

SCAFFOLDING OPERATIONS

MASSO501

Conduct scaffolding operations

Competence

RTQF Level:5

Credits: 9

Sector: Construction

Sub-sector: Masonry

Learning hours



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Purpose statement

The purpose of this module is to provide guidance to the trainee to safely erect, alter and dismantle scaffolds during the construction and maintenance of buildings.

L.U 1: Prepare the work

Learning Outcome 1.1: Identify areas of application

➤ Introduction on scaffoldings

Scaffolding, also called **scaffold** is a temporary structure used to support a work crew and materials to aid in the construction, maintenance and repair of buildings, bridges and all other manmade structures. Scaffolds are widely used on site to get access to heights and areas that would be otherwise hard to get to. Unsafe scaffolding has the potential to result in death or serious injury.

There are five main types of scaffolding used worldwide today. These are Tube and Coupler (fitting) components, prefabricated modular system scaffold components, H-frame / facade modular system scaffolds, timber scaffolds. Each type is made from several components which often include:

- A base jack or plate which is a load-bearing base for the scaffold.
- The standard, the upright component with connector joins.
- The ledger, a horizontal brace.
- The transom, a horizontal cross-section load-bearing component which holds the batten, board, or decking unit.
- Brace diagonal and/or cross section bracing component.
- Batten or board decking component used to make the working platform.
- Coupler, a fitting used to join components together.
- Scaffold tie, used to tie in the scaffold to structures.
- Brackets, used to extend the width of working platforms.

When we are to control carefully what we are elevating, at the height above 1.5 m; it becomes difficult; thus impossible. To overcome this, while elevating any structure (wall, column, pier, etc.) exceeding 1.5m; at elevated height we become unable problem we need to look for another technique to arrive at hang an elevated surface for working at that level. The use of scaffolding is to facilitate and allow workmen to get at working at elevated height.

➤ Definitions

Scaffolder: A scaffolder is a person skilled and experienced in the erection, altering and dismantling of scaffolding. A scaffolder aspires to or holds a certificate of competency as a scaffolder.

A scaffold: is a temporary structure designed to be constructed near the wall, pier, column, etc. for providing an elevated working surface to the workmen while elevating the structure.

Scaffold register: A written record of inspections carried out for scaffolding.

➤ **Key terms:**

- a) **Standards:** it is a vertical member of the frame work supported on the ground (drum), or it is inserted into the ground.
- b) **Ledgers:** they are horizontal members of the framework which is parallel to the wall. It connects various standards and supports putlogs.
- c) **Putlogs:** these are horizontal member s placed perpendicular to the wall. It is supported by the ledgers and the wall sometimes. When putlogs are supported on both ends by the ledgers; we call them transom.
- d) **Braces:** they are inclined members fixed on standards, to make them strong and stable as it is connecting them.
- e) **Sole plate:** horizontal member placed on the ground to level the surface on which all standards are supported together. It will be a timber board.
- f) **Base plate:** it is a strip timber that shall be put below each standard. It is used primarily for providing a stable base; but also to avoid any sliding that may occur.
- g) **Boarding:** this is a horizontal platform to make the surface on which workmen, tools and materials will be deposited during the elevation. The boarding constitutes the working. Area on which workmen will be supported as they are elevating the structure at elevated height. The boarding can be made of the following: Plat form made from dusty boards Plank of timber, or Just timber of some millimeters of thickness.
- h) **Guard rail (guard board):** horizontal member like a timber board, placed at the working level for securing workmen from falling down from the scaffold.
- i) **Toe board:** a timber board at the surface of the boarding (working area) for the protection of materials and tools from falling down.
- j) **Couplings (couple):** these are forged strips of steel used to join different steel members of the steel scaffold. For these couples on scaffold, they can be of the following:

Nails: for joining timber members

Bolts: for joining only timber, or steel only, or timber with steel.

Couples: for assembling steel members of the scaffolding together.

k) Anchorage: Component cast or fixed into the building or structure for the purpose of attaching a scaffold or tie; it also means the holding down system for cantilevered beams when referring to suspended scaffolding and cantilevered platforms.

➤ Purpose of scaffoldings

Scaffold, in building construction, temporary platform used to elevate and support workers and materials during the construction, repair, or cleaning of a structure; it consists of one or more planks of convenient size and length, with various methods of support, depending on the form and use.

The main purpose of a scaffold is to provide a safe place to work and a safe access to the materials needed. Many construction companies adhere to these regulations very strictly to avoid any accidents or mishaps.

The three basic elements of scaffolding are standards, ledgers and transoms. The tubes used to construct the scaffolds are also known as the standards or uprights.

They run throughout the entire structure and ensure that it stands upright. They also transfer the entire weight of the structure to the ground on a square base plate so as to spread the load. Ledgers are the tubes that are horizontal and connecting to the vertical tubes to hold the structure firmly. Transoms are placed on the ledgers at right angles to give the structure more strength. All these different components ensure that the structure is strong and firm to hold weight and ensure safety.

➤ Areas requiring scaffolds:

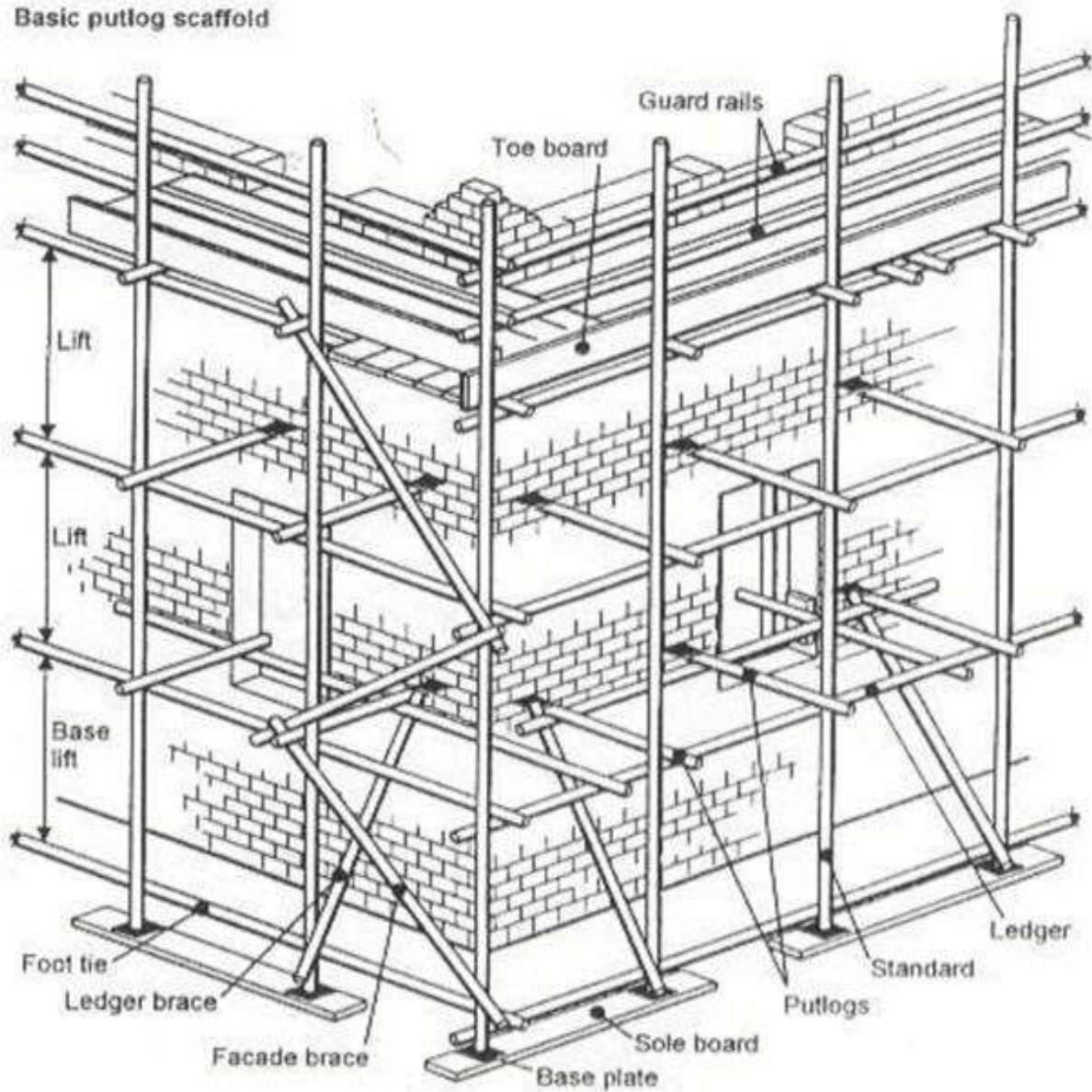
- Masonry
- Carpentry
- Painting
- Electricity
- Etc.....

Learning Outcome 1.2: Select scaffolds type

Types of scaffoldings

a. Single scaffolding or Putlog scaffolding or Bricklayer's scaffolding

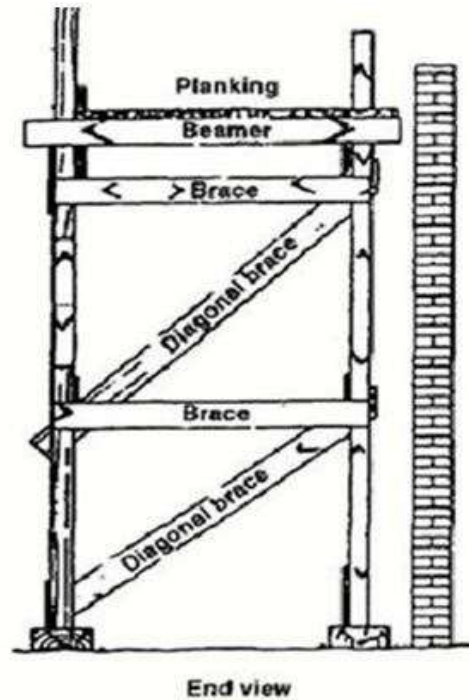
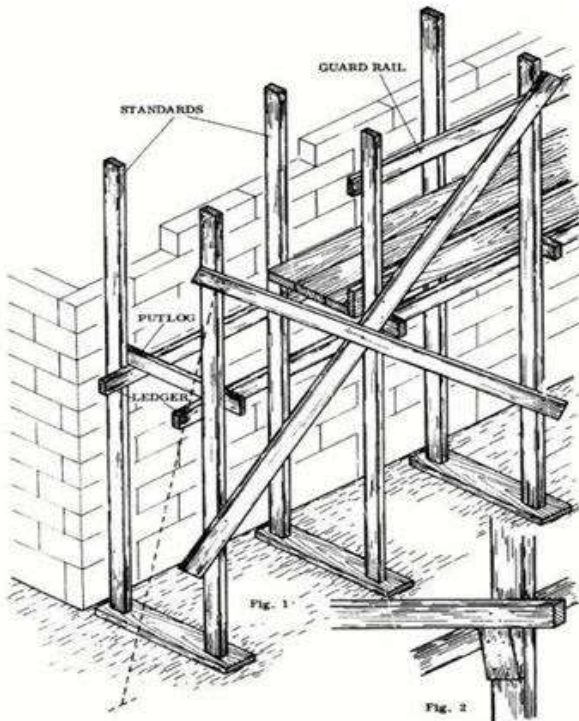
This is the scaffold made by a frame work of standards, ledgers, putlogs, and boardings. Standards are constructed at a distance of 1.2 m from the wall sur face. Standards are spaced by 2m to 2.5m. Ledgers are provided at each 1.2m to 1.8m high. One end of the putlog is supported by the wall, and the other is supported on ledger.



b. Independent scaffold or Double scaffold or Mason’s scaffold

It is by 2 rows of standards located on the same side of the wall to be constructed. The first row will be at 20cm to 30cm from the wall face; and standards will be separated by 2m. Each row of standards has ledgers to join them together, and above them there are putlogs. Putlogs do not

traverse the wall thickness. For making this scaffold more stable; we shall use braces and rakers. It is suitable for the elevation of columns, piers.



c. Needle scaffold or Cantilever scaffold

It is a scaffold supported from one side, and other vertical members are supported on that only one support. It will be preferably used when: The ground is weak to supports standards, The wall or column start at the outer position of the upper floor, It is not allowed to construct at the lower position such that we do not disturb the traffic movement.



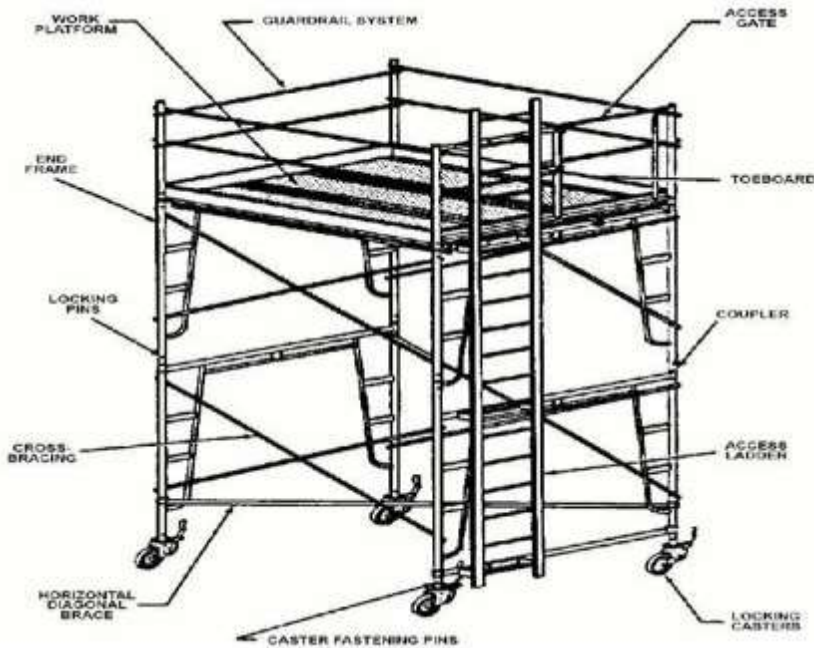
d. Suspended scaffold

It is a scaffold formed by suspending cables from the upper position, and we fix the platform on those cables or wires. This scaffold is used for repairing works such as painting, or pointing.



e. Trestle scaffold

It is that scaffold mounted on the structure of standards on wheels. It is used for repairing works. Its advantage is that it can be moved from one position to another without uninstalling its structure.



f. Pantod scaffold

It is a scaffold always in steel with special couplings, and plat form supported on brackets. These brackets can be adjusted at any height.

Learning Outcome 1.3: Select scaffold materials.

Scaffolding materials:

- Timber
- Steels
- Aluminium

Advantages and disadvantages of steels scaffolding materials

Advantages of steel scaffold

- It is strong
- Steel scaffolding provides a steady and firm standing \ It is easy reusable.
- If required, steel has the capacity to withstand a complete lifespan
- When compared to other materials, steel scaffolding has a longer durability.
- Steel Scaffold can be easily assembled and dismantled and it increases the work efficiency.
- Steel scaffolding can bear the load and the pressure, be it heavy rain or intense wind.
- Therefore, it helps in solving the problem of waste material and promotes a greener environment
- Steel does not require cutting and wasting of trees.

Disadvantages of steel scaffolds.

- Steel scaffold is very expensive.
- Steel scaffold is easy rust attack compared to timber.
- It require skilled technician in erection.
- Steel scaffold couples can be lost while dismantling.
- Steel scaffold require high technique in storing them.

Advantages and disadvantages of timber scaffolding materials:

Timber scaffolding has the following advantages:

- Timber scaffold is easy to cut and easy to fit.
- Timber scaffold can be joined without any special fitting
- Timber scaffold is cheap compared to those one of steels.
- Timber scaffold also is easy to get it (Available).
- Etc.....

Timber scaffolding has the following disadvantages:

- Not durable
- If there is a presence of water in ground, inserted part of timber scaffold became rotten.
- If required, timber hasn't the capacity to withstand a long lifespan. □ Timber scaffold is easy insect attack.
- Etc.....

L.U 2 Erect scaffoldings

Learning Outcome 2.1: Prepare scaffolding operations

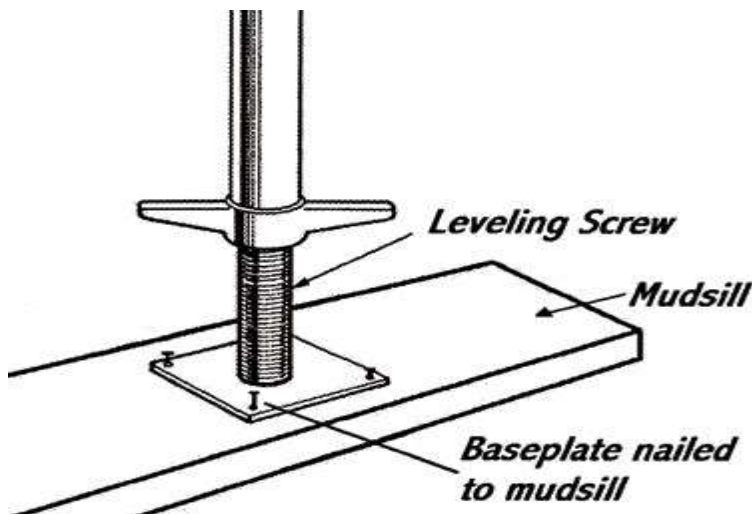
Assess the platform to bear (carry) the scaffolding for footings design.

Daily site conditions of scaffold footing can change with the temperature, rain, snow, etc. ... site's conditions and soil types have varying degrees of load bearing ability. ... Person must inspect the area to determine if this is a firm footing.

An adequate foundation is one that, like base plates on mud sills, will prevent the scaffold from settling into the ground.

The purpose of the mud sill under the scaffold base plate

- Is to uniformly distribute the scaffold load over a larger area than that distributed by the base plate alone
- Thereby reducing the loading on the ground beneath the base plates.
- Mud sills increase the area where the downward forces of the scaffold are transmitted.



Footings shall be level, sound, rigid, and capable of supporting the loaded scaffold without

settling or displacement. "Every scaffold must stand on a firm footing if it is to withstand the load that employees, equipment and materials place on it."

In short, an adequate foundation is one that supports the load of the supported scaffold, materials and workers without collapse or shifting of one component or the entire scaffold.

Daily site conditions of scaffold footing can change with the temperature, rain, snow, etc. It is important to plan the erection, use and dismantling of the scaffold to address all possible conditions including the site's soil conditions.

The employer must have a designated competent person make this determination. A competent person is defined as one who is capable of identifying existing and predictable hazards in the surroundings or work in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.

The competent person is designated by the employer and has the authorization to take prompt corrective measures to eliminate hazards. In making that determination, the employer should inquire into the individual's work credentials and experience.

The Requirement of a 'competent person'

- This provision must have specific training about scaffolding.
- Should have knowledge about the structural integrity of scaffolds as well as the degree of maintenance needed to maintain them.
- The competent person must also be able to evaluate the effects of occurrences such as, a dropped load, or a truck backing into a support leg that could damage a scaffold.
- A competent person must have training or knowledge in these areas in order to identify and correct hazards encountered in scaffold work.
- In addition, the competent person must be knowledgeable about the requirements of this standard.

In the situation you have described, the competent person must be able to assess the load of employees, equipment and materials placed on the scaffold's foundation. While an engineering degree is not a prerequisite, that assessment normally requires some technical skills, and the competent person making that determination would have to have those skills.

Select relevant tools and equipment

Level

Assembling a scaffold requires the base unit to be placed on a solid foundation and level. To accomplish this, the scaffold worker needs a good level that will check the assembled pieces to ensure they are horizontally straight and plumb. A good three-foot level will accomplish this task, but a smaller bob level may be the best choice, as it can be easily carried in a work pouch.

Claw Hammer

Even though the scaffolding is put together with pins and clamps, it is a good idea to have a claw hammer available. The claw hammer is used to drive the pins into place or to help remove the pins when a worker disassembles the scaffold. Claw hammers come in different lengths and weights, but a scaffold worker should have a heavy-duty commercial hammer.

Tape Measure

A tape measure will be needed to measure the height the scaffold needs to be and to assist the scaffold worker square up the frames. If a scaffold worker has to make his own planks, the tape measure is needed to measure the size of plank required. A worker will also need to measure the distance the scaffold is from the building to make sure the assembly is not tilting as it goes up.

Socket Set

A good socket set is required to assemble scaffolding. The cross-braces are attached to the mainframe with pins or clamps. These pins and clamps have nuts and bolts that need to be tightened or loosened when the scaffold is disassembled. Get a socket set that has both standard and metric sockets, as not all scaffolding accessories come with standard nuts and bolts, especially if the scaffold was built outside the United States.

Safety Harness and Lanyard

The higher the scaffold goes, the more important a good safety harness and lanyard becomes. A harness comes in many waist and full-body sizes, while the conventional size of a lanyard is three feet. The harness and lanyard are attached to a safety rope and protect the scaffold worker from falling to the ground in case the scaffold crumbles or falls over.

Personal protective equipment.

When a scaffold is working on a construction site in the United Kingdom they must make sure that they are wearing proper personal protective equipment to help to protect them from potential harm. This equipment includes a high visibility jacket, a hard hat and steel-toed boots.

If you are working in a noisy environment then you may also need to wear ear protection. If you are working at height, you should ensure that you are wearing a safety harness and that you are properly attached.

Cutting tools.

Measuring tools.

Identify possible site risks associated with scaffolding operations.

- **Risk of injury which can cause both temporary or permanent injury and death.**
- The scaffold accident.
- **Loss of scaffolding fittings.**

Scaffolding can present a **risk of injury** to people **from** the following:

- Falls from height. This can occur when workers are exposed to fall hazards while using, erecting or dismantling the scaffold.
- Falling objects. This can occur during the erection or dismantling of scaffold when components are not secured or when tools or materials are being used by workers and are not contained within the scaffolding.
- Scaffold collapse. This can occur when scaffolding is overloaded or incorrectly erected including the omission of ties, braces or other components.
- Work near power lines. This can occur when work is performed near or around live electrical parts.
- Mobile plant and traffic. This can occur when mobile plant or vehicular traffic comes in direct contact with scaffolding.
- Mix and match components. This can occur when components of different size, strength or characteristics are used and could affect the safe load capacity of the scaffold.
- Hazardous manual tasks.

The scaffold accident.

Scaffolding accidents are a common workplace accident, which can cause injury to construction workers, site visitors who are passing. Employers must provide a safe working environment for their workers, while there is times that the employer's negligence may be the reason for the accident, the workers themselves may be at fault in certain circumstances by.

Causes of scaffold accident.

- **Construction by incompetent employees**

Scaffolding should only be planned and erected by experienced and competent workers to ensure that adequate stability and sturdiness of the structure. Scaffolding that is not routinely or properly inspected before first use can lead to accidents.

- **Loading/unloading of materials on/off the structure**

The scaffolding must be built in a way that materials and tools can be easily and safely loaded/unloaded/moved around the structure. At times where a worker struggles with the movement of materials on the structure, this may lead to an accident.

- **Entrance to the scaffolding is unsafe**

Access points to the scaffolding that are unsafe, obstructed or unsupervised may lead to an accident. Where scaffolding is not easily accessible entering and exiting the structure may be a cause of accidents.

- **Uninspected structures**

In cases where events, such as extreme weather, have occurred and the scaffolding has not been properly inspected by a trained person, the integrity of the structure may be compromised.

- **Falls from heights**

Workers who fall from heights can experience serious injury. Causes of this could be slippery conditions on the scaffolding, items left in walkways obstructing a worker's path, poorly trained/untrained workers that were given permission to enter the scaffolding causing an accident.

- **Slips on wet surfaces**

This could be a result of weather conditions or employee negligence. In cases where a person has spilt liquid and failed to clean it up, it could create slippery conditions leading to a slip and fall off the scaffolding.

- **Tripping over objects left in the way**

It is imperative that walkways be left clear from obstruction. Objects left lying around may not be seen by other workers cause a trip and fall accident.

- **Falling Objects**

Falling objects can happen for a number of reasons, a common one being employee negligence where another worker lets something fall from a height injuring a person below them.

- **Collapsing scaffolding**

If the scaffolding is not planned and constructed by an experienced and trained group of people, the integrity of the structure may be compromised and collapse at any moment.

- **Lack of Personal Protective Equipment (PPE)**

PPE must be provided to all workers to ensure their safety. In cases where a person is not provided with protective work gear, this may leave them exposed to a risk of injury.

- **Corroded and/or rusting components**

Older parts that are rusting and/or corroded that are still in use can lead to collapse and serious injury * for those involved. Thorough inspection routines must be put in place to ensure that any components of the scaffolding that may be corroded or rusting are identified and safely removed.

- **Dismantling of scaffolding**

Dismantling of scaffolding by untrained workers or scaffolding that is dismantled in an incorrect manner may lead to accidents.

Preventing Scaffolding Accidents

The Health and Safety Authority (HSA) issued a safety alert with regards to scaffolding components and recommends:

- Regular and routine inspections of scaffolding components must be carried out to ensure the integrity of the structure is not compromised at any time.
- Excessively rusted or corroded components should never be used and if discovered on the structure should be safely removed and replaced.
- Manufacturer’s manual for all system scaffolds must be readily available and used when erecting, modifying and taking down scaffolding.

Provide access ways to scaffoldings.

While carried out scaffolding activities, the access way to reach in the platform is needed so that is why different construction attached on scaffold is necessary such as:

- Ladder
- Platform
- Temporary stairs

1. Ladder

A **ladder** is a vertical or inclined set of rungs or steps. The ladder used in scaffolding, it may fix ladder and Portable Ladders.

Fixed Ladders

- All fixed ladders will be constructed and maintained as prescribed in the Safety Requirements for Job-Made Wooden Ladders.
- All fixed ladders longer than 20 feet will be constructed with the required cages, wells, ladder safety devices, or self-retracting lifelines.
- Ladders longer than 20 feet that are not equipped with a ladder safety device or self retracting lifeline will have a landing at least every 30 feet.
- Fixed ladders will be inspected, (before use and periodically) for corrosion, wear, and broken parts. If a defect is found on a fixed ladder, it will be tagged, “do not use” so the defect is easily identified, or blocked from use and access until repaired.

Portable Ladders

- All portable ladders will conform to the applicable and be marked as such on each ladder.
- All portable ladders shall be inspected before use and after it has fallen or been involved in an accident to determine its condition.
- The inspection will include, but not be limited to: rungs or steps, side rails, guides or spreaders, and locking devices. If any part of the ladder is damaged or unserviceable, it will be tagged “Dangerous – Do Not Use” and repaired or destroyed.
- Ladders will not be painted or otherwise defaced so that defects in the ladder would be covered.
- Work on ladders shall be arranged so that the employee is able to face the ladder and maintain when climbing or working unless a fall protection system is in use.
- Stepladders shall not be used as a straight ladder. Employees using a stepladder shall not use the top two steps.

Types of ladder

- **Step Ladders:** Step ladders are the most commonly used ladder in the industry. In contrast to extension ladders; step ladders are self-supportable meaning they do not need to be leaned against any type of support to be used.
- **Extension Ladders:** Extension or "straight" ladders are normally the first type that comes to mind when you think of a ladder. This type is used to reach high places and must be leaned against some type of support; such as a house, wall, or tree before it can be used.
- **Platform Ladders:** A platform ladder is a front step ladder with a platform as its top step.
- **Telescoping Ladders:** A telescoping ladder is simply a ladder that is able to slide in and out to adjust in size and does so by the use of overlapping sections.
- **Folding Ladders:** These ladders get their name from their ability to fold up when not in use for extremely easy storage. Folding ladders are normally used for smaller inside tasks.

2. Stair.

Usually stairs used in scaffold are temporary as scaffold is also, All stairs built as temporary structures on a construction site will be constructed and maintained as prescribed in the Construction Standard, including tread depth, riser height, stairway angle, doors, gates or landings, hand rails and guard rails, and will be dismantled when construction work is completed.

Learning Outcome 2.2: Set scaffoldings

Purpose

The purpose of this procedure is to ensure scaffolding is adequate for the work to be performed and properly erected and dismantled. It covers selecting, erecting, and dismantling all types of scaffolds. It applies to workers, supervisors, scaffold qualified persons, scaffold custodians, and Facilities.

Erecting of Scaffolding.

Only competent employees will supervise the erection of scaffolding. Pertinent OSH regulations and information and guidance provided by the manufacturer of the particular type of scaffolding will be used. The following apply:

- 1 Manufacturers' erection instructions will be followed.
- 2 Advance planning considerations will be followed during the erection process.
- 3 Only competent employees will supervise the erection of scaffolding.
- 4 Each component will be visually inspected before use.
- 5 Defective or unserviceable materials will not be used.
- 6 Consult with the project manager where any instructions are unclear.

Pre-Inspection of Erected Scaffolding.

The three main areas of inspection are for rust, straightness of members, and welds. Only competent and qualified employees will conduct the pre-inspection.

- 1 Rust: Heavily rusted scaffolding equipment is a possible sign of abuse or neglect. Severely rusted components should be thoroughly inspected and cleaned before approved for use.
- 2 Straightness of Members: Mishandling, trucking, and storing may cause damage to scaffolding equipment. All members or parts of all steel scaffolding components should be straight and free from bends, kinks or dents.
- 3 Welds: Scaffolding equipment should be checked before use for damaged welds and any piece of equipment showing damaged welds or re-welding beyond the original factory weld should not be used.
- 5 Check alignment of coupling pins and braces.
- 6 Check serviceability of caster brakes (rolling scaffolds).

Final Inspection of Erected Scaffolding.

Only competent employees will conduct the final inspection of erected scaffolding.

- 1 Check for proper support under every leg of every frame.
- 2 Check for wash out (if outside) due to rain.

- 3 Check to ensure all base plates or adjustment screws are in firm contact with supports.
- 4 Check frames for plumpness and squareness in both directions.
- 5 Check serviceability and correctness of all cross braces.
- 6 Check to ensure that all planking and accessories are properly installed.
- 7 Check to ensure that all guard rails are in place.
- 8 Recheck periodically to ensure conditions remain safe

Alignment of scaffold during erection,

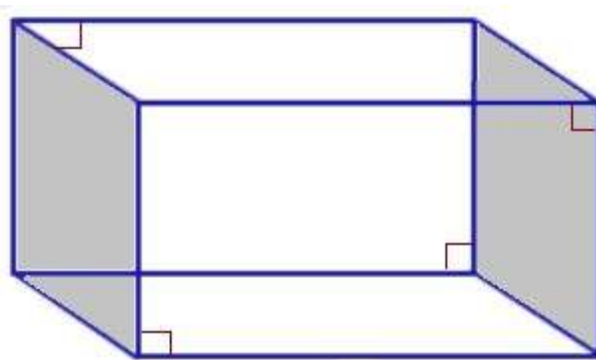
- Establishment of Pegs on the face where scaffold will be erected.
- Tie the construction lines on that pegs.
- Use Theodolite to check whether the scaffold will be in alignment.

Leveling tools and equipment of scaffold,

- Spirit level
- Dump level
- Theodolite
- Staff reading

Prism square

An optical square is a hand instrument used by surveyor's to lay off right angles that are multiples of 90° or of 45° . They normally comprise of two optical glass penta prisms in a sturdy housing. Used for placing points on a line, offset measurements, setting out curves or determining horizontal plans. We provide two good quality optical squares and attachment accessories which are durable and made to a high standard.



Square Prism

Learning Outcome 2.3: Size scaffolding elements or members.

Take measurements of places to receive scaffolds.

The following tools are used to take measurement of place to receive scaffolds and their element.

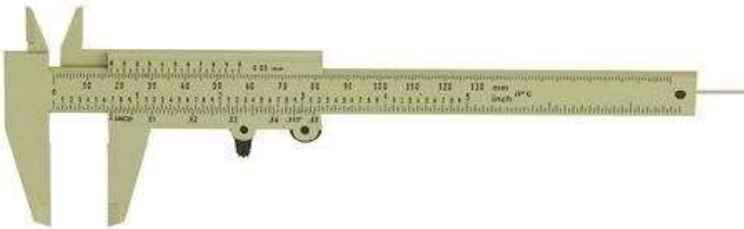
1. Tape measure

A **tape measure** is a strip of metal, plastic, or cloth which has numbers marked on it and is used for measuring.



2. Vernier caliper

Is a measuring instrument consisting of an L-shaped frame with a linear scale along its longer arm and an L-shaped sliding attachment with a vernier, used to read directly the dimension of an object represented by the separation between the inner or outer edges of the two shorter arms.



3. Combination square

A combination square is a tool used for multiple purposes in woodworking, stonemasonry and metalworking. It is composed of a ruler and one or more interchangeable heads that may be affixed to it. The most common head is the standard or square head which is used to lay out or check right and 45° angles.



4. Precision Try Square

A **try square** is a woodworking or a metalworking tool used for marking and measuring a piece of wood. The **square** refers to the tool's primary use of measuring the accuracy of a right angle (90 degrees); to **try** a surface is to check its straightness or correspondence to an adjoining surface.



Cut elements as per required measurements.

To achieve on required measurement of scaffold element the following tools and equipment are used to cut them to the required size:

- Cutting machine
- Saws
- Pang
- Etc.....

Learning Outcome 2.4: Assemble scaffold's members

This refers to join all member of scaffold. This process can be carried out in different way depending up on the materials on which scaffolding is made. Assembling methods.

1. Nailing methods

A general rule of thumb is that to attach one piece of wood to another, you should use a nail that is three times the thickness of the piece being nailed. While that's a good starting point, it isn't the whole story.



2. Threading methods

Threading is the process of creating a screw thread for screwing the nut and bolt.



3. Special fitting method



Characteristics of good scaffolding

A good scaffold will have to fulfill the following requirements:

- It has to be sufficiently strong and stable.
- It has a long life time (it will be used many times).
- It is easy to be transported and to be assembled.
- It is not expensive.
- It will be easily accommodated to every type of structure.

L.U. 3 MONITORS THE USE OF SCAFFOLDS

Learning Outcome 3.1: Identify scaffold defects

Scaffolds defects:

- i. **Tear:** a hole or split in something caused by it having been pulled apart forcefully.
- ii. **Wear:** is the deformation of material at **solid surfaces**. Causes of wear can be mechanical (e.g., **erosion**) or **chemical** (e.g., **corrosion**).
- iii. **Rust:** is an **iron oxide**, a usually red **oxide** formed by the **red nox** reaction of **iron** and **oxygen** in the presence of **water** or air moisture.
- iv. **Deformation:** refers to any changes in the shape or size of an object due to
 - An applied **force** (the deformation energy in this case is transferred through work) or
 - A change in temperature (the deformation energy in this case is transferred through heat).

Isolate, label and tag fault components for correction:

If any part of the scaffold is damaged or unserviceable, it will be tagged “Dangerous – Do Not Use” and repaired or destroyed.

Older parts that are rusting and/or corroded that are still in use can lead to collapse and serious injury * for those involved. Thorough inspection routines must be put in place to ensure that any components of the scaffolding that may be corroded or rusting are identified and safely removed.

The damaged scaffold elements can be isolated or removed away and other element which can harm users will be label and tagged Do Not Use before. Those consist of the following:

- i. Painting
- ii. Repair damaged items
- iii. Oiling
- iv. Etc.....

Check continuously the scaffolding in use against original design.

Learning Outcome 3.2: Identify required maintenance

Appropriate repairs according to defects:

- **Repair:** The scaffolding element which can show wear, knots, shake as defect and so on which not cause can scaffold to collapse or to be damaged, it can be repaired for reuse again.
- **Alteration:** The scaffold element which are deformed and which has tears, it can be replaced or tagged Do not use before alter them or remove in it position.
- **Oiling:** The elements of steel scaffold which can present the rust in it surface, you will remove the rust and paint the members with oil paint or anti rust paint in order to increase their long life.

Learning Outcome 3.3: Apply required maintenance

Maintenance techniques

- **Repairs:** This consists of modification of scaffold element in order to reuse again.
- **Alteration:** Consist of removing the damaged element of scaffold and use the new one
- **Oiling:** This consists of applying the coats of paint in rusted Element of scaffold.

Maintenance tools/materials

Even tool or materials used in maintenance of scaffold elements, it depend upon the materials used in scaffolding. The tools and materials are as follow:

- Tube
- Nails
- Vice
- Screws
- Brush
- Paint
- Hammers
- Etc

Behavior required while working on the scaffolding.

- Always check the conditions of materials which make the scaffold before using them.
- Do not overload the scaffold in the middle of its span.
- For large spans, put the inter mediate standards or use platform (planks) of sufficient thickness.

- Make sure standards are supported upon sufficiently stable and strong soil.
- Limit the amount of loads on the scaffold.
- Always, you have to provide guard rails and toe board.
- Provide ladder for accessing the platform. They will be inclined not more than 45°
- Do not put on slipping shoes.
- Do not jump or dance when you are on the scaffolding.
- Do not use the ladder as two persons at the same time.

L.U 4 REMOVES SCAFFOLD

Learning Outcome 4.1: Dismantle scaffold safely

Dismantling of scaffolding.

Only competent employees will supervise the dismantling of scaffolding. Manufacturers' dismantling instructions will be followed and consult with the project manager where any instructions are unclear.

The following steps will be followed when dismantling the scaffolding.

Dismantling steps:

- ✓ Repair possible destructions which would make scaffold unsafe, before commencing with the dismantling process.
- ✓ Dismantle scaffold from top to down. First remove the accessories from the main scaffolding structure.
- ✓ Always work from a minimum of two planks laid on frames below those being removed.
- ✓ Move the planking down as dismantling progresses.
- ✓ Do not remove ties until dismantling has reached the tier to which they are attached.
- ✓ Always stay within the inside of the scaffold. Do not climb on the outside for any reason while dismantling. Do not climb on ties, braces or unbraced frames.
- ✓ Only remove fastening devices from bottom of frames being removed.
- ✓ Lower scaffolding components in a safe manner as they are dismantled. Avoid dropping or throwing the components as this could result in damage to the equipment, or injury to personnel below.
- ✓ Each component will be visually inspected after use. Defective or unserviceable materials will not be stored with serviceable materials.

Learning Outcome 4.2: Store scaffold elements

After removing or dismantling the scaffold elements at their position, it is better to store them. In order to keep well it, while there are unserviceable. Regarding to the materials in which scaffold are made you will discard them. Dismantled elements of scaffold are arranged in the following ways:

Reuse: This consists of discarding the reused elements of scaffold to another one in order to get easy them while reuse again.

- ✓ **Disposal:** The element of scaffold which are not used again will be disposed in a safe way while storing them

- ✓ **Damaged:** The damaged members of scaffold also are stored together in order to manage them.
- ✓ **Repaired:** The repaired items also are discarded in order to distinguish them with other element.

Learning Outcome 4.3: Clean work area requisition:

- Clean work area:
 - No dust.
 - No waste material scattered.
- Dumping area.

EXERCISES

LU1 & L.U 2: Identify and erect scaffoldings

1.
 - a. Define the following terms as used in scaffolding operations
 - i. Scaffold
 - ii. Scaffolder
 - b. What are the areas in which the scaffold can be used (at least 6)?
2. Discuss at least ten (10) parts/ terms used for scaffold that you may know.
3. With examples of appropriate area of use, differentiate any five types of scaffoldings.
4. With clear sketches, differentiate single scaffold to double scaffold.
5. The scaffold can be made from different materials like timber or metal, compare a metal scaffold with a timber scaffold based on the advantages and disadvantages that they can present (at least ten points of comparison).
6. What are the requirements of good scaffolding?
7. When erecting scaffolding, an adequate foundation is required.
 - a. How can you define an adequate foundation for scaffolding?
 - b. Who is responsible for determining whether the foundation is adequate?
 - c. What are the qualities of that person?
8. List and explain the importance of any five tools and/or equipment required when erecting the scaffolding.
9. When joining the scaffold members, this process can be carried out in different way depending up on the materials on which scaffolding is made. Give these assembling methods and indicate for which material each can be appropriate.
10. Erection of scaffold should be conducted properly and safely to avoid any risk of accident. From your understanding, explain step by step how scaffolding can be erected.

L.U. 3 Monitor the use of scaffolds

Question 1: Scaffolding can present different defects, explain scaffolding defects.

Question 2: a. Damaged members of scaffolding can be maintained in different ways. Explain in which ways the scaffolding can be maintained.

b. List at least any 10 tools and/or materials that can be used in scaffolding maintenance.

L.U 4 Remove scaffold

Question 1: List the steps that can be followed for safe dismantle of scaffolding.

Question 2: How can you arrange different members of scaffolding while storing them?