Finishing construction

Work Level-II

Learning Guide-114

Unit of Competence: Use painting and decorating tools and equipment

Module Title: Using painting and decorating tools and equipment

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LO 1: Plan and prepare

Instruction Sheet	Learning Guide #114

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

- Obtaining confirming and applying the work instructions
- ***Follow Safety*** (***OHS***) requirements
- Identifying and implementing Signage and barricade requirements
- Calculating material quantity requirements
- identifying obtaining, preparing ***materials*** appropriate to the work application
- Identifying Environmental protection requirements

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**:

- Obtain Work instructions and operational details using relevant *information* confirm and apply for planning and preparation purposes.
- follow *Safety requirements* in accordance with safety plans and policies
- identify and implement Signage/barricade requirements
- calculate Material quantity requirements in accordance with plans and/or specifications
- Identify, obtain prepare safely handle and locate ready for use ***materials*** appropriate to the work application
- Identifying and applying the Environmental protection requirements for the project in accordance with environmental plans and regulatory obligations

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below
3. Read the information written in the information Sheet
4. Accomplish the “Self-checks, in each information sheets**.**
5. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-checks).
6. If you earned a satisfactory evaluation proceed to “Operation sheets and LAP Tests if any”. However, if your rating is unsatisfactory, ask your teacher for further instructions or go back to Learning Activity.

Information Sheet-1	obtaining confirming and applying Work instructions,

1.1. Work instructions

Introduction:-In construction site identify plan location and specification according to work instructions techniques. A work instruction is a document that provides specific instructions to carry out any activity. It's a step by step guide to perform a single instruction. A work instruction contains more detail than a procedure and is only created if detailed step by step instructions are needed. **Work instruction including plans, specification and quality requirement etc**

1.1.1. Plan

A drawing showing technical details of a building, machine, etc., with unwanted details omitted, and often using symbols rather than detailed drawing to represent doors, valves, etc.
The plans for many important buildings were once publicly available.

A set of intended actions, usually mutually related, through which one expects to achieve a goal. He didn't really have a plan; he had a goal and a habit of control.
A two-dimensional drawing of a building as seen from above with obscuring or irrelevant details such as roof removed, or of a floor of a building, revealing the internal layout; as distinct from the elevation.

1.1.2. Specification

Specification is defined as the designation or statement by which written instructions are given distinguishing and/or limiting and describing the particular trade of work to be executed. In short specification is a statement of particular instructions of how to execute some task. Specification is one of the contract documents.

Specifications are written based on the prepared design, drawings, general and scientific trends of workmanship, quality expected equipment involved and materials to be used for the particular trade of work.

The specifications should clearly specify:-

1. Design and drawing
2. Labor employment
3. Materials to be used
4. Construction method
5. Equipment used

Specifications should be clear, concise, and brief descriptions of what is required to execute the proposed trade of work. The information that is needed for construction is usually conveyed by two basic communication lines. They are Drawings (pictorial) and Specifications (written).

In so doing the methods of communication should complement each other and neither should overlap or duplicate the other. Specifications are devices for organizing the information depicted on the drawings and they are written descriptions of the legal and technical requirements forming the contract documents.

Their differences that the drawings should generally show the following:

1) Dimensions, extents, size, shape, and location of component parts

2) Location of materials, machineries, and fixtures

3) Interaction of furniture, equipment' sand space

4) Schedules of finishes, windows and doors

Specifications generally describe the following:-

1. Type and quality of materials, equipments, labor or workmanship
2. Methods of fabrication, installation and erection
3. Standards, codes and tests
4. Allowance, submittals and substitutions
5. Cost included, insurance and bonds
6. Project records and site facilities.

Types of Specifications

In general, specifications can be broadly classified into four categories as follows:

1. **Manufacturer's specification:** Manufacturers prepare specification of their product for the guidance of their users, which may include property description and installation guide lines.
2. **Guide Specification:** Specifications prepared by an individual or group of individuals based on manufacturer's specifications, established trends of workmanship, service and laboratory tests and research findings to be used as guide lines for preparation of contract specifications.
3. **Standard Specification:** Specifications which are intended to be used as a reference standard in the construction of a project. The guide specification which has been standardized by a recognized authority is considered as standard specification.
4. **Contract (Project) Specification:** the specification prepared for a particular project to accompany the drawings and other contract documents.

1.1.3. **quality requirements**

Quality planning documents are used by organizations to ensure that quality At the highest level, quality goals and plans should be integrated with overall strategic to applicable standards, practices, procedures, and work instructions,

Quality in construction industry can be defined as the attainment of acceptable levels of performance from construction activities. This performance would be attained when the activity meets the requirements of client or owners

1.1.4. **Material Safety Data Sheet (MSDS)**

- **What is included in the MSDS?**

A Material Safety Data Sheet (MSDS) is a document that contains information on the potential hazards (health, fire, reactivity and environmental) and how to work safely with the chemical product. It is an essential starting point for the development of a complete health and safety program.

- **What is a MSDS and what is its purpose?**

One way that consumers and workers are informed of the risks is by use of material safety data sheets. A material safety data sheet (or MSDS) is a document that provides workers with procedures for safely handling or working with a particular substance.

Self-Check -1	Written Test

Directions: Answer all the questions listed below.

1. ----------is nothing more than progressively finer and more numerous scratches.

What about sanding

A. Sanding surface C. painting surface

B. Plastering surface D. all

2. Specifications which are intended to be used as a reference standard in the construction of a project

A. Manufacturer's specification
B. Contract (Project) Specification
C. Standard Specification:
D. none

3. ----------is the specification prepared for a particular project to accompany the drawings and other contract documents

A. Manufacturer's specification
B. Contract (Project) Specification
C. Standard Specification:
D. none

4. ----------is a document that provides specific instructions to carry out any activity.

A. Plan
B. Specification
C. Work instruction
D. Material

Score = _____

Rating: _____

Answer Sheet

Name: _____ Date: _____

Short Answer Questions

1. ----------
2. ----------
3. ----------
4. ----------

Information Sheet-2	***Follow Safety*** requirements

1.2. **Observing *OH&S* requirements**

Occupational health and safety (OHS) relates to health, safety, and welfare issues in the workplace. OHS includes the laws, standards, and programs that are aimed at making the workplace better for workers, along with co-workers, family members, customers, and other stakeholders.

OHS requirements are to be in accordance with legislation and regulations, organizational safety policies and procedures and project safety plan.

1.2.1. **individual regulatory requirements**

Safety measures to be taken whenever using Electrical Equipment.

In every site there are a lot of electrical hand tools and machines employed and in use. The purpose of every electrical tool is to ease the work, to accelerate, safe time, ease the work process, and to attain a better quality of work. The most common are drilling machine, concrete mixer, circular saw, lamps, extensions cable, cutting machines, electrical vibrators etc. handled, and installed improperly, they are source of hazard and accidents to anybody. A broken cable, for instance, exposed cable wires connected to body of a machine under power, and if someone touches the machine, it will give a heavy electrical shock or accident can possibly exist.

Similarly, human body conducts a current, if there is a direct contact between his body and any materials of good conductors with electrical power, the person becomes part of the circuit and the current starts to flow through his body. Starting from a current of 0.05 Ampere the power can even cause of death.

1.2.2. personal protection needs throughout the work

1.2.2.1. What is PPE?

PPE in this guidance notes means equipment that is intended to be worn or otherwise used by a person at work and that protects the person against one or more risks arising from chemical or chemical operation to the person's safety or health. It includes any addition or accessory to the equipment designed to meet a similar objective.

1.2.2.2. Protective clothing and equipment

A. Helmets should be worn especially in areas where there is likelihood of objects falling from roofs or multistory building.

B. Goggles or face shields should be worn during drilling, chiseling or grinding operation on metal, store, and concrete. These operations produce dust and flaying chips which could be injurious to eye.

C. The feet should be protected from nails and other sharp objects and from heavy falling objects by hard-rolled leather boots with metal toe-cap

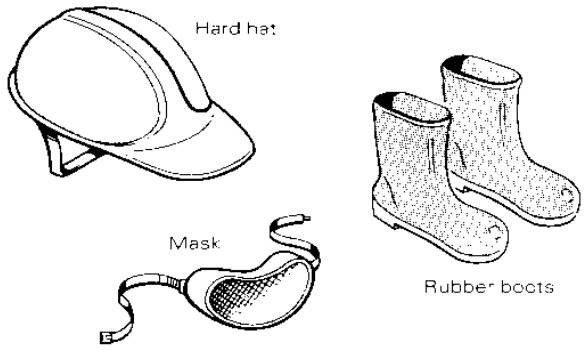


Figure 1.1 Protective clothing.

Fig.1.2. *Panoply Work wear Clothing*

Panoply Work wear Clothing

Panoply work wear - MACH2 & MACH5 quality cotton/polyester clothing:

- *Men's work trousers with kneepad pockets and elasticated waist*
- *Overalls & double-zip overalls with kneepad pockets*
- *Dungarees with knee pad pockets and elasticated waist*
- *Knee pads to fit Panoply MACH work wear*
- *Vests / body warmers with drawstring to adjust waist*
- *Work jackets with multiple pockets*
- *Work cargo shorts with elasticated waist*
- *Waterproof coats with removable quilted lining and hood*

Fig.1.3. *Safety Boots*

Safety Boots & Shoes

Superb range of work safety boots & shoes from Redwood, Capps, Capps Composite & Panoply. Redwood is the premier brand for comfortable and reliable safety boots. Capps is the premium brand for sports-style safety boots. Capps Composite boots are entirely non-metallic, whilst still offering 200 Joule toe caps and protective midsoles, resulting in lightweight, comfortable safety footwear.

Fig.1.4.Safety

Safety Glasses

Safety glasses and safety goggles from Venire - experts in eye protection. All safety glasses and goggles are close-fitting and comfortable. Many tinted and stylish safety glasses available at

Glasses great prices.

Dust Masks

New Venire Spider Mask - reduces cost and optimizes comfort!

Dust masks by Venire. For respiratory protection against non-toxic fine particles and fumes. The range includes FFP1, FFP2 and FFP3 dust masks.

Fig.1.5.*Dust Masks*

Ear Defenders

*Venire Ear Defenders - **NEW!** Radio electronic ear defenders, adjustable ear muffs, noise reducing foam ear plugs and reusable silicone earplugs. We supply the full Venire ear protection range. Please contact us if you can't find what you're looking for!*

Fig.1.5*.*Ear Defenders

Gloves

Protective gloves from Venire. Range includes cotton/polyester gloves, 100% polyamide gloves and thermal polyester/acrylic gloves. With coated palm and fingers for exceptional grip..

Fig.1.6. Gloves

Fig.1.7. Knee Pads

Knee Pads

Work knee pads - high quality gel kneepads and foam kneepads by Tommy co and Rubi.

- ***Tommy co*** *are one of the largest manufacturers of kneepads in the World, with 25 years experience in producing high quality, innovative & environmentally friendly knee pads. Their extensive range includes quality gel and Nitro Foam kneepads.*
- ***Rubi*** *knee pads offer the best in ergonomic knee protection for tillers and other tradesmen. PLUS: Rubi ergonomic seat - ideal for large flooring jobs!*
- ***Panoply*** *knee pads to fit all Panoply MACH work wear with kneepad pockets.*

Fig.1.8. Fall Arrest Equipment

Fall Arrest Equipment

Excellent selection of quality fall arrest equipment (PPE) from Panoply (previously branded Foment). The range includes: fall arrest kits (suitable for safflowers), full body fall arrest harnesses, energy (shock) absorbing lanyards, retractable fall arrest blocks, ladder fall arrest system, rope & webbing fall restraint lanyards (not for fall arrest), karabiners and safety scaffold hooks. All Panoply fall protection equipment is compliant with the relevant EN safety standards.

Handling of materials

Cornice should be carried and handled ‘on edge’ to avoid cracking the core or wrinkling the paper liner. Where possible, use full lengths of cornice and miter all joints. Ensure accurate and level placement by marking ceilings and walls with a line at the cornice edge. Measure and precut cornice to length before mixing the Cornice Adhesive Install shorter lengths of cornice first then fit longer lengths by bowing out to spring miters into place.

Storage

Compounds should be stored in a dry place above ground and protected from the elements and temperature extremes. Storage in an unsuitable environment or once container or bag is opened can shorten the life of the product.

Manufacturer’s Warranty

The use of non-specified additives or jointing compounds will void Boral Plasterboard’s warranty on the total jointing system

Use of firefighting equipment,

Firefighting equipment is equipment designed to extinguish fires or protect the user from fire. Firefighting equipment includes not only fire hoses and fire extinguishers but also fire-resistant protective clothing, fire-resistant gloves, respirators, and communication equipment.

Fire is the rapid oxidation of a material in the exothermic chemical process of combustion, releasing heat, light, and various reaction products. The flame is the visible portion of the fire. If hot enough, the gases may become ionized to produce plasma. Depending on the substances alight, and any impurities outside, the colour of the flame and the fire's intensity will be different.

Organizational First Aid

• If plaster compound or dust comes into contact with the eyes wash eyes thoroughly with water.

• If plaster compound or dust comes into contact with skin wash skin thoroughly with soap and water.

• If dust is inhaled move to a fresh air environment.

• If plastering compound or dust is ingested drink plenty of water.

A, Hazard control and hazardous materials and substance

WHS legislation in New South Wales requires that PCBUs, in consultation with workers identify all potentially hazardous things or situations that may cause harm. In general, hazards are likely to be found in the following;

- ✓ Physical work environment,
- ✓ Equipment, materials or substances used,
- ✓ Work tasks and how they are performed,
- ✓ Work design and management

Self-Check -1	Written Test

Directions: Answer all the questions listed below.

1. one of the following is differ from the other
   A. glove
   B. safety shoes
   C. Google
   D. Trowel
2. -------- is equipment designed to extinguish fires or protect the user from fire.
   A. Firefighting equipment
   B. First Aid
   C. Storage
   D. all

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short

1. ----------
2. ----------

Information Sheet-3	Identifying and implementing Signage and barricade requirements

1.3. Identifying and implementing Signage and barricade requirements

1.3.1. GENERAL REQUIREMENTS

A variety of situations exist at Council worksites where barricading and/or safety signage are required. Barricading and safety signage draw attention to hazardous objects and situations that may affect health and safety, reducing the potential of injury to personnel and damage to property. Examples include warning tape, mesh barrier, road barriers, traffic control signs, emergency signage, mandatory PPE signs and precautionary signage.

Barricading and safety signage shall be used:

- when there are no other practical control measures available to control a hazard;
- as an interim measure until a more effective way of controlling the risk can be used or the hazard is no longer present; and
- as a secondary control measure to supplement higher level control measures.

The type and number of barricading or safety signage erected must be assessed adequately and positioned to be suitable for the intended purpose.

Barricading Requirements

Barricading is one of the risk control measures used to protect personnel from hazard such as:

- being struck by falling objects, material movements or plant;
- fall from height, including falling into open excavations or penetrations;
- fall from unprotected edges (e.g. removed flooring, walkways, stairs and handrails);
- exposure to hazardous substances, process or activities;
- unauthorized entry into a confined space or other restricted work areas; and

- Any potentially hazardous work processes, such as hot works, demolition work, scaffolding, radiation work and work involving asbestos.

Barricading may also be used as part of incident management and emergency response procedures.

Selection of Barricade

The following factors are to be considered as part of a risk assessment when selecting the type of barricade (soft or hard):

- risk associated with the hazard;
- required strength of the barrier (e.g. impact potential); and
- The amount of clearance provided from the hazard by the barricade.

Barricading shall be used to manage the risk of fall from height greater than two meters and excavations greater than 1.5 meters deep.

All barricading shall be designed, installed and used in accordance with the relevant Australian Standards and the recommendations of the manufacturer. Where barricades are supported by star pickets, the star pickets shall be protected by using a suitable cap fitted to the star pickets.

Erection and Use of Barricade

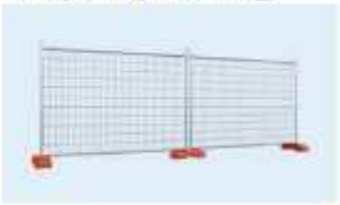
The barricade shall be placed so that the whole area affected by the hazard is appropriately identified, taking the following factors into account:

- distance to/from the hazard;
- possible movement of an object inside the barricade if it falls;
- access and egress; and
- Sparks or slag generated from hot work activities.

An appropriate sign shall be affixed to barricades at all access points, indicating the following:

- The hazards present within the barricaded area; and
- The name and contact details of the person in charge of the barricaded area.

APPENDIX 1 – Types of Barricading

Type	Purpose	Condition / Requirements
Soft Barricading		
Caution Tape 	Demarcates areas that require personnel to be warned of identified hazards prior to entry.	Access permitted, caution required. Persons requiring access must make sure they familiarise themselves with the hazards, risk-assess the situation and proceed into the area only if confirmed that it is safe to do so. **Not** suitable for medium, high or extreme risk hazards, e.g. electrical hazards, falling objects, unprotected edges.
Danger Tape 	Demarcates areas and/or equipment where there is an immediate threat to people, equipment and/or the environment.	Personnel shall **not** enter or work within an area that is demarcated with Danger Tape, unless authorised. Suitable to restrict access from hazards.
Mesh Barrier and Bunting Flags  	High visibility soft barricading options where a solid barricade is not required. Delineate work areas that require authorised access, or used to highlight the boundary of a work area.	May be used in conjunction with appropriate barricading tape. Mesh shall be installed with the top edge at a height between 900mm – 1200mm. Can be used with capped star pickets and/or barricade stands.
Double Sided Floor Stands 	Identify related hazards where caution is required, e.g. slip hazard.	Stands shall be placed in a prominent position.
Traffic Cones 	Demarcate areas where work is taking place on roads and ground, e.g. clean-up, spills, survey or mobile plant.	Person requiring access must familiarise themselves with the hazards, risk-assess the situation and proceed into the area if confirmed that it is safe to do so.
Hard Barricading		
Temporary Fencing 	Demarcates areas with restricted access, often used for security purposes. Also useful where there is no structure to fix barricading tape.	Used in conjunction with appropriate barricading tape and information tag.

Safety Signage Requirements

Safety signs are erected to warn workers or the public of specific hazards and to communicate necessary precautionary measures and emergency actions. Safety signage, in accordance with Ethiopian Work Health and Safety Regulation required for:

- construction sites;
- confined spaces;
- asbestos;
- hazardous areas;
- hazardous chemicals;
- site specific Personal Protective Equipment (PPE) requirements;
- fire protection equipment;
- emergency and first aid information;
- emergency eyewash shower; and
- Traffic management and pedestrian control.

Signage Classification and Use

Safety signage are classified and shall be used according to their function as follows:

Type	Use	Example
1. **Regulatory Signs** – Signs containing instructions that if ignored could either be an offence at law, or a breach of site safety rules, safety procedures or other directions.		
Principal contractor construction site signage	Any principal contractor for a construction project must be identified with signage. At a minimum, the sign must: • Identify the principal contractor's name and telephone contact numbers (including an after hours telephone number); • Identify the location of the site office for the project, if any; and • Be clearly visible from outside the workplace, or the work area of the workplace, where the construction project is being undertaken.	
Mandatory Signs	Signs that specify that an instruction MUST be carried out. Symbols (or pictograms) are white on a blue circular background and indicate the minimum standard of compliance required for the workplace where it is displayed. The sign's wording is in black lettering on the white background. Multiple symbols may be on the sign.	 

Type	Use	Example
Prohibition Signs	Signs that specify behaviour or actions, which are not permitted. The round shape with a slash should be depicted in red over the action symbol in black. The sign's wording is in black lettering on the white background.	
Limitation or Restriction Signs	Signs that place a numerical or other defined limit on an activity. The most common signs are speed restriction signs. The signs have a symbolic Red circle shape with black writing or symbol on it and may also be on the roadway surface.	
2. Hazard Signs – Signs advising of hazards.		
Danger Signs	Signs warning of a particular hazard or hazardous condition that is likely to be life-threatening. (The word 'DANGER' shall be in white featured inside a red ellipse inside black rectangle. The sign's wording shall be in black lettering on the white background.)	
Warning Signs	Signs warning of a hazard or hazardous condition that is not likely to be life-threatening. (The hazard symbol shall be black on a yellow background and a triangle should be depicted around the hazard symbol. The sign's wording shall be in black lettering on the yellow background.)	
3. Emergency Information Signs		
Muster Point, First Aid Locations, etc	Signs indicating the location of, or directions to, emergency related facilities such as exits, safety equipment or first aid facilities. (They feature a white symbol and/or wording on a green background.)	
4. Fire Signs		
Fire-fighting Equipment Locations, etc	Signs advising the location of the alarms and fire-fighting facilities. (Fire signs shall comprise a red rectangle with white symbol and/or wording.)	

Type	Use	Example
5. Hazardous Chemicals Placards		
Placards	Placards alert the emergency services and other persons to the presence of hazardous chemicals and provide information about them.	
6. General Information Signs		
Other signs not contained within the categories listed above	These signs are used to communicate information of a general nature (e.g. housekeeping)	

Self-Check -3	Written Test

Directions: Answer all the questions listed below.

1. ---------- is one of the risk control measures used to protect personnel from hazard.
   A. Barricading
   B. Safety signs
   C. Regulatory sign
   D. Engineering safety
2. --------- are erected to warn workers or the public of specific hazards and to communicate necessary precautionary measures and emergency actions
   A. Barricading C. Regulatory sign
   B. Safety signs D. Regulatory sign

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

1. --------
2. ----------

Information Sheet-4	Calculating material quantity requirements

1.4. Calculating material quantity requirements

Estimating quantity of materials

Using unit standards

A standard unit of measurement for painting work is as follows. For paint, Primer, Thinner and Anti-rust e.t.c. Liter and gallon is used. Whereas for stucco and glue, gram and kilogram is preferably used.

Calculating quantity of materials:

Materials required for painting work are usually calculated based on their state, as liquid, thinner

Or as solid, stucco.

Calculating quantity of paint:

a) Paint

First coat = 0.07 lit/m^2 x 100m^2 = 7 lit

Second coat = 0.06lit/m^2 x 100m^2 = 6 lit

Apply three coats of plastic emulsion paint to external newly plastered surfaces.

b) Primer. Primer coat to fill the pores of the surface and to prepare smooth base for the first paint coat

Data stucco = 50g/m^2

Animal glue = 12.5g/m^2

1st coat = 0.08 lit/m^2

2nd coat = 0.07 lit/m^2

3rd coat = 0.06 lit/m^2

Let the area be = 50 m^2

Quantity of Primer

$$\text{Stucco} = \frac{50g}{m^2} x 50m^2 = 2500g = 2.5kg$$

$$\text{Animal glue} = \frac{12.5g}{m^2} x 50m^2 = 625g = 0.625kg$$

Quantity of Paint

1st coat = 0.08lit/m^2 x 50m^2 = 4 lit

2nd coat = 0.07lit/m^2 x 50m^2 = 3.5 lit

3rd coat = 0.06lit/m^2 x 50m^2 = 3.0 lit

Total = 10.5 lit

Apply three coats of synthetic enamel paint

Data: Stucco for knotting = 0.05 kg/m^2

1st coat = 0.6 lit/m^2

2nd coat = 0.05 lit/m^2

3rd coat = 0.04 lit/m^2

Let area to be finished be 121m^2

Estimate the quantity of materials required left as an exercise problem.

4. 2 coats of varnish to wooden surface

1st coat = 0.6 lit/m^2

2nd coat = 0.05 lit/m^2

Stucco for knotting = 0.05 kg/m^2

Let the area to be varnished be 112 m^2.

Estimate the quantity of material required.

5. 3 coats of synthetic enamel paint to steel surface.

Let the area to be painted be 100m^2

Primer: Primary coat (antirust)

= 0.04 lit/m^2

Thinner for antirust = 0.5 lit/gallon

$$\text{Antirust} = \frac{0.04\text{lit}}{\text{gallon}} \text{x} 100\text{m2} = 4\text{lit} = 1\text{gallon}$$

$$\text{Thineer} = \frac{0.5\text{lit}}{\text{gallon}} \text{x} 1\text{gallon} = 0.5\text{lit}$$

Total = 12 lit

= 3 gallons

$$\text{Thin}\ \frac{0.5\,\text{lit}}{\text{gallon}} \text{x}\ 3\,\text{gallons} = 1.5\,\text{gallons}$$

6. Three coats of synthetic enamel point to galvanized steel surface.

Note: For paint badly adheres to galvanized steel or iron, one method of painting galvanized steel or iron is to expose it to weather for at least half a year.

Data

1^{st} coat = 0.04 lit/m^2

2^{nd} coat = 0.04 lit/m^2

3^{rd} coat = 0.04 lit/m^2

Let the surface to be painted be 33.5 m^2. Estimate the amount of synthetic enamel point required. Let as an exercise problem.

Calculating quantity of primer:

1. Two coats of plastic emulsion to internal newly plastered surface.

a) Primer. Primer coat to fill the pores off the surface and prepare smooth base for the first paint coat.

Data: Stucco = $50g/m^2$

Animal Glue = $12.5\ gm/m^2$

Which gives primary coat of $62.5\ g/m^{2?}$

1^{st} coat = $0.07\ lit/m^2$

2^{nd} coat = $0.06\ lit/m^2$

Let area to be painted is $100\ m^2$

Primer = stucco = $\frac{50g \times 100m^2}{m^2} = 500g = 5kg$

Animal glue = 1.25 kg

Self-Check -4	Written Test

Directions: Answer all the questions listed below. Say true of false.

1. Primer coat to fill the pores of the surface and to prepare smooth base for the first paint coat.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

1. ----------

Information Sheet-5	**identifying obtaining, preparing materials appropriate to the work application**

1.5. identifying obtaining, preparing materials appropriate to the work application

What is paint?

Paint is a mix of pigments color held along with binders suspended in a liquid. The liquid may be no more than water or it may be a more complicated mix of natural or man –made resins. When the paint is applied to a surface the liquid evaporates leaving just the pigment and the binders as a surface coating.

Painting is just something applied for decorative purpose. It also serves to protect the surface to which it is applied.

There are many advantage of painting .paint preserves, protect s and decorates surface and enable them to be cleaned easily, that is why iron and wood are always painted. Advantages of painting are as follows.

1. It protects iron and wood from wear and tear and moisture. Besides this, it reduces the possibility of fire. Wood swells when it comes in contact with moisture. It wood is painted nicely, it is affected by moisture.
2. Paint protects iron from rusting and corrosion.
3. Painted surface is clean, smooth and beautiful.
4. Reflection of heat and light takes place nicely on painted surface.

A number of factors play an important part in achieving good protective and decorative work. The most important are;

1. Selecting the correct paint for the job
2. Using the most suitable tools
3. Preparing surface
4. Appling the paint

The top ten golden rules of painting

1. Always read instructions on the paint can carefully and follow them
2. Using access equipment properly .don't take short cuts
3. Wear sensible clothing an especially ,mask or other item designed to protect you
4. Use the right tools for the job
5. Select the correct paint for the purpose .an interior paint will not last long out side
6. Only paint when conditions are suitable
7. Two thin coats of paint are always better than one thick coat
8. Clean utensils immediately after use. Do not allow paint to dry on brushes or rollers
9. Paint the work carefully
10. Prepare surfaces properly .bad preparation means a poor finish that will not last.

Type of paints

There are seven groups of paints;

1. Oil paints
2. Syntactic paints
3. Water paint
4. Emulsion paints
5. Cellulose paints
6. Varnishes
7. Special paints

PREPARATION OF PAINT

The base is ground in a vehicle to the consistency of paste in a stone pestle known as *muller*. Linseed oil, is intermittently added to the paste in small quantities and the mixture is stirred with a wooden puddle. In case of coloured paints, the pigment is mixed with linseed oil separately and the paste is formed as explained above. Driers are also ground separately in linseed oil. The three pastes so prepared are mixed and a little linseed oil is added further to softenthepaste.Themixtureiscontinuouslystirredtillaconsistencyofcreamisobtained.The mixture is thereafter strained through fine canvas or a sieve. The paint is now ready for use. Thepaintsopreparedcanbeusedbyaddingoilorathinnertomakeitofworkableconsistency before application.

For commercial manufacturing of paints a four-storey building is used to have gravitational

flow of materials. Pigments, oil, thinner, plasticizer, drier, etc. are stored on the fourth floor and are fed by means of chutes in proper proportions, to the grinding mill placed on the third floor and are ground. The thoroughly ground materials are then sent to storage tanks on the second floor. The charge in the tanks is kept in motion by agitation mechanism so that settling of materials does not take place. An additional quantity of vehicle is added here to get the desired composition. The batch is then tested for quality control. The paint material is then strained and sent to first floor, where it is packed in containers. Finally the packed material in containers is sent to the ground floor.

Self-Check -5	Written Test

Directions: Answer all the questions listed below.

1. ------ is a mix of pigments color held along with binders suspended in a liquid.

   A. Paint

   B. Cement

   C. Primer

   D. all

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

1. ----------

Information Sheet-6	identifying Environmental protection requirements

1.6. identifying *Environmental protection* requirements

Identified for the project in accordance with environmental plans and regulatory obligations and applied. Safety although there are no known health hazards associated with standard plaster board installation the following precautions is recommended:

- Avoid creating dust when handling plaster board or mixing plaster board compounds.
- After toweling, reduce sanding by wiping a wet sponge over the edges of finished joints.
- If dry sanding is necessary, minimize the effect of dust by:
  – providing adequate ventilation
  – wearing eye protection
  – wearing a respiratory mask conforming

• Keep all tools and materials out of the reach of children.

• Use mechanical sanding tool fitted with dust extractor and storage bag.

1.5.1. Clean-up management

Cleaning is the process of removing unwanted substances, such as dirt, infectious agents, and other impurities, from an object or environment. Cleaning occurs in many different contexts, and uses many different methods. Several occupations are devoted to cleaning.

Cleaning and disinfection generally consists of six steps:

- **Pre-clean** - remove excess food waste by sweeping, wiping or pre-rinsing.
- **Main clean** - loosens surface waste and grease using a detergent.
- **Rinse** - remove loose food waste, grease and detergent.
- **Disinfection** - kill the bacteria with disinfectant or heat

1.5. protect noise the environment

i. Industrial Noise

Although the problem of noise was recognized centuries ago, for example Ramazini in 1700 described how workers who hammer copper have their ears injured due to exposure to the sound. The extent of the problem, which was caused by such noise, was not felt until the industrial revolution in England. The increasing mechanization in industries, farms, transport and others are likely to be more intense and sustained than any noise levels experienced outside the work place.

Industrial noise problems are extremely complex. There is no “standard " program that is applicable to all situations. However, industries are responsible to consider and evaluate their noise problems and to take steps toward the establishment of effective hearing conservation procedures.

The effectiveness of hearing conservation program depends on the cooperation of employees, supervisors, employers, and others concerned. The management responsibility is to take

measurements, initiating noise control measures, undertaking the audiometer testing of employees, providing hearing protective equipment with sound policies, and informing employees of the benefits to be derived from a hearing conservation program

General Class of Noise Exposure

There are three general classes into which occupational noise exposure may be grouped.

1. **Continuous noise**: Normally defined as broadband noise of approximately constant level and spectrum to which an employee is exposed for a period of eight hours per day or 40 hours a week.
2. **Intermittent Noise**: This may be defined as exposure to a given broadband sound pressure level several times during a normal working day

The effects of noise on humans can be classified into two types:

- Non auditory effect
- Auditory effect

ii. Prevention of noise exposure

OSHA requires a five phase hearing conservation program for industry:

1. Noise Monitoring
2. Audiometric (Hearing) Testing
3. Employee Training
4. Hearing Protectors
5. Recordkeeping

Self-Check -6	Written Test

Directions: Answer all the questions listed below.

1. Normally defined as broadband noise of approximately constant level and spectrum to which an employee is exposed for a period of eight hours per day or 40 hours a week.
   A. Prevention of noise exposure
   B. Continuous noise
   C. Intermittent Noise
   D. All
2. The exposure to a given broadband sound pressure level several times during a normal working day
   A. Prevention of noise exposure
   B. Continuous noise
   C. Intermittent Noise
   D. All

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

1. ----------
2. ----------

List of Reference Materials

1. Barricading and Signage Document Number – OHS-PROC-134
2. [2] J. Broomfield, Corrosion of Steel in Concrete: Understanding, Investigation and Repair, Taylor & Francis, New York, NY, USA, 2nd edition, 2007.
3. BUILDING CONSTRUCTION HANDBOOK Tenth edition Roy Chudley And Roger Greeno
4. BUILDING CONSTRUCTION HANDBOOK Seventh edition R. Chudley MCIOB and R. Greeno BA (Hons) FCIOB FIPHE FRSA
5. Construction Materials Third edition Edited by J.M. Illston and P.L.J. Domone
6. Building construction (part 1 by Getachew Yimer)
7. Building construction (by Dr B.C.Punmia)
8. Building construction(by Sushil Kumar)
9. Text book of Building construction(by Abebe Dinku)

Finishing construction

Work Level-II

Learning Guide-115

Unit of Competence: Use painting and decorating tools and equipment

Module Title: Using painting and decorating tools and equipment

LG Code: EIS FCW2 M24 18 19 LO2-LG-115

TTLM Code: EIS FCW2 M24 TTLM 0919v1

LO 2: Identify hand and power tools.

Instruction Sheet	Learning Guide #115

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

- Identifying hand and power tools, their functions, operations and limitations
- OHS requirements for using hand tools
- OHS requirements for using power tools

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**:

- Identify hand and power tools, their functions, operations and limitations
- OHS requirements for using hand tools for recognizing and adhering.
- OHS requirements for using power tools for recognizing and adhering.

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below
3. Read the information written in the information Sheet
4. Accomplish the “Self-checks, in each information sheets**.**
5. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-checks).

Information Sheet-1	Identifying hand and power tools, their functions, operations and limitations

2.1. Identifying hand and power tools, their functions, operations and limitations

Functions hand and power tools

Proper tools and equipment are essential for the effective operation of any painting works site. Equipping the construction site with the correct tools and equipment plays an essential role in achieving timely and good quality results. For every construction activity there is an optimal combination of tools, equipment and labor. Depending on the nature and content of the works, the technical staff needs to know which tools to use and how to effectively combine them with manual labor. Once on site, equipment requires trained operators and supervisory staff who are proficient in its operation and maintenance. Faulty equipment is a common reason for delays on construction sites. A major responsibility of the project management is to ensure that tools and equipment are maintained in a good condition and are readily available when required for the various work activities.

When applying labor-based work methods, the use of hand tools supported with selected items of light equipment can produce results comparable with those achieved when using only heavy equipment. For every construction activity there is an optimum combination of equipment and labour. In order to utilize the equipment and labour in the most effective way, the use of equipment needs to be carefully coordinated with the output of the work gangs.

Characteristics of Suitable Hand Tools

Hand tools should be of good quality and designed so that they are efficient in use. The tools should be strong enough to withstand intensive use at the work site, and resistant to wear so that they have a long working life. For most tools this means that the metal head should be made from carbon steel, heat-treated to give the correct strength and wear characteristics. For the main excavation and striking tools such as hoes, pickaxes, mattocks and sledgehammers, the tool heads should be forged in a single piece. Cast or fabricated and welded tool heads do not provide sufficient quality.

The timber handle should be made from a tough, preferably light, seasoned hardwood. The wood should be straight grained, with the grain lying along the length of the handle. The handles should not have any splits or knots, since these lead to handles breaking when used.

Tool handles should be smoothly f finished and carefully shaped with a raised grip at the end to prevent the workers hands sliding off. Long handled tools are generally preferred since they allow the workers to stand in an upright position, which is less tiring than having to bend or crouch down.

The handle should be a tight, secure fit in the head of the tool.

- have the correct shape in order to work efficiently,
- be of suitable weight for the strength of the workers, and
- be properly sharpened along the working edges.

The effective selection of construction equipment for use on any construction project relies on the proper analysis of three principal considerations:

1. **Technical efficiency**, i.e. the requirement that the particular construction task be completed to the correct specification within the project timetable, by using the correct machines. In short, this identifies the plant with the ability to perform the job.
2. **Commercial and financial viability,** i.e. that the cost of the equipment falls within the estimates for the specific project. In addition, where purchase of equipment is involved, the selection must meet the overall financial criteria required by the construction company as a whole.
3. **Availability** - equipment can be supplied from a number of sources, i.e. existing internal holdings, the hire market or by additional purchase

Self-Check -1	Written Test

Directions: choose the best answer.

1. ----------is the requirement that the particular construction task be completed to the correct specification within the project timetable, by using the correct machines
   A. Availability
   B. Commercial and financial viability
   C. Technical efficiency
   D. all
2. ---------is equipment can be supplied from a number of sources, i.e. existing internal holdings, the hire market or by additional purchase
   A. Availability
   B. Commercial and financial viability
   C. Technical efficiency
   D. all
3. ----------is the cost of the equipment falls within the estimates for the specific project.
   A. Availability
   B. Commercial and financial viability
   C. Technical efficiency
   D. all

Answer Sheet

Score = _____

Rating: _____

Short Answer Questions

1. _____
2. _____
3. _____

Information Sheet-2	OHS requirements for using hand tools

2.2. OHS requirements for using hand tools

Ensure that employees are properly trained in the safe use of hand tools. ... Keep cutting tools sharp and cover sharp edges with a suitable covering to protect the tool and to prevent injuries from unintended contact. Replace cracked, splintered, or broken handles on files, hammers, screwdrivers, or sledges.

Basic Safety Rules for Hand Tools

- Always wear eye protection.
- Wear the right safety equipment for the job.
- Use tools that are the right size & right type for your job.
- Follow the correct procedure for using every tool.
- Keep your cutting tools sharp and in good condition.
- Don’t work with oily or greasy hands.

Hazards of Hand Tools

Hand tools are tools that are powered manually. Hand tools include anything from axes to wrenches. The greatest hazards posed by hand tools result from misuse and improper maintenance.

Some examples include the following:

- If a chisel is used as a screwdriver, the tip of the chisel may break and fly off, hitting the user or other employees.
- If a wooden handle on a tool, such as a hammer or an axe, is loose, splintered, or cracked, the head of the tool may fly off and strike the user or other employees.
- If the jaws of a wrench are sprung, the wrench might slip.
- If impact tools such as chisels, wedges, or drift pins have mushroomed heads, the heads might shatter on impact, sending sharp fragments flying toward the user or other employees.

Self-Check -2	Written Test

Directions: Choose the best answer.

1. One of the following is not basic safety rules for hand tools.
   A. Always wear eye protection.
   B. Wear the right safety equipment for the job.
   C. Use tools that are the right size & right type for your job.
   D. Follow the correct procedure for using every tool.
   E. None

Answer Sheet

Score = _____

Rating: _____

Short Answer Questions

1. _____

Information Sheet-3	OHS requirements for using power tools

2.3. OHS requirements for using power tools

Power Tool Safety Tips from OSHA

Appropriate personal protective equipment such as safety goggles and gloves must be worn to protect against hazards that may be encountered while using hand tools. Workplace floors shall be kept as clean and dry as possible to prevent accidental slips with or around dangerous hand tools.

Power tools must be fitted with guards and safety switches; they are extremely hazardous when used improperly. The types of power tools are determined by their power source: electric, pneumatic, liquid fuel, hydraulic, and powder-actuated

To prevent hazards associated with the use of power tools, OSHA recommends that workers should observe the following general precautions:

- Never carry a tool by the cord or hose.
- Never yank the cord or the hose to disconnect it from the receptacle.
- Keep cords and hoses away from heat, oil, and sharp edges.
- Disconnect tools when not using them, before servicing and cleaning them, and when changing accessories such as blades, bits, and cutters.
- Keep all people not involved with the work at a safe distance from the work area.
- Secure work with clamps or a vise, freeing both hands to operate the tool.
- Avoid accidental starting. Do not hold fingers on the switch button while carrying a plugged-in tool.
- Maintain tools with care; keep them sharp and clean for best performance.
- Follow instructions in the user's manual for lubricating and changing accessories.

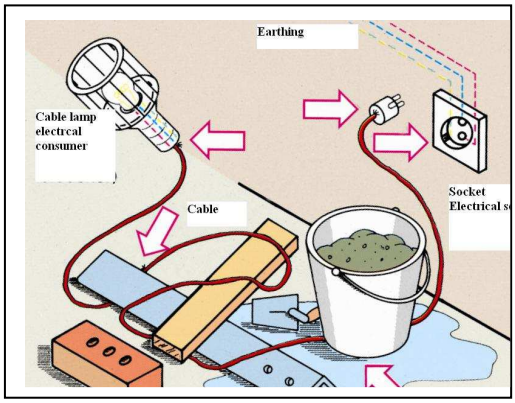
- Be sure to keep good footing and maintain good balance when operating power tools.
- Wear proper apparel for the task. Loose clothing, ties, or jewelry can become caught in moving parts.
- Remove all damaged portable electric tools from use and tag them: "Do Not Use."

Electrical Equipment

Another source of hazards is electrical machines and equipment. On the one hand they ease the work very much, but on the other hand they can course accidents, when not proper used or handled.

Danger from touching the power

The human body conducts the current; if someone touches the machine body his own body becomes part of the circuit, so that the current can flow. Starting from a current of 0.05 Ampere the power can course dead.



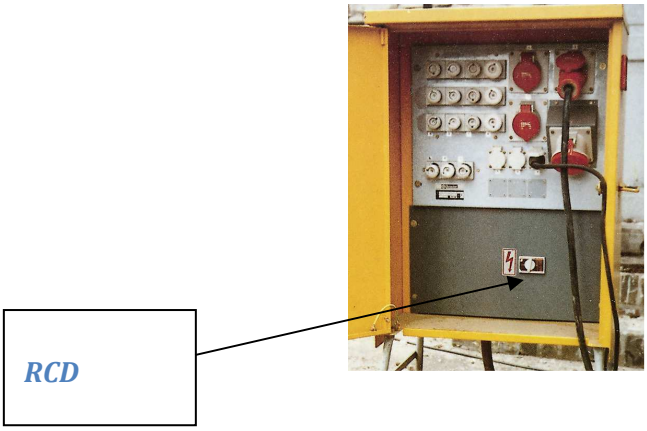
An inappropriate use of a hand lamp and a confusing cable lining is dangerous. If the Untidy terrible place cable is broken and somebody touches the bucket, trowel or iron bar or steps into the water he will suffer a heavy electrical shock and may be dead.

Avoiding electrical accidents

Accidents can be avoided, when the distribution board is connected to the main course according to the safety rules. A most important thing here is the RCD Residual Current Device. This device cuts the power off immediately when a fouls occurs in the circuit. It is therefore very important to safe lives on site.

The following has to be kept:

- Electrical tools and equipment must be in safe condition
- Electrical tools and equipment must be connected to the main board
- The RCD must be checked every day
- Do not use broken tools
- Flexible cables must be protected at exposed points (lifted, covered)
- Illumination should be rain protected



Distribution Board in Good Condition

Self-Check -3	Written Test

Directions: Say true or false.

1. Another source of hazards is electrical machines and equipment

Answer Sheet

Score = _____

Rating: _____

Short Answer Questions

1. _____

List of Reference Materials

1. Barricading and Signage Document Number – OHS-PROC-134
2. [2] J. Broomfield, Corrosion of Steel in Concrete: Understanding, Investigation and Repair, Taylor & Francis, New York, NY, USA, 2nd edition, 2007.
3. BUILDING CONSTRUCTION HANDBOOK Tenth edition Roy Chudley And Roger Greeno
4. BUILDING CONSTRUCTION HANDBOOK Seventh edition R. Chudley MCIOB and R. Greeno BA (Hons) FCIOB FIPHE FRSA
5. Construction Materials Third edition Edited by J.M. Illston and P.L.J. Domone
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7. Building construction (by Dr B.C.Punmia)
8. Building construction(by Sushil Kumar)
9. Text book of Building construction(by Abebe Dinku)

Finishing construction

Work Level-II

Learning Guide-116

Unit of Competence: Use painting and decorating tools and equipment

Module Title: Using painting and decorating tools and equipment

LG Code: EIS FCW2 M24 18 19 LO2-LG-116

TTLM Code: EIS FCW2 M24 TTLM 0919v1

LO 3: Select tools for project.

Instruction Sheet	Learning Guide #116

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

- selecting ***tools and equipment***
- checking serviceability, safety and fault of tools
- Rectifying or report any faults for tools
- checking and maintaining power tool guards, retaining bolts and couplings and gauges and controls
- Select equipment to hold or support material during operation.

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**:

- Select ***tools and equipment*** are consistent with job requirements.
- Tools, including leads and hoses, for checking for tags, serviceability and safety and any faults.
- Check and maintain power tool guards, retaining bolts couplings, gauges and controls in accordance with manufacturer recommendations.
- Select equipment to hold or support material during operation.
- Pre-operational checks, including lubricants, hydraulic fluid and water for complete in accordance with manufacturer recommendations.

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below
3. Read the information written in the information Sheet
4. Accomplish the “Self-checks, in each information sheets.
5. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-checks).

Information Sheet-1	selecting *tools and equipment*

3.1. selecting *tools and equipment*

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

Fig 3.1. *Buckets*

Drop sheets: a protective sheet (such as of cloth or plastic) used especially by painters to cover floors and furniture.

Fig 3.2. *Drop sheets:*

Hammer: is a tool meant to deliver an impact to an object. The most common uses are for driving nails, fitting parts, forging metal and breaking up objects. Hammers are often designed for a specific purpose, and vary widely in their shape and structure. The usual features are a handle and a head, with most of the weight in the head.

Fig 3.3 *Hammer*

Hand sanders: is used to smooth surfaces by abrasion with sandpaper. Sanders have a means to attach the sandpaper.

Fig 3.4 *Hand sanders*

heat guns :A heat gun comprises a source of heat, usually an electrically heated element, but sometimes a gas flame; a mechanism to move the hot air such as an electric fan, unless gas pressure is sufficient; a nozzle to direct the air, which may be a simple tube pointing in one direction, or specially shaped for purposes such as concentrating the heat on a small area or thawing a pipe but not the wall behind; a housing to contain the components and keep the operator safe; a mechanism to switch it on and off such as a trigger; a handle; and a built-in or external stand if the gun is to be used hands-free.

Fig 3.5. *heat guns*

Belt: A belt sander or strip sander is a sander used in shaping and finishing wood and other materials. It consists of an electric motor that turns a pair of drums on which a continuous loop of sandpaper is mounted. Belt sanders may be handheld and moved over the material, or stationary (fixed), where the material is moved to the sanding belt. Stationary belt sanders are sometimes mounted on a work bench, in which case they are called bench sanders. Stationary belt sanders are often combined with a disc sander

.

Fig 3.6. *Belt sander*

Palm sander or the sheet sander: is for finishing work and it is what you use just before you apply some varnish or paint the wood surface. These **sanders** are less powerful than the random orbit and their primary purpose it to give the surface a smooth and clean touch.

Fig 3.7. *Palm sander or the sheet sander*

Random orbital: The random orbit sander can be used for all types of sanding work. It is capable of tough jobs such as stripping down paint to more delicate tasks like smoothing corners. When buying a sander spend a bit more for better vibration control, a better vacuum system, and variable speed

Fig 3.8. *Random orbital*

Nail punches: nail punch (plural nail punches) a carpenter's tool used to hammer nail heads in to just below the surface of the wood, something that cannot be achieved with a hammer alone.

Fig 3.9. *Nail punches*

Putty knives: A putty knife is a specialized tool used when glazing single glazed windows, to work putty around the edges of each pane of glass. An experienced glazer will apply the putty by hand, and then smooth it with the knife.

Fig 3.10. *Putty knives*

Paint roller: is a paint application tool used for painting large flat surfaces rapidly and efficiently. The paint roller typically consists of two parts: a "roller frame," and a "roller cover." The roller cover absorbs the paint and transfers it to the painted surface, the roller frame attaches to the roller cover. A painter holds the roller by the handle section. The roller frame is reusable. It is possible to clean and reuse a roller cover, but it is also typically disposed of after use.

Fig 3.11. *Paint roller*

Paint scraper – to remove loose or peeling paint from wood, plaster, and other surfaces.

Fig 3.12. *Paint scraper*

Brush: A paintbrush is a brush used to apply paint or sometimes ink. A paintbrush is usually made by clamping the bristles to a handle with a ferrule. They are available in various sizes, shapes, and materials. Thicker ones are used for filling in, and thinner ones are used for details. They may be subdivided into decorators' brushes used for painting and decorating and artists' brushes use for visual art.

Fig 3.13. *Brush*

Duster brushes :is a brush used for dusting

Fig 3.14. *Duster brushes*

Filling blades: handy selection of flexible stainless steel blades with plastic handles for small mixing and filling jobs on walls, ceilings and woodwork. Each pack contains one each of the following 120mm, 100mm, and 80mm and 50mm width blades.

Fig 3.15. Filling blades

Wire brush – to remove efflorescence and loose material from masonry, or to remove loose, flaking paint

Fig 3.16. *Wire brush*

Self-Check -1	Written Test

Directions: Answer all the questions listed below.

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

   A. Buckets C. Hand sanders

   B. Hammer D. Wire brush

2. ------- is a tool meant to deliver an impact to an object.

   A. Buckets C. Hand sanders

   B. Hammer D. Wire brush

3. -------- is used to smooth surfaces by abrasion with sandpaper.

   A. Buckets C. Hand sanders

   B. Hammer D. Wire brush

4. ---------- to remove efflorescence and loose material from masonry, or to remove loose, flaking paint

   A. Buckets C. Hand sanders

   B. Hammer D. Wire brush

Answer Sheet

Score = _____

Rating: _____

Short Answer Questions

1. _____
2. _____
3. _____

Information Sheet-2	checking serviceability, safety and fault of tools

3.2. checking serviceability, safety and fault of tools

Inspect cords for defects: check the power cord for cracking, fraying, and other signs of wear or faults in the cord insulation. Check for damaged switches and ones with faulty trigger locks. Inspect the plug for cracks and for missing, loose or faulty prongs.

Testing and maintenance of tools and equipment

A person conducting a business or undertaking (PCBU) who carries out electrical work must ensure the electrical safety of all persons and property likely to be affected by the electrical work.

A PCBU must have procedures in place to ensure that tools, testing equipment and personal protective equipment are regularly inspected and tested.

This requirement ensures that workers carrying out the work are electrically safe and that the work, when completed, is electrically safe.

Visual inspection

All tools, testing equipment and PPE should be visually inspected before each use for signs of damage.

PCBUs should have 'pre-start' visual inspection procedures in place to ensure that equipment such as, tools, PPE, rubber mats and LV rescue kits are in good working order before use.

Testing equipment should be checked for damage to insulated leads and probes and needs to be confirmed as working before use.

Testing of equipment

Testing equipment should be tested regularly to ensure it provides the level of protection required. Testing intervals will depend on several factors including:

- the frequency of use
- the environment in which it is being
- Manufacturer's advice.

For example, a multi meter used in a workshop environment may be subject to less damage that a multi meter carried in the back of a work van.

In absence of manufacturer's advice PCBUs should refer to a competent person with the knowledge and skills required for testing the particular type of equipment.

Items that have been misused or damaged should not be used until they have been re-retested and confirmed as functioning correctly.

Test equipment used for measurements such as earth continuity and insulation resistance should be regularly tested to confirm they are working correctly.

Some equipment such as multi meters may be able to be tested in-house, by using a calibrated resistor test block. Other equipment such as fault loop impedance testers or RCD testers may require specialist testing.

Self-Check -2	Written Test

Directions: Answer all the questions listed below. Say true or false.

1. Inspect cords for defects to check the power cord for cracking, fraying, and other signs of wear or faults in the cord insulation.
2. Testing equipment should be tested regularly to ensure it provides the level of protection required.

Answer Sheet

Score = _____

Rating: _____

Short Answer Questions

1. _____
2. _____

Information Sheet-3	checking and maintaining Power tool guards, retaining bolts and couplings ,gauges and controls

3.3. checking and maintaining Power tool guards, retaining bolts and couplings and controls

3.3.1. Power tool guards

The exposed moving parts of power tools need to be safeguarded. Belts, gears, shafts, pulleys, sprockets, spindles, drums, flywheels, chains, or other reciprocating, rotating, or moving parts of equipment must be guarded.

Machine guards, as appropriate, must be provided to protect the operator and others from the following:

- Point of operation.
- In-running nip points.
- Rotating parts.
- Flying chips and sparks.

Safety guards must never be removed when a tool is being used. Portable circular saws having a blade greater than 2 inches (5.08 centimeters) in diameter must be equipped at all times with guards. An upper guard must cover the entire blade of the saw. A retractable lower guard must cover the teeth of the saw, except where it makes contact with the work material. The lower guard must automatically return to the covering position when the tool is withdrawn from the work material.

Coupling Bolts: A coupling bolt is a mechanical means of holding two halves of a flanged shaft together to properly transfer the torque while maintaining shaft alignment

Types of Nuts and Bolts

Fasteners come in many different forms. To make it easy for you, we've compiled the data below as a guide for figuring out what each fastener is called. Scroll down to learn about many different types of nuts, bolts and screws!*

*Note: Bolts are fasteners that require a nut or pre-taped hole to be installed. Screws use their threads to provide their own holding power. The terms in the industry are commonly mixed so sometimes you will see something that is called a screw or a bolt that is actually the opposite. Example: Lag Bolts and Lag Screws are the same thing. We have broken them down according to their true definition.

Self-Check -3	Written Test

Directions: Answer all the questions listed below.

1. Safety guards must never be removed when a tool is being used.
2. The exposed moving parts of power tools need to be safeguarded

Answer Sheet

Score = _____

Rating: _____

Short Answer Questions

1. _____

2. _____

Information Sheet-4	Select equipment to hold or support material during operation.

3.4. Select equipment to hold or support material during operation.

Safety of workplace machinery, equipment and tools

Use hand-held tools safely

Anyone who uses a hand-held tool may be at risk of injury, either accidentally, through misuse or through equipment failure.

Hand-arm vibration syndrome

Hand-arm vibration is caused by the use of hand-operated power tools. Employees who regularly use these could suffer permanent injury known as hand-arm vibration syndrome (HAVS). This can cause severe pain and permanent loss of feeling in the fingers and hands.

There are many types of equipment that can cause HAVS, including:

- chainsaws
- power hammers
- hand-held power drills
- sander
- lawnmowers
- strimmers
- road drills

To find out about vibration and repetitive strain injury (RSI), see prevent repetitive strain injury at work.

Reducing risks from hand-held tools

Apart from hand-arm vibration, there's a range of other risks for employees when using hand-held tools. For example, noise puncture wounds and cuts caused by sharp equipment such as:

- scissors
- needles
- paper guillotines
- knives
- chisels
- saws
- planes
- screwdrivers

As far as possible, use guards and provide protective clothing, eg masks, ear defenders and gloves. Organise the use of tools during work operations and their storage when not in use.

Heat-producing equipment such as blowtorches and irons can cause burns and permanent scarring. Always provide protective clothing and regularly test equipment to make sure it's safe.

To minimise injury from employees using hand-held tools, you should:

- assess and then manage the risks involved
- make sure the tools are suitable for the task and are well-maintained
- train all employees to use and store the equipment appropriately
- consider whether employees could use different equipment which poses fewer risks

During selecting of equipment kits us considering such things like: time, quality of kit equipment because the equipment is failing down through operation and contact to other equipments. Equipment and tool serve by bucket and wheelbarrow.

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

Storage equipment is used for holding or buffering materials over a period of time. The design of each type of storage equipment, along with its use in warehouse design, represents a trade-off between minimizing handling costs, by making material easily accessible, and maximizing the utilization of space (or cube).

If materials are stacked directly on the floor, then no storage equipment is required, but, on average, each different item in storage will have a stack only half full; to increase cube utilization, storage racks can be used to allow multiple stacks of different items to occupy the same floor space at different levels. The use of racks becomes preferable to floor storage as the number of units per item requiring storage decreases. Similarly, the depth at which units of an item are stored affects cube utilization in proportion to the number of units per item requiring storage.

Self-Check -4	Written Test

Directions: Answer all the questions listed below.

1. Hand-arm vibration is caused by the use of hand-operated power tools
2. Storage equipment is used for holding or buffering materials over a period of time

Answer Sheet

Score = _____

Rating: _____

Short Answer Questions

1. -------
2. --------

Information Sheet-5	Checking Pre-operational including lubricants, hydraulic fluid and water for complete

3.5. Checking Pre-operational including lubricants, hydraulic fluid and water for complete

Oil and Lubricants

The primary purpose of a lubricant is to reduce friction and wear between two moving surfaces, but a lubricant also acts as a coolant, prevents corrosion, and seals out dirt and other contaminants. In order for a lubricant to perform as intended, careful attention must be given to its selection and application as well as its condition while in use.

Equipment provides more information on lubricants and their use. The equipment manufacturer should provide specific information on the lubricant type and on the periodic recommended maintenance for a particular application.

Oil Lubrication

Oil lubrication can take many forms—from simple squirt oil can to a complex circulating system. Regardless of the method by which the oil is applied, the intent is the same, which is to keep a lubricant film between moving surfaces. For successful lubrication, it is critical that the proper oil be chosen, properly applied, and kept clean and uncontaminated.

While it is beneficial to have as few types of oil in stock as possible, there is no one all purpose oil that can be used in all applications. Various additives, such as emulsifiers, rust and corrosion inhibitors, detergent, and dispersants, are added to oil to enhance performance for a given application. Characteristics that may be desirable in one case may be very undesirable in another.

Grease Lubrication

Grease is a lubricant consisting of lubricating oil combined with a thickening agent. The base oil makes up 85–95 percent of the grease and performs the actual lubrication. The thickening agent, usually some type of soap, determines many of the characteristics of a grease, such as heat resistance, water resistance, and cold weather pump ability. Various additives may also be added to improve performance.

Overheating and subsequent failure of grease lubricated bearings caused by over lubrication is a common problem. The idea that more is better, coupled with the fact that it usually is difficult to determine the actual amount of grease in a bearing housing, causes many bearings to be “over greased.”

Ideally, a grease-lubricated bearing should be “packed” by hand so that the bearing housing is approximately one-third full of grease. The unit should be operated approximately 30 minutes before the plug is replaced to allow excess grease to escape.

Hydraulic Oil

The main purpose of hydraulic oil is to transmit power, but it also must lubricate the components of the hydraulic system. In many systems, lubricating oil such as turbine oil can be used as the hydraulic fluid. If the system uses a gear pump, operates at pressures less than 1,000 psi and has similar viscosity requirements, turbine oil can function very well as hydraulic oil. In systems that operate over 1,000 psi or use a piston or sliding vane pump, a fluid with an anti wear additive usually is required. Where the system operates in an area of great temperature extremes, such as gate operators, an oil with a high viscosity index might be required to provide desirable high and low temperature viscosity characteristics.

Self-Check -5	Written Test

Directions: Answer all the questions listed below. Say true or false

1. The primary purpose of a lubricant is to reduce friction and wear between two moving surfaces
2. Grease is a lubricant consisting of lubricating oil combined with a thickening agent.

Answer Sheet

Score = _____

Rating: _____

Short Answer Questions

1. _____
2. _____

List of Reference Materials

1. Barricading and Signage Document Number – OHS-PROC-134
2. [2] J. Broomfield, Corrosion of Steel in Concrete: Understanding, Investigation and Repair, Taylor & Francis, New York, NY, USA, 2nd edition, 2007.
3. BUILDING CONSTRUCTION HANDBOOK Tenth edition Roy Chudley And Roger Greeno
4. BUILDING CONSTRUCTION HANDBOOK Seventh edition R. Chudley MCIOB and R. Greeno BA (Hons) FCIOB FIPHE FRSA
5. Construction Materials Third edition Edited by J.M. Illston and P.L.J. Domone
6. Building construction (part 1 by Getachew Yimer)
7. Building construction (by Dr B.C.Punmia)
8. Building construction(by Sushil Kumar)
9. Text book of Building construction(by Abebe Dinku)

Finishing construction

Work Level-II

Learning Guide-117

Unit of Competence: Use painting and decorating tools and equipment

Module Title: Using painting and decorating tools and equipment

LG Code: **EIS FCW2 M24 18 19 LO4-LG-117**

TTLM Code: **EIS FCW2 M24 TTLM 0919v1**

LO 4: Use tools

Instruction Sheet	Learning Guide #117

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

- Power and compressed air supply for connecting to work area.
- follow Start-up and shut-down procedures
- Using tools safely and effectively
- safely locating the tools

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**:

- Power and compressed air supply for connecting to work area.
- Follow start-up and shut-down procedures
- Use tools safely and effectively according to manufacturer recommendations and OHS requirements.
- Safely Locating tools when not in immediate use.

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below
3. Read the information written in the information Sheet
4. Accomplish the “Self-checks,in each information sheets**.**
5. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-checks).

Information Sheet-1	Power and compressed air supply for connecting to work area

4.1. Power and compressed air supply for connecting to work area brushwork accessories

4.1.1. Compressed air supply

A clean, dry, oil free supply of compressed air is required. This is normally taken direct from a compressor. The compressor must be capable of supplying the necessary volume and pressure; an overworked compressor can produce an excessive amount of dirt and oil. The control of volume pressure and cleanliness of the air entering the spray gun is of critical importance to the performance of the system

Compressed air is air kept under a pressure that is greater than atmospheric pressure. Compressed air is an important medium for transfer of energy in industrial processes. Compressed air is used for power tools such as air hammers, drills, wrenches and others. Compressed air is used to atomize paint, to operate air cylinders for automation, and can also be used to propel vehicles. Brakes applied by compressed air made large railway trains safer and more efficient to operate. Compressed air brakes are also found on large highway vehicles

4.1.2. How to Work Safely with Compressed Air

- How to Use an Air Compressor
- Air Compression Safety Tips
- Tips for Air Receivers, Distribution Lines, and Pressure Regulation Devices
- Things to Remember When Using of Air Tools

Safety is one of the primary concerns of any working environment, whether it's in a construction or factory setting. You want to ensure your employees are safe at all times, avoid injuries, and know that your workforce is always intact with high morale.

Safety measures also decrease the possibility of machinery getting damaged or broken. Your company is less likely to endure unexpected down times or incur costly repairs or replacements when you operate according to a practical set of safety measures.

When operating high-powered machinery such as air compressors and other impact tools that utilize air pressure, even the smallest mishandling can cause damage to the machine itself, as well as to any connected or nearby parts. It's important to read instruction manuals fully, so you and your team can fully understand how to handle, activate, and operate any machinery.

Even though such manuals can sometimes seem pedantic and convoluted, they contain a wealth of information that will keep your work team safe. Reading the manuals also helps to ensure that each piece of equipment remains in optimal working condition for the longest possible time.

There are also a number of shorter and more concise measures that you can follow to maintain general safety standards on your worksite. The following lists will help you stay safe, learn how to properly operate your air compressors, and provide general tips for regulation and maintenance.

4.1.3. How to Use an Air Compressor

The machine and its peripheral equipment should only be handled and maintained by skilled, qualified personnel.

Intake air should never be inhaled because it generally contains pollutants and carbon monoxide that can be hazardous to your health. For these reasons and more, it's essential to keep your workspace circulated with clean, natural air at all times.

Monitor the air compressor's voltage. If any repairs are needed, lock-out, un-power the machine and bleed the tank's pressure. If you have an air compressor that has been designed

primarily for indoor operations, don't allow it to be in outdoor conditions exposed to, rain or wet environments.

For optimal function, pneumatic tools must receive air at high pressure. It's never wise to alter, eliminate, or evade a relief valve on a compressor because they're strategically placed to help ensure your safety during operations.

One of the most dangerous possibilities in a work setting is to allow a tank to become rusty. This will make it more likely to combust. This situation could put anyone near the tank in grave danger. For obvious reasons, it's crucial to keep the tank drained with the underside valve on a day-to-day basis. In any case, don't try to repair a rusted tank. Once rusting has occurred, the tank is due for a replacement.

If you work in an environment that's prone to high temperatures, there are steps that can be taken to decrease moisture in the air. Try to increase the air circulation within your work area. Also, consider operating the compressor for longer durations, or setting up a peripheral crankcase heater. Adding a dryer to the system will also remove moisture.

If there's an electric drain valve on your air compressor, keep that part of the unit no less than a foot and a half off the ground. Electric drain valves can't be anywhere near moisture because they come equipped with sparking parts.

Don't refuel your air compressor when it's currently activated or has been shut off for only a short time. Refuels and oil changes should only be done when the machine is cool.

Before you power on the air compressor, make sure no tools have been pulled at the trigger.

Only plug your air compressor into an outlet with the proper grounding. If an outlet isn't grounded properly, it could damage the electrical circuitry of the machine and potentially ignite flames.

4.1.4. Air Compression Safety Tips

Before activating any sort of pneumatic tool, it must be connected to a source of air. Whenever a part is connected weakly or fitted loosely to a corresponding piece of equipment, it can jeopardize the performance of the tool and leave you vulnerable to injury.

At the inlet, the air that goes in should be clean and free of moisture, with a maximum of 90 psig pressure, unless the tool itself has a pressure rating set to a higher level. If the maximum pressure rating of a particular tool is surpassed, it could cause any given number of dangers, such as cracks, undue velocity, or faulty pressure or output torque.

In the event of anything going wrong with the air supply, make sure there is a shutoff valve within reach at all times. If something goes wrong with an air hose — for example, if it starts flapping uncontrollably — don't try to control it manually. Cut the air source before going near.

If a hose malfunctions or comes apart at the coupling, whipping can be prevented with two applications. One is an air fuse of proper size, which should be installed in the hose upstream. The other is a whip-inhibiting device, which should be placed along the coupling of a hose.

All pneumatic tools require proper lubrication in order to function at maximum efficiency. You must apply the recommended lubricants for any given tool in question. However, it isn't wise to use a particular lubricant if you're unable to verify whether or not it's flammable.

Before you install, remove, fine-tune, or perform any kind of maintenance on your pneumatic impact tools or accessory parts, do three things: shut off the source of air, bleed the air pressure, and disengage the air hose.

Never put your hands anywhere near the end of an active pneumatic tool. For similar reasons, never allow clothing or hair to get anywhere close to the working parts of such equipment. Most of all, never point the active end of a tool anywhere near your body or face.

Always position yourself in a firmly grounded place, and be mindful of the unpredictable nature of an active piece of machinery. Make sure you're at a safe distance from the working parts of a tool, in case abrupt changes in movement occur.

Be sure to check the air source itself on a regular basis to ensure optimal performance and efficiency. The shutoff valve should always be visible and within reach when working with compressed air.

Don't allow grease or oil to deposit or linger on an air hose; grease can cause hoses to deteriorate. Don't allow hoses or cords to hang along floors or aisles; doing so could cause people to trip and possibly get injured and/or pull cords and cut power supplies. As an alternative, suspend hoses overhead wherever possible.

Compressed air is not suitable for cleaning clothing or human skin. When using shop air for cleaning purposes, don't exceed 15 psi without the aid of a nozzle.

Pneumatic tools are capable of generating static energy, and must therefore be grounded whenever activated. This is especially true when in the presence of flammable or combustible elements, such as fuel or explosives.

Self-Check -1	Written Test

Directions: Answer all the questions listed below. Say true or false

1. Compressed air is only air kept under a pressure that is greater than atmospheric pressure.
2. Compressed air is an important medium for transfer of energy in industrial processes.
3. Compressed air is used for power tools such as air hammers, drills, wrenches and others.

Answer Sheet

Score = _____

Rating: _____

Short Answer Questions

1. _____
3. ----------
2. _____

Information Sheet-2	follow Start-up and shut-down procedures

4.2. follow Start-up and shut-down procedures

START-UP PROCEDURE

Connect the power supply to the proportioner per the manufacturer's recommendations.

- If using a generator and compressed, turn on and let warm at idle speed for approximately 10 minutes.
- If using shore power, connect to an approved breaker with the recommended electrical wire. Inspect the condition of the DOP/TSL in the iso wet-cup.
- Change the pump lube before it becomes a gel, or when it becomes the same color as the isocyanate.

Inspect the inlet strainer screens for contaminants.

- Always check the screens before the start-up of the equipment.
- Check the screens daily for the first week, and then if there are no sign of contaminants check them periodically as a routine maintenance.

Turn on the refrigerated air dryer and set the automatic drain.

Turn on the air compressor and let pressurize to the manufacturer's set recommendation.

- Connect air lines to both 2:1 transfer pumps. Set the pressure regulator per the manufacturer's recommendations.
- Connect an air line to the air purge gun per the equipment manufacturer's recommendations. Set the pressure regulator per the manufacturer's recommendations.
- Connect additional airlines to any other auxiliary equipment that may be being used.

Turn on the proportioner.

- Reactor – Turn on the main power switch, located on the right side of the bottom electrical counsel. The temperature and motor display should light up at this point.
- Hydraulic Proportioner – Turn on the main power switch, located on the front left side of the electrical counsel. The control power switch should light up.

Open the supply ball valves located on either side of the proportioner.

Turn on the heaters.

- Set the desired target temperature prior to turning on the heater circuits. NOTE: Never set the hose heater temperature higher than the primary heater temperature. The hose heater is designed to maintain the heat from the primary and not to add heat above the primary settings.
- Turn on the hose heater by pushing the hose heater key located on the temperature control display. Let warm approximately ten degrees above ambient temperature.
- Turn on the B-side primary heater by pushing the B primary heater key located on the temperature control display.

  NOTE: If a generator is being used it may be necessary to let the generator idle down before proceeding to the A heater.
- Turn on the A-side primary heater by pushing the A primary heater key located on the temperature control display.

SHUT DOWN PROCEDURE

Shut down the proportioning pumps.

- Push the Park key. Disengage the safety lock and trigger the air purge spray gun u ntil the pump shuts off.
- NOTE: When the A/Bdisplacement pistons are at the bottom of the stroke the elect rical circuit will shut off. The reactor is only parked when the ON/OFF and PARK indicator lights are not illuminated.
- Turn off the heaters.
- Turn off the hose heater by pushing the hose heater key located on the temperature control display.
- Turn off the Bside primary heater by pushing the B primary heater key located on t he temperature control display.Turn off the Aside primary heater by pushing the A p rimary heater key located on the temperature control display.

Turn off the proportioner.

- Reactor -

  Turn off the main power switch, located on the right side of the bottom electrica l console. The temperature and motor display should light up at this point.
- Hydraulic Proportioner –

  Turn off the main power switch, located on the front left hand side of the electr ical console. The control power switch should light up.

Close the supply valves located on either side of the proportioner.

Disconnect airlines from the 2:1 transfer pumps.

Turn off mixer; turn off air compressor, and drain.

Disconnect the power supply to the proportioner per the manufacturer'srecommendations

- If using a generator, let idle for approximately 10 minutes before turning off.

- If using shore power, turn off the breakers before disconnecting the main power wires.

Shut down air purge gun.

- Close the B-side fluid manifold manual valve.
- Close the A-side fluid manifold manual valve.
- Disengage the safety and trigger the gun until there is no more mist coming throug h the mixing chamber. This will ensure that the Aand B chemical passages are free and clear.
- Engage the safety lock.
- Remove grease fitting cap. Using the grease gun, dispense grease into the grease fitting until a mist of grease is noticed from the mixing chamber.
- Disconnect the air line from the spray gun. NOTE: Always remember that when th e spool (trigger) is not being pulled, engage the safety lock

Self-Check -2	Written Test

Directions: Answer all the questions listed below. Say true or false

1. Always check the screens before the start-up of the equipment.
2. Turn on the heaters set the desired target temperature prior to turning on the heater circuits

Answer Sheet

Score = _____

Rating: _____

Short Answer Questions

1. _____
2. _____

Information Sheet-3	Using tools safely and effectively

4.3. Using tools safely and effectively

Point sharp tools (e.g., saws, chisels, knives) laying on benches away from aisles and handles should not extend over the edge of the bench top. Maintain tools carefully. Keep them clean and dry, and store them properly after each use. Carry tools in a sturdy tool box to and from the worksite.

General safety tips for hand and power tools:

- Buy quality tools many tools, including cutters and hammers, should be made of steel and should be heat-treated.
- Regularly inspect tools to make sure they are in good shape and fit for use.
- Be sure to maintain your tools by performing regular maintenance, like grinding or sharpening. Always follow the manufacturer's instructions.
- Dress for the job by avoiding loose clothing or articles that can get caught in a tool's moving parts, like jewelry.
- Wear appropriate personal protective equipment, like leather gloves.
- Use the right tool for the job. In other words, don't try to use a wrench as a hammer.
- Make sure that your feet are planted on a stable surface.
- Be aware of the people around you and make sure they stay clear of the tools you are using.
- Never carry tools up a ladder by hand. Instead, use a bucket or bag to hoist tools from the ground to the worker.
- When working at heights, never leave tools lying out in the areas where they could present a hazard to workers below.
- When appropriate, secure work with a clamp or vise to keep it from slipping.
- Never carry pointed tools in your pocket. Carry them in a toolbox or cart instead.
- Inspect your tools on a regular basis, checking for damage. Report damaged tools to your supervisor.
- Make sure to keep extra tools handy in case the tool you had planned to use is damaged.
- Make sure tools are stored in a safe place.

Safety tips for power tools:

- Keep floors dry and clean to avoid slipping while working with or around dangerous tools.
- Keep cords from presenting a tripping hazard.
- Never carry a power tool by its cord.
- Use tools that are double-insulated or have a three-pronged cord and are plugged into a grounded receptacle.
- Do not use electric tools in wet conditions unless they are approved for that use.
- Use a ground fault circuit interrupter (GFCI) or an assured grounding program.
- Use appropriate PPE.

Self-Check -3	Written Test

Directions: Answer all the questions listed below. Say true or false.

1. Point sharp tools laying on benches away from aisles and handles should not extend over the edge of the bench top.
2. Not keep floors dry and clean to avoid slipping while working with or around dangerous tools.

Answer Sheet

Score = _____

Rating: _____

Short Answer Questions

1. _____

2. _____

Information Sheet-4	safely locating the tools

4.4. safely locating the tools

The employer is responsible for the safe condition of tools and equipment used by employees. Employers shall not issue or permit the use of unsafe hand tools. Employees should be trained in the proper use and handling of tools and equipment.

Employees, when using saw blades, knives, or other tools, should direct the tools away from aisle areas and away from other employees working in close proximity. Knives and scissors must be sharp; dull tools can cause more hazards than sharp ones. Cracked saw blades must be removed from service.

Wrenches must not be used when jaws are sprung to the point that slippage occurs. Impact tools such as drift pins, wedges, and chisels must be kept free of mushroomed heads. The wooden handles of tools must not be splintered.

Iron or steel hand tools may produce sparks that can be an ignition source around flammable substances. Where this hazard exists, spark-resistant tools made of non-ferrous materials should be used where flammable gases, highly volatile liquids, and other explosive substances are stored or used

Self-Check -4	Written Test

Directions: Answer all the questions listed below. say true or false

1. Safely locating the tool the employer is responsible for the safe condition of tools and equipment used by employees
2. Safely locating the tool the wrenches must not be used when jaws are sprung to the point that slippage occurs.

Answer Sheet

Score = _____

Rating: _____

Short Answer Questions

1. _____
2. _____

List of Reference Materials

1. Barricading and Signage Document Number – OHS-PROC-134
2. [2] J. Broomfield, Corrosion of Steel in Concrete: Understanding, Investigation and Repair, Taylor & Francis, New York, NY, USA, 2nd edition, 2007.
3. BUILDING CONSTRUCTION HANDBOOK Tenth edition Roy Chudley And Roger Greeno
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7. Building construction (by Dr B.C.Punmia)
8. Building construction(by Sushil Kumar)
9. Text book of Building construction(by Abebe Dinku)

Finishing construction

Work Level-II

Learning Guide-118

Unit of Competence: Use painting and decorating tools and equipment

Module Title: Using painting and decorating tools and equipment

LG Code: EIS FCW2 M24 18 19 LO5-LG-118

TTLM Code: EIS FCW2 M24 TTLM 0919v1

LO 5: Select plant and equipment.

Instruction Sheet	Learning Guide #118

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

- Identifying Function and limitations of plant and equipment in painting and decorating
- Selecting *Plant and equipment***.**
- Identifying Method of operation of plant and equipment
- OHS requirements for operating and using plant and equipment
- Checking plant and equipment

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**:

- Identify function and limitations of plant and equipment using in painting and decorating
- Select ***plant and equipment*** consistent with hazard minimization and needs of job.
- Identifying Method of operation of plant and equipment.
- OHS requirements for operating and using plant and equipment for recognizing and adhering.
- Rectify or report plant and equipment are checked for safety and faults.

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below
3. Read the information written in the information Sheet
4. Accomplish the “Self-checks, in each information sheets.
5. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-checks).

Information Sheet-1	Identifying Function and limitations of plant and equipment in painting and decorating

5.1. Identifying Function and limitations of plant and equipment in painting and decorating

5.1.1. Airless spray equipment

Airless spray is a method of atomizing paint without the use of compressed air. The paint is pumped under high pressure through a supply line to an airless gun. The paint is forced at high pressure through a small opening at the front of the valve, called the orifice, or spray tip. The tip restriction (orifice) forms a spray pattern. The break-up of material into small droplets is called **atomization.**

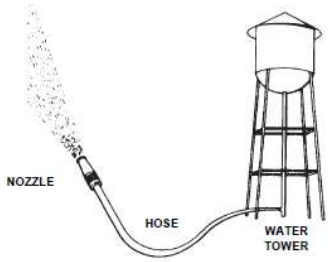


Figure 1. Water System

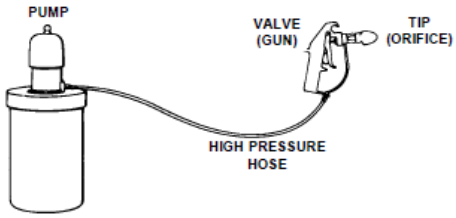


Figure 2. Basic Airless System

Advantages of Airless Spray:

1. Airless has less overspray or “bounce back” of material than air spray.
2. More efficient than conventional spray. Airless has transfer efficiency of 60% to 90%.
3. A thicker coat of material can be applied in a single pass. With the high pressure of airless spray, high viscosity materials can be atomized without costly solvent reduction.
4. Airless accommodates faster production line speeds. More paint can be applied at a heavier mil thickness.
5. Good penetration can be attained on recessed areas of work pieces.

ADJUSTMENTS

The key factor to good atomization is the coating flow rate. Flow rate is controlled by the spray tip size and the pump. The spray tip orifice size also determines the spray pattern size and the range of atomization.

NOTE: The airless supply pump must be the proper size to supply the required flow rate to one or multiple airless spray guns at a given spray pressure.

Atomization

There are two adjustments that can be made on an airless system once the tip has been selected:

- Material Viscosity
- System Pressure

Viscosity

The viscosity of paint can be lowered either by adding solvents or heating. Lower viscosity will almost always produce a finer atomization.

Pressure

The pressure can be adjusted in an airless system to achieve the best atomization possible. The fluid pressure needed will vary based on the viscosity of the material. To adjust the pressure, increase the pressure gradually at the system's fluid regulator until a full elliptically shaped cone spray pattern is formed. Use the least amount of atomization fluid pressure possible to attain the best possible pattern.

.

5.1.2. conventional spray equipment

A conventional spray gun is a tool which utilizes compressed air to atomise (break up) paint and apply it to a surface. Air and paint enter the gun through separate channels and are mixed using an air cap to form a controlled pattern, known as a 'fan'.

Paint can be fed to a conventional spray gun via different methods. These vary from a cup which is attached to the bottom of the gun which supplies the paint by suction (suction fed), or a cup on the top of the gun which supplies the paint by gravity (gravity fed) to a supply hose which supplies the paint via pressure applied to the paint. The latter can use a pressure pot, which is a

vessel containing the paint which is pressurised with compressed air, forcing out the paint, or a diaphragm pump which pumps the paint under pressure directly to the gun.

Suction and Gravity fed guns

Pressure fed gun

Pressure Pot / Diaphragm Pump

Conventional Spray Components

The equipment components required for conventional spray are:

- Compressed air supply
- Moisture and oil separator
- Air supply hoses and regulator
- Paint supply
- Fluid supply hoses (for pressure fed guns)
- Spray gun

This manual considers each of these components in turn with regard to what is needed to achieve the best possible results. For detailed information regarding the appropriate equipment for your facility, refer to the manufacturer or installer of the equipment.

Compressed Air Supply

A clean, dry, oil free supply of compressed air is required. This is normally taken direct from a compressor. The compressor must be capable of supplying the necessary volume and pressure; an overworked compressor can produce an excessive amount of dirt and oil. The

control of volume pressure and cleanliness of the air entering the spray gun is of critical importance to the performance of the system

Moisture and Oil Separator

Most compressors are fitted with moisture and oil traps. However it is important to fit a separator between the compressor and the spray equipment, because this 4 air comes into direct contact with the paint. Moisture and oil can dramatically affect the paint materials being sprayed:

- Polyurethanes are moisture sensitive. Water can react with the isocyanate curing agent to produce soft films and bubbling.
- In epoxy coatings, moisture can react with the curing agent to produce contaminants which can subsequently create problems when overcoating.

The separator works by spinning the air around a chamber and collecting moisture, oil and dirt in the bottom of the chamber which can be drained periodically.

Air Regulator

An air regulator is a device for controlling the pressure of the air coming from the compressor. Once set at a particular pressure, it maintains that pressure with minimal variations, even if the pressure supplied varies.

The regulator should be installed in the area the operator will be painting so that it can be adjusted by the operator.

Air Supply Hoses

The air hose and fittings from the compressor to the paint pot should be in good condition and free from leaks.

The hose must have a minimum working pressure rating above the normal working pressure, and be of adequate internal diameter (ID) to deliver the required volume of air, without causing undue pressure drops. Undersized hoses will result in poor spraying characteristics which are often wrongly attributed to paint or spray guns.

Paint Supply

As mentioned previously, paint can be supplied to the spraygun in various ways. The most common types of supply are gravity feed, suction feed or pressure feed.

Gravity Feed

Gravity fed spray guns have a small (usually 0.5 litre) hopper on top of the gun from which the material flows into the gun.

Suction (Siphon) Feed

Suction fed spray guns have a cup attached to the underside of the gun from which the material is drawn up into the spray gun via suction caused by the flow of air through the gun. Because the power to draw the paint up is drawn from the air used by the spray gun, this often requires adjustment in gun set up to maintain the correct spraying characteristics.

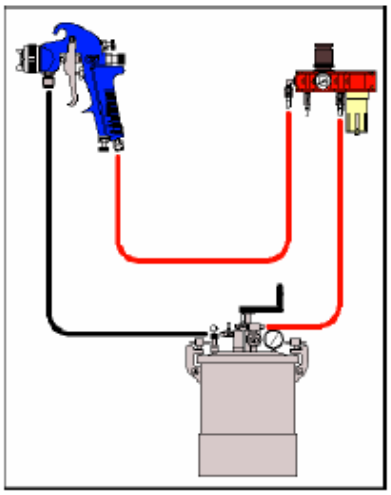
Pressure Feed

Pressure fed spray guns have the paint supplied directly into the head of the gun via a fluid hose. The paint can be supplied at pressure, allowing for larger volumes or thicker materials to be sprayed. The two main types of pressure feed equipment are pressure feed tanks or diaphragm pumps.

Pressure Feed Tanks or Pressure Pots

Pressure feed tanks are closed containers, ranging in size from about 5 litres to 200 litres. They provide a constant flow of material, under constant pressure, to the spray gun. The tank is pressurised with clean, regulated compressed air, which forces the liquid out of the tank through the fluid hose to the gun. The rate of fluid flow is controlled by increasing or decreasing the air pressure in the tank.

Due to the fact that these are pressurized vessels, pressure feed tanks are fitted with safety release valves, but care should always be taken not to use tanks at pressures higher than recommended for safe use.



Pressure Feed Tank System

5.1.3. Water blasters.

High-pressure water blasters are handy pieces of kit to have around, both at home and on the pant in and decorating work site. Here are 10 labor-saving uses for water blasters that could make your life easier.

Cleaning floor and wall: From commercial office and warehouse flooring to industrial factory floors and garages, a pressure washer can lift dust, dirt and debris and prevent stains.

Cleaning outdoor areas: When a garden hose won't cut it, turn on the water blaster to maintain your driveway, patio, steps, swimming pool surrounds and other outdoor spaces, turning down the pressure for wood decks.

Cleaning exteriors: It's not just the ground that can benefit from a high-pressure wash. You can also give your exterior walls, fences and garage doors a spring clean with the waster blaster, adjusting the pressure to avoid chipping paint.

SAFETY FIRST:

If you are collecting the equipment for someone else please make sure this sheet is given to the equipment user to read. In accordance with Health and Safety in Employment Act requirements, this sheet should be given to the site supervisor if the equipment is being hired for use at a commercial worksite so that the information is available to all users.

Pre-Start Checks and Safety

- Ensure the machine has a current Electrical Code of Compliance
- Ensure a transformer or Residual Current Device (RCD) is used
- Extension power leads must not exceed 20 metres in length (longer leads result in a voltage drop to the motor)
- Ensure adequate water supply is on hand and suction filter is clean
- Avoid kinks in suction and delivery hoses
- Never run machine without water
- Never spray at people or animals
- Never hold finger over high pressure nozzle
- Please take extreme caution with high pressure water - never spray at people, animals or live electrical equipment

Self-Check -1	Written Test

Directions: Answer all the questions listed below.

1. -------- is a method of atomizing paint without the use of compressed air.

   A. Viscosity C. Airless spray

   B. Pressure D. all

2. -------- Paint can be lowered either by adding solvents or heating.

   A. Viscosity C. Airless spray

   B. Pressure D. all

3. ------- can be adjusted in an airless system to achieve the best atomization possible.

   A. Viscosity C. Airless spray

   B. Pressure D. all

Answer Sheet

Score = _____

Rating: _____

Short Answer Questions

1. _____

2. _____

Information Sheet-2	Selecting *Plant and equipment*.

5.2. Selecting *Plant and equipment*.

plant layout and equipment selection go hand in hand, in that the needs of the equipment with respect to the processes, flow direction, ease of operation and maintenance, etc. must be blended into the overall plan, with the ultimate objective of maximizing the productivity of each machine and minimizing handling.

On selecting equipment with energy in mind, due consideration should be given to:

a) its relationship to other equipment in the process and to be balanced accordingly;
b) its energy demands per unit of production must be acceptable;
c) to be properly sized to meet production demands as well as having adequate capacity to cater for surge requirements, yet not to operate well below its rated capacity;
d) to be robust in construction, reliable and permit ease of maintenance so as to ensure a minimum of downtime;
e) to incorporate a correctly designed waste disposal system so as to avoid accumulation of residues which would otherwise be detrimental to both equipment and the overall plant operation.

It has been estimated that on average between 10-20 percent (94) of operating time within the mechanical wood products industry is comprised of idle time, mainly attributed to mechanical troubles, interrupted flow of raw materials, congestion, etc. which could well have been avoided at the planning and design stage. It is axiomatic that a well-balanced mill that is running with a maximum throughput, with a minimum of idling time and waste is utilizing its energy to the maximum effect and it is towards this end that the designer must select and size his materials handling and process equipment

Self-Check -2	Written Test

Directions: Answer all the questions listed below. Say true or false

1. Selecting equipment consideration of relationship to other equipment in the process
2. Selecting equipment consideration is energy demands per unit of production must be acceptable

Answer Sheet

Score = _____

Rating: _____

Short Answer Questions

1. _____
2. _____

Information Sheet-3	Identifying Method of operation of plant and equipment

5.3. Identifying Method of operation of plant and equipment

Types of plant for painting and decorating.

- Airless Spray
- Conventional Spray Equipment
- Water Blasters.

5.3.1. AIRLESS SPRAY

SPRAY TECHNIQUES

In any airless spray application, a careful study to determine correct spray techniques for each work piece configuration can save both time and material. Section III divides spray techniques into three separate areas as follows:

- Operator Technique
- Gun Position and Movement
- Work Piece Configuration

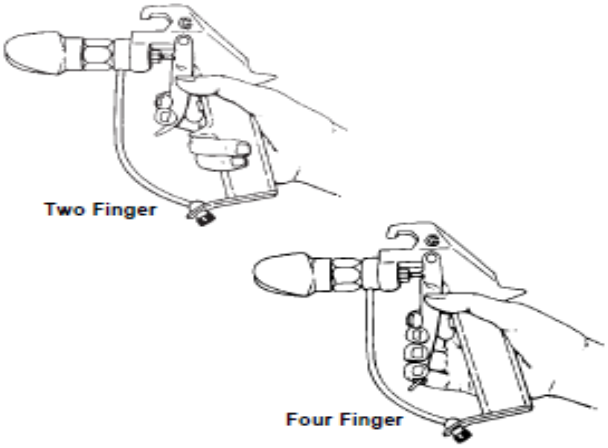
A balanced combination of these three factors will generate the best finish quality, with the least effort and the lowest cost

Operator Techniques

Gun Position

Hold the airless spray gun with a firm, but comfortable grip. Use the index and middle fingers to trigger the spray gun. The gun should be a natural extension of the operator's arm.

There are both two and four finger guns.



Gun Movement and Position

Distance

The fan angle and orifice size of an airless tip affect the spray pattern. Gun tip distance from the work piece being sprayed also affects the spray pattern. As the gun distance from the part increases, the fan width becomes wider, eventually causing and overspray condition and uneven coverage. A gun distance of approximately 12” produces the best coverage. If the 12” distance must be exceeded, select a narrower fan width to retain your efficiency. All airless tips are sized at the 12” spray distance.

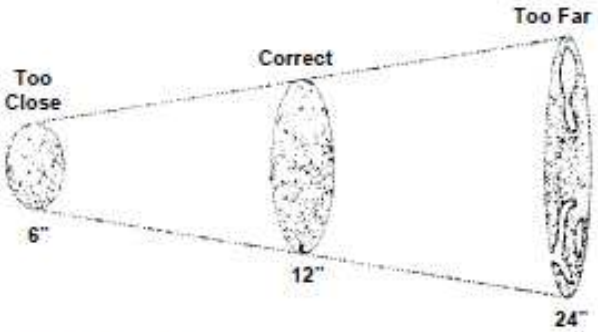
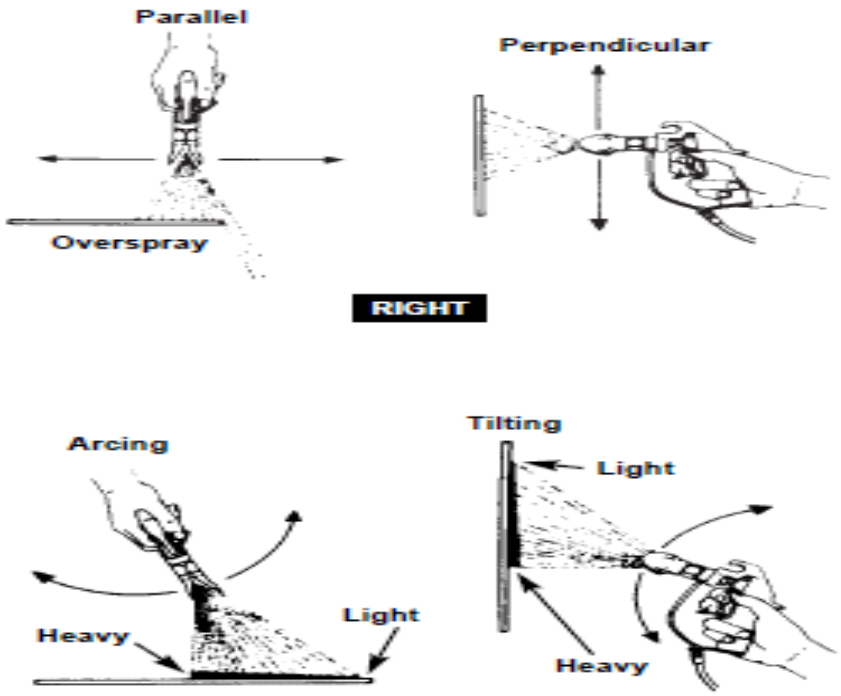


Figure 10. Spraying Distances

Gun Position

Hold the gun perpendicular to the surface whenever possible to reduce the chance of uneven paint coverage. Tilting the gun either up of down will produce a heavy build-up of paint on the top

or bottom of the spray pattern. Arcing the gun causes a heavy coverage of paint on the left and right side of the pattern. Both arcing and tilting the air spray gun also causes an angle at which the paint can bounce off the work piece surface.



5.3.2. Water blasters.

When Operating

- Work approx a minimum of 3-4 meters from the machine to avoid water and dirt entering the machine
- Squeeze the gun trigger to turn the water blaster on (**NOTE:** depending on the when the machine is turned on) You may experience a kick back caused by the pressure on some models)

Units fitted with detergent kit:

- If using with a detergent, put the suction hose into a container
- Twist the combination nozzle at the end of the wand to allow the detergent to be suckled through (Note: Water pressure will drop)
- Spray object to be cleaned with detergent
- Return nozzle to normal operation and spray off

Starting procedure

- Connect end of high pressure hose with gun to machine
- Connect water supply to inlet connection of machine
- Turn water supply full on
- Squeeze trigger on high pressure gun for approx 20-30 seconds to allow any air locks to bleed through system
- Plug your transformer or Residual Current Device (RCD) into a power supply
- Plug extension cord (only if required) into transformer or RCD then plug water blaster into other end
- Switch water blaster on (machine will start automatically then stop once full pressure is obtained)

Stopping and After Use

- Switch off machine
- Turn off from power supply
- Turn off water supply
- Release pressure from system by holding gun trigger open
- If chemicals have been used, flush pump with clean water
- Pack up and tidy all item

Self-Check -3	Written Test

Directions: Answer all the questions listed below.

1. Mention three types of plant and equipment for painting and decorating? (5 points)

Answer Sheet

Score = _____

Rating: _____

Short Answer Questions

1. _____

_____

Information Sheet-4	OHS requirements for operating and using plant and equipment

5.4. OHS requirements for operating and using plant and equipment

People operating machinery and equipment could:

- be required to place their hands close to the mechanism of the machinery and equipment that does the work, and may be injured if caught or trapped by moving parts
- be exposed to constant harmful noise, radiated energy or fumes being emitted from the machinery and equipment being operated, or are close to
- inadvertently bump or knock poorly placed control levers or buttons
- be required to make adjustments to the mechanism of machinery and equipment while the machine is in motion
- be required to clear away scrap
- Make minor adjustments, or reach into the moving mechanism of the machinery and equipment being operated.

5.4.1. Key principles of plant and equipment safety

i. Mechanical hazards

Machinery and equipment have moving parts. The action of moving parts may have sufficient force in motion to cause injury to people.

When assessing machinery and equipment for possible mechanical hazards, consider:

- Plant and equipment with moving parts that can be reached by people
- Plant and equipment that can eject objects (parts, components, products or waste items) that may strike a person with sufficient force to cause harm
- Plant and equipment with moving parts that can reach people, such as booms or mechanical appendages (arms)
- Mobile machinery and equipment, such as forklifts, pallet jacks, earthmoving equipment, operated in areas where people may gain access.

Common mechanical hazards and associated risks for machinery and equipment are shown below.

Hazard	Risk
Rotating shafts, pullies, sprockets and gears	Entanglement
Hard surfaces moving together	Crushing
Scissor or shear action	Severing
Sharp edge – moving or stationary	Cutting or puncturing
Cable or hose connections	Slips, trips and falls (e.g. oil leaks)

ii. **Non-mechanical hazards**

Non-mechanical hazards associated with machinery and equipment can include harmful emissions, contained fluids or gas under pressure, chemicals and chemical by-products, electricity and noise, all of which can cause serious injury if not adequately controlled. In some cases, people exposed to these hazards may not show signs of injury or illness for years. Where people are at risk of injury due to harmful emissions from machinery and equipment, the emissions should be controlled at their source.

When assessing machinery and equipment for possible non-mechanical hazards, consider how machinery and equipment can affect the area (environment) around them.

Common non-mechanical hazards are shown below.

Common non-mechanical hazards are shown below.

Non-mechanical hazards	
Dust	Mist (vapours or fumes)
Explosive or flammable atmospheres	Noise
Heat (radiated or conducted)	Ignition sources (flame or spark)
High intensity light (laser, ultraviolet)	Molten materials
Heavy metals (lead, cadmium, mercury)	Chemicals
Steam	Pressurised fluids and gases
Ionising radiation (x-rays, microwaves)	Electrical

People providing cleaning services could:

- work alone
- access machinery and equipment from the rear or sides, or in unexpected ways
- climb on machinery and equipment
- enter confined spaces, or larger machinery and equipment
- become trapped by the mechanism of the machinery and equipment through poor isolation of energy sources or stored energy, such as spring-loaded or counter-balance mechanisms, compressed air or fluids, or parts held in position by hydraulics or pneumatic (air) rams
- work with chemicals
- operate electrical equipment in wet areas

Self-Check -4	Written Test

Directions: Answer all the questions listed below.

1. List types of Key principles of plant and equipment safety?(3 points)

Answer Sheet

Score = _____

Rating: _____

Short Answer Questions

1. _____

   _____

2. _____

   _____

Information Sheet-5	Checking plant and equipment for safety and rectify or report faults

5.5. Checking plant and equipment for safety and rectify or report faults

5.5.1. Safety of workplace machinery, equipment and tools

Equipment maintenance and checks for safety

A maintenance schedule should be in place to ensure that you maintain your equipment regularly. You should check equipment as often as suggested by the manufacturer or more often if indicated by the risk assessment. Any daily checks should be undertaken as recommended by the manufacturer. This will help prevent problems such as blockages, leaks or breakdowns, which can increase risks.

You'll also need to maintain safety devices around the equipment such as guards, alarms, safety cages and warning signs.

If you use heat-producing equipment you should regularly check the environment around it. You must keep floors clear. There must be adequate ventilation at all times. You also need to remove all combustible materials from the area and regularly maintain and check fire detectors.

Equipment checks required by law

Some types of equipment - require examinations by law. in addition to normal repair and servicing. This is known as thorough examinations by a competent person, Examples include gas appliances, lifting equipment, pressure systems and power presses You need to keep the certificates and records of such checks, detailing the findings and any repair work.

Check equipment safely

If any equipment is to be checked or repaired, it should always be turned off and isolated so no one can start it in error.

Most equipment now comes with guidelines for maintenance. This includes advice on how to carry out equipment checks safely.

Many businesses use documented procedures for maintenance and repair work, such as a permit to work scheme. You can also use warning signs to remind workers that equipment is temporarily out of use. You could also user a lock out system. This means the person doing the maintenance work has a key that prevents the equipment starting up while they work on it.

Self-Check -5	Written Test

Directions: Answer all the questions listed below. Say true or false

1. All types of equipments require examinations by law.
2. A maintenance schedule should be in place to ensure that you maintain your equipment regularly.

Answer Sheet

Score = _____

Rating: _____

Short Answer Questions

1. _____

2. _____

List of Reference Materials

1. Barricading and Signage Document Number – OHS-PROC-134
2. [2] J. Broomfield, Corrosion of Steel in Concrete: Understanding, Investigation and Repair, Taylor & Francis, New York, NY, USA, 2nd edition, 2007.
3. BUILDING CONSTRUCTION HANDBOOK Tenth edition Roy Chudley And Roger Greeno
4. BUILDING CONSTRUCTION HANDBOOK Seventh edition R. Chudley MCIOB and R. Greeno BA (Hons) FCIOB FIPHE FRSA
5. Construction Materials Third edition Edited by J.M. Illston and P.L.J. Domone
6. Building construction (part 1 by Getachew Yimer)
7. Building construction (by Dr B.C.Punmia)
8. Building construction(by Sushil Kumar)
9. Text book of Building construction(by Abebe Dinku)

Finishing construction

Work Level-II

Learning Guide-119

Unit of Competence: Use painting and decorating tools and equipment

Module Title: Using painting and decorating tools and equipment

LG Code: EIS FCW2 M24 18 19 LO6-LG-119

TTLM Code: EIS FCW2 M24 TTLM 0919v1

LO 6: Use plant and equipment

Instruction Sheet	Learning Guide #119

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

- Using plant and equipment are safely and effectively.
- Safely locate plant and equipment
- Cleaning, maintaining plant and equipment

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**:

- Plant and equipment are safely and effectively used.
- Plant and equipment are safely located when not in immediate use.
- Plant and equipment for cleaning, maintaining and storing after use.

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below
3. Read the information written in the information Sheet
4. Accomplish the “Self-checks, in each information sheets**.**
5. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-checks).

Information Sheet-1	Using plant and equipment are safely and effectively.

6.1. Using plant and equipment are safely and effectively.

Machine Safety

Machine shops are an integral part and are a focus for many student courses and elective activities. Machine shops can pose a myriad of hazards that must be taken seriously. Many of the most frequently cited OSHA safety standards pertain to machine safeguarding.

Basic Shop Safety Rules

- Users must receive instruction on each piece of equipment prior to using it for the first time.
- Make sure emergency contact numbers are posted.
- No loose clothing or jewelry. Long hair must be secured up. No open-toed shoes or sandals.
- Safety glasses are to be worn at all times while machines & tools are in use.
- No food or drink is permitted in the workshop.
- Cell phones, mp3 players, and other personal electronic devices must not be used when working at any machine. Loud music is prohibited.
- Users must not undertake any actions that may injure or distract other users or result in damage to equipment or the work of others. No horseplay allowed in the shop.

A combination of guards (rigid barriers) and devices (interlocks, stop buttons) must be used to protect against the hazards of:

- Power transmission devices – belts, gears, chains, etc.
- Points of operation - cutting edges
- Moving parts – rotary movement, in-running nip points
- Flying chips/materials

General Machine Safety Rules

- A machine designed for a fixed location must be securely anchored to prevent walking or moving.
- No equipment is to be left running while unattended.

- Any damage to the machines, tools, fixtures, etc. must be reported to a supervisor immediately.
- Machines shall be completely stopped and de-energized before attempting to clear jammed work or debris

Equipment Safety

Generally, safety equipment

It is the protection that is used by workers to avoid injuries, casualties, life threatening situations etc.. Different types of safety equipment are used by workers depending upon the nature of risk involved in the work. For example, in a welding operation the dark welding helmets are used as a piece of safety equipment. In construction operations, hard hats, foot gear and coveralls are considered safety equipment. All these types of safety equipment fall under the Personal Protective Equipment (PPE) category.

Self-Check -1	Written Test

Directions: Answer all the questions listed below. Say true or false.

1. Basic shop safety rules are users must receive instruction on each piece of equipment prior to using it for the first time.
2. Safety equipment is the protection that is used by workers to avoid injuries, casualties, life threatening situations.

Answer Sheet

Score = _____

Rating: _____

Short Answer Questions

1. _____

2. _____

Information Sheet-2	Safely locate plant and equipment

6.2. Safely locate plant and equipment

Plant and equipment refers to a wide range machinery, installations, equipment and tools which need to be fit for purpose, maintained, inspected and used in accordance with safe systems of work

Safe plant and equipment

Plant and equipment must be made safe before maintenance starts.

Safe isolation

Ensure moving plant has stopped and isolate electrical and other power supplies. Most maintenance should be carried out with the power off. If the work is near un insulated, overhead electrical conductors, e.g. close to overhead travelling cranes, cut the power off first

Other factors you need to consider

- Release any stored energy, such as compressed air or hydraulic pressure that could cause the machine to move or cycle
- Support parts of plant that could fall, e.g. support the blades of down-stroking bale cutters and guillotines with blocks
- Allow components that operate at high temperatures time to cool
- Place mobile plant in neutral gear, apply the brake and chock the wheels
- Safely clean out vessels containing flammable solids, liquids, gases or dusts, and check them before hot work is carried out to prevent explosions. You may need specialist help and advice to do this safely
- Avoid entering tanks and vessels where possible. This can be very high-risk work. If required, get specialist help to ensure adequate precautions are taken
- Clean and check vessels containing toxic materials before work starts

Self-Check -2	Written Test

Directions: Answer all the questions listed below. Say true or false

1. Plant and equipment must be made safe before maintenance starts.

Answer Sheet

Score = _____

Rating: _____

Short Answer Questions

1. _____

2. _____

Information Sheet-3	Cleaning, maintaining plant and equipment

6.3. Cleaning, maintaining plant and equipment

6.3.1. Plant and equipment maintenance

Maintenance on plant and equipment is carried out to prevent problems arising, to put faults right, and to ensure equipment is working effectively.

Maintenance may be part of a planned programme or may have to be carried out at short notice after a breakdown. It always involves non-routine activities and can expose those involved (and others) to a range of risks.

Why is maintenance of plant and equipment important?

An effective maintenance programme will make plant and equipment more reliable. Fewer breakdowns will mean less dangerous contact with machinery is required, as well as having the cost benefits of better productivity and efficiency.

Additional hazards can occur when machinery becomes unreliable and develops faults. Maintenance allows these faults to be diagnosed early to manage any risks. However, maintenance needs to be correctly planned and carried out. Unsafe maintenance has caused many fatalities and serious injuries either during the maintenance or to those using the badly maintained or wrongly maintained/repaired equipment.

The Provision and Use of Work Equipment Regulations 1998 (PUWER) require work equipment and plant to be maintained so it remains safe and the maintenance operation is carried out safely.

What do I have to do?

If you are an employer and you provide equipment for use, from hand tools and ladders to electrical power tools and larger plant, you need to demonstrate that you have arrangements in place to make sure they are maintained in a safe condition.

Think about what hazards can occur:

if tools break during use machinery starts up unexpectedly there is contact with materials that are normally enclosed within the machine, ie caused by leaks/breakage/ejection etc

Failing to correctly plan and communicate clear instructions and information before starting maintenance can lead to confusion and can cause accidents. This can be a particular problem if maintenance is during normal production work or where there are contractors who are unfamiliar with the site.

Cases study one

A worker received crush injuries to his head and neck while he was undertaking maintenance work, when the hoist he was working on started up.

What caused the accident?

The power supply to the hoist had not been isolated before work started. This was because workers had not been given adequate training or instruction on safe isolation procedures. It was also found that isolation by the interlocked gates could be bypassed.

Extra care is also required if maintenance involves:

- working at height or when doing work that requires access to unusual parts of the building
- when entering vessels or confined spaces where there may be toxic materials or a lack of air

How can I do it?

Establishing a planned maintenance programme may be a useful step towards reducing risk, as well as having a reporting procedure for workers who may notice problems while working on machinery.

Some items of plant and equipment may have safety-critical features where deterioration would cause a risk. You must have arrangements in place to make sure the necessary inspections take place.

But there are other steps to consider:

Before you start maintenance

- Decide if the work should be done by specialist contractors. Never take on work for which you are not prepared or competent
- Plan the work carefully before you start, ideally using the manufacturer's maintenance instructions, and produce a safe system of work. This will avoid unforeseen delays and reduce the risks
- Make sure maintenance staff are competent and have appropriate clothing and equipment
- Try and use downtime for maintenance. You can avoid the difficulties in co-ordinating maintenance and production work if maintenance work is performed before start-up or during shutdown periods

  Safe working areas

Cases study two

Maintenance staff removed a section of grating to gain access to plant located below a walkway. A worker fell through a gap in the walkway, seriously injuring his shoulder.

What caused the accident?

The fall happened because there was nothing to make workers aware of the dangers caused by machinery maintenance. Barriers, guards and signs should have been used to indicate that maintenance was taking place.

You must provide safe access and a safe place of work Don't just focus on the safety of maintenance workers – take the necessary precautions to ensure the safety of others who may be affected by their work, eg other employees or contractors working nearby Set up signs and barriers and position people at key points if they are needed to keep other people out

Dos and don'ts of plant and equipment maintenance

Do…

- ensure maintenance is carried out by a competent person (someone who has the necessary skills, knowledge and experience to carry out the work safely)
- maintain plant and equipment regularly – use the manufacturer's maintenance instructions as a guide, particularly if there are safety-critical features

- have a procedure that allows workers to report damaged or faulty equipment
- provide the proper tools for the maintenance person
- schedule maintenance to minimise the risk to other workers and the maintenance person wherever possible
- make sure maintenance is done safely, that machines and moving parts are isolated or locked and that flammable/explosive/toxic materials are dealt with properly

Don't…

- ignore maintenance
- ignore reports of damaged or unsafe equipment
- use faulty or damaged equipment

Self-Check -3	Written Test

Directions: Answer all the questions listed below. Say true or false.

1. An effective maintenance programmed will make plant and equipment more reliable.
2. Before start maintenance decide if the work should be done by specialist contractors.

Answer Sheet

Score = _____

Rating: _____

Short Answer Questions

1. _____

2. _____

List of Reference Materials

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Finishing Construction

Works Level II

Learning Guide-120

Unit of Competence: Use painting and decorating tools and equipment

Module Title: Using painting and decorating tools and equipment

LG Code: EIS FCW2 M24 LO7-LG-120

TTLM Code: EIS FCW2 M24 TTLM 0919v1

LO 7: Clean up

Instruction Sheet	Learning Guide #120

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

- Clean up work area and recycling material
- Maintaining Plant, tools and equipment

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**:

- Clear work area and dispose of reuse or recycle materials in accordance with legislation, regulations, and codes of practice and job specification.
- Clean, check, maintain and store plant, tools and equipment in accordance with manufacturer recommendations and standard work practices

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below
3. Read the information written in the information Sheet
4. Accomplish the “Self-checks, in each information sheets.
5. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-checks).

Information Sheet 1	Clean up work area and recycling material

5.1. Clean up work area and recycling material

5.1.1. Disposing & recycling waste materials

Disposal methods adopted depend on the nature of the material. To obtain this information, a comprehensive sampling and analysis program is required so that the correct route for disposal can be determined. For an old tip, sampling should also ascertain the odor levels, presence of methane, groundwater levels and leach ate quality.

Solid inert wastes

Solid inert waste found on plastering work site usually consists of building rubble, but may also include as demolition material timber, cement, and sand, lime, plastic and lath metals. Such wastes should be reused, recycled, or disposed of to a landfill site licensed to take such wastes.

Contaminated Material and wastes

To ensure that all contaminated material uncovered on a construction site are excavated and disposed of in an environmentally responsible manner. Suggested measures

- Assay material uncovered on-site prior to disposal.
- Excavate material in a manner which avoids off-site environmental problems.
- Seal remaining contaminated material or wastes, where only part of the tip has been excavated, to ensure that there is no off-site effect now or in the future.
- Transport odorous wastes in covered vehicles.
- Dispose of contaminated material in a land fill licensed to take the type of contaminated material or wastes uncovered.

Recyclability

Recyclability measures a material's capacity to be used as a resource in the creation of new products. Steel is the most commonly recycled building material, in large part because it can be easily separated from construction debris by magnets.

Many building materials that cannot be reused in their entirety can be broken down into recyclable components. Often, it is the difficulty of separating rubble from demolition that prevents more materials from being recycled.

Waste Disposal Collect, store, and remove combustible waste products at the end of each workday or at the end of each work shift. Use only noncombustible containers to dispose of waste and rubbish and equip them with fitted or self-closing covers. Promptly remove and dispose of spills of flammable or combustible liquids. Place scrap lumber in containers and do not allow it to accumulate in work areas. Remove or bend over protruding nails unless the scrap lumber is placed directly in containers for removal.

When choosing between waste minimization options, the following hierarchy for waste management is preferred:

i. waste avoidance and/or reduction
ii. Reuse
iii. Recycling Diverting the waste stream in these ways means that waste treatment and waste disposal options can be reduced. Plastering work sites should pursue this hierarchy and seek out waste reduction opportunities. To identify opportunities it is necessary to consider all aspects of the project and the wastes it generates. Waste can be minimized by using improved technology, recycled or reused on-site, or by making purchasing decisions that favor recycled products. Wherever possible, include performance measures and targets for reduction, reuse and recycling options in the environmental management plan

Waste minimization opportunities include:

- obtaining construction materials, paints, lubricants and other liquids in reusable packaging or containers
- using noise barriers made from recycled materials
- Using overburden to construct temporary noise barriers.
- using contaminated water out of sediment dams for dust suppression and irrigating adjacent vegetated land
- sending waste concrete from demolition activities to a concrete recycler instead of landfill
- segregating and recycling solid wastes generated by construction activities, offices and mess-rooms
- collecting lubricating oil from the construction vehicle fleet and sending it to a recycle

Self-Check 1	Written Test

Instructions: Say true or false

1. Disposal methods adopted depend on the nature of the material.
2. Recyclability measures a material's capacity to be used as a resource in the creation of new products.
3. Waste Disposal Collect, store, and remove combustible waste products at the end of each workday or at the end of each work shift.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

1. ----------
2. ----------
3. ----------

Information Sheet-2	Maintaining Plant, tools and equipment

5.2. Maintaining Plant, tools and equipment

Tools and Equipment

- Only tools and equipment which are in good condition may be used.
- Tools shall only be used for the purpose for which they were designed.
- Employees shall make frequent inspections of tools and equipment, and immediately remove from service any items found defective. The following are examples of the types of defects which should be looked for:
    A. Split, broken, cracked, or splintered wooden handles.
    B. Mushroomed heads on chisels or impact drills.
    C. Wrench jaws which slip or do not hold.
    D. Frayed cords damaged or modified grounding plugs, or broken insulation on electrical tools.
    E. Rounded edges on sharp-edged tools.
    F. Dull cutting tools.
- When using hand tools, the employee shall place himself in such a position that he will avoid injury if the tool slips.
- Only soft faced hammers (brass, plastic, rubber, or similar materials) shall be used on highly tempered steel tools such as cold chisels, star drills, etc. Proper eye protection must be worn when performing such an operation.
- Files, rasps, and other tools having sharp tangs shall be equipped with approved handles.
- Tools which are not in use shall be placed where they will not present a tripping or stumbling hazard.
- Pointed tools shall never be carried edge or point up in pockets.
- Tools shall not be thrown from one worker to another, or to another working location.
- Extensions shall not be used on wrenches to gain leverage unless the wrench is designed to be used in such a fashion.
- When cutting wire or any other material under tension, the material being cut shall be secured to prevent the ends from snapping free.
- All power tools must be properly grounded before their use.

- Gloves shall not be worn when operating lathes, drill presses, power saws, or similar equipment. Loose clothing must not be worn and long sleeves should be rolled up prior to operation.
- Hooks, brushes, vacuums, or special tools shall be used to remove dust or chips. Compressed air shall not be used.
- All machinery must be turned off when unattended.
- Maintenance, repairs, adjustments, and measurements must not be made while saws, lathes, grinders, and similar equipment are in operation.
- Compressed air shall never be used to dust off clothing, or be directed toward another person.
- Saw blades, gears, sprockets, chains, shafts, pulleys, belts, and similar apparatus shall not be operated without the proper guarding.
- Safety glasses, goggles, or face shields shall be worn when operating power tools

Checking and maintenance

- Before every use, look for signs of damage to blasting equipment and power tools.
- Before use, check compressed air lines; check that any compressed air cutout works properly.
- At least once a week, check the condition and operation of blasting equipment.
- At least once a quarter, maintain the equipment according to the manufacturer's instructions.
- Keep this information in your testing logbook.

Use care when handling hawks and trowels as the edges can become sharp with use. Keep the surfaces of application tools clean during use and when the work is done. Ensure that application tools are dry before storing them. Never use a trowel for chipping or chopping.

Self-Check -2	Written Test

Directions: Say true or false.

1. Maintenance is not before every use look for signs of damage to blasting equipment and power tools.
2. When using hand tools, the employee shall place himself in such a position that he will avoid injury if the tool slips.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

1 _____

2 _____

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7. Building construction (by Dr B.C.Punmia)
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