STRUCTURAL CONSTRUCTION WORKS

Level – I

Based on March, 2022 Curriculum Version- I

Module Title: - Lay Smooth and Rough Cement Screeds

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Catalog

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Introduction to the Module

In Structural construction work filed; **Lay Smooth and Rough Cement Screeds** Work project helps to know to plan, place screeds and cleanup work area after laying smooth and rough cement screeds for structural construction work. This module is designed to meet the industry requirement under the structural construction occupational standard, particularly for the unit of competency: **Prepare and Mix Mortar, Cast, and Level Concrete Work.**

This module covers the units:

- Work instruction
- Cement Screeds
- Clean up

Learning Objective of the Module

- Apply work instruction
- Place Screeds
- Clean up

Module Instruction

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

1. Read the information written in each unit
2. Accomplish the Self-checks at the end of each unit
3. Perform Operation Sheets which were provided at the end of units
4. Do the “LAP test” giver at the end of each unit and
5. Read the identified reference book for Examples and exercise

Unit one: Work Instruction

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

- Work instruction and operation
- Safety requirements
- Signage/barricade requirements
- Tools and equipment
- Screeding materials
- Environmental protection requirements

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 work instruction and operation
- Identify and explaining safe work practices.
- Identify signage/barricade.
- Select Tools and equipment
- Identify Screeding materials
- Identify Environmental protection requirements

1.1. Work Instruction

1.1.1 Plan / working drawing

A plans is a set of drawings or two-dimensional diagrams used to describe a place or object, or to communicate building or fabrication instructions. Usually plans are drawn or printed on paper, but they can take the form of a digital file. Construction drawings are necessary in most spheres of the building industry, as being the best means of conveying detailed and often complex information from the designer to all those concerned with the job. Building trades people should be familiar with the basic principles involved in understanding and reading drawings correctly.

Mistakes on either side – in design or interpretation of the design – can be costly, as drawings form a legal part of the contract between architect/client and builder. This applies even on small jobs, where only goodwill may suffer; for this reason, if a non-contractual drawing or sketch is supplied, it should be kept for a period of time after completion of the job, in case any queries should arise.

- **How to read engineering drawings**

Engineering drawings are typically used as visual tools in the creation of homes, bridges, and other buildings. While these drawings can be quite straightforward to individuals who are skilled in the field of engineering or architecture, they can be quite difficult to interpret for laypeople. Knowing how to read engineering drawings will help provide you with a better idea of the building plans.

- **Familiarize yourself with the scale of the drawings.**

Understanding how large or small certain items are essential when reading engineering drawings. While most engineering drawings are created in "scale" versions of 1/4-1/8 inches (.55-.275 centimeters) per foot, other scales may be used for very large creations. Always determine the scale of the drawing before examining it in detail. If the scale is not obviously evident on the drawing, consult with the engineer who drew it for clarification.

Fig. 1.1: scale of the drawings

- **Understand the basic symbols used in the engineering drawings.**

As these drawings are done on such a small scale, the use of symbols is often required. While many symbols exist, understanding a few of the basics can be very helpful when reading engineering drawings. Some of the most common symbols used in these drawings include rectangles, circles, and triangles. As with determining the scale, consulting with the engineer who created the drawing can provide great insight as to the symbols used.

Fig.1. 2: Understand the basic symbols

- **Look for circled numbers.**

As discussed previously, engineering drawings are typically done on a scale so small that creating detail is almost impossible. Because of this, engineers often add circled numbers to certain parts of the drawings. These circled numbers indicate that the area identified is shown in greater detail on another page.

Fig.1. 3: indicate that the area identified

- **Identify specific abbreviations.**

Abbreviations are a useful tool for engineers. Like symbols, they can indicate shapes, processes, and even dimensions through a few letters. Some of the most common

abbreviations used in engineering drawings include DP, which stands for depth, and DIA, which stands for diameter.

Fig. 1.4: the most common abbreviations

- **Work with colleagues.**

When all else fails, consult with other professionals to better clarify the drawings. While it may be embarrassing to admit that you are having difficulty interpreting the drawing, those who regularly work with and understand the drawings will help you read them. Ask "in the know" individuals on the project to clarify anything you do not understand; better that this happens in the early stages of a project than to encounter a mistake farther into a project because of improperly reading engineering drawings.

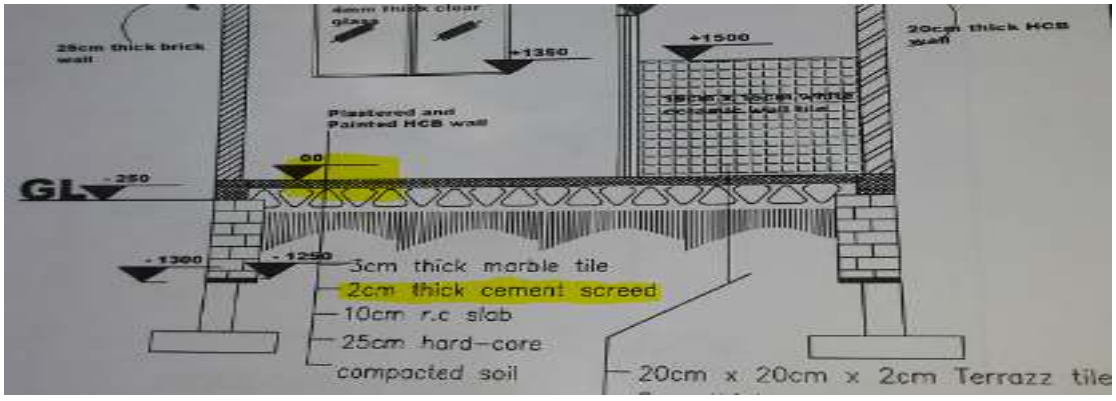

Fig. 1.1: section plan which shows flooring material.

Fig. 1.2: floor plan which shows floor finishing material.

1.1.2 Supervisor instruction for cement screeding

Introduction

A common project to carry out on floors for work or home projects is to install a screed layer. This can be extremely difficult to do without prior experience and the correct tools to carry out the work, so it is important to have all the training and equipment necessary if you want to do the job yourself. A floor which is poorly screeded can easily become damaged later on, even to the point of breaking up and forcing you to begin laborious, expensive work again, so it is important to be well prepared before even beginning to prepare a floor for screeding.

Supervisors instruction for cement screeding;-

- Check the suitability of the screed specifications against the EBCS Code of Practice requirements, and seek specialist advice in case of differences.
- Check that the soundness category specified is suitable for the specified flooring and for the expected traffic and load.
- Check the levels of the base substrate are suitable for achieving the specified minimum/maximum screed thickness.
- Check that any services that need to be incorporated in the screed are adequately detailed and positioned, so as to avoid disruption of the screed at a later stage.
- Check that appropriate surface preparation is carried out depending on the type of screed construction.

- Check that the raw materials and the mixing of screed are correct. The ideal mix proportion for normal cement/sand screeds is – 1:3 to 1:5 – that is 1 part Portland Cement (which compiles to EBSS) mixed with 3 to 5 parts of sand which compiles to grading limit C or M of BS882 (where not more than 10% should pass through 150mm sieve), and should be mixed with water of potable quality. Make sure the screed mix proportions are checked against the data sheet for specialist proprietary screeds.

- Where screed pumps are used, check the suitability of screed mix for pumping. Cement content, water content and aggregate grading can affect the pump ability of screeds.

- When using ready mix screeds, check the screed supplied is in accordance with EBCS4721: 1981. Batching should ideally be done in compliance with EBCS EN 13139. This is a new standard applying solely to pre manufactured ready mixed screeds delivered to site.

- Check the workability of the screed using the 'snowball test' by squeezing a handful of screed mix with a gloved hand. The right workability is when the screed forms a moist ball on releasing the hold, and does not crumble (too dry) or drip water (too wet).

- If using a bonding slurry grout, ensure that the screed mix is laid on the base while the grout is still wet, and see to it that the screed mix is consolidated thoroughly to achieve the expected level and maximum compaction.

- Pay special attention to bay edges and corners. Ensure that thicknesses of over 50-60 mm are compacted in two separate layers, with minimal time delay between laying of the layers. For thickness greater than 75mm make sure layers of 50mm are rolled and raked, applying fresh on fresh screed to achieve thorough compaction throughout the full depth.

- If using reinforcement, check that it is laid at approximately mid-depth of the screed.

- Check that the finishing technique is appropriate for the final floor finish that will be used. Wood floating followed by steel toweling can produce a smooth surface which is found to be satisfactory for most floor finishes.

- For proprietary screeds, make sure if curing is necessary to prevent premature drying. Many proprietary screeds do not require curing.

- For traditional screeds that require polythene curing, ensure that the screeds are closely covered with polythene sheets immediately after installation.

- Ensure that the polythene sheets are kept in place for a minimum of 7 days. Follow manufacturer's advice for proprietary screeds.
- Under conditions of extremely low temperature, ensure that the screed is protected with insulating quilts for 2 – 3 days.

- Ensure that site traffic is regulated, and the proceeding of light foot traffic is allowed only after 48 hours of traditional screeds. Follow manufacturer's advice for proprietary screeds.
- Even if light traffic is allowed to proceed, make sure the screed is protected from direct impact by protecting the screed using screed protection materials such as corrugated plastic, cardboard or reinforced paper. This should be retained until the screed is fully dry and ready for the final floor finish.

1.1.3 Quality requirements

From the type of cement, to the grade of aggregate and the method of storage of screed material – there are several details that determine the final quality of a screed.

Though mix proportions vary for depending on the intended use of the screed, the normal range specified for cement-sand leveling screeds is **a mix proportion of 1:4.5 – Portland cement: sand/aggregate.** Listed below are the components/factors that need to be considered:

1. **Cement**

The EBCS guidance regarding the types of cement that are best suited for different kinds of screeds. It is important to choose the specified cement type for best results, as variations in cement quality can affect the strength development of the screed and its susceptibility to poor curing.

For a general **fine concrete screed**, the recommended cement is ordinary **Portland class 42.5N** cement. But in cases where **class 32.5N cement** is used, **an additional 10%** should be added to the recommended mix proportion to achieve the expected results.

2. **Aggregates**

The size and shape of aggregates can have considerable impact on the performance and appearance of a screed. Make sure the aggregates do not contain unacceptably high amounts of deleterious materials such as lignite, coal or iron pyrites, as it can cause 'pop-out' on the screed surface.

The aggregate type specified for ordinary cement-sand levelling screed is **0-4 mm washed sharp sand.**

For **general fine concrete screeds** a mix ratio of **1:1:3 (cement: single sized aggregate: sand)** can be used, where the aggregate replaces 25% of the sand.

For **heavy duty fine concrete leveling screeds**, the aggregate specified is: **single sized aggregates between 6mm and 10mm**.

Single sized finely graded sand, fine brick-laying sands, crushed rock-fines and sea-dredged sand containing high amounts of flat shell are to be avoided.

3. **Water**

Water should be running potable water. The amount of water can be adjusted on site to suit different mix designs. The ideal quantity is described as enough water to facilitate easy pumping, toweling and compaction of the screed-mix.

To make sure the screed consistency is right, use the simple ‘Snowball Test’, see above. Squeeze a handful of the screed-mix tightly with a gloved hand. The consistency is right if the screed holds together without dripping water. (In the picture, the left sample is good.)

4. **Fibers**

Polypropylene (PP) fibers are added to the screed mix to reinforce the screed and to reduce the incidence of cracking. The PP fibers work by deflecting micro cracking created by the stress generated during the drying of cement. However, PVA (Poly Vinyl Acetate) fibers are water sensitive, and should not be used in areas expected to be exposed to permanent dampness.

5. **Admixtures**

Admixtures, additives or cement replacements are useful in bringing down the cement/water ratios – providing faster drying and less shrinkage and curling. The common types of admixtures available are:

- Water-reducing
- Super plasticizing
- Air-entraining
- Accelerating
- Waterproofing
- Retarding

As these are proprietary materials, and vary from one manufacturer to the other, always make sure the manufacturer's instructions are followed while using the products. It is important to understand the interaction and ensure compatibility before using two or more admixtures together.

6. **Storage**

Portland cement is a highly vulnerable item, and should be stored off the ground and kept covered – protected from damp and extreme temperature conditions.

If mixing and laying of screed are to proceed during cold weather, make sure the stored cement and aggregates are kept at temperatures above freezing. (In case the aggregates are exposed to moisture during wet weather, it is important to make adjustments in the water level used during the mixing of screed.)

7. **Screed Protection**

Leveling

Screeds are not designed to be used as wearing surfaces, therefore always make sure the surfaces are adequately protected against damage or wear during subsequent building operations.

During freezing weather, the surface temperature of the laid screed (not the air temperature) should be kept above 5˚C during construction and for 4-5 days after laying. Make sure freshly installed screed is covered with carefully lapped tarpaulin or plastic sheets – supported away from the surface using temporary framework.

In hot/drying weather, keep the screeded surface protected with plastic sheeting or adequate material, to protect the screed from the risks of thermal cracking.

1.1.4 Operational details

❖ Procedure of Floor Screeding

- Evaluate the surface of the base
- Estimate materials used for screeding
- Prepare the base
- Prepare the floor screed mixture
- Apply bonding agents such as water or bonding slurry
- Place the floor screed mixture
- Finally, properly cure the placed materials

1.2. Sefity requirements

1.2.1 Introduction

The minimum necessary standard, a key protection of the Privacy Rule, is derived from confidentiality codes and practices in common use today. It is based on sound current practice that protected health information should not be used or disclosed when it is not necessary to satisfy a particular purpose or carry out a function. The minimum necessary standard requires covered entities to evaluate their practices and enhance safeguards as needed to limit unnecessary or inappropriate access to and disclosure of protected health information

1.2.2 Safety requirements

The workplace is full of many types of health and safety hazards, and exposure to these hazards can be harmful, and sometimes fatal, to employees. OSHA, the U.S. Occupational Safety and Health Administration, mandates employers to adhere to regulated workplace safety requirements to eliminate hazards and maintain a safe, accident-free workplace.

- **Safety Signs**:

Many health and safety hazards can be eliminated through the use of proper signage. The Health and Safety Executive website explains that safety signs must be used at work whenever a safety hazard has not been able to be completely eliminated by the employer. The many types of warning and caution signs each have different implications. Danger signs, for

instance, are used for more severely hazardous work areas, while caution signs are used to warn employees of potential risks.

OSHA explains that failure to use safety signs could lead to accidental injury, as well as property damage. Proper signage must be used with biological hazards, chemicals, heavy machinery and equipment, large vehicles and electrical devices. In office environments, caution signs should be put up whenever walking surfaces are wet or slippery, when parts of the building are under repair and on the bottles of cleaning agents, to illustrate what types of dangers the chemicals can cause.

- **Personal Protective Equipment:**

It is a workplace requirement, per OSHA, for employers to provide their staff with the appropriate personal protective equipment to keep employees safe when performing their jobs. Personal protective equipment ranges from goggles to cover the eyes to respiratory devices, and must be used whenever there are hazardous environments, or when employees are working with flying particles or objects, chemical hazards or mechanical irritants.

OSHA explains that employers must make sure that there is enough personal protective equipment for all employees, and that the equipment fits the employees properly. Goggles that are too loose, for instance, will not adequately shield and protect the eyes.

Sanitation Requirements:

Employees have the right to a sanitary work environment, so OSHA has requirements that employers must abide by to ensure good housekeeping practices. Waste must be disposed of regularly and in a way that does not cause unsanitary conditions, including spills or odors in public areas. Offices or enclosed workspaces must be constructed in a way that prevents the entrance of vermin, as rodents and insects pose a health hazard to people. Toilet facilities must be kept tidy and cleaned regularly with chemical agents that disinfect bacteria. Spills and leaks must be mopped up and addressed immediately to avoid any toxicity hazards, as well as to avoid slip-and-fall accidents.

1.2.3 Personal Safety tools

Safety Helmet: -Protects head of the worker from any falling objects dropping from high level during construction.	

Overall Cloth:-Protects the normal clothes from dust, grease and other spilling materials.	
Safety shoe (boot):-Protects the worker form nail, sharp objects and heavy falling objects by hard-rolled leather shoes with metal toe caps. It must be Non-slip oil resistant shoe	
Rubber boot: - Protects the workers feet from colds, chemical, and mud in the working area.	
Mask: - Protects eyes of the worker from other endangering object and dust during construction.	
Goggle: - Protects eyes of the workers during welding of metal works and when placing reinforcement in the formwork.	
Glove: -Protects the workers from oils, chemicals, and dust and other dangerous material that affect the skin.	
Safety Belt: - Secures laborers working in a plane where the construction is done at high level.	

1.3 Signage/barricade requirements

1.3.1 Introduction

Concepts signage/barricade requirements

Construction site premise in concrete work every working man should be protected against the dangers of injury sickness or death through safe and healthy working condition, thereby assuming the conservation of valuable manpower resources and the prevention of loss of damage to lives and properties.

Construction work should be fenced off and suitably signed. This will protect people from site dangers. For some jobs the workplace will have to be shared. Perhaps the work will be

done in an operating mixer. Agree who has to control each area. Agree what fences, barriers, means of separation or permits to work are required to keep both construction workers away from hazards created by others and other people away from hazards created by the concrete work.

Generally Construction site requires

- Complete understanding between the owner and the contractor
- Practical experience in running construction jobs
- Accident prevention as part of advance planning
- Protection of workers and the public
- Applicable government standard regulations

1.3.2 Signage requirement

is to defend or block something by building a barricade. It's a line of objects placed across a road, etc. to stop people from getting pass. Signage is the design or use of signs and symbols to communicate a message to specific group, usually for the purpose marketing or any kinds of visual graphics. Barricades and signage that are no longer required are removed as Barricading controls shall be implemented and authorized as part of barricaded area it shall have its own barricading and label to identify the hazard.

The identification, isolation, and control of these causes are distance Advance Warning Signs may be required on any type roadway, but particularly on multi-lane the lines, then barricades or cones shall be used to channel traffic around the work area.(this includes the driving tools and the implement being driven)Signage and barriers use when construction is inactive. Contractor is responsible to implement any requirements specified in the contract. Determine the responsibility of each contractor for lights, barricades, and warning sign.

❖ **Construction safety signage**

Safety signs in the workplace are an indispensable way of protecting employees from accidents. Their purpose is to convey information in a comprehensive way about objects and situations that can be dangerous. In case of a fire, for instance, well placed signs can speed up the evacuation of a building and help those giving first aid. Construction premises shall have adequate fire, Emergency or danger sign and safety instruction standard colours and sizes visible at all times. Visual alerting devices gives information on the nature and degree of potential hazards which can cause injury or death should alert persons to the following:

- Specific Hazards
- Degree or level of seriousness

- Probable consequence of involvement with the hazards
- how hazards can be avoided

Safety sign shall be placed visible to the intended viewer and should be protected against unforeseeable damage, fading or visual obstruction caused by abrasion, ultra- violet light, or substance such as lubricants, chemical and dirt.

❖ **Panel sign**

Area of safety sign having distinctive background color different from adjacent areas of the sign which is clearly delineated by line, border or margin

❖ **Signal word panel**

Area of safety that contains the signal word and the safety alert symbol

❖ **Message panel**

Area of the safety sign that contains the word messages which identify the has indicate how to avoid the hazard and advises of the probable consequence of avoiding the hazard.

❖ **Safety sign color**

Color play an important role when it comes to safety signs: they convey a message – and each safety color has a specific meaning.

The color of the sign specifies its nature:

- Red signs are prohibitive;
- Blue signs are mandatory;
- Yellow signs are warnings; and
- Green is used for safe condition and first aid signs. Similar rules apply to the different shapes:
- Prohibitive and obligatory signs are circular:
- Warning signs are triangular; and
- Oblong signs offer help and directions

Table 1 Safety sign colours (excluding fire safety signs)

Colour	*Meaning or purpose*	*Instruction and information*
Red	Prohibition sign Danger alarm	Dangerous behaviour; stop; shut-down; emergency cut-out devices, evacuate
Yellow or Amber	Warning sign	Be careful; take precautions; examine
Blue	Mandatory sign	Specific behaviour or action, eg wear protective equipment
Green	Emergency escape First-aid sign	Doors; exits; escape routes; equipment and facilities
	No danger	Return to normal

A. Safety red: Prohibition sign and danger alarm

A sign prohibiting behavior likely to increase or cause danger, to call attention to fire protection equipment apparatus and facilities.

Fig 3.1 **Fire Equipment Signs**

Intrinsic features for;-

Rectangular shape;

White pictogram on Red background, Black edging

Fig1.3 safety sign

B. Safety Green: precaution emergency escape or first-aid sign

A sign giving information on emergency exits, first aid, or rescue facilities Intrinsic features:

Rectangular or square shape;

White pictogram on a green background (the green part to take up at least 50% of the area of the sign).

C. Safety Yellow: warning sign (Caution)

A sign giving warning of a hazard or danger such as striking against stumbling, falling, tripping and caught in between, danger: electricity 'Intrinsic features:

(a) Triangular shape;

(b) Black pictogram on a yellow background with black edging (the yellow part to take up at least 50% of the area of the sign).

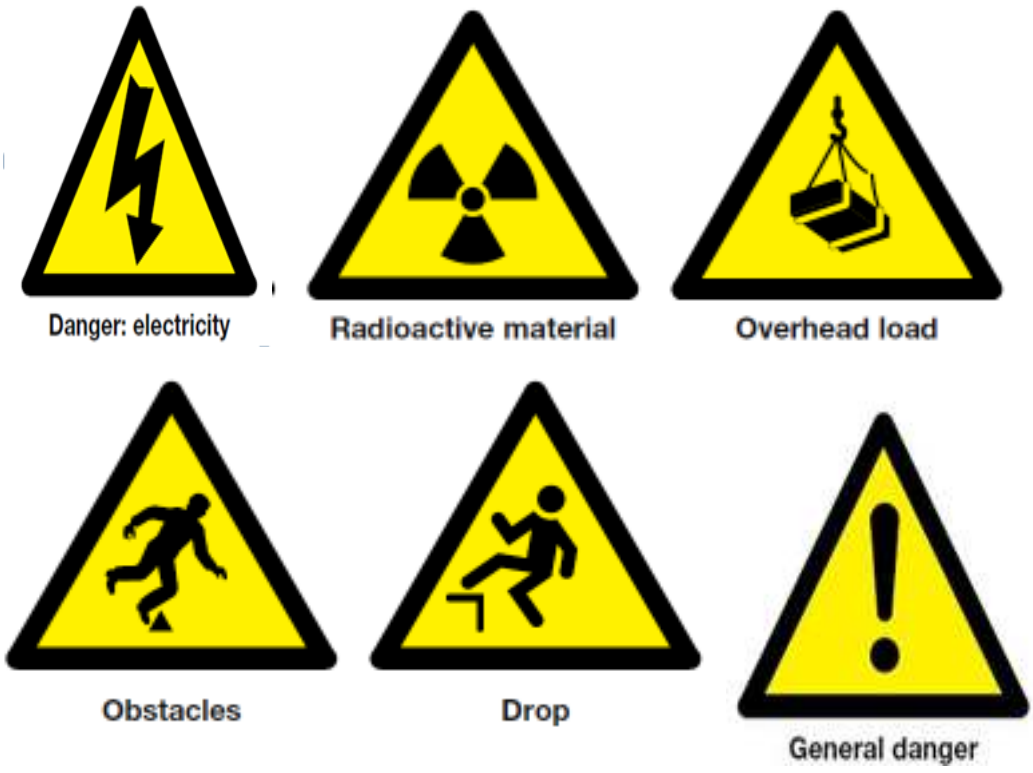

Fig 3.2

D. Safety Blue: mandatory sign (precaution)

A sign prescribing specific behavior, To designate cautions limited to warring against starting use of, or moving equipment which is under repair or being worked upon. Intrinsic features: **Round shape**; White pictogram on a blue background (the blue part to take up at least 50% of the area of the sign).

- **Symbols and arrows on signage.**

Use symbols in place of text where the symbol is universally recognized. For example, public information symbols.

- Signage symbols, contrast, color, positioning Checklist
- Use symbols in place of text or to supplement text where possible.
- Use arrows to indicate direction.
- There should be good contrast between the signboard and any mounting or background surface.
- There should also be good contrast between the text and background colour of the sign itself so that it is easy to read.

- **Purpose of Signage/barricade**

The main purpose of sign is to communicate, to convey information designed to assist the receiver with decision –making based on the information provided. Signage/barricade of Symbol:- Warning illumination usually is provided by incandescent or fluorescent lamps or spotlights. These may be used to illuminate barriers and primary warning signs.

- **Where signage is needed**
- Usage of PPE prior to entry to the project site
- Potential risks of falling objects

- Potential risk of falling
- Explosive an flammables substances are used or stored
- Tripping or slipping hazards
- Danger from toxic or irritant airborne contaminates/ substances may exist
- Contact with or proximity to electrical/ facility equipment
- Contact with dangerous moving parts of machinery and equipment
- Fire alarm and firefighting equipment
- Instructions on the usage of specific construction equipment

1.3.3 Barricading requirements

Barricading controls shall be implemented and authorized as part of the safe work system to protect persons from hazards such as:

- Being struck by falling objects;
- Being struck by moving plant;
- Fall from height, including falling into open excavations, penetrations, and falls from unprotected edges such as removed flooring, walkways, stairs and / or hand railings.
- Exposure to hazardous chemicals;

Types of barricading

Barricades can be classed as either a soft barricade or a hard (solid) barricade. Soft barricades are those that use an approved tape to prevent or restrict access to an area. A hard barricade is a physical structure such as scaffold tubes or water filled devices that prevent or restrict access to an area.

A. **Soft barricades: -** they are to be used to identify and protect personnel from general hazards and also those which are high risk and may pose a risk to life and health

Fig A. Soft barricades

B, Solid barricades:- the purpose of a solid barricade is to provide a physical barrier capable of performing the same function as a permanent guardrail.

A solid barricade shall:

- Have a solid top and mid rail (E.g. scaffold tube or equivalent) with the applicable sign attached.
- The installation of a kick rail or mesh to contain objects etc. shall be by risk assessment and detailed in the unprotected edge risk control authorization.
- Where solid barricades are used they shall be accompanied with signs to communicate the hazard information. As appropriate, barricade tape may be used to highlight the existence of the barricaded area.

Solid barricades example

Fig . Solid barricades:-

1.4 Tools and equipment for Cement screeding

1.4.1 Hand tools for cement screeding

1. Spirit level

It is used to control the horizontal and vertical alignment of wall surface and edges. The length is at least 80 to 120cm long. It is made of metal, synthetic material or wood. It has two measuring bubbles: one is located at mid length is used to check horizontal positions. While the second one, at the end, is used to check vertical position. This tool requires always to be handled with care and needs to be checked from time to time weather it is still working accurate or not.

FIG. 3.1: Spirit level

2. Alignment string /masons' line/

Alignment string /mason line/, sometimes called, Fish line, is a rope used to transfer horizontal & vertical alignments or lines, i.e., use to mark base line on the floor or vertical point alignments of wall. In other words, it is used to align the walling blocks, (stone, bricks, concrete blocks, hydra form etc). It is available in different thickness & sizes in the market.

FIG. 3.2: Mason line/alignment string

3. Hose level

It is a transparent PVC hose. It is used to transfer or mark vertical levels on surface of wall when it is filled with water, but without any air bubbles. The water level in each end of the hose is equal. It is an instrument to mark equal levels on site. It is very accurate but not eases to handle.

FIG. 3.3: Hose level/water level

4. **Wood float**

Used to smooth out concrete surface before the concrete fully cure. It is about 30cm long and 15 cm wide with a handle. Floating concrete is an operation of concrete finish work after drabbing on bull floating to remove slight imperfection, fill small holes, level etc. on the surface of concrete.

Fig. 3.4: wooden float

5. **Metal float**

This does the same as wooden float except that it points a slick on the concrete. You may prefer this for patios and concrete slabs whenever smooth concrete surfaces are required.

fig. 3.5: metallic float

6. Edge float

It is made of metal like the metal float, but it has bent – over at right angles to the flat part or at one edge. It is used along the edge of a walk a slab to polish and have, finished look to the work, it makes slightly rounded edges and border about 10 cm.

Fig.3.6: Concrete edging float

7. Darby

Used for making smooth concrete surface on small area in places where it is difficult for ball float to reach, which as large slabs where there is constructions of pipes, reinforcement on other types of building components. It consists of a long flat rectangular piece of wood on aluminum from 7.5cm to 10cmon wide with a handle on the top.

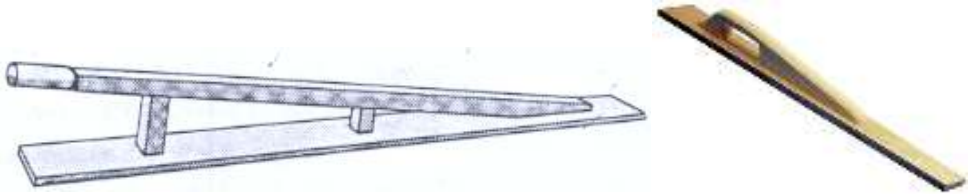

Fig.3.7: Darby

8. Bull float

It is a large, flat rectangular piece of wood or aluminum usually 20cm wide and 100cm to 150cm long with a handle of 1.2 m to 4.8m long. It is used to make large area of concrete finishes. It is more commonly used outdoors where there is enough space to use the long handle.

Fig. 3.8: bull float

9. Straight edge/Level/

This is a perfectly straight metal/aluminium/ with all long and short edges parallel to its centreline. It is employed to check straight alignments of walls. Its length ranges from 2m up

to 4m. Together with the sprit level, it can be used to bridge over the point to be checked. A straight edge/Level/ can also be made from a wooden plank with perfectly parallel edges.

Fig. 3.9: Straight edge

10. Angle / mason square

It is used to measure a right angle (90º) of a corner. Used inlaying masonry units or blocks at corners of masonry wall.

Fig. 3.10: Mason square

11. Measuring tape

A tape measure, also called measuring tape, is a type of flexible ruler used to measure dimensions of building parts and distances in site. the term "tape measure" refers to a roll-up, self-retracting style tape measure that's designed for carpentry. It is manufactured from steel, plastic or fibre 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.

Fig. 3.11: Measuring tape & proper adjustment of measuring tape

12. Mortar barrel/ drum

This is used by mason, plasterer, tiller, etc, and serves to prepare small amount of mortar right at the working place. It is also used as temporary mortar storage, supplied from mixing station, and to control water ratio of the mix when it gets dry. Always, keep it workable and clean.

Fig. 3.12: Mortar drum

13. Water Bucket

A Bucket is used to serve small amount of water or material and to take the tools after work.

Fig. 1.13: water Bucket

2. Wheelbarrow

Wheelbarrow is used to dispose disposal materials from working place, to transport or serve materials and tools during construction activities in the site.

It is the most efficient way in transporting materials or items. ; In comparison to a barilla, (commonly used in the country), a wheelbarrow is much more efficient.

For this reason, it is operated by one person and can be carried up to 100 kg at once. So that it saves operation cost; it is time effective and therefore in general.

Fig 1.15: Wheelbarrow /85Lit

- **Graphite Pencil**

This is used for marking in wall construction. It is specially produced for this purpose in such a way that it will not wear out fast.

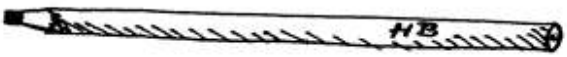

Fig. 1.16: Graphite pencil

- **Trowel**

This is a tool, which every mason needs. Used for picking up mortar out of the barrel, spreading mortar on the wall, bed joints and cutting off excess mortar. In addition to the picture shown, a Triangular and rectangular trowel are also used by the mason.

fig. 1.17: trowel

- **Hacksaw:** A hacksaw is a general tool on site

fig. 1.18: hack saw

Mixing Tools

Spade: - Used to mix concrete materials manually in the construction site. The blasé should be made from high quality steel.

fig. 1.19: spade

Concrete mixing hoe: - Used to clean small area of the construction site from organic and mix concrete materials.

Fig. 1.20: Concrete mixing hoe

Mixing platform: - Used for hand mixing of concrete. Water tight platform at least 2m wide and 3.5 long should be provided. Such platform should preferably be made of boards 3 to 5cm thick, tongued and grooved so that points are tight and platform is rigid.

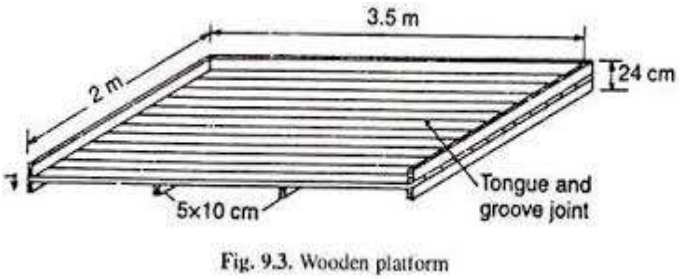

Fig. 9.3. Wooden platform

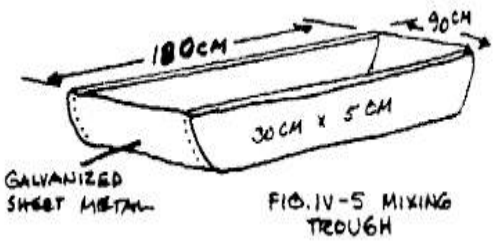

Fig. 1.21: Mixing platform

1.4.2. Equipment/ Machinery for cement screeding

1. Mixer

Mmixers are available in from of different capacities. Small mixers can produce 250Lit of mortar or concrete and the big ones produces more and more, up to 6000Lit. Widely used,

small mixers up to a capacity of 1000Lit. Mixers are driven with diesel, benzene engine or electrical power.

Fig. 1.14: Mixer 250 lit

1.5 Material Selection for Cement Screed

1.5.1 Cement Screed Materials

1. CEMENT

The job to be done will determine the type of cement to select. Cement binds the concrete mix together. There are a number of types of cement. The most common, used for general construction, is called Type I Normal Portland cement.

Another variation used in construction is white Portland cement. It is light-colored and used chiefly for architectural effects. White Portland cement is made from carefully selected raw materials and develops the same strength as the normal gray colored Portland cement.

Fig. Cement for Screed Floor

Types of cement include:

- ✓ **Type I**, Normal Cement (most common)
- ✓ **Type II**, Moderate Sulfate Resistance (slow-reacting)
- ✓ **Type III**, High Early Strength (fast-setting)
- ✓ **Type IV**, Low Heat of Hydration (low heat generation)
- ✓ **Type V**, High Sulfate Resistance used to produce special types of concrete.
- ✓ **Type IV** is low heat generation for large construction building foundation projects, such as dams to speeding up construction works.

3. Sand

The size and shape of sand can have a considerable impact on the performance and appearance of a screed. It should be guaranteed that the presence of materials does not exceed the acceptable level. The size of aggregate is specified based on the function of the screed for instance for normal duty screed, the maximum size of sand is 4mm. However, for heavy duty screed, the maximum size of aggregate ranges from 6mm and 10mm.

Fig. Sand for Floor Screed

4. WATER

In a correctly proportioned concrete mix, only about half of the mixing water is needed to hydrate the cement. The remainder acts as a lubricant to produce workability. When more

water is actually needed for workability is added, the concrete is diluted, its density is reduced, and it is weakened. If the water is fit to drink, it is satisfactory to use in concrete. This is not to say that water to be used in concrete must be completely pure. Impurities in water may cause efflorescence, surface discolorations, corrosion of steel as well as affecting setting time and strength.

5. Admixtures

Commercially available admixtures, especially of the water-reducing type, may be used, but preferably only on the recommendation of the laboratory which tests the sands, and only where adequate control of dosage on site can be guaranteed.

1.5.2 Mix Ratio of Cement Screed for Floors

Mix ratio of sand and cement screed for floor varies based on the intended use of the screed. Added to that, cement type, grade of aggregate and the method of storage of screed material influence the mix ratio to a certain extent. Therefore, a suitable type of cement shall be selected, and sand needs to be free of deleterious materials.

The recommended mix is 1 Portland cement: 3 sands or 1 Portland cement: 4.5 sand.

However, 1 cement: 1.5fine sand: 3 coarse aggregate (10 mm maximum aggregate size) should be considered if the floor screed thickness is greater than 40mm.

1.5.3 Material calculations for cement screed

❖ **Quantity of Cement and Sand Calculation in Mortar**

Quantity of cement mortar is required for rate analysis of screed and plaster or estimation of masonry work for a building or structure. Cement mortar is used in various proportions, i.e. 1:1, 1:2, 1:3, 1:4, 1:6, 1:8 etc.

❖ **Calculation of quantity of cement mortar in screed**

1. Quantity of Mortar:-

Volume of mortar= 1 m^3

Mix Ratio –> 1:4

2. **Dry volume of mortar = Wet volume x 1.33**

Dry Volume = 1.0 m^3 x 1.33 = 1.33 m^3

3. Quantity of cement:-

Quantity of Cement = (Dry Volume of mortar x Cement ratio) / (Sum of the ratio)

∴ Quantity of cement = (1.33 x 1) /(1+4)= 0.266 m^3

Density of Cement = 1440 kg/m^3

∴ Weight of Cement = 1440 x 0.266 = 383.04 Kg

1 bag of cement contains 50 kg of cement

∴ Number of bags = 383.04 Kg/50 = 7.661 No's

4. Quantity of sand:-

Cement : Sand :: 1:4

Quantity of Sand = Quantity of Cement x 4

∴ Quantity of Sand = 0.266 m^3 x 4 = 1.064 m^3

1 m^3=35.3147 Cubic Feet (CFT)

∴ Quantity of sand = 1.064 x 35.3147 = 37.574 CFT

Density of sand = 1920 kg/m^3

∴ Weight of the sand= 1.064 m^3 x 1920 kg/m^3= 2042.88 kg =>2.0428 tones

5. Quantity of water:-

Water cement ratio = weight of water /weight of cement

W/C–>0.50

weight of water = (weight of cement)x(w/c ratio)

∴ Weight of water = 383.04 kg x 0.5 = 191.52 kg (Littre)

1.5.4 MixingCement Screed

1. Hand mixing

Small quantities of cement-sand screed may be hand mixed but this is hard work and unsuitable for all but the smallest sites. A void hand mixing wherever possible.

Fig 1. Cement screed hand mixing

2. Machine mixing

The use free-fall mixers for mixing cement-sand screed are not recommended. Small free-fall site mixers may be safely used for mixing concrete and bricklaying mortars, which are more fluid in consistency, but they are not suitable for mixing screed because they do not efficiently distribute the cement throughout the sand. Research has shown that these mixers can cause balling of cement and weakness in the finished screed. If this form of mixer is used there is a very high risk of crushing failure of the screed.

Fig 2 Cement screed Mechanical mixing

1.6. Environmental protection

Environmental protection is a practice of protecting the natural environment on individual, organizational or governmental levels, for the benefit of both the natural environment and humans. Due to the pressures of population and technology, the biophysical environment is being degraded, sometimes permanently. This has been recognized, and governments have begun placing restraints on activities that cause environmental degradation. Since the 1960s, activity of environmental movements has created awareness of the various environmental issues. There is no agreement on the extent of the environmental impact of human activity, and protection measures are occasionally criticized.

Academic institutions now offer courses, such as environmental studies, environmental management and environmental engineering, that teach the history and methods of environment protection. Protection of the environment is needed due to various human activities. Waste production, air pollution, and loss of biodiversity (resulting from the introduction of invasive species and species extinction) are some of the issues related to environmental protection. Environmental protection is influenced by three interwoven factors: environmental legislation, ethics and education. Each of these factors plays its part in influencing national-level environmental decisions and personal-level environmental values and behaviors. For environmental protection to become a reality, it is important for societies to develop each of these areas that, together, will inform and drive environmental decisions.

Self check-1

Instruction: select the correct answer for the give choice. You have given 1 Minute for each question. Each question carries 1 Point.

1____ is used to control the horizontal and vertical alignment of wall surface and edges.

A. Spirit level B. string C. trowel D. float

2. ----is used to dispose disposal materials from working place, to transport or serve materials and tools activities in the during construction site.

A. spade **B**. Wheelbarrow C. mixer D. ladder

3. ---------One of the following including in Work Health and Safety Regulation 2011,

A/Specific personal protective equipment (PPE) requirements;

B/Hazardous chemicals;

C/Fire protection equipment

D/ All of the above

4. A construction worker should aware one of the following safety rule

A/Specific Hazards

B/Probable consequence of involvement with the hazards

C/How hazards cab be avoided

D/ All of the above

5. The purpose of a solid barricade is to provide a physical barrier capable of performing the same function as a permanent guardrail.

A/ True B/ False C/ A & B are correct D/ None

6. Creating a good environment will play an important role in guaranteeing the quality and safety of construction projects,

A/True B/ False C/Both D/All

7. Minimizing waste, sorting waste into the appropriate bins and leaving the site clean and tidy at the end of each day.

A/ Land disturbance B/ Noise and vibration

C/Waste management D/All

8. -----is firstly to do rational planning and management of construction plan

.**A /Control of working environment** B/Waste management

C/Noise and vibration D/ None

Self check-2

Test-II Matching

Instruction: select the correct answer for the give choice. You have given 1 Minute for each question. Each question carries 2 Point.

A	B
---------1. **Edge float**	A. Used to smooth out concrete surface before the concrete fully cure
---------2. **Trowel**	B. It is used along the edge of a walk a slab to polish
---------3. **Spade**	C. used for lifting and spreading mortar
---------4. **Darby**	D. used to mixing concrete
---------5. **Wood float**	E. Used for making smooth concrete surface on small area
	F. used for volume batch of concrete

Test III: short Answer writing

Instruction: write short answer for the given question. You are provided 3 minute for each question and each point has 5Points.

1. What is the purpose of Signage?
2. Write down at least three concrete making machines?
3. What is the difference between concrete and mortar?

Note: Satisfactory rating – above 60% Unsatisfactory - below 60%

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

OPERATION SHEET-1

Operation title: materials handling and storage.

Purpose: it used to Perform handling and storage all materials.

Instruction: Steps to be followed while performing all materials handling and storage are.For this operation you have given 2hour and you are expected to provide the answer on the given table.

Tools and requirement:

- **Wheelbarrow**
- bucket
- Braille

CONSUMER MATERIALS : -

- **Cement**
- **Sand**
- **Water**

Precautions:

- Wear working cloths which properly fit with your body
- Make working area hazard free
- Working area good & brightness

CONDITIONS OR SITUATIONS FOR THE OPERATIONS:-

- Wear appropriate clothes, shoe, helmet, glove ...
- Ensure the work shop hazard free
- Ensure the working area is bright / good visibility
- Make workstation comfortable

PROCEDURE,

Step 1: follow Requirements for Storing different types of materials

Step 2: follow PP&E requirements to handle materials

Step 3: perform material storing accordance with specific requirement

QUALITY CRITERIA:

- Assured the performance of all the activities according to the given guide.
- Assure the perform Clean up to get deposing &recycle waste materials & Increase productivity based on cleanup methods.

OPERATION SHEET-2

Operation title: material quantity calculation.

Purpose: it used to Perform material **quantity calculation**.

Instruction: Steps to be followed while calculating the required material quantity for cement screed work are. For this operation you have given 2hour and you are expected to provide the answer on the given table.

Tools and requirement:

- Calculator

CONSUMER MATERIALS : -

- A4 paper

- Penciled

Precautions:

- Wear working cloths which properly fit with your body
- Make working area hazard free
- Working area good & brightness

CONDITIONS OR SITUATIONS FOR THE OPERATIONS:-

- Wear appropriate clothes, shoe, helmet, glove ...
- Ensure the work shop hazard free
- Ensure the working area is bright / good visibility
- Make workstation comfortable

PROCEDURE,

Steps 1- Identify screed mix ratio/proportion:

Step 2- Calculate the dry volume of materials required:

Step 3- Calculate the volume of cement required:

Step 4- Calculate the volume of sand required:

QUALITY CRITERIA:

- Assured the performance of all the activities according to the given guide.
- Assure the perform Clean up to get deposing &recycle waste materials & Increase productivity based on cleanup methods.

LAP TEST

Name: _____ Date: _____

Time started: _____ Time finished: _____

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

Task 1: Perform all materials handling and storage.

Task 1: Calculating materials quantity requirements

Unit Two: Plan Screeds

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

- Defective sand and cement screeds
- Backgrounds to receive screeds
- DPM
- sand and cement screeds level

This guide 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:

- Remov defective sand and cement screeds
- Prepar backgrounds to receive screeds
- Install DPM
- Lay and finish sand and cement screeds level

2.1 Defective sand and cement screeds

2.1.1 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.

2.2 Prepar backgrounds to receive screeds

2.1.1 Prepar 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.

2.1.2 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

2.3 DPM /Damp Proof Course

2.3.1 Introduction

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.

2.3.2 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.

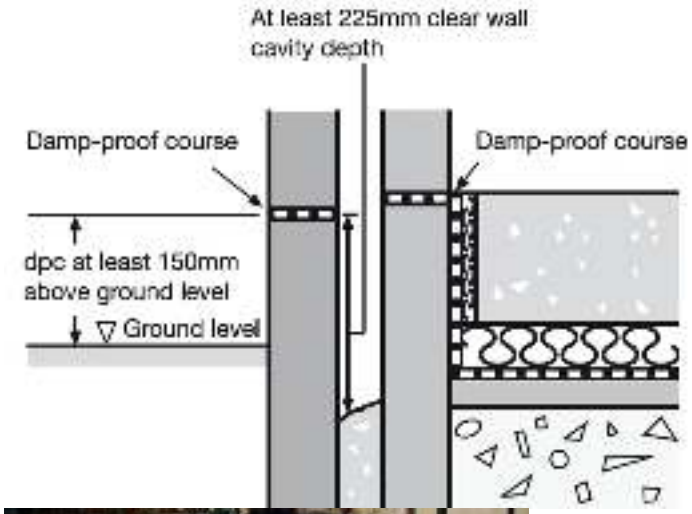

Fig. 2.2applying DPM/C

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.

2.3.3 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.

2.4 Sand and cement screed laying

2.4.1 Screed

What is screed?

Used in a wide range of applications within construction, screed is a thin layer of non-structural material that's similar to concrete, and is commonly applied to a concrete subfloor or over insulation. It acts as a finishing layer on internal floors to improve both appearance and durability. This thin layer can vary in thickness from around 50mm to 100mm depending on its application.

Usually, it's made from a mix of sharp sand, cement and water, in a 1:3 or 1:4 ratio of cement to sharp sand, which produces a semi-dry consistency that can be shovelled, trowelled and levelled into place. Certain additives are also added to improve particular characteristics such as faster drying times, improved thermal conductivity for underfloor heating or increased strength.

It's also used in the application of new flooring, especially wherever an existing lab facility's flooring is uneven and puts staff at risk of tripping or injuring themselves.

The low cost of sand-cement screed means it's been used for years, but its slow, manual labour-intensive application and low thermal conductivity means this variety is gradually being replaced by flowing/liquid screeds.

Flowing (or liquid screeds) are gypsum/anhydrite/calcium sulphate or cement-based screeds that flow from a pump and can be applied much faster than traditional screeds. They result in a smooth, even surface and have good thermal conductivity, and despite their high water content, they rarely crack or curl.

2.4.2 Different types of screed

There are three main types of screed which are used in the marketplace, which are:

Unbonded screed: Unbonded screed sits on top of plastic sheets or another type of membrane as opposed to sitting directly onto the concrete floor or other substrates.

This layer protects the concrete floor from moisture and settling (i.e., when floor joists are set too far apart or they span too great a distance without support from beneath, causing them to settle, sag and cause the floor to slope.

Bonded screed: This type of screed, on the other hand, involves adhesion of the screed directly to the concrete subfloor.

Floating screed: Floating screeds are unbonded screeds that are typically laid on a layer of insulation. They are mainly used in structures with underfloor heating or wherever acoustic or thermal insulation is needed.

2.4.3 Method of laying cement screed

Before the process of screeding begins, there are number of things to take into account prior to application which we'll run through below.

The surface of the floor the screed will be applied to should be clean and free of any debris. Concrete floors should also be wetted and brushed, as any dirt and grease can prevent the mixture from settling evenly.

Where bonded screeds are required, the floor should also be suitably prepared with cement grouting or a bonding agent so the screed can adequately adhere.

Because screeding should never take place in weather conditions that might affect the end result, damp proofing should be completed beforehand. Likewise, precautions must be taken to prevent the screed surface drying out too quickly in hot or dry weather, while screeds shouldn't be installed in cold weather. Any screed that's damaged by the cold should be removed and replaced.

2.4.4 Apply flooring screed

Unbonded screed

Once the floor is clean as described above, lay down polythene sheets or another form of membrane to separate the concrete flooring from the screed. Be sure to overlap the sheets by 20-30cm and then tape them to prevent leakage onto the concrete subfloor. The sheets should also run up the walls by around 10 cm.

Run insulation, edging foam or polystyrene around the walls to prevent damage to walls when the screen shrinks in the drying process.

If it's needed, reinforce the screed with fibres. This strengthens the screed and prevents it from cracking when it dries. Alternatively, you can lay screed reinforcement mesh over the subfloor, which should sit in the top half of the screed once it's been laid.

You're now ready to lay the screed.

Bonded screed

When adhering bonded screed to the concrete subfloor, you should first roughen the surface of the concrete. This exposes the concrete in the aggregate and maximises the subfloor's adhesive potential. You can do this by using a chipping hammer, a pick or specialist equipment such as a shot blaster or floor scabbler.
Next, sprinkle the floor with water to reduce the number of airborne particles, and use a vacuum cleaner to remove any dust and debris.

Now you're ready to apply your bonding agent to the concrete. A mixture of PVA glue, water and cement or styrene-butadiene rubber (SBR) tends to be a popular choice, but whichever agent you go for, always follow the manufacturer's instructions when preparing the bonding agent.

Once done, add the screed immediately. Do not leave it for any length of time or the screed and bonding agent will not mix. Now you're ready to lay the screed.

Self check-1

Instruction: select the correct answer for the give choice. You have given 1 Minute for each question. Each question carries 1 Point.

1. For DPC at plinth level, which grade of concrete is used?

A. C10

B. C20

C. C15

D. C20

2. If the soil is dry, DPC for ground floor consists of the layer of:

A. Metal

B. Coarse sand

C. Concrete

D. Fine sand

3. DPC materials should ideally be flexible, where differential thermal movements occur.

A. False

B. True

4. At roof slab level over the DPC, _____ are provided.

A. Tiles

B. Concrete

C. Rubber sheet

D. P.C.C

5. DPC materials can be classified into:

A. 3

B. 4

C. 5

D. 2

Self check-2

Test-II Matching

Instruction: select the correct answer for the give choice. You have given 1 Minute for each question. Each question carries 5 Point.

A	B
1. *Unbonded screed*	A. involves adhesion of the screed directly to the concrete subfloor.
2.*Bonded screed*	B. sits on top of plastic sheets
3.Floating screed	C. The minimum thickness 20mm
	D.are typically laid on a layer of insulation.

Test III: short Answer writing

Instruction: write short answer for the given question. You are provided 3 minute for each question and each point has 5Points.

1. Write Properties of Materials for DPC
2. write Method of laying cement screed

Note: Satisfactory rating – above 60% Unsatisfactory - below 60%

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

OPERATION SHEET-

Operation title: Perform all laying sand and cement screed steps.

Purpose: it used to lay sand and cement screed steps

Instruction: Steps to be followed while Laying sand and cement screeds are**:**

Tools and requirement:

- Spade
- bucket
- broom
- Trowel

- Straightege
- Mixing panel

CONSUMER MATERIALS : -

- **Cement**
- **Fine sand**
- **Water**

Precautions:

- Wear working cloths which properly fit with your body
- Make working area hazard free
- Working area good & brightness

CONDITIONS OR SITUATIONS FOR THE OPERATIONS:-

- Wear appropriate clothes, shoe, helmet, glove ...
- Ensure the work shop hazard free
- Ensure the working area is bright / good visibility
- Make workstation comfortable

PROCEDURE,

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

QUALITY CRITERIA:

- Assured the performance of all the activities according to the given guide.
- Assure the perform Clean up to get deposing &recycle waste materials & Increase productivity based on clean up methods.

Lap test

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: Lay sand and cement screeds

Unit Three: Clean work areas

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

- Clearing work area
- Disposing , reusing or recycling materials
- Cleaning, checking, maintaining and storing plant, tools and equipment

Checking consistency by slump test.This guide 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:

- Clear work area
- Dispose , rues or recycle materials
- Clean, check, maintain and sort plant, tools and equipment

3.1 Clearing work area

3.1.1 Introduction

Cleanliness is both the abstract state of being clean and free from dirt, and the process of achieving and maintaining that state.

Cleanliness may be endowed with a moral quality, as indicated by the aphorism "cleanliness is next to godliness," and may be regarded as contributing to other ideals such as health and beauty.

In emphasizing an ongoing procedure or set of habits for the purpose of maintenance and prevention, the concept of cleanliness differs from purity, which is a physical, moral, or ritual

state of freedom from pollutants. Whereas purity is usually a quality of an individual or substance, cleanliness has a social

Dimension, or implies a system of interactions. "Cleanliness," observed Jacob Burckhardt, "is indispensable to our modern notion of social perfection." A household or workplace may be said to exhibit cleanliness, but not ordinarily purity; cleanliness also would be a characteristic of the people who maintain cleanness or prevent dirtying.

On a practical level, cleanliness is thus related to hygiene and disease prevention. Washing is one way of achieving physical cleanliness, usually with water and often some kind of soap or detergent. Procedures of cleanliness are of utmost importance in many forms of manufacturing.

3.2 Disposing , reusing or recycling materials

Disposing, reusing and recycling waste materials

Reuse and recycling of waste construction materials is one component of a larger holistic practice called sustainable or green building construction. The efficient use of resources is a fundamental tenet of green building construction. This means reducing, reusing, and recycling most if not all materials that remain after a construction or renovation project. Many building materials can be reused or recycled. Reusing and recycling materials salvaged from demolition and building sites depends on:

- local recycling facilities
- market demand
- quality and condition of materials and components
- time available for salvage
- emphasis put on reuse and recycling.

Materials that can generally be recycled from construction sites include:

- steel from reinforcing, wire, containers, and so on
- concrete, which can be broken down and recycled as base course in driveways and footpaths

- aluminum
- plastics – grade 1 (PET) and 2 (HDPE)
- paper and cardboard
- untreated timber, which can be used as firewood or mulched
- topsoil
- paint. manufacturers/retailers should take back unwanted paint and paint containers.

Materials that can generally be recycled from deconstruction/demolition sites include:

- siteworks and vegetation – asphalt paving, chain link fencing, timber fencing, trees
- concrete – in situ and precast concrete
- masonry – concrete blocks and decorative concrete, paving stones, bricks,
- metals – reinforcing steel (rebar), structural steel, steel roofing including flashings and spouting, zinc roofing, interior metal wall studs, cast iron, aluminium, copper including flashings, spouting, claddings and pipework, lead, electrical, plumbing fixtures
- timber – hardwood flooring, laminated beams, truss joists, treated and untreated timbers/posts, joinery, untreated timber generally, engineered timber panels
- terracotta tiles
- electrical wiring
- wool carpet
- plastics – grade 1 (PET) and 2 (HDPE).

Components that can readily be reused include:

- stairs
- timber – hardwood flooring, weatherboards, laminated beams, truss joists, treated and untreated framing, timbers/posts, native timber components
- thermal insulation – fiberglass, wool and polyester insulation, polystyrene sheets

- carpet and carpet tiles
- plumbing fixtures – baths, sinks, toilets, taps, service equipment, hot water heaters
- electrical fittings – light fittings, switches, thermostats
- linings and finishing – architraves, skirtings, wood paneling, specialty wood fittings, joinery
- doors and windows – metal and timber doors, mechanical closures, panic hardware, aluminium windows, steel windows, sealed glass units, unframed glass mirrors, store fronts, skylights, glass from windows and doors, timber and metal from frames
- clay and concrete roof tiles
- metal wall and roof claddings
- PVC and metal spouting.

Hazardous materials

Hazardous materials must be disposed of appropriately. Check the requirements for removal and disposal of hazardous waste for your local area.

Hazardous wastes from the demolition of buildings may include:

- fluorescent light ballasts manufactured before 1978 – contain PCBs
- fluorescent lamps – contain mercury
- refrigeration and air conditioning equipment – contain refrigerants made using CFCs
- batteries – contain lead, mercury and acid
- roof and wall claddings, pipe insulation, some vinyl flooring, textured ceilings and roofing membrane sheets containing asbestos fibers
- lead or materials that contain lead such as flashings, paint, bath and basin wastes.

When cleaning up, materials such as cement, sand, paint and other liquids and solvents, **must not** be released into the storm water or sewerage disposal systems. This should be included in the demolition specification.

Requirements for recycled or reused materials

The economic value of reusing and recycling. Factors include the:

- cost of transport
- cost of skip hire
- value of material
- weight/amount of material
- number of contaminants.

And you should find out:

- material type
- acceptable and unacceptable levels of contamination
- acceptable and unacceptable levels of damage
- quantities accepted
- transportation requirements
- required documentation including waste tracking forms
- sorting and handling requirements for each material type.

Things to check for concrete

- Types of concrete and rubble accepted.
- Size of concrete pieces.
- Amount of preprocessing.
- Acceptable levels of bricks and tiles.
- Acceptable amount of contamination from materials such as glass, metal, soil.

Some concretes products are too hard-wearing on crushing machines and some concretes are too soft to meet reuse specifications after crushing,

Things to check for metal

- Types of metal accepted.
- Contamination tolerances from materials such as plastics and leftover product in containers.

Things to check for plasterboard

- Whether demolition board is acceptable.
- Minimum and maximum sizes of chip or powder particles.
- Contamination tolerances from materials such as screws, nails, paint and glues.
- Moisture tolerances.
- Minimum and maximum quantities.

Things to check for timber

- Types of timber acceptable (for example, treated, native, untreated).
- Minimum and maximum sizes of board and lengths of timber.
- Minimum and maximum quantities.
- Contamination tolerances from materials such as nails, paint, concrete.
- Any preprocessing requirements such as sorting or grading.
- How timber is to be received (for example, loose, stacked in containers or on pallets).

3.3 Plants, Tools and Equipment Maintenance

Construction tools and equipment suffer a lot of wear and tear. Hence, it is important to maintain them regularly. This will help increase the service life as well as the performance of the equipment. Precautionary maintenance of tools and equipment will also help reduce unwanted expenses related to broken or faulty equipment. Small problems generally lead to bigger issues if left unattended. Perform all cleaning and repair work as soon as you see any

signs of damage or neglect. This will keep your instruments from failing you at crucial moments.

Common types maintenance

1. Preventive maintenance: Equipment is maintained before any fault occur or the equipment to be in working condition. It's to maintain a level of certain service on equipment, programming or configuration if required and done by maintenance department.

2. Periodic Maintenance: The basic maintenance of equipment by its user or operator. It consists of data collection, visual inspection, cleaning, lubrication, re tightening of screws for which only a brief training is required and.

3. Corrective maintenance: It is to correct the defect to be found in the equipment and are corrected by the maintenance department.

Clean the construction tools and equipment after each day's work. While a thorough cleaning is not required each day, a general wipe-down and removal of the heaviest construction dirt is key to extending the life of the tools.

Lubricate air tools and pneumatic equipment before each day's use. Condensation in the airline creates an environment for corrosion inside pneumatic tools. Coating the internal components of these tools with air-tool oil will displace the moisture and prevent tool corrosion.

Good Housekeeping

Effective housekeeping can eliminate some workplace hazards and help get a job done safely and properly. Poor housekeeping can frequently contribute to accidents by hiding hazards that cause injuries. If the sight of paper, debris, clutter and spills is accepted as normal, then other more serious health and safety hazards may be taken for granted.

purpose of workplace housekeeping

Poor housekeeping can be a cause of accidents, such as:

- tripping over loose objects on floors, stairs and platforms
- being hit by falling objects
- slipping on greasy, wet or dirty surfaces
- striking against projecting, poorly stacked items or misplaced material

- cutting, puncturing, or tearing the skin of hands or other parts of the body on projecting nails, wire or steel strapping

To avoid these hazards, a workplace must "maintain" order throughout a workday. Although this effort requires a great deal of management and planning, the benefits are many.

benefits of good housekeeping practices-

Effective housekeeping results in:

- reduced handling to ease the flow of materials
- fewer tripping and slipping accidents in clutter-free and spill-free work areas
- decreased fire hazards
- lower worker exposures to hazardous substances (e.g. dusts, vapours)
- better control of tools and materials, including inventory and supplies
- more efficient equipment cleanup and maintenance
- better hygienic conditions leading to improved health
- more effective use of space
- reduced property damage by improving preventive maintenance
- less janitorial work
- improved morale
- improved productivity (tools and materials will be easy to find)

Self check-1

Instruction: select the correct answer for the give choice. You have given 1 Minute for each question. Each question carries 1 Point.

1. One of the following is not Effective housekeeping results

   A. reduced handling to ease the flow of materials
   B. less janitorial work
   C. increase fire hazards
   D. more effective use of space

2. what is the use of cleaning work area?

A, the work place so that it is a more effective, more efficient place to work

B, it involves strong out what is note needed to perform the required work in the work area

C, ALL D, None

3. Good housekeeping helps to create:

A/Better working conditions

B/Safer workplaces

C/Greater efficiency.

D/All

4. Which of the following Information is true about Machinery and Equipment neatness

A/ Clean and free of unnecessary material.

B/Free of unnecessary dripping of oil or grease.

C/ Benches and seats clean and in good condition.

D/ All of the above

5. The successful maintenance program include one of the following

A/Good planning and managing effectively

B/Identifying and controlling hazards at workplaces

C/Define operational procedures

D/ All of the above

Self check-2

Test-II Matching

Matching

Instruction: select the correct answer for the give choice. You have given 1 Minute for each question. Each question carries 2 Point.

A	B
1.Preventive maintenance	A. The basic maintenance of equipment by its user or operator
2.Periodic Maintenance	B. It is to correct the defect to be found in the equipment

3.Corrective maintenance	C. Equipment is maintained before any fault occur
4.Effective housekeeping results	D. Used to wipe the cleaning tools and equipment
	E. reduced handling to ease the flow of materials
	F. A device that uses an air pump

Test III: short Answer writing

Instruction: write short answer for the given question. You are provided 3 minute for each question and each point has 5Points.

1. A good housekeeping program identifies and assigns responsibilities for the following: (4points)

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2. Least at list 4 Effective housekeeping results? (3points)
3. How to maintain tools & equipment at construction site? (3 points)
4. What is the purpose of work place housekeeping? (10)

Note: Satisfactory rating – above 60% Unsatisfactory - below 60%

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

OPERATION SHEET-3

Operation title: Perform Disposing, reusing and recycling waste materials.

Purpose: it used to Perform Dispos, reus and recycl waste materials.

Instruction: Use the given procuder to Perform Dispos, reus and recycl waste materials.

For this operation you have given 2hour and you are expected to provide the answer on the given table.

Precautions:

- Wear working cloths which properly fit with your body
- Make working area hazard free
- Working area good & brightness

CONDITIONS OR SITUATIONS FOR THE OPERATIONS:-

- Wear appropriate clothes, shoe, helmet, glove ...
- Ensure the work shop hazard free
- Ensure the working area is bright / good visibility
- Make workstation comfortable

PROCEDURE,

Steps 1- Check the requirements for removal and disposal of hazardous waste

Step 2- Check material type to be reused or recycle

Step 3- Check acceptable and unacceptable levels of contamination and damage

Step 4- Check **sorting and handling requirements for each material type**

Stepp 5- Check required quantities and transportation requirements

Stepp 6- Reuse and recycle

QUALITY CRITERIA:

- Assured the performance of all the activities according to the given guide.
- Assure the perform Clean up to get deposing &recycle waste materials & Increase productivity based on clean up methods.

OPERATION SHEET-3

Operation title: performing maintaining plants, tools and equipment

Purpose: it used to performing maintaining plants, tools and equipment

Instruction: Steps to be followed to Perform all cleaning and repair work as soon as you see any signs of damage.

Precautions:

- Wear working cloths which properly fit with your body
- Make working area hazard free
- Working area good & brightness

CONDITIONS OR SITUATIONS FOR THE OPERATIONS:-

- Wear appropriate clothes, shoe, helmet, glove ...
- Ensure the work shop hazard free
- Ensure the working area is bright / good visibility
- Make workstation comfortable

PROCEDURE,

Steps 1- Clean your tools and equipment: Follow the manufacturer's guidelines for proper cleaning and maintenance.

Step 2- Protect electrical cords: cover the electrical cords with industrial strength casings or purpose-built ramps.

Step 3- Lubricate tools and equipment: Lubricate tools and equipment regularly

Step 4- Lubricate tools and equipment: Regularly inspect your tools for signs of damage and faulty functioning.

Stepp 5- Store tools with care: Store tools properly

QUALITY CRITERIA:

- Assured the performance of all the activities according to the given guide.
- Assure the perform Clean up to get deposing &recycle waste materials & Increase productivity based on clean up methods.

OPERATION SHEET-3

Operation title: Perform all good housekeeping steps.

Purpose: it used to Perform all good housekeeping steps.

Instruction: Steps to be followed while performing good housekeeping are:

Precautions:

- Wear working cloths which properly fit with your body
- Make working area hazard free
- Working area good & brightness

CONDITIONS OR SITUATIONS FOR THE OPERATIONS:-

- Wear appropriate clothes, shoe, helmet, glove ...
- Ensure the work shop hazard free
- Ensure the working area is bright / good visibility
- Make workstation comfortable

PROCEDURE,

Steps 1- clean up during the shift:

Step 2- cleanup day-to-day:

Step 3- Dispose waste:

Step 4- Remove unused materials:

Stepp 5- Inspect to ensure cleanup is complete:

QUALITY CRITERIA:

- Assured the performance of all the activities according to the given guide.
- Assure the perform Clean up to get deposing &recycle waste materials & Increase productivity based on clean up methods.

LAP Test

Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within 8-12 hours.

Task 1: Disposing, re-using and recycling waste materials

Task 2: Maintaining plants, tools and equipment

Task 3: Performing good housekeeping