form drainage outlets and skirting. (5 points)

Note: **Satisfactory rating - 3 and 5 points** **Unsatisfactory - below 3 and 5 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Operation Sheet 1	Installing DPM

1. Perform all laying sand and cement screed steps.

1.1. Steps to be followed while Laying sand and cement screeds are:

Step 1: Assess the surface of the base

Step 2: Calculate the materials

Step 3: Prepare the base

Step 4: Preparing the screed mix

Step 5: Prepare and apply the bonding slurry

Operation Sheet 2	Laying sand and cement screeds

2. Perform all laying sand and cement screed steps.

2.1. Steps to be followed while Laying sand and cement screeds are:

Step 1: Assess the surface of the base

Step 2: Calculate the materials

Step 3: Prepare the base

Step 4: Preparing the screed mix

Step 5: Prepare and apply the bonding slurry

Operation Sheet 3	Forming drainage outlets and skirting

1. Perform all forming drainage outlets and skirting steps.

1.1. Steps to be followed while forming drainage outlets and skirting are:

Step 1: Put a length of timber the required distance from the paved surface

Step 2: Mix 1:4 concrete and fill the channel slightly lower than the edge of the timber.

Step 3: Press the guttering into the wet concrete to leave a clear imprint

Step 4: Remove the guttering and smooth any ridges in the concrete

Step 5: Use a spirit level to make sure the fall is set at the correct angle.

LAP Test	Practical Demonstration

Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within 1 hours.

Task 1: Install DPM

Task 1: Lay sand and cement screeds

Task 1: Form drainage outlets and skirting

Self-Check -1

Question #:

1.

- To obtain a defined level
- To carry the final flooring
- To provide a wearing surface

Self-Check -2

Question #:

1.

- The base concrete should be free of random cracking.
- The surface of the base concrete should be reasonably accurate to the required level

Self-Check -3

Question #:

1. Damp proof course (DPC) is a material which applied at basement levels which restricts the movement of moisture through walls and floors.

2.

- It should be impervious.
- It should be strong and durable, and should be capable of withstanding both dead as well as live loads without damage.
- It should be dimensionally stable.
- It should be free from deliquescent salts like sulphates, chlorides and nitrates.

3.

- **Flexible Materials:** Materials like bitumen felts
- **Semi-rigid Materials**: Materials like mastic, asphalt, or combination of layers.
- **Rigid Materials:** Materials like first class bricks, stones, slate, concrete etc.

Self-Check -4

Question #:

1.

- Monolithic screeds and toppings
- Bonded screeds and toppings
- Unbounded screeds and toppings

Self-Check -5

Question #:

1.

- guttering timber mold
- filling the channel with concrete
- pressing the guttering into wet concrete

List of Reference Materials

1. http://www.level.org.nz/material-use/minimising-waste/reuse-and-recycling/
2. https://www.ccohs.ca/oshanswers/hsprograms/house.html
3. https://www.wikihow.com/Maintain-Construction-Tools
4. http://www.fao.org/3/x5744e/x5744e08.htm
5. https://theconstructor.org
6. https://civilseek.com/category/construction/
7. https://geniebelt.com/blog/blueprints

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No	***Name***	***Profession***	***Mob. no***	***Region***	***College***
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This model TTLM was developed at Adama, Ethiopia September, 2019