Participant Handbook

Sector

Construction Skill Development Council of India

Sub-Sector

Real Estate and Infrastructure Construction

Occupation

Interior & Exterior Finishes

Reference ID: **CON/Q1103, Version 3.0**
NSQF Level 3

Assistant False Ceiling & Dry Wall Installer

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"Skilling is building a better India. If we have to move India towards development then Skill Development should be our mission."

Shri Narendra Modi
Prime Minister of India

Certificate

COMPLIANCE TO

QUALIFICATION PACK- NATIONAL OCCUPATIONAL STANDARDS

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for

SKILLING CONTENT:PARTICIPANT HANDBOOK

Complying to National Occupational Standards of

Job Role/Qualification Pack:'Assistant False Ceiling & Dry Wall Installer'

QP No.'CON/Q1103, Version 3.0 NSQF Level 3'

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(Construction Skill Development Council)

Acknowledgements

This participant's handbook meant for Assistant False Ceiling & Dry Wall Installer is a sincere attempt to ensure the availability of all the relevant information to the existing and prospective job holders in this job role. We have compiled the content with inputs from the relevant Subject Matter Experts (SMEs) and industry members to ensure it is the latest and authentic. We express our sincere gratitude to all the SMEs and industry members who have made invaluable contributions to the completion of this participant's handbook.

This handbook will help deliver skill-based training in the field of Assistant False Ceiling & Dry Wall Installer. We hope that it will benefit all the stakeholders, such as participants, trainers, and evaluators. We have made all efforts to ensure the publication meets the current quality standards for the successful delivery of QP/NOS-based training programs. We welcome and appreciate any suggestions for future improvements to this handbook.

About this book

This participant handbook has been designed to serve as a guide for participants who aim to obtain the required knowledge and skills to undertake various activities in the role of an Assistant False Ceiling & Dry Wall Installer. Its content has been aligned with the latest Qualification Pack (QP) prepared for the job role. With a qualified trainer's guidance, the participants will be equipped with the following for working efficiently in the job role:

- Knowledge and Understanding: The relevant operational knowledge and understanding to perform the required tasks.
- Performance Criteria: The essential skills through hands-on training to perform the required operations to the applicable quality standards.
- Professional Skills: The Ability to make appropriate operational decisions about the field of work.

The handbook details the relevant activities to be carried out by an Assistant False Ceiling & Dry Wall Installer. After studying this handbook, job holders will be adequately skilled in carrying out their duties according to the applicable quality standards. The handbook is aligned with the following National Occupational Standards (NOS) detailed in the latest and approved version of Assistant False Ceiling & Dry Wall Installer QP:

- CON/N0101: Erect and dismantle temporary scaffold up to 3.6 meter height
- CON/N1105: Identify, handle and use hand and power tools relevant to installation of false ceiling and dry walls
- CON/N1106: Measure, mark and cut the gypsum, plaster, fiber and composite boards for false ceiling and dry wall installation
- CON/N1107: Fix the dry walls board with fasteners for installing dry wall sheets on walls
- CON/N8001: Work effectively in a team to deliver desired results at a construction site
- CON/N9001: Work according to personal health, safety and environment protocols at construction site
- DGT/VSQ/ N0101: Employability Skills

The handbook has been divided into an appropriate number of units and sub-units based on the content of the relevant QP. We hope it will facilitate easy and structured learning for the participants, allowing them to obtain enhanced knowledge and skills

Symbols Used


Key Learning Outcomes


Exercise


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It is recommended that all trainings include the appropriate Employability skills Module. Content for the same can be accessed https://www.skillindiadigital.gov.in/content/list

1. Introduction to Assistant False Ceiling & Dry Wall Installer

Unit 1.1 – Introduction to Construction Industry

Unit 1.2 – Role and Responsibilities of Assistant False Ceiling & Dry Wall Installer

Key Learning Outcomes 

By the end of this module, participants will be able to:

- Explain the role and responsibilities of Assistant False Ceiling and Dry Wall Installer.
- Identify the career progression options for Assistant False Ceiling and Dry Wall Installer.

Unit 1.1. Introduction to Construction Industry

Unit Objectives

By the end of this unit, participants will be able to:

- Give an overview of the construction industry.

1.1.1. Construction Industry

The construction industry is the oldest and one of the largest in the world, with a market size of over 10 trillion dollars. Construction has traditionally been a contracting sector, and the industry consists of a huge number of small businesses. Currently, the building industry is one of the main economic sectors. It contributes significantly to the national economy and employs a substantial number of people.

Construction Industry in India

During the forecast period, India's construction market is expected to grow at a CAGR greater than 10%. (2022–2027). As COVID-19 spread over the country in April 2020, the Indian construction sector, which was already struggling with poor management and a lack of labour force tracking, totally lost its central grip, bringing an end to the business. COVID-19 caused havoc on all levels and scales of the value chain.

- The availability of building supplies and the rate of price rise were major concerns. The lack of timely implementation due to lockdowns led to cost overruns, significant delays, and even the cancellation of projects.

- Many MSMEs were compelled to close their doors or restrict their activities as a direct result of the cancellation and postponement of projects. This was a major concern because the majority of construction firms and design studios are small and specialize in a certain style of structure.

- Despite the impact of COVID-19 restrictions and lockdowns on construction activity, India experienced 45 million square feet of new supply in 2020, with 36 million square feet coming from tier I cities and 8.9 million square feet from tier II and III cities.

- The 3PL and e-commerce sectors, which accounted for 62 percent of total absorption in 2020, continued to drive warehouse demand in 2021, with the manufacturing sector accounting for 14 percent. Delhi-NCR had the highest absorption rate among India's major cities in 2021, at 18%, followed by Pune at 15%. 14 percent and 11 percent absorption rates were recorded in Mumbai and Bangalore, respectively, with 20 percent in tier II and tier III cities.

- In 2021, industrial and logistics sector investments surpassed USD 1.5 billion, making it the second-largest receiver of such money after the office sector. This asset category has maintained its popularity due to its strong growth rate and regular returns.

The commercial real estate subsector is poised for growth as individuals return to the workplace and organizations adopt hybrid work arrangements. As more companies send their employees back to work, the demand for commercial office space gradually increases.

1.1.2. Types of Construction

The following are the types of construction:

a. Building construction:

Building construction is the act of adding a structure to undeveloped ground and adapting it for various uses, including residences, commercial buildings, garages, etc. The bulk of building construction projects involve minor improvements, such as adding a room, renovating a bathroom, enhancing a porch, etc.

There are differences between building construction projects, but there are some aspects and procedures that are universal. For example: design considerations, a budgetary estimate, and ethical and legal factors.

In the case of commercial building construction, multiple strategies are utilised. They consist of Design & Build, Cost Estimating, Competitive Bidding, Contract Management, Construction Management, and Design-Build Bridging.

The governments of all states and nations have enacted laws and regulations governing the construction of both commercial and residential buildings. During the designing and building processes, these norms and regulations must be properly adhered to. The materials required for the construction process should be readily accessible at the construction site. Brick construction is the most common technique of house construction in India.

b. Industrial Construction:

Industrial construction represents a minor portion of the construction sector. Even so, it is regarded as quite vital. Planning the layout of an industry, establishing industrial sectors, installing heavy machinery, and planning and constructing the size of an industry are the procedures involved in industrial construction.

Infrastructure, power transmission and distribution, metallurgy and material handling, medicine, petroleum, chemical, power generation, manufacturing, etc. are the primary aspects to be considered.

This form of building requires extremely specific knowledge of planning, cost estimation, design, and construction. When a large construction business launches a project, it typically assigns the task of ensuring the project's success and safety to a team. Architects and civil engineers are employed to assist in the planning of construction projects. In this instance, construction entails the construction or assembly of infrastructure.

Large-scale building projects necessitate the completion of several jobs by a large number of individuals. Different jobs are provided to different teams. For instance, a Project Manager is responsible for Project management,

Fig. 1.1.1 Industrial Construction Site Plan

while a Construction Manager oversees Project construction. Additional examples include Design engineer, Project architect, and Financial Advisor. If a project is to be conducted successfully, the following must be ensured: Effective planning, successful scheduling, budgeting, construction site safety, availability of building materials, and logistics are essential for a successful construction project (that is transport of raw materials, etc).

c. Infrastructure Construction

Infrastructure, often known as heavy civil or heavy engineering, consists of massive public works, dams, bridges, highways, railroads, water or wastewater systems, and utility distribution. Civil engineering encompasses the design, building, and maintenance of the physical and naturally built environment, such as roads, bridges, canals, dams, tunnels, airports, water and sewage systems, pipelines, and railways.

Fig. 1.1.2 Under Construction Bridge

The infrastructure sector is an important economic driver in India. The sector is largely responsible for driving India's overall growth, and the government has placed a great deal of emphasis on implementing laws that will expedite the establishment of world-class infrastructure in the country. The infrastructure sector consists of power, bridges, dams, highways, and the development of urban infrastructure. In other words, the infrastructure sector functions as a catalyst for India's economic growth by driving the expansion of associated industries such as townships, housing, built-up infrastructure, and construction development projects.

1.1.3. Construction Project Categories

Each sort of construction project necessitates a specialised team for planning, design, building, and maintenance. There are typically three basic categories of construction projects:

1. Residential projects

Residential projects involve residences, housing developments, structures, and garages. Individual landowners (self-build), expert house-builders, property developers, general contractors, and suppliers of public or social housing can all engage in residential construction (eg: local authorities, housing associations). Local building authority laws and codes of practise must be complied with by residential construction techniques, technologies, and materials.

2. Non-residential/ Commercial Projects

These projects involve the construction of large and small commercial structures, such as businesses, churches, schools, and hospitals. Depending on the type of building, a diverse variety of private and public entities, including local authorities, educational and religious bodies, transit undertakings, shops, hotels, property developers, and financial institutions, can procure non-residential building construction. The majority of building in these industries is performed by general contractors.

3. Engineering projects

Construction of bridges, roads, reservoirs, big public works, dams, motorways, trains, water or wastewater, and utility distribution are examples of engineering projects. Civil engineering include the planning, building, and upkeep of such massive enterprises.

1.1.4. Market Segment of Construction Industry

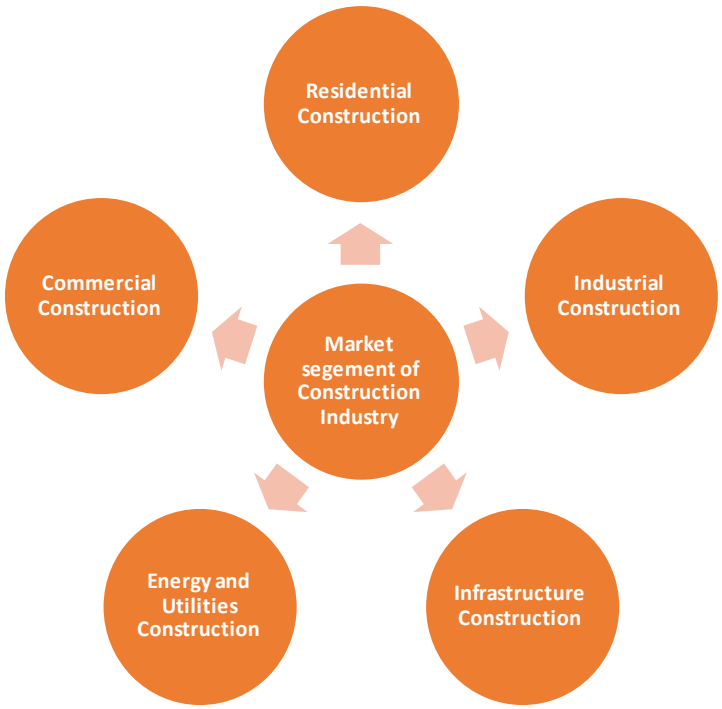

Fig. 1.1.3 Market segment of construction industry

Notes

Scan the QR code to watch the video

https://youtu.be/nndLyZrGfWc

Construction Industry

https://youtu.be/1WVzo2UFyo8

Types of Construction

Unit 1.2 Role and Responsibilities of a Assistant False Ceiling and Dry Wall Installer

Unit Objectives

By the end of this unit, participants will be able to:

- Define personal attributes required in the interior and exterior finishes occupation.
- Recall the basic terms used in false ceiling and dry wall installation works.
- Describe the role and responsibilities of an Assistant false ceiling and dry wall installer.
- Explain the career progression options of an Assistant false ceiling and dry wall installer.

1.2.1. Assistant false ceiling and dry wall installer

False Ceiling is an auxiliary ceiling that hangs beneath the primary ceiling. False Ceiling is found in contemporary homes and businesses. False ceilings are quite inexpensive and simple to build. The following are the top eight categories of false ceiling materials:

- Plaster of Paris (POP)
- Wood or plywood
- Gypsum
- Metal
- PVC
- Fabric or cloth
- Mineral fibre
- Glass

Drywall is a flat panel constructed of gypsum plaster layered between two thick paper sheets. It is attached to metal or wood studs by nails or screws. Drywall is classified into four types:

- Standard
- Mould resistant
- Moisture resistant
- Fire resistant
- Soundproof

An assistant false ceiling and dry wall installer is responsible for performing preparation operations prior to false ceiling and dry wall installation, such as measuring, marking, cutting, and fixing drywall boards for dry wall installation. He is expected to have a knowledge of different tools and materials required in the installation of false ceiling and dry walls, unit conversions, measurements, standard process and safety norms that are followed.

1.2.2. Role and Responsibilities of an Assistant false ceiling and dry wall installer

The primary responsibility of an assistant false ceiling and dry wall installer is to assist the False ceiling and dry wall installer in finishing the overall assignment. He is responsible for:

- Using and managing hand and power tools, measuring tools, levelling devices, and other equipment used in false ceiling and dry wall installation work
- Assisting in fixing dry wall and false ceiling.
- Measuring, marking and cutting the gypsum, plaster, fiber and composite boards for false ceiling and dry wall installation
- Erecting temporary scaffold
- Fixing dry wall boards with fasteners
- Visually inspecting the board materials.
- Obeying all safety guidelines, and utilise PPE and other safety devices

1.2.3. Personal Attributes required by an Assistant false ceiling and dry wall installer

The Assistant False Ceiling and Drywall Installer works under the supervision of the False Ceiling and Drywall Installer. The individual is expected to be physically fit and should be able to work across various locations in extreme weather/site conditions. The person must be able to perform efficiently within a team, handle the various false ceiling installation tools and materials and work responsibly.

1.2.4. Career Path of an Assistant false ceiling and dry wall installer

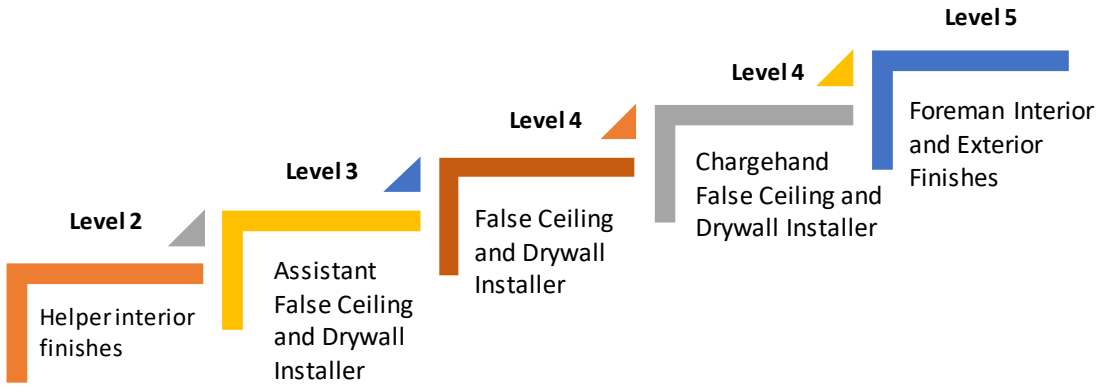

Fig. 1.2.1 Career path of an Assistant false ceiling and dry wall installer

Exercise

1. Show the career path of an assistant false ceiling and dry wall installer.
2. What are role and responsibilities of an assistant false ceiling and dry wall installer?
3. State few personal attributes required by an assistant false ceiling and dry wall installer.
4. What are the types of construction? Name them.

Notes

Scan the QR code to watch the video

https://youtu.be/Tfz2pWR8K6M

Assistant false ceiling and dry wall installer

2. Erect and dismantle temporary scaffold

Unit 2.1 Erect and dismantle a scaffold

(CON/N0101)

Key Learning Outcomes

By the end of this module, participants will be able to:

- Identify different components of scaffold.
- List tools, materials components required for erection of 3.6 meter scaffold.
- Erect a temporary scaffold up to 3.6 metres height.
- Dismantle and stack a temporary scaffold up to 3.6 metres height.

Unit 2.1 Erect and dismantle a scaffold

Unit Objectives

By the end of this unit, participants will be able to:

- Explain scaffolding and its purpose
- List the common materials and tools used for erection of scaffolding (pipe, cup lock (vertical and ledgers), H- frames, bamboo and balli.
- List the functions of different hand tools like hammer, spanner, pulleys, hooks, ropes, etc., used for erection/ dismantling of scaffolds.
- List the visual checks to be carried out on the scaffolding components to ascertain their usability.
- Explain the functions of materials, components and accessories used in scaffolding.
- Explain the methods adopted during the erection of the scaffold to ensure its safety.
- Explain various checks to be done on completion of erection of scaffolds, such as verticality check, stability check and so on.
- Explain the sequence and standard procedure to, dismantle the whole scaffold and stack their components.
- Select different components used in temporary scaffolding such as base, toe board, guard rails, platform, walkways and ladder.
- Demonstrate preparation of scaffolding base for a scaffold up to 3.6 m height.
- Demonstrate erection of a scaffold (up to 3.6 m height) using pipes and couplers/ cup lock system/ H frame using appropriate hand tools.
- Demonstrate the process of conducting verticality check, stability check and rigidity check.
- Demonstrate the dismantling and stacking of scaffold.

2.1.1. Scaffolding

A scaffold, also known as scaffolding or staging, is a temporary construction that provides a sturdy platform for working at height or in difficult-to-access areas.
These temporary constructions are frequently used to support work crews and materials during the construction, maintenance, or repair of buildings, bridges, and other man-made structures.

Benefits of scaffolding

Scaffolding has been used for thousands of years for a reason: it works. Scaffolding continues to be one of the most useful and efficient means of working at height.

Here are the principal benefits of use scaffolding for work at height:

- **Access.** Scaffolding can provide unobstructed, stable access to virtually any region of a structure.
- **Balance.** Scaffolds provide workers with stable footing, allowing them to maintain balance in a variety of operating situations.
- **Construction ease.** Scaffolding is generally simple to assemble and remove, and may be erected and dismantled quickly.
- **Long-lasting.** Whether they're composed of wood or steel, most scaffolding may last for an extremely long time.
- **Safety.** Safety is one of the most essential benefits of scaffolding, as it provides a stable working platform for personnel. The best option for work at height, however, is to reduce or even eliminate the requirement for a person to be there; in the final portion of this guide, we will discuss how drones can assist inspectors lessen their need to work at height.
- **Functions as a bridge.** A variety of construction tasks necessitate that workers take circuitous paths to reach specific areas, which is a major time waster. By shortening the distance that employees must go, bridging points on scaffolding can aid in solving this issue.

2.1.2. Uses of Scaffold

Nowadays, scaffolding is utilized for a variety of purposes. Here are some of the most prevalent applications for scaffolding:

- **Cleaning:** Workers frequently use scaffolding to clean windows and other components of tall structures.
- **Construction:** Scaffolding is essential for construction because it allows employees to stand on a secure surface at heights. This is notably true for skyscrapers and other high-rise structures, but it is also a typical practise for ground-level construction projects.
- **Occupational inspections:** Scaffolding is commonly used for inspections because it enables inspectors to reach inaccessible regions to conduct visual inspections and other NDT testing. Inspectors frequently employ internal scaffolding or other temporary structures for both internal and external inspections, such as those performed inside enormous industrial boilers or pressure vessels. Regardless of the type of inspection, the scaffolding serves the same purpose: to enable inspectors to stand at height and conduct a variety of tests to satisfy inspection criteria.
- **Maintenance:** Typically, inspections are the initial stage in a maintenance procedure, as they identify areas that may require maintenance. After these faults are discovered by inspectors, maintenance personnel will address them while standing on scaffolding.
- **Other uses:** Different types of scaffolding are also employed for:
  - Theatrical stages
  - Installations of art
  - Exhibition displays
  - Observation platforms
  - Observation stand seating
  - Shoring Ski ramps

2.1.3. Scaffolding Components

Here are all the scaffolding components:

- **Standards.** This structure comprises of vertical elements supported on the ground, on drums, or by ground anchors.
- **Ledgers.** The length of a scaffold bay is defined by tubes with a case wedge fixing device positioned horizontally between two standards and defining the length of the scaffold bay.
- **Braces.** The braces are attached to the standards diagonally.
- **Putlogs.** A putlog connects the wall under construction to the ledger. A putlog hole is drilled into the side of a structure to accommodate a putlog.
- **Transoms.** A transom is a sort of ledger putlog that both ledgers support.
- **Bridle.** Bridles are used to bridge an opening in a wall by supporting one end of the putlog that is used to build the wall.
- **Boarding.** Boarders function as horizontal platforms for supporting workers and materials throughout the construction process.
- **Guard railings.** A rail installed at the same height as the ledger.
- **Toeboard.** A parallel arrangement of boards supported by putlogs that provides protection at the level of the working platform.
- **Ladder scaffolding.** Using scaffolding ladders, employees can simply mount and descend the erected structure.
- **Scaffolding wheels.** Wheels at the base of the scaffold that facilitate its mobility from one location to another.
- **Cup-lock:** Cup-lock Scaffolding is a temporary framework utilized to support a slab, work crew, and materials during the construction, maintenance, and repair of buildings, bridges, and all other man-made structures. Cup-lock is a galvanized or painted, multipurpose steel scaffolding system that is excellent for giving general access and supporting vertical loads. All vertical standards and ledgers tubes are 48.3mm diameter with 3.00 or 3.20 mm thickness.
- **H Frames:** Due to its features, H-frame scaffolding guarantees significant labour and time savings. Essentially, the system consists of interconnected frames. One H frame is 2 metres high, whereas the length between two H frames is 2.5 metres. In addition, auxiliary factors are utilized in this system:

    - Metal plank
    - Stairs with or lacking a landing
    - Adjustable base jack
    - Adjustable support

- Inclined floors are levelled with the aid of screws with a variable length. Steel work platforms improve the safety and durability of scaffolding. Passageways between floors are secure inside scaffolding with some applications such as staircase or access ladder. The use of a scaffolding clamp in jacketing operations improves scaffold safety and facilitates its deployment.

- **Pipes:** Galvanized scaffolding pipes are the most durable type of steel scaffold tubes. There are three distinct variations of galvanized steel scaffolding pipes. Include E-galvanized scaffolding pipes, GI pipes, and hot-dip galvanized steel pipes. HDG scaffold tubes are another term for hot-dip galvanized scaffolding pipe.

- **Bamboo:** In China and Hong Kong, bamboo scaffolding has replaced steel for numerous reasons. In reality, bamboo has a higher tensile strength than steel. It is also considerably less expensive and fully eco-friendly.

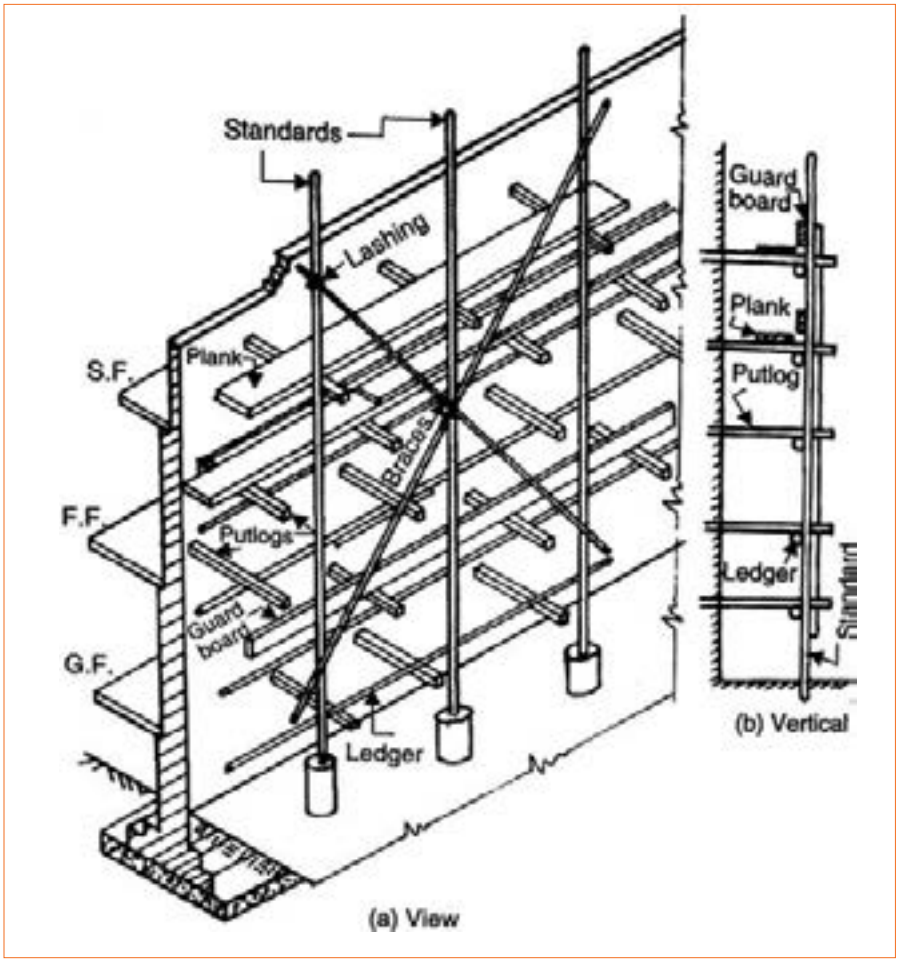

Fig. 2.1.1 Components of Scaffolding

2.1.4. Scaffolding Materials

Here are three of the most prevalent materials used to construct scaffolding:

- **Aluminum scaffolding.** Aluminum is commonly used for scaffolding because it is lightweight, sturdy, and highly corrosion-resistant.
- **Bamboo skeletons.** Since it is sturdy, flexible, lightweight, easy to work with, and abundant in certain places of the world, bamboo is an excellent alternative to steel. In Hong Kong, for example, bamboo is the most prevalent material used for scaffolding, and it is frequently repurposed from other applications to reduce waste.
- **Iron scaffolding.** Steel scaffolding is one of the most prevalent scaffolding materials. Although it is more expensive than bamboo or aluminium, it is quite sturdy and long-lasting, making it a perfect material for urban construction.

2.1.5. Scaffolding Erection and Dismantle

The erection and disassembly of scaffolding remains a hazardous task, not just for those performing the work, but also for other workers and the general public. The measures outlined in this guidance must be considered by everyone engaged in such activities. It is intended not only for scaffolding sector workers, but also for clients, planning supervisors, and general contractors. Listed below are a number of important considerations you must make to ensure the safety of scaffolding activities.

Scaffold Licenses

Before a scaffold can be placed on a public motorway, a permit from the local authority is required. Typically, an additional licence is required to instal a protective fan. A licence may stipulate lighting or painting requirements for a scaffold, or the maximum height at which a fan may be installed. For further guidance you should contact your local highway authority.

Protection of the public

During scaffolding activities, the public must be separated from both the work area and a suitable buffer zone.

- Obtaining a temporary pavement or street closure whilst operations are carried out;
- Carrying out operations during “quiet” hours, i.e. early morning, late evening, or weekends;
- Incorporating fans, crash decks, and “tunnels” as early as possible into a scaffold;
- Erecting barriers and signs and diverting the public away from operations;
- Storing scaffold clips and other loose material safely on the scaffold; and
- Not raising or lowering the scaffold during

Also remember that disabled individuals require proper access along scaffold-covered sidewalks.

2.1.6. Scaffolding Erection

Scaffolding is frequently required for building and home maintenance. Set up scaffolding correctly to ensure your safety and the safety of those utilizing the equipment. A lapse in scaffolding erection could result in a serious accident. The use of scaffolding is an alternative to ladders. In comparison to a ladder, scaffolding provides a bigger working space and greater manoeuvrability. It provides a walking surface and a place to set your tools. This significantly reduces work hours.

Here is a summary of the processes necessary to construct scaffolding:

- **Establish the foundation.** The scaffolding should be constructed on flat, stable ground. Attach the scaffolding to base plates or mud sills for stability; if you are on an uneven surface, you may need to dig down to level the soil.
- **Level it.** Ensure the scaffolding is level by adjusting the screws. If the terrain is steeply sloping, you may need leg extensions.
- **Consider casting devices.** If you intend to move the scaffolding from one location to another, it should incorporate wheels. Ensure that the casters are locked before installing the item.
- **Guarantee good assembly.** The scaffolding ends must be constructed correctly. First, raise one end portion, then connect the upper cross brace. To attach the upper cross brace of the second end piece, you must support the end by lifting the far end of this brace. Finally, secure the ends of the cross braces to the bottom of the opposing end frame.
- **Place the planks.** Place the planks over the scaffold bar and secure them in place using the provided hardware.
- **Identify access.** Consider accessibility when constructing a scaffold. If ladders are used for access, ensure that they are suited for the exact scaffold you are using and do not offer any other safety risks.
- **Mount guardrails.** Due to the height of the equipment and the risk of falling, guardrails must be installed on all scaffolds. Additionally, you should think about fall prevention measures, such as tie-offs.
- **Observe it**. Inspect the scaffolding thoroughly to ensure that it is safe for use. Ensure that all scaffolding components are secure by reviewing the setup properly. After leaving and returning to the site, always verify the scaffolding to ensure that it is still safe.

2.1.7. Hand Tools used in Erection/Dismantle

The following hand tools are used in erecting or dismantling the scaffold:

1. Hammer: A hammer is intended to deliver a large amount of force in a compact area. It is a long wooden stick connected to a metal block. The hammer is circular on one side and sharp on the other. The hammer is your closest friend whether you need to hammer something into place or smash something. However, ensure that the weight is appropriate for the user. When selecting a hammer, one must carefully consider the available sizes and weights.

Fig. 2.1.2 Hammer

2. Spanner/Wrench: A spanner is utilized to grasp and rotate items. Aside from plumbing, these instruments can also be used to assemble furniture or repair bicycles by loosening or tightening nuts and bolts. There are numerous types of spanners, including those with closed ends, open ends, and adjustable ends.

Fig. 2.1.3 Spanner/Wrench

3. Pulleys: A pulley is a simple machine composed of a rope and a wheel with grooves. The rope fits into the wheel's groove, and pulling on the rope causes the wheel to rotate. Generally, pulleys are used to raise objects, particularly heavy ones. The item lifted by a pulley is referred to as the load.

Fig. 2.1.4 Pulley

4. Hooks: A double-action aluminium scaffold hook typically used in conjunction with a fall arrest safety lanyard for rapid attachment to scaffolding or steel structures.

Fig. 2.1.5 Hooks

5. Ropes: Bundles of scaffolding rope coir yarn. In shapes such as bales, spools, dholls, and ropes. Cut to lengths suitable for both industrial and agricultural applications. Material used in the production of PVC-tufted pile carpets and mats, wall-to-wall carpets, and doormats. Support for hop plants and scaffolding erection for construction operations. Depending on the twist of the yam and the type of fibre used, a variety of characteristics suitable for various applications are available.

Fig. 2.1.6 Scaffolding rope

2.1.8. Safety Checks

1. Vertical Safety Check: Checking verticality would be required at various stages of building construction, such as when constructing vertical column formwork and transferring levels up consecutive floors of multi-story constructions. Several ways for controlling or inspecting verticality work in building construction are discussed.

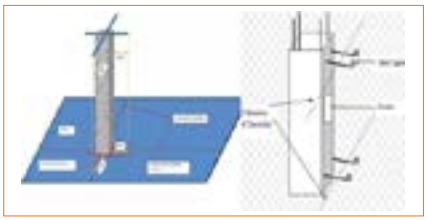

Fig. 2.1.7 Vertical Scaffolding Check

Methods used to check or control verticality works include:

a. Plumb-bob technique
b. Spirit level
c. Theodolite
d. Optical plummet

Fig. 2.1.8 Plum Bob Technique

a. Plumb-Bob Technique

As depicted in the illustration below, a plum-bob consists of a weight with a pointy tip attached to the end of a string. The heavy object will hang under the force of gravity and provide an exact vertical line, known as a plumb line.

This method is used for verifying or controlling the vertical alignment of structural elements, particularly inside, such as lift shafts. In addition, it controls the verticality of the foundation, walls, and columns.

The plumb line or vertical line of a plumb-bob will lose its accuracy and precision when subjected to wind force. Small to moderate lateral movement of the plumb-bob can be effectively minimized by soaking it in oil or water. If the height of the structural member is high, it is conceivable to replace the string with a long wire, but substantial precautions must be taken to avoid endangering the workers below.

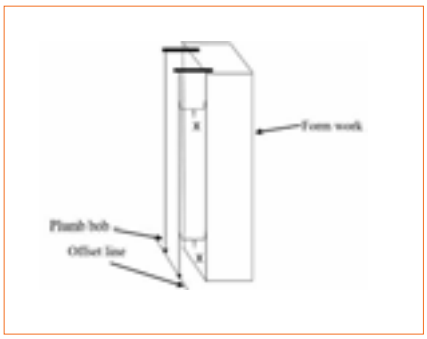

Fig. 2.1.9 Checking Verticality of Columns

b. Spirit Level Method

This device is suitable for managing the verticality of small-scale construction projects, such as examining door frames and formwork. If a spirit level is used for approximate inspections, then a more precise technique must be used to evaluate the verticality.

Fig. 2.1.10 Spirit Level

c. Theodolite Method

The theodolite is an extremely potent equipment that may be used to check the verticality of construction projects with high precision and accuracy. It is appropriate for verifying or managing the verticality of towers walls, foundations, and columns, particularly a large number of columns along a single grid line. Using a Theodolite in conjunction with a tape, it is possible to measure the slope of the member's out-of-plumb line. The process for verifying column verticality comprises:

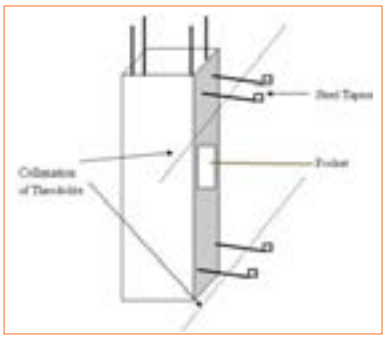

Fig. 2.1.11 Checking Verticality Using Theodolite

Install the digital Theodolite so that it is positioned on a peg that is 500 mm from the column grid.

After Theodolite has been precisely positioned, the laser beam will be activated and focused on the steel tape that is attached to the formwork.

Put the steel tape's reading via the telescope.

Take the readings of two spots at the same level on both the upper and lower formwork levels. By taking two measurements at the same level, any surface curvature can be determined. The figure below illustrates these steps.

d. Optical Plummet Method

It is a device that can look directly up or directly down. In comparison to previous methods utilized for managing verticality, the optical plummet's automatic compensator substantially improves its accuracy.

Fig. 2.1.12 Optical Plummet

2. Stability Check: Under each foot's contact with the ground, stabilize the scaffolding with solid, flat wood planks. This will prevent your scaffolding from becoming uneven and sinking into muck. Add weight and bracing to prevent the device from toppling.

2.1.9. Safety Check before Dismantling

Safety must always come first in scaffolding and the construction business. Because disassembling a scaffold is just as tough as assembling one. Therefore, one must first devise a plan for disassembling your scaffold. Before dismantling a scaffold, one should always begin by doing a comprehensive inspection. One may continue as follows:

One may continue as follows:

Step 1: Check the stability and statics of the scaffolding. All scaffolding components should continue to be firmly attached to one another. If individual components have been removed or badly damaged throughout the scaffold's service life, they must be replaced for safe dismantlement.

Step 2: Check whether the scaffolding decks are still firmly in place.

Step 3: Verify the stability of all anchors and fasteners on the scaffold.

Step 4: Check the type of fall protection required during disassembly and install it.

Ensure that no unsecured building materials or tools remain on the scaffolding. In the worst-case scenario, these could fall during disassembly and injure those below.

All of these stages are fundamental to a proper scaffold inspection.

2.1.10. Dismantling the Scaffold

Once the scaffold has passed all safety inspections, then can begin disassembling it. Again, one should continue methodically:

Step 1: Make space for the disassembled scaffolding components.

Create a nearby storage area for the disassembled scaffolding components. During disassembly, individual scaffold components should be taken off the scaffold and set away for subsequent inspection. In addition, there must be an access route for the vehicle that will transfer the scaffolding materials away from the construction site.

Step 2: Put safety equipment

Wear the appropriate protective clothes. This comprises PPE, such as safety shoes, a helmet, and gloves, as well as any other safety equipment necessary by the project.

Step 3: Remove scaffolding components from the top to the bottom

Logic dictates that disassembly should occur in the reverse sequence of assembly, from top to bottom. Before disassembling the scaffold decks, remove the tubes and safety railings first. During disassembly, scaffolding components should not be stored on the scaffold, but rather transferred immediately to the ground. This can be accomplished by reaching down to a colleague or by carefully lowering using a rope system or similar device.

Step 4. Remove scaffolding anchors

Stability must also be maintained at all times during scaffold disassembly. Therefore, remove the anchors only after disassembling the complete platform.

Step 5: Check the scaffolding components

After disassembling all scaffolding components, properly inspect them. Defective scaffolding components may cause injury, so any components that cannot be fixed must be set aside for disposal. All undamaged or reparable scaffolding components must be stored properly for transfer off-site.

Exercise

1. Explain scaffolding and its uses.
2. Name any 5 scaffolding components.
3. Explain the steps required for dismantling the scaffold.
4. Name the hand tools used in erection or dismantling of scaffold.

Notes

Scan the QR code to watch the video

https://youtu.be/96shGh3rfXw
Scaffolding

https://youtu.be/5Vj-MosphpY
Uses of Scaffold

https://youtu.be/OKawvyUhUkA
Scaffolding Erection and Dismantle

https://youtu.be/AoDWOZE8Wb4
Safety Checks

3. Hand and power tools relevant to installation of false ceiling and dry wall

Unit 3.1 Hand and power tools used in false ceiling and dry wall installation

(CON/N1105)

Key Learning Outcomes

By the end of this module, participants will be able to:

- Use hand and power tools used for false ceiling and dry wall installation works.
- Transfer levels using various levelling tools.

Unit 3.1 Hand and power tools used in false ceiling and dry wall installation

Unit Objectives

By the end of this unit, participants will be able to:

- Identify various hand and power tools used in false ceiling and dry wall installation works.
- Discuss the standard size and specification of tools relevant to false ceiling and dry wall installation.
- Explain the basic functions of various hand and power tools relevant to false ceiling and dry wall installation works.
- List various different levelling tools used for transfer of levels.
- Select and use different type of hand and power tools used in false ceiling and dry wall installation works.
- Perform checks for serviceability and safety of tools and equipment.
- Demonstrate the use of levelling devices such as spirit level, water level and straight edge.
- Demonstrate set out using relevant tools.

3.1.1. Hand and Power tools

Tools that aid construction workers, carpenters, and other manual labourers in their work are referred to as hand tools or power tools, depending on whether they are operated manually or electrically. While hand and power tools are very helpful, they also provide a number of physical risks that, if not avoided, can result in minor and serious accidents.

Hand and Power Tool Safety

Without the aid of manual and power tools, no industry can prosper. However, employees and safety experts must make sure that the proper safety precautions are regularly used due to the inherent risks involved in their use. According to OSHA, the following are the five fundamental safety guidelines for avoiding risks related to the use of hand and power tools:

i. **Keep all tools in good condition with regular maintenance:** To maintain the equipment's dependability and safety throughout usage, regular maintenance is crucial. Regular tool inspections are necessary to reduce the risk of accidents caused by broken machinery and to avoid unplanned downtimes, which have a detrimental effect on operational effectiveness.

ii. **Use the right tool for the job:** Depending on their intended use, hand and power tools are constructed differently. It's important to select the right tool for the work in order to prevent accidents and injuries. For instance, employing a chisel in place of a screwdriver could result in the tip breaking and flying off, perhaps leading to eye damage.

iii. **Examine each tool for damage before use and do not use damaged tools:** Before beginning work, hand and power tools need to be checked and inspected in order to find broken or malfunctioning equipment. Both minor and serious injuries, such as cuts, punctures, blindness, electrical shock, and skin infections as a result of scrapes and abrasions, can be brought on by damaged equipment.

Making ensuring that employees never use instruments that are damaged is one of the employers' duties. Equipment should make it simple for workers to complete their tasks and shouldn't endanger them. Tools that are broken might be dangerous and could endanger your company.

iv. **Operate tools according to the manufacturers' instructions:** Employees can be guided by equipment manuals on how to handle and use tools properly. To prevent improper tool usage that results in otherwise avoidable mishaps, employees should read and follow the manufacturer's instructions.

v. **Provide proper personal protective equipment (PPE):** By lowering the overall physical risks brought on by power equipment, PPE aids in guaranteeing employee safety. To prevent physical contact with combustible materials that could result in burns, blindness, respiratory conditions, or other serious health issues, all personnel are required to wear the proper PPE when working around flammable gases, volatile liquids, or other explosive materials.

3.1.2. Tools used in false ceiling installation

1. **Drill machine:** The simplest, most versatile, and accurate machine tool found in virtually all manufacturing facilities and tool rooms is the drilling machine. Since drilling primarily serves to create holes in the workpiece, it might be considered a single-purpose machine tool. A drilling machine is a particular kind of machine that uses a spinning instrument called a drill bit or twist drill to create holes on the workpiece.

Fig.3.1.1 A Drill Machine

2. **Taping Knife:** Taping knives are an essential component of every drywall professional's toolkit. They are used for mud application, finishing, laying tape, and other tasks. A genuine workhorse, most jobs would be impossible to complete without a taping knife.

Fig.3.1.2 A Taping Knife

3. **Scaffolding ladders:** A scaffolding ladder is a piece of scaffolding equipment that allows a worker to move from one level of a scaffolding structure to another. Depending on the needs of the builder and the type of scaffolding utilised, this scaffolding ladder can be fixed on the outside or inside of the structure.

Fig.3.1.3 A Scaffolding ladder

4. **Self-levelling laser:** A pendulum system and an internal magnet are used in a self-leveling laser. The two systems collaborate to maintain a level reading independent of the surrounding land or floor. The type of laser utilised may project vertical and horizontal lines or a single dot upon a wall or feature.

Fig.3.1.4 A Self-levelling laser

5. **Rawlplug:** A Rawlplug, also known as an anchor or wall plug, is a fibre or plastic (originally wood) insert intended to allow the connection of a screw in material that is porous or fragile or that would not otherwise hold the weight of the object attached with the screw.

Fig.3.1.5 A Rawlplug Set

6. **Electric drill with clutch attachments:** An electric drill is a tool that uses an electric motor to revolve a changeable drill bit to create a hole in wood, plastic, or metal. An electric drill with clutch attachments features a clutch that serves the same purpose as a car's clutch. The clutch on the drill allows the user more control over the amount of torque applied to a screw, preventing it from sinking too deeply, tearing away the head of a screw, or even breaking the screw shaft.

Fig.3.1.6 An Electric drill with clutch attachments

7. **Circular saw:** A circular saw is a tool for cutting a variety of materials such as wood, stone, plastic, or metal. It can be hand-held or machine-mounted. The word "circular saw" in woodworking applies specifically to the hand-held variety, with the table saw and chop saw being additional prevalent types of circular saws.

Fig.3.1.7 A Circular Saw

8. **Cutting tool:** A cutting tool, also known as a cutter, is a hardened metal tool that is used to cut, shape, and remove material from a workpiece using machining tools and abrasive tools via shear deformation.

Fig.3.1.8 A Tin Snip Tools

9. **Line Dori:** A Line Dori, also known as Line Thread, is an essential piece of equipment for any person in construction industry. Often a line dori with a diameter of 3 millimetres is used. There is a layer of wax utilised. These days, nylon line thread is employed, and its diameter can range anywhere from 1mm to 2mm.

Fig.3.1.9 A Line Dori

10. **Straight edge:** A straight edge provides a firm guide for marking, working, and cutting in straight lines. It is a critical component in ensuring precision on any work. Straight edge tools made from steel or aluminium are often the best. Steel is used when a heavier duty product is required. Aluminium for something lighter but no less precise.

Fig.3.1.10 A Straight Edge

11. **Spirit level:** A spirit level is a tool for measuring the level of surfaces, notably tabletops. A spirit level is a basic bubble instrument. It's an angular measurement device in which the bubble always rises to the highest point of a glass vial fixed to the top surface of the Spirit Level. The Spirit Level is easy to calculate; simply monitor the movement of the bubbles.

Fig.3.1.11 A Spirit Level

12. **Tube Level:** A Tube Level is just a clear plastic tube filled with a column of water. It is used to move a vertical level over a long distance. It operates on the premise that water seeks its own level. The water surfaces will always rest in the same vertical plane when the two ends of the tube are held up.

Fig.3.1.12 A Tube Level

13. **Connecting Clip:** Connecting clips are used to join the ceiling or U section to the intermediate channel or tube portion.

Fig.3.1.13 A Connecting Clip

14. **Joint Paper Tape:** Joint tape is a substance that is used to finish drywall joints before painting. Putting up drywall is a reasonably simple operation, but prepping the joints for painting is a bit more difficult, assuming you don't mind a sloppy-looking wall. Taping is the technique of smoothing out the joints so that they are undetectable after painting. It entails applying joint tape over the joints.

Fig.3.1.14 A Joint Paper Tape

15. **Plumb Bob:** Plumb bob is a basic tool used by bricklayers to build any vertical bricklaying task. It is typically available in mild steel with a coating weighing 30-40 gms. The plumb bob is a pointed weight connected to a line length enclosed within the bob and fixed in a slot in the lid.

Fig.3.1.15 A Plumb Bob

16. **Line Marker/Pencil:** Measurements of the main wall's condition and safety are taken while the wall is being installed. The line on which the curved silhouettes need to be set is marked using a pen, marker, or pencil before the setting process begins.

17. **Stud Interlocking Tools:** The stud-frame tool has been designed so that it can accept a stud on one end and a top plate or bottom frame plate on the other. This allows the tool to facilitate the easy placement, square-alignment, and fastening of a stud to a plate, which ultimately results in no edges that are not aligned properly. Powder coating with thermoplastic or thermoset polymer serves to protect the tool surface and minimise chipping and scratching.

Fig.3.1.16 A Studding Set

18. **Chisel:** Wood, stone, and metals can all be cut, chopped, and shaped with the help of chisels. Chisels have a long, metal blade with sharp edges and a handle made of wood, metal, or plastic. You can use a hammer or mallet to strike the back of the chisel in order to crave, cut, or shape a material. In industries where work is done with wood, metal, and stone, chisels are the most often used hand tool. Due to use, chisels will dull over time. Chisels need to be sharpened frequently to cut or chip effectively.

Fig.3.1.17 A Chisel

19. **Hammer:** A hammer is a tool, typically a hand tool, that has a weighted "head" attached to a long handle and is used to strike a specific area of an item. A tool with a weighted head connected to a long handle is called a hammer. A heat-treated steel is typically used for hammer heads (for surface hardness). A hammer's handle is often constructed of wood.

Fig.3.1.18 A Hammer

20. **Hacksaw:** a hacksaw designed specifically for cutting metals that has a frame and a small, fine-toothed blade. The majority of hacksaws are hand saws with a walking frame in the shape of a C that keeps a blade under tension. These hacksaws feature pins on the handle, which is often a pistol grip, for fastening a thin disposable blade. To fit blades of various sizes, the frames may also be movable. The thin blade is tensioned using a screw or another device.

Fig.3.1.19 A Hacksaw

21. **Crimping Tool:** By deforming one or both of the pieces to hold the other, a process known as "crimping" is used to unite pieces of metal or other ductile material. The device used to bend the material and establish the connection is a crimping tool. The fittings that use this technique to connect to the wire are known as "crimp connectors," and they typically feature an insulated sleeve linked to a metal connector.

Fig.3.1.20 A Crimping Tool

22. **Screw Driver Set:** A screwdriver is a necessary instrument that may be used to tighten or loosen screws as well as install and remove them. It usually has a large, lengthy shaft that is attached to a screw head. When the screw head is put into the screw, the screw can then be tightened or loosen by spinning the screwdriver.

Fig.3.1.21 A Screwdriver Set

23. **Screws:** Things like metal or wood pieces can be held together with the use of screws. Screws offer greater strength and holding capability than regular nails. They create a tighter seal as well. Additionally, they can be taken off rather simply, unlike nails.

Fig.3.1.22 Screws

3.1.3. Tools used in dry wall installation

1. **Drywall Knife:** One of the first things your employees ought to prepare before heading out on a task is a drywall knife. Using these flat blades, drywall mud is applied over seams so they may be sealed. For various places, several sizes are employed. For instance, 6-inch knives are more frequently used for initial applications whereas 12-inch knives are more frequently used for final coats.

Fig.3.1.23 Drywall Knives

2. **Drywall Lifts:** If there are several people working on a project, this is not necessary, but occasionally you might need the extra support. When there is only one person available, this device aids in lifting drywall sheets into position.

Fig.3.1.24 A Drywall Lift

3. **Foot lifter:** A foot lifter is a lever that raises drywall panels off the ground so that lifting them is simpler. It lifts all common size drywall sheets and is built of metal for durability and strength. For simple carrying, the majority of drywall foot lifts may fit in a pocket or tool pouch.

Fig.3.1.25 A Foot Lifter

4. **Jab Saw:** Jab saws are one of those instruments that serve a very narrow yet crucial purpose. In this instance, it is used to cut drywall holes that are typically 6 to 8 inches long.

Fig.3.1.26 A Jab Saw

5. **Electric drywall saw:** It is the jab saw in a bigger, more imposing form. This is used to quickly and powerfully cut through huge drywall sheets rather than drilling holes in them.

Fig.3.1.27 An Electric Drywall Saw

6. **Utility Knife:** This instrument, which should not be confused with the drywall knife, is a generic all-purpose tool that every contractor ought to have for any project, regardless of whether or not it involves drywall.

Fig.3.1.28 Utility Knives

7. **T-square:** This is already known to carpenters to provide the most precise cutting. However, the T-squares used by carpenters are too small for drywall work. T-squares for drywall are around 4 feet long.

Fig.3.1.29 A T-Square

8. **Tape Measure:** Compared to simple measurement instruments, a tape measure provides more precise measurements.

Fig.3.1.30 A Tape Measure

9. **Dust Mask:** No matter how good one is at the job, drywall dust will be stirred up while working. A mask prevents dust particles from entering your lungs.

Fig.3.1.31 A Dust Mask

10. **Drywall corner knife:** While a standard drywall knife will do the majority of the job in terms of material application, these specialty knives have a 90-degree slant to make things easier.

Fig.3.1.31 A Dust Mask

11. **Drywall mud pan:** A mud pan is an efficient technique to keep your knife clean when installing drywall by eliminating extra material from your drywall knife.

Fig.3.1.33 A Drywall Mud Pan

12. **Carpenter's pencil:** Carpenter's pencils assist in adding additional lines to keep track of the job while making all of the measurements to put together a drywall installation.

Fig.3.1.34 A Carpenter's Pencil

13. **Texture Sprayers:** While sanding can help with the finish, there are occasions when a more precise texture for the final drywall is desired. A texture sprayer can achieve this quickly.

Fig.3.1.35 A Texture Sprayer

14. **Drywall Screws:** Drywall screws are the most cost-effective method of securing drywall. For most drywall applications, 5/8-inch screws are recommended.

Fig.3.1.36 Drywall Screws

15. **Drywall Screw Gun:** Rather than placing screws one at a time, this tool allows you to quickly fasten and hang drywall. For greatest versatility, a cordless drill should be used for this task.

Fig.3.1.37 Drywall Screw Gun

16. **Sanding Sponges:** These sponges are typically used for touch-ups after the wall has been placed in order to achieve a consistent surface. The majority of sponges have one rough and one smooth side. Because they are easier to handle and manage, these are often preferred over sanding sheets.

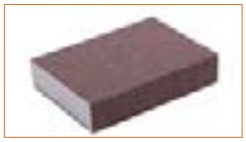

Fig.3.1.38 A Sanding Sponge

17. **Corner Sander:** This, like the corner drywall knife, ensures a more consistent sanding finish in the corners of rooms.

Fig.3.1.39 A Corner Sander

Exercise

1. List the various levelling tools used in false ceiling and drywall installation.
2. List and describe the different types of saw used in false ceiling and drywall installation.
3. Explain the fundamental safety guidelines for using hand and power tools.
4. Match the following:

S.No	Tool Image	Tool Name
1		**Jab Saw**
2		**Drywall Screw Gun**
3		**Drywall Lifts**
4		**Circular Saw**
5		**Plumb Blob**

Notes

Scan the QR code to watch the video

https://youtu.be/nNh9wiKIAFE
Hand and Power tools

https://youtu.be/z8tDhkRmnMA
Tools used in false ceiling installation

https://youtu.be/KpPb1sklA1E
Tools used in dry wall installation

4. Cut the boards for false ceiling and dry wall installation

Unit 4.1 Cut the boards for false ceiling and dry wall installation

(CON/1106)

Key Learning Outcomes

By the end of this module, participants will be able to:

- Measure and mark the gypsum, plaster, fiber and composite boards for cutting to required dimension.
- Cut the measured boards using correct tools as per marking.

Unit 4.1 Cut the boards for false ceiling and dry wall installation

Unit Objectives

By the end of this unit, participants will be able to:

- Interpret sketches related to measuring and marking of the boards
- Describe the standard size and specification of gypsum boards and plaster board panels
- Describe the standard practices of measuring and marking of the boards for installing false ceiling and dry wall finishes.
- Describe the process of calculating area and layout of board to be cut.
- Interpret the method statement of cutting of boards as provided by superiors.
- Describe the process of storage of cut sheets for optimum utilization.
- Describe the use of filing device such as drywall rasp, etc. for trimming of rough edges of board.
- Demonstrate measuring of the gypsum, plaster, fiber and composite boards using tape measure, straightedge or square and other similar tools to required dimension.
- Demonstrate the use of appropriate PPE's required for reducing the dust exposure during cutting of boards.
- Demonstrate marking and cutting of the gypsum, plaster, fiber and composite boards using correct tools and equipment as per markings following manufacturer's specifications.
- Demonstrate filing of the cut boards using appropriate tools.
- Demonstrate the proper storage of cut sheets to facilitate optimum utilization.

4.1.1. Drywall and False Ceiling

Drywall and false ceiling are two common construction materials used for renovating and building homes. While the two materials may look similar, they have very different properties and functions.

Drywall

Drywall is a sheet of gypsum board used to construct interior walls and ceilings. The sheets are made of a mineral-based core and paper covering, which is then treated with a fire-resistant coating. It is very easy to install and can be painted or textured to match any interior style.

The most common type of drywall is ½-inch-thick sheets, though thicker and thinner varieties are available. standard sizes for drywall are 1/2 inch and 5/8 inch. The 5/8-inch boards are made with a thicker core of gypsum and are better for walls and ceilings that are more likely to get damaged, like in commercial settings. Panels made of plaster board, on the other hand, can be anywhere from 4 to 12 feet long and 8 to 16 feet wide. Plaster board panels usually have a thickness of 1/2 inch, but some may be 3/8 inch. All of the panels have tongue-and-groove edges that make them easy to put up. Drywall is used in residential and commercial buildings and is typically used in areas where fire protection is required.

False Ceiling

A false ceiling, also called a suspended ceiling, is a secondary ceiling installed beneath the original ceiling. The false ceiling is typically comprised of lightweight panels made from suspended metal frames and insulation material. False ceiling panels are available in various shapes and sizes and can be used to create various aesthetically pleasing designs.

False ceiling panels are designed to absorb sound, reduce heat gain and improve the overall acoustics of the room. A false ceiling is put up on supports that hang from the roof slab. Most of the time, false ceilings are used to control the temperature (heat insulation for AC), to put in lights, or to hide ugly or too high ceilings or electrical and networking cables. They're also great for hiding ductwork, cables, and pipes.

The Difference

The main difference between drywall and false ceiling is the thickness and function of the material. Drywall is thicker than false ceiling and is primarily used to construct interior walls and ceilings. False ceiling is thinner and is used to improve the aesthetics and acoustics of a room.

Drywall is also more fire-resistant than false ceiling, making it a great choice for areas where fire safety is a concern. False ceiling is typically used in areas where sound absorption and heat insulation are a priority.

4.1.2. Preparing for Installation

The following steps are important in the post-installation process of false ceiling and drywall:

1. **Ensuring the availability of the right PPE (Personal Protective Equipment):** No matter how large or small the construction job, safety and being prepared are the top priorities. Before beginning, ensure that the appropriate personal protective equipment, such as helmets, mask, safety vests, goggles, safety gloves, and safety shoes, are readily available at the work site.

Fig. 4.1.1 Personal Protective Equipment (PPE)

2. **Interpreting the sketches:** The interpretation of sketches is a crucial stage in achieving the desired result. Understanding the room's dimensions is the first stage since they will influence the size and design of the artificial ceiling. It is crucial to distinguish between the sketch's structural and purely decorative aspects in order to decide on the false ceiling's materials, finishes, and lighting needs. It's also crucial to carefully examine the schematic, which includes all the measurements and directions, including the fake ceiling's height, the quantity of panels, and the connectors that should be utilized. Once all the necessary information has been acquired, it will be feasible to start building the false ceiling, making sure to follow all safety procedures and making any necessary modifications to guarantee that the false ceiling complies with the sketch's specifications.

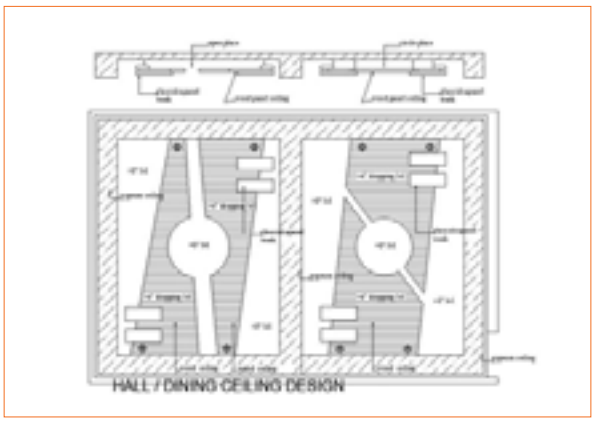

Fig. 4.1.2 A False Ceiling Sketch

3. **Determining that the necessary tools are available:** Having the right tools available during construction is essential for any successful project. Not only do the right tools help ensure that the job gets done quickly and safely, but they can also help to minimize costs and maximize efficiency.

   When selecting the tools for a project, it is important to consider the type of work that will be done and the materials that will be used. If a project requires a specialized tool, it is important to acquire it before beginning construction.

   It is also important to make sure that the tools are in good condition. Old and worn tools may not work properly, leading to potential safety hazards or inferior work. Additionally, if the tool is too small or too large, it can cause problems with accuracy. For this reason, it is important to take the time to inspect the tools and ensure that they are the appropriate size and in good condition.

4.1.3. Process of False Ceiling and Drywall Installation

Step 1: Selection of Dry Wall and False Ceiling for the Room

The selection of drywall for the inside walls is based on the dimensions, thickness, and type of drywall.

- **Dimension:** A drywall panel is typically 4 by 8 inches in size, however bigger panels can also be used.
- **Thickness:** The specifications for the thickness of the drywall panels are provided by the local building code. The thicknesses that are frequently on hand are 14, 12, 3/8, and 5/8 inches. According to the standard codes, different applications call for different depths.

  The 5/8 inch model is the heaviest and most soundproof of the three. The 1/4 inch panels are utilised for curving walls and arches, while the 3/8 inch panels are used to cover the existing walls.

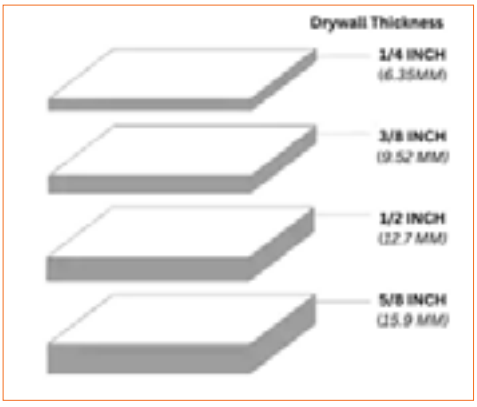

Fig. 4.1.3 Thickness of Drywall

- **Material:** The drywall material is chosen based on the setting in which it will be installed. For instance, “green rock” drywall is a kind of drywall made to be more moisture resistant in spaces like restrooms and garages.Based on their intended uses, chosen materials, look, and visibility, false ceilings can be classified into a wide variety of categories. Following is a basic list of the main categories on the basis of the materials used.

- **Gypsum False Ceiling:** A calcium sulphate that has been hydrated is gypsum false ceiling. Lightweight, sound-absorbing, fire-resistant, soft, and thermally insulated are all characteristics of this type of false ceiling.

Fig. 4.1.4 Gypsum False Ceiling

- **Plaster of Paris ceiling:** In the creation of false ceilings, plaster of Paris (POP) is the primary material employed. These kinds of false ceilings provide the ceiling a smooth finish in addition to covering unsightly structural components like ventilation ducts and conduits.

Fig. 4.1.5 POP Ceiling

- **Fiber False Ceiling:** Due to their low cost and simple installation, fibre false ceilings are much sought after for use in the construction of false ceilings. The synthetic and natural minerals used in the production of fibre ceiling panels are man-made.

Fig. 4.1.6 Fiber False Ceiling

- **Wooden False Ceiling:** Due to its natural textures and patterns, wooden false ceiling is used. It is costly, hence not used in shopping centres or hospitals, but it can be erected in homes.

Fig. 4.1.7 Wooden False Ceiling

- **Glass False Ceiling:** False ceilings made of glass are one form that is frequently used in building. It is a translucent, non-crystalline substance that is brittle.

Fig. 4.1.8 Glass False Ceiling

- **Metal Ceiling:** Metal false ceiling largely uses metal since it is a strong and long-lasting material. The gleaming sheen that results from polishing a metal surface is a visual pleasure. Aluminum and galvanised iron are the metals used in this.

Fig. 4.1.9 Metal Ceiling

- **Cloth or Synthetic Leather Ceiling:** This sort of ceiling is made out of either leather or cloth. These are only used in temporary tents or other temporary structures since they accumulate dust and have poor light transmitting capabilities.

Fig. 4.1.10 Cloth Ceiling

Step 2: Inspection and Preparation of Installation Site

The site is thoroughly cleaned and prepped for installation. Old drywall, screws, and nails are removed in order to prepare for renovation work. All undesirable components that prevent the installation of fresh drywall sheets are eliminated and cleated.

The surface preparation aids in keeping the board flat across the surface. Check the area for any concerns that could hinder the installation, such as moisture damage, termites, loose blockage, or other problems. The drywall can be put over steel or wood studs. Steel studs are stronger, termite- and fire-resistant, and they also last longer. Both steel and wooden studs require the use of drywall screws during installation.

Examine the insulations for rips and damage if any are present. Kraft tape can repair a tear in insulation. Before beginning to hang the drywall, finish all the insulation work. Triple-expanding foam can be used to fill in any gaps or cracks on the outside walls. Always go with foam that is firm, non-shrinking, permanent, waterproof, or water-resistant. Applying foam near the doors or windows is not recommended.

Step 3: Measuring the Board

When it comes to measuring and cutting boards, the instructions provided by superiors must be strictly followed. This includes using the correct tools and equipment, as well as following all safety procedures.

Fig. 4.1.11 Measuring and Cutting of the Board

The installation procedure involves measuring a range of gypsum, plaster, fibre, and composite boards. Numerous equipment, such as tape measure, straightedge, or square, can be used to take precise measures. The measurements can be acquired in a variety of methods depending on the size and shape of the board. For instance, measurements can be made along the length and width of a rectangular board. If it is round, the radius may be determined, however, a board with an irregular shape can have various locations measured. Multiple precise measurements can be taken so that the boards can be cut to the necessary size and form.

Step 4: Cutting of Board

- Simple cuts can be made to boards either longitudinally or widthwise. Before cutting, a line is drawn with a pencil or line marker. Using a cutting knife, cutting should be done on the board's front face.

- The gypsum core will break precisely along the line of the cut on its side face if both hands are simultaneously applied to the board. The board is then turned over, and the cutting knife is used to cut the paper on the opposite side as well.

- The need for a circular handsaw only arises when large amounts of board cuttings are needed; otherwise, boards may be easily cut with a regular saw and curves can be cut with an electric tool.

- Before drilling up to 60 mm to 80 mm with a high speed drill, circular holes for electrical plates, cables, and fasteners must first be marked. Use normal carpentry or electrical tools to make all cutouts.

Step 5: Trimming the rough edges

After the board has been cut, levelling requires clean planing to eliminate the imperfections of the board edges. Drywall rasps are useful for trimming the rough edges of boards quickly and efficiently. They are hand-held tools that are shaped like files and are usually made of steel. To use a drywall rasp, hold it firmly in one hand and move it in a sawing motion against the edges of the board. The rasp will quickly and easily remove any splinters, jagged edges, or excess material that could be a potential hazard. Keep in mind that the rasp will not create a smooth finish on the board, as it is designed to only remove material. To achieve a smoother finish, use sandpaper or use a block plane.

Fig. 4.1.12 A Drywall Rasp

Step 6: Handling and Storage

Only competent manual labourers are permitted to unload false ceiling boards. Avoid lifting the boards by their short edges and avoid holding them in a horizontal position. Carry the boards from the edges, supporting the top edge and holding on to the long edge to prevent it from breaking.
For optimum utilization of cut boards, proper storage methods are essential. It is important to take the necessary precautions to ensure that the boards remain in good condition and don't incur any damage during transport or storage.

To start, the boards should be covered with protective packaging such as plastic or bubble wrap. This prevents dust, dirt, and other debris from settling on its surface and reduces the possibility of water damage. Additionally, the boards should be labeled with information regarding its size, type, and other details.

Once the boards are properly covered, they should be transported to their designated storage area. Ideally, this should be a dry and cool space with minimal temperature fluctuations. This can be either an indoor or outdoor space, depending on the size of the boards and the storage duration.

It is also important to stack the boards properly in order to conserve space and prevent any damage. To do this, the boards should be placed on edge rather than flat and should be separated with strips of wood or cardboard in between each one. This will ensure that the boards don't rub against each other and stay in good condition for an extended period of time.

Finally, the boards should be checked regularly, at least once a month, for any signs of damage or wear. This includes checking for warping, splitting, or cracking of the boards. If any damage is found, the boards should be replaced as soon as possible. Proper storage of the boards is key to making sure they are in good condition and ready for use.

Step 7: Laying Out and Fixing the board

In order to finish the top row of panels first, the panels are often installed starting at the upper corner of the room and moving horizontally. A single panel might or might not cover the entire length of the room depending on its dimensions.

Fig. 4.1.13 Drywall Installation from Left top Corner

A hoist can be used to hang the drywall from the ceiling. After placement, the panel is secured against the stud by driving screws or nails down from the ends. Before attaching the board, the intermediate strapping in between the studs can be bonded.

Fig. 4.1.14 Drywall Lifting using Hoisting

Openings like arches, windows, and doors can be covered with drywall, which is then trimmed to fit the openings' dimensions. To help prevent damage during cutting, the screws are bored into the opening's perimeter during fixing. Up until one row of the wall is finished, the drywall is attached to the wall using glue, hoisting, and screws.

Step 8: Mudding and Taping the Drywall

The procedures for taping and mudding drywall are as follows:

- Clean up the drywall mud compound that will be applied to the seam. The seam receives the initial coat right on top of it. The mud must completely enclose the seam. A drywall knife with plenty of mud on it is used to apply it.
- Cover the seam with drywall tape. To flatten the tape, use a drywall knife. Start the tape from one seam end and draw it towards the other end all at once. Use a corner tool for corner seams.
- A smooth, flattened seam is created by wiping away any excess mud on the tape's surface. Some specialists can create a seamless seam without using fibreglass or tape.
- Utilizing a putty knife that is a little wider, apply at least 2-3 coats. Each coat must dry the previous one's dirt layer.
- Apply the swiping coat over the screws in order to conceal the edges. By screeding some mud on top of the drywall, any flaws can be removed.
- For each joint, repeat the process.

Fig. 4.1.15 Mudding and Taping

Step 9: Sanding and Finishing

The steps are as follows:

- Sand the hard-to-reach wall surfaces first with a pole sander. Avoid going overboard since mud can be easily sanded, and too much sanding will reveal the surface beneath.
- The remaining areas of the walls can be sanded using a portable drywall sander.
- Use a portable light to search for any minor faults or imperfections. Any flaws are noted with a pencil and afterwards sanded using a sponge sander.
- Using a pole sander, prime the entire wall before lightly sanding it again. This results in a lovely, smooth finish.

Fig. 4.1.16 Sanding

4.1.4. Tips for False Ceiling and Drywall Installation

1. **Verify the level of your framing prior to beginning:** For the wallboards to remain intact, the framing of a ceiling or wall must be flat from one stud or joist to the next. Uneven framing may cause panels to bow, adding odd shapes or fissures to the walls.

   Before putting any sheets up, use a level and straight edge to make sure the ceiling and walls are level and perpendicular. If required, shim out components that aren't far enough or smooth down joists or studs that are too far out.

2. **Apply horizontal drywall boards:** Installing drywall panels horizontally will reduce the number of seams that need to be finished when adding additional walls to a room in your home. Additionally, the horizontal placement reinforces the wall's framework, shielding your house from the weather and unintentional harm. If you utilise 12-foot-long drywall panels, you might not have any vertical seams in some rooms.

3. **Mark stud positions with a chalk line:** Use a pencil to mark the centre of the wall studs on the floor and ceiling as you begin placing your drywall panels on the walls and ceilings. This will allow you to drive your equally spaced drywall screws along the studs and attach your sheets.

   Professionals frequently draw a chalk line between the floor and ceiling lines on the boards, then fasten drywall screws to the studs every foot and a half to make measuring and screwing easier. If you use a chalk line, make the line light and wipe it away at the conclusion of the project to prevent the chalk from bleeding through the paint finish.

4. **Snap panels rather than cutting:** Use a utility knife to slice the board on one side, then turn the board over and crack it with your knee to effectively cut your drywall sheets. If you cut the panel properly, it will separate along the line you scored. Folding the board and using a utility knife to cut along the fold from the opposite side will finish the cut.

5. **Order correct screws for your drywall size:** Professionals utilise coarse-threaded screws at the proper length for their drywall panels instead of fine-threaded screws because of the higher gripping power of the screws. To hold your drywall panels in place if you are using normal half-inch thick drywall, use screws that are 1 1/4 inches long.

6. **Cut out holes for switches and outlets:** In order to save time, experts mark the beginning and end of each obstruction with a chalk line before positioning the sheet along the wall. The chalk markings should transfer to the back of the wallboard if you hold it firmly against the wall. Use a jab saw to cut the openings based on the marks after removing the wallboard from the wall.

7. **Use of proper PPE:** To ensure that workers are not exposed to hazardous dust particles during the cutting of boards, the use of Personal Protective Equipment (PPE) is essential. PPE can help to prevent respiratory problems and other health issues associated with the inhalation of dust particles.

   The type of PPE that should be used for reducing dust exposure depends on the type of work being done and the potential hazards that may be present. Generally, workers should wear a respirator with a filter to protect them from inhaling dust particles. In addition, safety glasses, gloves, and other protective clothing should be worn to prevent dust particles from coming into contact with the skin.

   In addition to wearing the proper PPE, other steps may be taken to reduce dust exposure. Workers should be sure to use machines that are designed to reduce dust, such as a vacuum shroud on the saw blade. The use of adequate ventilation and air filtration systems can also help to reduce the amount of dust in the air.

Exercise

1. State the difference between false ceiling and drywall.
2. What do you mean by false ceiling? List the different types of false ceiling boards.
3. What is a drywall rasp?
4. What are the factors that influence the selection of drywall?
5. Write the names of the steps involved in false ceiling and drywall installation.

Notes

Scan the QR code to watch the video

https://www.youtube.com/watch?v=wdcq4EYST2c

Scaffolding Components

https://www.youtube.com/watch?v=OKawvyUhUkA

Dismantling the Scaffold

5. Fix the dry walls board with fasteners

Unit 5.1 Fix the dry walls board with fasteners

(CON/1107)

Key Learning Outcomes

By the end of this module, participants will be able to:

- Demonstrate installation of sub-frame used for dry wall installation works as per instructions.
- Demonstrate fixing of dry wall boards with fasteners as per instructions.
- Fix joints in panels as per instructions.

Unit 5.1 Fix the dry walls board with fasteners

Unit Objectives

By the end of this unit, participants will be able to:

- Explain the standard practices for fixing of dry wall in place.
- Interpret sketches used for dry wall installation works.
- Classify dry walls based on their composition
- Interpret the method statement/manufacturer's instructions for installation of dry wall and partitions.
- Explain the process of installation of wooden t-braces for sub frame for dry wall.
- Explain the process of measuring, marking and cutting of dry wall board.
- Explain the process of fixing of dry wall boards and joints in panels for seamless finish.
- List down different joint compounds and tape covers used for dry wall fixing.
- Measure area for estimation of plasterboard requirement.
- Calculate area to ascertain layout of boards.
- Select different adhesives used for fixing of dry wall.
- Demonstrate installation of sub-frame using wooden planks/studs or t-braces as per instructions as per manufacturer's instructions.
- Demonstrate measuring, marking and cutting of dry wall board with appropriate tools including cut outs for windows and doors.
- Demonstrate fastening of board to studs as per instructions.
- Demonstrate fixing and filling of joints, corners and screws for seamless finish.

5.1.1. Drywall

Drywall is a construction material used to cover wall and ceiling frame. It is constructed of gypsum, a mineral that occurs naturally and is widely available (making it an eco-friendly choice). A slurry made of the gypsum and other components is sandwiched between two sheets of paper and dried. Drywall is also called "Gypsum Board". The kind of drywall depends on the thickness and type of paper as well as the slurry's chemical composition.

Types of Drywall

1. **Regular Drywall:** The most popular type of drywall used for walls and ceilings in residential and commercial construction is regular drywall, also known as white board. For domestic application, 12 inch is the most typical thickness. The most typical drywall sheet size is 4' x 8', but for high ceilings, it's also available in lengths of up to 16'. To make the sheets easier to handle and for modest repairs, home improvement businesses sell drywall in 2' by 2' sizes.

2. **Mold-resistant Drywall:** Green board, also known as mold-resistant drywall, has a paper backing that is thicker than conventional drywall and is wax-coated for increased moisture resistance. Additionally, it includes a non-organic fibreglass mesh that eliminates the food that mould needs to develop (called paperless drywall). The most popular places to utilise mold-resistant drywall are bathrooms, kitchens, laundry rooms, and as a tile backer. There is also mold-resistant mud available. Keep in mind that mold-resistant drywall is not the same as moisture-resistant drywall.

3. **Plasterboard:** Plasterboard, also known as blue board, is used as a substrate for plaster applications, similar to how lath is utilised in lath and plaster walls. A thin coat or coatings of plaster must be applied over the whole surface of plasterboard. Because the face paper absorbs moisture, the plaster finish layer adheres to the drywall more effectively. Older homes utilise it to create the appearance of plaster and lath.

4. **Soundproof Drywall:** While every drywall has some soundproofing properties, soundproof drywall goes above and beyond conventional drywall's sound transmission class (STC) by adding more wood fibre, gypsum, and polymers. STC is a rating that gauges how much noise a material can block, much like the Richter scale. When more soundproofing is needed, such as between living areas and common walls, soundproof drywall is employed. It can be more challenging to deal with because it is denser than conventional drywall.

5. **Fire-resistant Drywall:** Around potentially flammable equipment in garages and basements, specialised fire-resistant drywall is used. It contains fibreglass, which retards the spread of fire and burns more slowly than standard gypsum. Type X and Type C are the two different varieties of fire-resistant drywall. Type X is 5/8" thick and offers up to an hour of fire protection. If necessary, it can be applied in several layers to offer more protection. Similar to Type X, Type C does not shrink when burned. To prevent collapse during a fire, it is usually utilised in ceilings.

6. **VOC-absorbing drywall:** VOC-absorbing drywall, a relatively recent invention, traps chemicals and other volatile organic compounds inside the drywall, rendering them inert. These chemicals are found in both the cleaning supplies we use on a daily basis and other building materials. The drywall continues to function for up to 75 years after being painted or covered with a light wall covering.

5.1.2. Fixing a Drywall

When it comes to drywall repair, there are a few standard practices that should be followed to ensure a successful job. The first step is to ensure that the drywall is properly installed, as replacing drywall can be a difficult and time-consuming process. It is important to make sure to cut the sheet of drywall to the correct size before installing it, as this can prevent future problems from occurring.

Once the drywall is installed, it is important to make sure that all of the surfaces of the drywall have been properly sealed. This can be done with a compound or sealant to prevent any moisture from entering the drywall and causing further damage.

Once the drywall is properly sealed, it's time to start making the repairs. If the damage is minor, such as small holes or scratches, then all that is needed is a patching compound and a putty knife. Simply apply the patching compound to the affected area, allow it to dry, and then sand it down until the surface is smooth.

For more severe damage, such as deep holes, it is important to use a mesh patch. This involves cutting a piece of mesh slightly larger than the hole and then embedding it in a thin layer of joint compound. Once the mesh patch is securely in place, apply a thicker layer of compound over the top of it, and then sand the surface until it is smooth.

Finally, when all of the repairs are completed, it is important to apply a coat of primer and then several coats of paint to the drywall. This will not only give the drywall a finished look, but it will also help to protect the drywall from future damage.

5.1.3. Process of Drywall Installation

Here's the step-by-step drywall installation process:

Step 1: Prepare the drywall sheets for the ceiling

One should measure and mark the appropriate locations before beginning to install the wallboard on the ceiling. If you're using 12-foot boards, you might only need one sheet of drywall, but if the space is large, you might need more. Here are some pointers for measuring and cutting ceiling drywall:

- Measure from a corner that forms a 90-degree angle with the joists, the horizontal framing elements spanning on top of load-bearing walls, to determine where to place the first board.
- The board must end in the middle of a joist if it isn't the complete length of the ceiling; otherwise, you'll need to take a measurement to the centre of the farthest piece of framework where the board overlaps. On the first board's edge, note the updated dimensions.

- While scoring the mark with a utility knife, use a square as a reference. Use your knee to snap the extra drywall from the opposite side after setting the piece on edge.

- Mark the location where the joists intersect the wall on the top plate to help you decide where to put screws throughout the drywall panels.

Step 2: Install t-braces for sub frame

Installing wooden t-braces for the sub frame of dry wall is a reasonably simple task. First, you need to determine the size and shape of the t-braces you will be utilising, based on the area and size of the wall you are working on. Once you have the t-braces, you will need to measure and mark the spots where they need to be installed.

Next, pre-drill the wood and use a screw gun to put the t-braces into place. Ensure that they are not over-tightened since this could cause them to break. After installing the T-braces, you can install the sub frame and dry wall.

Step 3: Install the subframe

To begin, make sure that the area to put the sub frame in is smooth and level. Drill in the walls to create holes for the screws. It's best to use a masonry bit or a drill bit specifically made for drilling into drywall. Once the holes are drilled, you can insert the screws, and make sure they are tightened securely.

Next, measure and cut the wood for the sub frame. Cut two pieces, one for the top and one for the bottom. The top piece should be slightly shorter than the bottom one so that it fits snugly. Once you have the two pieces cut, use wood glue to attach them together.

Finally, use drywall anchors to attach the sub frame to the wall. The anchors should fit snugly into the holes and shouldn't protrude from the sub frame. You'll need to use a screwdriver to drive the screws into the wall and secure the sub frame. Once everything is in place, you can begin to add the material of your choice to the sub frame and complete the installation.

Step 4: Install drywall on the ceiling

You can properly install the panels now that you know where to place them. To drywall the ceiling, take the following actions:

- Place the first board up against a top corner with the help of a lift or a helper. Make certain that the edges are parallel to the frame elements and that one end is flush with the wall.
- After the board is fastened in position, fasten five equally spaced screws in a line across the entire sheet and into the part of the framing that is closest to the board's centre.
- Maintain the screws' alignment using the top plate markers, making sure that each screw is at least half an inch away from the nearest edge. Drive the screw heads into the board deeply enough to imprint the paper without piercing it.
- Until you reach the end, drill a line of five screws into each joist that your drywall board touches.
- Make sure that the screws in the subsequent row are at least a few feet away from the previous row as you continue driving them in. Any screw heads that poked through the paper will need a screw next to them.

Step 5: Measure and cut drywall for the wall

The wallboard can be set up for interior walls after covering the ceiling. To measure wallboards for walls, remember these tips:

- Cut the drywall sheet so that it is approximately 1/4 inch shorter than the width of the wall.
- The drywall should be raised and positioned tightly against the ceiling using a hoist or a helper.
- With a utility knife and drywall square, score the mark, then snap the extra material up against the line.

Step 6: Install drywall on the wall

As the newly trimmed drywall boards are installed, use drywall adhesive across the studs to reduce the number of screws required. Additionally, drywall adhesive will improve the soundproofing of walls. Use the following techniques to cover the wall with drywall boards:

- Ensure that the initial sheet of drywall will finish up in the middle of a stud, the vertical framing component of a wall, prior to its application. If changes are necessary, trim the board so that it fits in the middle.

- Utilize a lift or a helper to position the board on the studs so that one edge fits tightly against the ceiling board and the other against the neighbouring wall.
- Drive drywall screws at a convenient height into the board's middle.
- Once the first screws have been inserted, put in the others, working from the middle of the board outward.
- Drive the screws and evenly distance them apart as you fasten them into all the studs.
- To cover the wall quickly, hang the drywall horizontally to limit the amount of adhesive, placing the seam at a convenient height. If this is insufficient, you will need additional sheets.

Step 7: Cut openings for doors, windows and outlet boxes

There are probably doors and windows in the space, and the drywall must be trimmed for a current or future opening. Follow these guidelines for cutting the region where a sheet covers an uninstalled window:

- Install a sheet of drywall over the window and a few screws to designate the future window's corners.
- Make a hole in the approximate centre of the future window with a jab saw, and then cut horizontally and vertically until you reach the edges.

Follow these guidelines if the window is already installed:

- Before mounting the panel, remove the window casing and cut the opening in the drywall.
- Place the sheet along the floor to lay out the cut, and mark the point where it meets the window's lower edge.
- To mark the top cut's edge, measure from the ceiling to the window's uppermost portion.
- Cut off the window opening and attach the panels with screws.

To cut around a door, prepare the drywall in the same manner as you would for a window cut.

- Remove the door's trim and prop the sheet of drywall against the door aperture. Mark the studs and draw a line for the door opening's upper edge.
- Cut the door opening with a jigsaw and attach the panels with screws.

If you wish to make electrical outlet cuts:

- Indicate the height of the outlet box from the floor.
- Cover the electrical box with drywall and fasten it to the studs while the power is off.
- Locate the inside edge of the box by perforating the sheetrock with the jab saw and cutting outward.

Step 8: Secure the drywall against the outside and inside corners

Install the drywall to reach the floor and frame the exterior corners by following these steps:

- Start with a shorter panel in the bottom row so that the top seam is not precisely above the bottom.
- Place the wallboard in its designated spot and secure it with screws.
- Install the taller sheet following the installation of the shorter one.
- There should be a tiny gap between the drywall and floor to prevent the drywall from knocking against bumps on the floor. The area will eventually be covered by the baseboard. If required, clip the sheet to provide a gap of approximately half an inch.
- Cut a sheet of drywall so that it extends beyond the corner.
- After it has been positioned correctly, it is trimmed using a jigsaw.
- Install the panel by leaving it long and cutting it to form a snug corner.

Ensure that, for inner corners, components fit snugly but are not squeezed together. Overly squeezing boards together increases the likelihood of cracking and disintegration. You can leave around one-eighth of an inch of space between the boards, as the gaps will be filled with drywall cement later.

Step 9: Joint Compound and tape covers

Joint compounds and tape covers are essential tools used to seal and patch drywall.

Common joint compounds include ready-mix joint compound, lightweight joint compound, and all-purpose joint compound. Ready-mix joint compound is ready to use straight out of the container, making it a popular choice for many. Lightweight joint compound is used for filling small holes and cracks, and is less likely to crack or shrink. All-purpose joint compound is a middle-weight compound that can be used for both major and minor repairs.

Tape covers are available in a variety of materials, such as paper and mesh tape covers. Paper tape covers are used primarily for interior drywall applications, as they are more flexible and easier to apply. Mesh tape covers are used for exterior drywall applications, as they are more water-resistant and provide a more durable seal

Step 10: Add the finishing coats of drywall compound

Utilize a lightweight container of drywall compound to fill the joints. Make sure you have enough material in the mud pan to apply one full layer on the framing component where you'll be working. Even though you would follow these techniques for both vertical and horizontal seams, you should begin with horizontal seams for optimal results.

- Cover the complete span of the wallboard seam with compound using drywall knife. Use light, even coats to cover the gaps and level them with the adjacent boards.
- Apply the joint tape to the newly coated seam while the joint compound is still wet. Leave roughly an eighth of an inch of gap if two pieces intersect.
- Apply the lightweight compound with a bigger drywall knife completely over the tape and the surrounding area, ensuring that the coatings are flush with the wall.
- Instead of using tape to get the first and second coats on the corners, use a metal or fiberboard corner bead, depending on the expected traffic in the area. Apply it on top of the first layer of compound, then apply a second layer of compound on top.
- Fill the screw dimples while allowing the joints to cure according to the instructions on the container of joint compound. After pushing the screws into the wall, cover any screw heads that protrude with the compound.
- Wait until the walls have completely dried and the compound has turned entirely white before removing the compound from the walls.
- Apply the last thin layer to all the seams and corners using a drywall knife. If you had to fix any screw heads that were protruding, you should also apply a second coat there.
- Run over the walls again with a drywall knife and check that wallboard is level with the seams. Check joints for gaps with drywall knife, then apply drywall compound to repair low locations.
- After the final coat has dry, sand the joints until you cannot feel any defects, joints, or screws when you touch them.
- After sanding and touching up the walls, apply primer and paint them.

Exercise

1. What is a Drywall? List the different types of drywalls.
2. Explain the process of measuring, marking and cutting of drywall board.
3. List down different joint compounds and tape covers used for dry wall fixing.
4. Fill in the blanks.

(Hint: 4' x 8', ready-mix, all-purpose, green board, blue board, Sound Transmission Class, lightweight)

i. _____ is also known as mold-resistant drywall.

ii. Common joint compounds include _____, _____, and _____ joint compound.

iii. The most typical drywall sheet size is _____.

iv. Plasterboard, also known as_____.

v. STC stands for _____.

6. Interact and communicate effectively

Unit 6.1 Effective Interaction and Communication

(CON/N8001)

Key Learning Outcomes

By the end of this module, participants will be able to:

- Demonstrate effective communication with co-workers, superiors and sub-ordinates across different teams
- Provide support to co-workers, superiors and sub-ordinates within the team and across interfacing teams to ensure effective execution of assigned task.

Unit 6.1 Effective Interaction and Communication

Unit Objectives

By the end of this unit, participants will be able to:

- Interpret work sketches, false ceiling and dry wall installation works formats, permits, protocols, checklists etc.
- Interpret scope of false ceiling and dry wall installation works.
- Explain effect and benefit of timely actions relevant to false ceiling and dry wall installation works with examples.
- Explain importance of team work and its effects relevant to false ceiling and dry wall installation works with examples.
- Explain importance of proper and effective communication and its adverse effects in case of failure of proper communication.
- Demonstrate effective communication skills while interacting with co-workers and trade seniors during the assigned task.
- Demonstrate effective reporting to seniors as per applicable organisational norms.
- Instruct subordinates in a clear and precise manner with respect to false ceiling and dry wall installation works.
- Demonstrate team work during assigned task.

6.1.1. Time Management

Time management is not about working harder; rather, it is about working smarter so that employees do not overburden themselves and create unnecessary strain. By effectively managing their time, employees will meet deadlines, increase their effectiveness, become more productive, and produce superior work.

By effectively managing their time, employees will meet deadlines, increase their effectiveness, become more productive, and produce superior work. They will also have a higher degree of job satisfaction because they will experience less stress, which will help them advance in their careers and reduce company's staff turnover.

The benefits of time management skills to both for the person and the company are:

1. **Enhanced productivity and performance:** Poor time management causes employees to feel overwhelmed, whereas excellent time management leads to increased efficiency, which in turn improves performance.

2. **Providing work on schedule:** This is the most visible advantage of excellent time management, but it is also one of the most crucial. Time management enables workers to meet deadlines, which is essential for meeting client expectations.

3. **Less anxiety and stress:** When employees are stressed and anxious, not only do they miss deadlines and produce subpar work, but it also negatively affects their health. As an employer, you are responsible for ensuring that the mental health of employees is a top priority. Stressed employees are more prone to take sick days and seek alternative jobs.

4. **Better-quality work:** With effective time management, employees have the necessary time to produce work that is not only completed on time but also of a superior quality.

5. **Boosts confidence:** When employees are on top of their responsibilities, it boosts their confidence and enables them to believe in their own talents. In turn, this reduces tension and anxiety because the body produces dopamine.

6. **Reduces procrastination and wasted time:** Knowing how to prioritise decreases procrastination and promotes a "eat the frog" mentality among staff. This saves downtime and increases productivity.

7. **Enhances the work-life balance:** An effective work-life balance When an employee is well-rested and has the opportunity to re-energize, they are in the best position possible to produce their finest work.

8. **Make better decisions:** When employees have time to concentrate and work thoroughly, they are not required to make decisions under duress. Instead, individuals can make selections based on all the necessary information to make the greatest choice.

Time Management for False Ceiling and Dry Wall Installer

False ceiling installation is a time-consuming process that requires careful planning and effective time management in order to produce quality results. To ensure the installation is done efficiently, it is important to have a plan and to prioritize tasks.

Begin by assessing the project and the space that needs to be worked on. This helps in determining the skill set needed and the best way to approach the installation. Once the assessment is complete, determine the timeline and how long the installation should take.

When it comes to time management, it is important to break the project down into smaller tasks that can be completed in a reasonable amount of time. This keeps the work on track and allows focusing on one task at a time.

Additionally, it is a good idea to designate a certain amount of time to each task so that you can stay focused and complete it as quickly and accurately as possible.

The following steps should be followed by false ceiling and dry wall installers for effective time management:

1. Keep the project schedule at the forefront
2. Prioritize the task list
3. Delegate tasks as needed
4. Conduct actionable meetings
5. Communicate clearly and effectively
6. Use the right tools

6.1.2. Effective Communication

Effective communication is the process of sending and receiving messages from sender to receiver properly and successfully. The information is passed by signs and signals, speaking, writing or using some other medium and means. The objectives of effective communication are:

1. Sending, receiving and understanding the message or information.
2. Development of Interpersonal Skills.
3. To express effectively & with maximum efficiency.

Effective communication requires one to follow basic principles of communication, i.e., 7Cs:

- Clear: Be assertive about what needs to be communicated, whether verbally or in writing
- Concise: Use simple words and say only what's needed
- Concrete: Use exact words, phrases, Use facts and figures
- Correct: Use correct spellings, language and grammar
- Coherent: Words should make sense and should be related to the main topic
- Complete: A message should have all the needed information
- Courteous: Be respectful, friendly and honest

Communication Process

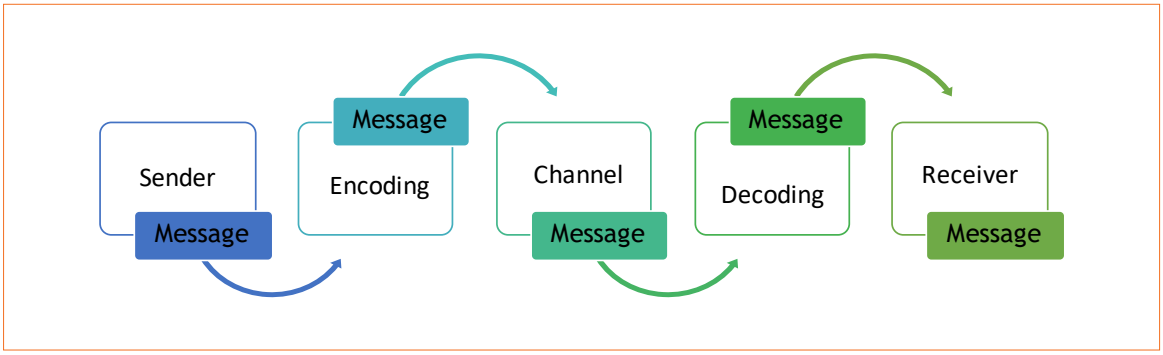

Fig 6.1.1 Effective Communication Process

- Sender: The person or entity starting the communication.
- Message: The information that the sender wishes to share.
- Encoding: Choosing the medium to send a message.
- Channel: The medium used to send a message.
- Receiver: The person or entity to whom the message is sent.
- Decoding: Understanding the message received.
- Feedback: The receiver's response to the message.

6.1.3. Workplace Communication

Every workplace organisation requires communication for day-to-day business, regardless of size, location, goals, etc. It forms a bridge between people to exchange ideas, inform, express their feelings, influence others, etc. Communication is required to communicate within the organisation with managers and employees, etc. and outside with suppliers, buyers, etc.

Effective Communication with Stakeholders

The key factors to establishing effective communication in the construction industry are:

1. Establish a Communication Chain of Command

Construction projects need a communication chain. The contract documents usually require the owner and general contractor to communicate through the architect.

The architect communicates with consultants and the general contractor with suppliers and subcontractors. The general contractor usually contacts the project superintendent.

Contract documents—drawings, specifications, change order forms, and requests for information—form the basis for construction communication. Any direct communication not in the contract documents must be authorised, and any scope or schedule modifications must be documented and reported.

2. Select an Appropriate Communication Method

We communicate vocally and nonverbally daily, and construction communication is no different. We text, talk on the phone and in person, send emails, and some of us still use fax machines inexplicably in this digital era. We communicate on the building site with signs, drawings, hand gestures, and meetings. We write daily reports, take photographs, generate information requests (RFIs), and examine modification orders.

There are benefits and drawbacks to each way of communication. Selecting the appropriate mode of communication can facilitate and expedite the transmission of information.

3. Be an Active Listener

One should be an active listener when engaging in oral communication, whether in person or by phone. At best, it is passive listening to sit there and absorb the information like a digital recorder. Try to comprehend what the speaker is trying to convey from their perspective.

Take notes on significant points, rather than transcribing every word they say, and jot down information that may require clarification. Maintain eye contact and use nonverbal cues such as head nods to demonstrate attentive listening.

4. Prevent Confusion, Be Clear and Concise

When communicating in the construction industry, you want message to be understood the first time you convey it. Avoid jargon and unfamiliar phrases when interacting with others. Your communication should be concise and direct. Keep it as brief and clear as possible.

Focus on one project at a time if you are working on multiple projects with the same owner or architect to avoid misunderstanding. The real difficulty lies in attempting to be as descriptive as possible while using as few words as possible.

It takes practice to be concise yet comprehensive in your construction communications. Before sending any written communication, proofread it to determine if it may be shortened without affecting its meaning or omitting vital details.

5. Keep Written Communication Always Professional

Avoid using profanity and allowing your emotions to influence your message. If your feelings are running high, wait 24 hours before sending the email so that you can examine and make any necessary modifications. If a quick answer is required, read the message aloud or have another person review it for a second opinion.

Separate huge data pieces into smaller paragraphs. People tend to scan rather than read emails; thus, dividing the content into smaller bits facilitates processing. Use numbered or bulleted lists when delivering numerous details or posing innumerable questions.

6. Stick to the Facts

One should solely care about presenting or obtaining facts. In all communications, do not overcomplicate or provide irrelevant details. Keep the personal ideas and feelings about a project to yourself unless asked.

However, you must offer your professional thoughts on a project when you believe they could contribute to its practical completion. Your company's expertise contributed to its selection for the project, so don't be shy.

- Communicate effectively with the plant operator; Lower all ground engagement tools and/or implements to the ground.
- Disengage the plant controls so that they cannot be accidentally activated by the operator or by any other means;
- Visibly remove their hands from the controls of the powered mobile plant; and cease all movement of the plant.

6.1.4. Adverse Effects of Poor Communication

There is poor workplace communication when there is disconnect between what is said and what is heard, whether between co-workers or between an employee and management. Specifically, there is a lack of mutual understanding between two parties when the recipient of your communication misunderstands it.

The following issues are faced due to poor communication:

Confusion

In building, a lack of communication is problematic. Miscommunications can also have a negative effect on a project by causing misunderstandings among significant stakeholders, construction professionals, and field personnel. Inconsistent reporting, incomplete reporting, inaccurate reporting, and delayed reporting can all contribute to errors that result in project delays and cost overruns on the construction site and the office.

Clear and straightforward messages prevent confusion. Keep messages brief, concise, and to the point.

Unnecessary Delays

Poor communication is a primary cause of project delays in the construction sector. It can manifest in various ways, including delays in the flow of information, communication directed to the wrong person or location, and confusing communication that leads to misunderstanding or incorrect interpretation.

Any of these inefficient communication elements can result in errors and cause delays. Ordering unsuitable material, omitting a step in the construction process, or misallocating labour can all result in project delays.

Budget/Cost Overruns

According to the Project Management Institute (PMI), inefficient communications and improper time management of project communications account for more than half of all project budget risks. Poor or erroneous communication frequently results in greater expenditures. Adding a zero to a significant number can wreak havoc on a budget.

Injuries and Safety Issues

Poor safety communication is frequently attributable to three frequent causes:

- Workers lack familiarity with the safety training vocabulary. This is particularly true for trainees who are fresh to safety training. They can disconnect more quickly at this moment.
- Workers are scared to speak out when they find a safety hazard. They may fear judgement if they alert a colleague or supervisor to a potential danger. It is simpler to avoid risk.
- Workers frequently regard safety communication as unfavourable. Typically, only negative situations are discussed or emphasised, while the positive aspects of their behaviour are neglected.

Issues with Stakeholders

Multiple parties are involved in every construction project, including owners, designers, investors, general contractors, project managers, subcontractors, and labourers. Effective and thorough communication among a project's stakeholders is essential to its success. It can lead to increased project expenses, delays, and stakeholder disputes. Poor project data and miscommunications between project stakeholders account for nearly 48% of all project rework.

6.1.5. Teamwork at Workplace

Teamwork is when people of an organisation collaborate to achieve a common objective or set of objectives. In the modern workplace, teamwork can take place in-person or (increasingly) online.

It is important to note that modern teams are vastly different from those of the past. Today's teams, for instance, are more varied and dynamic, with specialised skill sets that present new problems and opportunities. Consequently, any team-based initiative can also serve as an opportunity for personal and professional development.

As technology continues to dominate the workplace, digital literacy, or the ability to use information and communication technologies, has become increasingly vital in team settings.

Advantages of Teamwork

There is no stronger tool in a business' armoury than a strong staff. Effective teams can increase efficiency by tackling more complex tasks (think "two heads are better than one"), improve communication by fostering open discussion and cooperation among team members, maximise output by leveraging each team member's strengths, provide opportunities for personal growth, and serve as a support mechanism for staff.

Unsurprisingly, cooperation in the workplace has also been demonstrated to boost invention and creativity by allowing team members to contribute their own unique perspectives. Effective cooperation supports organisational growth and improves performance and success by capitalising on the unique talents and characteristics of each employee.

Importance of Teamwork for False ceiling and drywall installer

It is necessary for an assistant false ceiling and drywall installer to maintain constant communication with the supervisor and the team. It is of the utmost importance to maintain clear lines of communication and cooperate productively with them in order to accomplish the tasks. Multiple steps are involved in the installation of drywall and false ceilings. Teamwork is essential to following each phase and completing it successfully.

6.1.6 .5 C's of Teamwork

It is crucial for organisations and corporations to continuously seek ways to increase their productivity and competitiveness. It has been discovered how to make work teams more unified and effective. In other words, work as a team. For this reason, a great number of specialists have sought out the most efficient method for fostering teamwork.

Tom Peters, who is regarded by many as the "father" of modern management, investigated the variables necessary for teams to achieve high performance. His research established the five C's of teamwork, which are essential for achieving high performance.

Co-operation

Without cooperation between team members, no group will survive. Cooperation is intimately linked to effective communication and self-assurance. Better communication and a transparent and healthy work environment necessitate some degree of clarity and trust.

Compromise

Work relationships are not exempt from the necessity of reaching compromises on particular issues. If our peers' or managers' argument is valid and can contribute to greater performance, we may be required to concur. It is acceptable that not everyone can be on the same page at all times. To manage such circumstances, we must examine the situation and consider potential outcomes.

Communication

Considered vital for organising the individual and group efforts of the team. Communication is essential for conflict resolution and problem-solving, and companies must support healthy communication within and between teams. Communication must be open, honest, and timely so that every team member knows what to do and how to do it.

Confidence

Team members should have confidence in their skills. The leader must provide the team with a clear and simple explanation of the project, each member's responsibilities, and the final objective. It is essential to remember that confidence does not develop in the blink of an eye. It must be constructed step by step.

Commitment

The demands and interests of the team take precedence above individual concerns. Every action should contribute to the overall corporate objective.

6.1.7. Enhancing Teamwork in the Workplace

Working in a team can be complicated due to the fact that we are all unique individuals with varying mental states. Improving teamwork relies heavily on the role of the team's leader. Here are some recommendations that can assist them in achieving greater teamwork:

1. Concentrate more on "us" than "me"

A minor step is to begin speaking in the plural, so that all members feel as though they are a part of the effort. The greater our involvement, the harder we work to obtain the finest results.

2. Communicate Explicitly

Communication is the fundamental prerequisite. We must create an atmosphere in which team members are free to share their thoughts. It is advisable to make an effort to prevent such misunderstandings.

3. Delegate and believe

When working in a team, each assignment symbolises a problem that can be readily overcome via teamwork. Team leaders should be aware of the abilities and qualities of their team members and assign them jobs where they may demonstrate their value. For this, they must feel at ease while working and have confidence that their bosses have faith in them.

4. Establish shared aims and objectives

It is crucial to establish a unified business objective and effectively communicate it to team members.

5. Recognize and honour the achievements of others.

This attitude strengthens the team's trust and teamwork, which will inspire them to achieve the following objectives.

6. Conquer a conflict with success

Workplace conflicts are prevalent, and people with conflict management abilities are in high demand. Learn this talent if you still lack it.

7. Build a diverse group

People with varied origins, personalities, and experiences can be a source of innovative ideas. Through intelligent reading, we will recognise that we have the opportunity to maximise each individual's qualities.

8. Believe in Team Building

It's been said that teams that have fun remain together, thus establishing personal relationships in the workplace is a fantastic way to boost teamwork.

6.1.8. Construction Reporting

Construction reporting is the preparation of official records that provide stakeholders with information on significant events, project phases, and processes. Typically, these reports are written documents containing data. They can also describe the condition of particular project components or the budget. Construction reports should be short and written in straightforward language. Additionally, they should be simple to navigate and contain only the essential information. Additionally, they should not be replicated in other reports. Reporting on construction gives the project team excellent visibility and comprehension of what should be done. Inaccurate reporting can have significant effects on project costs and deadlines.

Objective of Construction Reporting

Construction reports are a way to comprehend the activities occurring on construction sites. In order to provide an accurate depiction of the project's state, construction reporting utilises a number of methods to collect and combine project data.

Creating reports improves comprehension of current activities and minimises the likelihood of project delays and cost overruns. The information flow from construction reporting keeps stakeholders informed and provides psychological comfort as they enjoy a project's efficient operation. Construction reports can reduce safety concerns because problems are identified and documented before they escalate.

Types of Construction Reports

There are numerous types of construction reports that detail various project operations. The majority of construction reports fall under many categories, as illustrated below.

1. Materials Report

Technological advancements have produced new construction technologies that contractors can utilise. Consequently, material reports provide construction organisations with information regarding materials that offer greater cost savings and a longer lifespan. These construction material reports are provided by a variety of organisations, and construction enterprises must enlist in order to receive their services.

2. Trend Report

Standard in the building business, trend reports provide information on various construction styles and whether their market usage is expanding or diminishing. To have access to such information, contractors must subscribe to the websites that publish studies on building industry trends. The majority of these papers are published annually and provide excellent overviews of the most recent trends and industry dynamics.

3. Cost Report

These are construction reports that tell the client and other interested parties on the expected and actual expenditures of a project. Typically, cost consultants such as quantity surveyors or contractors produce cost reports. The project is then constructed in accordance with the client-presented cost estimate. These reports are periodically updated to monitor the project's expenses. Throughout the lifecycle of a project, cost reports are in a state of ongoing evolution. Consequently, the amount of detail and precision improves as the project progresses and more information becomes available.

4. Progress Report or Daily Report

Daily reports are an integral component of project management. A daily report describes the actions of a project on a daily basis. Daily reports augment a contract by recording and confirming project progress.

These report describe the site's specifics and keep stakeholders updated. In the event of any delays, daily reports clarify the underlying causes, thereby eliminating the time wasted disputing over the surrounding minutiae. The daily report is typically prepared by the construction manager or foreman.

6.1.9. Interpreting scope of false ceiling and drywall installation works.

False ceiling and drywall installation is one of the most essential parts of any construction project. False ceilings and drywall provide interior spaces with a finished look, while also improving the soundproofing, thermal insulation, and fire protection of the space.

A false ceiling and drywall installer is responsible for the installation of these materials in any commercial or residential space. The installer's scope of work includes measuring and cutting the false ceiling and drywall panels to fit the room's dimensions and prepare the materials for installation. The installer will also check for any existing electrical wiring, outlets, and fixtures, and prepare the room for installation by securing the framing and other components.

The scope and potential of the false ceiling and drywall industry is tremendous. This industry has the potential to drive the economy of any nation. It has seen a huge surge in demand in recent years and is expected to grow even further in the near future.

Understanding how to become a false ceiling and drywall installer will enable a person to practise the necessary abilities for the position.

Exercise

1. What are the 7 Cs of effective communication?
2. State some Adverse Effects of Poor Communication.
3. What do you understand by Workplace Communication?
4. How to enhance teamwork in the workplace?
5. Explain the importance of time management.

7. Follow Safety Norms at Workplace

Unit 7.1 Workplace Hazards

Unit 7.2 Fire Safety

Unit 7.3 Safety Measures at Workplace

(CON/N9001)

Key Learning Outcomes

By the end of this module, participants will be able to:

- Identify various hazards at construction site.
- Use PPE's relevant to false ceiling and dry wall installation task.
- Perform safe waste disposal at construction site.

Unit 7.1 Workplace Hazards

Unit Objectives

By the end of this unit, participants will be able to:

- Explain the types of hazards at the construction sites and identify the hazards specific to the false ceiling and dry wall installation work.
- Recall the safety control measures and actions to be taken under emergency situation.
- Explain the reporting procedure to the concerned authority in case of emergency situations.
- Describe the standard procedure for handling, storing and stacking of material, tools, equipment and accessories.
- Explain the types and benefits of basic ergonomic principles, which should be adopted while carrying out specific task at the construction sites.

7.1.1. Workplace Safety

Workplace safety is important to be established for creating a safe and secure working for the workers. The workplace has to be administered as per the rules of the Occupational Safety and Health Administration (OSHA). It refers to monitoring the working environment and all hazardous factors that impact employees' safety, health, and well-being. It is important to provide a safe working environment to the employees to increase their productivity, wellness, skills, etc.

The benefits of workplace safety are:

- Employee retention increases if they are provided with a safe working environment.
- Failure to follow OSHA's laws and guidelines can result in significant legal and financial consequences.
- A safe environment enables employees to stay invested in their work and increases productivity.
- Employer branding and company reputation can both benefit from a safe working environment.

Workplace Safety at Construction Site

To avoid injuries, accidents, and other health issues on a building site, the following safety guidelines must be followed:

1. Always wear PPE All personnel and visitors on the construction site must wear the required PPE to reduce their exposure to potential hazards. Goggles, helmets, gloves, ear muffs or plugs, boots, and high visibility vests and suits are typical PPEs.

2. Pay attention and obey signs

Employees and visitors can be warned and made more aware of health and safety hazards through the use of safety signs. When necessary, strategically position them throughout the facility. Workers should be aware with construction site safety advice and various signs, including prohibition signs, required signs, warning signs, safe condition signs, and fire fighting equipment signs.

3. Provide precise directions

There should be a site induction or contractor induction on the job site. This will familiarise new employees with site operations. Additionally, toolbox presentations are an effective means of communicating health and safety instructions to the employees. On a daily or more frequent basis, a pre-work inspection is performed.

4. Keep site tidy

Ensure that excavation debris, dust, loose nails, and stagnant water are not lying about the site. For the prevention of slips and trips, the building site must be cleaned everyday and kept decluttered.

5. Organize and store equipment

Ensure that there are no tools laying around, and unplug all lights and power tools. The observance of building site regulations will prevent tools from becoming damaged or perhaps causing worker injury. Putting them in their proper location will help facilitate navigation.

6. Use the proper tools for the correct job

Frequently, accidents occur due to improper usage of a tool or piece of equipment. Avoid using homemade tools. Use the proper tool to complete the task more quickly and safely.

7. Have an emergency response plan

An emergency response plan instructs employees on what to do in the event of emergencies such as natural disasters, fire, hazardous material spills, and other catastrophes. Have a team committed to addressing emergency situations, answering queries, and reporting potential risks, quality issues, and near misses.

8. Set up protections

Installation of engineering controls, such as barriers, fences, and safeguards, is one method for ensuring site safety. These will aid in isolating individuals from hazardous places like high-voltage electricity or harmful chemicals.

9. Perform pre-inspection of tools and equipment.

Ensure that the tools and equipment to be utilised are free of defects or damage before beginning work.

10. Report problems immediately

Train employees to immediately report flaws and near-misses on the job site. Problems can only be resolved when management is made aware of them. The sooner problems are identified, the less likely they are to worsen and cause accidents or additional damage.

7.1.2. Workplace Hazards

A workplace is a situation that has the potential to cause harm or injury to the workers and damage the tools or property of the workplace. Hazards exist in every workplace and can come from a variety of sources. Finding and removing them is an important component of making a safe workplace.

Common Workplace Hazards

The common workplace hazards are:

- **Biological:** The threats caused by biological agents like viruses, bacteria, animals, plants, insects and also humans, are known as biological hazards.
- **Chemical:** Chemical hazard is the hazard of inhaling various chemicals, liquids and solvents. Skin irritation, respiratory system irritation, blindness, corrosion, and explosions are all possible health and physical consequences of these dangers.
- **Mechanical:** Mechanical Hazards comprise the injuries that can be caused by the moving parts of machinery, plant or equipment.
- **Psychological:** Psychological hazards are occupational hazards caused by stress, harassment, and violence.

- **Physical:** The threats that can cause physical damage to people is called physical hazard. These include unsafe conditions that can cause injury, illness and death.
- **Ergonomic:** Ergonomic Hazards are the hazards of the workplace caused due to awkward posture, forceful motion, stationary position, direct pressure, vibration, extreme temperature, noise, work stress, etc.

Workplace Hazard at Construction Site

Working on a construction site entails working with or alongside massive, functioning plant machinery and tools and working at heights and in potentially hazardous settings.

The following are a few hazards of a construction site:

- **Working at Heights:** Working at heights is the leading cause of fatal workplace injuries. All personnel working at height must receive adequate training in operating on various equipment, and such work must be carefully organised.
- **Moving Objects:** A building site is a constantly-evolving environment with numerous objects in constant motion, frequently on uneven ground. Delivery vehicles, large plant gear, and overhead lifting equipment pose a threat to workers and operators on the job site. Sites should always be designed to manage plant-to-pedestrian contact when physical barriers and enough segregation are present.
- **Slips, Trips, and Falls:** Slips, trips, and falls can occur in practically any environment, but they occur less frequently in the construction industry than in other sectors. Unsurprisingly, slips, trips, and falls are major hazards on construction sites due to the often uneven ground and ever-changing typography.
- **Noise:** Exposure to loud, excessive, and repetitive noise can result in long-term hearing issues, including deafness. Noise can also be a risky distraction, diverting a worker's attention from the task at hand, which can lead to mishaps. A full noise risk assessment should be conducted if the risk assessment identifies a noise hazard associated with the proposed work.
- **Hand Arm Vibration Syndrome:** HAVS is a painful and debilitating condition affecting the blood vessels, nerves, and joints. It is often brought on by the repeated use of hand-held power tools, such as vibrating power tools and ground-working equipment. HAVS is avoided if construction projects are structured to minimise exposure to vibration during work and if personnel utilising vibrating tools and equipment are monitored and properly protected.
- **Material Handling - Manual and with Equipment:** On construction sites, materials and equipment are continuously lifted and transported, either manually or with equipment. Handling always carries a degree of danger.

- **Excavations:** On construction sites, incidents frequently occur within excavations, such as an unsupported excavation collapse with employees inside.
- **Electricity:** Contact with overhead or subsurface power cables and electrical equipment/ machinery accounts for most of these mishaps. The standard in the construction industry is service strikes. The strikes occur when excavation is performed without a sufficient search for existing utilities. Consequently, problems can be readily averted by employing technologies such as CAT and Genny scanning equipment to scan an area, anticipate prospective services, and prevent service interruptions.

Workplace Hazards Analysis

A workplace hazard analysis is a method of identifying risks before they occur by focusing on occupational tasks. It focuses on the worker's relationship with the task, the tools, and the work environment. After identifying the hazards of the workplace, organisations shall try to eliminate or minimize them to an acceptable level of risk.

Control Measures of Workplace Hazards

Control measures are actions that can be taken to reduce the risk of being exposed to the hazard. Elimination, Substitution, Engineering Controls, Administrative Controls, and Personal Protective Equipment are the five general categories of control measures.

- **Elimination:** The most successful control technique is to eliminate a specific hazard or hazardous work procedure or prevent it from entering the workplace.
- **Substitution:** Substitution is the process of replacing something harmful with something less hazardous. While substituting the hazard may not eliminate all of the risks associated with the process or activity, it will reduce the overall harm or health impacts.
- **Engineering Controls:** Engineered controls protect workers by eliminating hazardous situations or creating a barrier between the worker and the hazard, or removing the hazard from the person.
- **Administrative Controls:** To reduce exposure to hazards, administrative controls limit the length of time spent working on a hazardous task that might be used in combination with other measures of control.
- **Personal Protective Equipment:** Personal protective equipment protects users from health and safety hazards at work. It includes items like safety helmets, gloves, eye protection, etc.

7.1.3. Hazard Identification and Risk Assessment (HIRA)

Hazard Identification and Risk Assessment (HIRA) is conducted to identify undesired events that can lead to a hazard, analyse the hazard of this undesirable event, and estimate its scope, magnitude, and possibility of detrimental effects. Within the industry, it is commonly acknowledged that the various risk assessment approaches contribute significantly to improving the safety of complex processes and equipment.

This analysis of hazards and risks aims to identify and assess hazards, the event sequences that lead to hazards, and the risk associated with hazardous occurrences. There are numerous strategies for identifying and analysing dangers, ranging from simple qualitative procedures to advanced quantitative methods. Multiple methodologies for hazard analysis are advised because each has its objective, strengths, and weaknesses.

To manage risk, risks must first be identified, and then the risk must be assessed and its acceptability established.

The earlier an effective risk analysis is conducted in the life cycle, the more cost-effective the future safe operation of the process or activity is expected to be. Most of the facility's other process safety management tasks are based on understanding the risk obtained via these studies. An inaccurate perception of risk at any time could result in inefficient use of scarce resources or the unwitting acceptance of hazards that exceed the genuine tolerance of the organisation or community.

Procedure for HIRA:

At each stage of the work life cycle, a review team questions process specialists about potential hazards and evaluates the risk of any detected hazards. There are numerous typical ways to evaluate a design, ranging from straightforward qualitative checklists to extensive quantitative fault tree analysis. Typically, the results of the review process are recorded on a worksheet whose level of information varies according to the stage of the job and the evaluation method employed. Typically, risk evaluations on operational processes are regularly updated or revalidated.

This work's objective is to detect hazards and risks by assessing each step involved in various building activities and to provide recommendations to remove or reduce the risk assessment (HIRA). The industry achieves success by satisfying production objectives and ensuring high employee satisfaction by meeting workplace safety criteria. Regularly, hazards and risk assessments should be performed, and steps should be taken to reduce the risk to an acceptable level.

HIRA Process it consist of four steps as follows:

i. Hazard identification
ii. Risk assessment
iii. Risk analysis
iv. Monitor and review

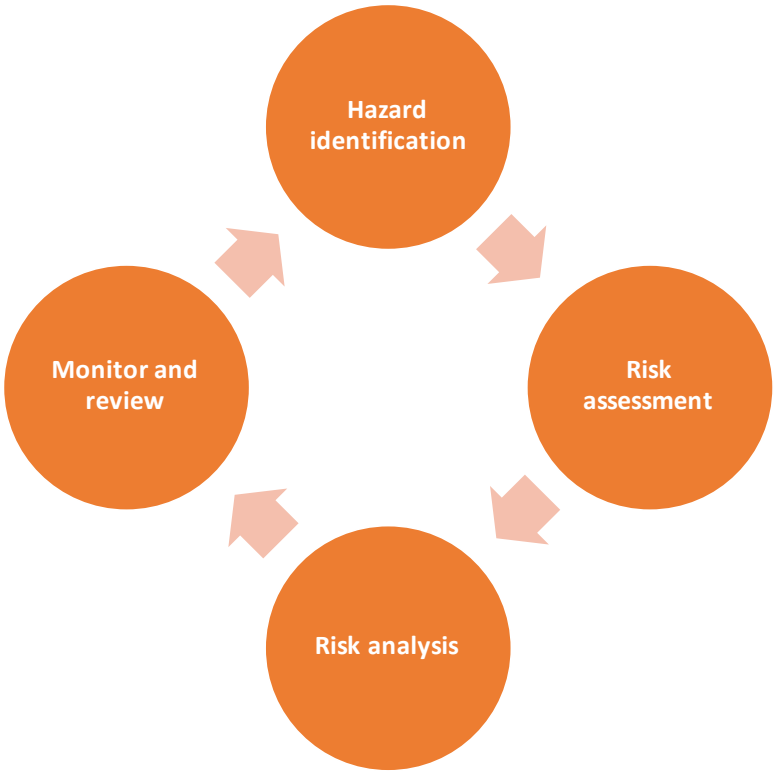

Fig. 7.1.1 HIRA Process

7.1.4. Workplace Warning Signs

A Hazard sign is defined as 'information or instruction about health and safety at work on a signboard, an illuminated sign or sound signal, a verbal communication or hand signal.'

There are four different types of safety signs:

- Prohibition / Danger Alarm Signs
- Mandatory Signs
- Warning Signs
- And Emergency

1. **Prohibition Signs:** A "prohibition sign" is a safety sign that prohibits behaviour that is likely to endanger one's health or safety. The colour red is necessary for these health and safety signs. Only what or who is forbidden should be displayed on a restriction sign.

Fig. 7.1.2 Prohibition Warning Signs

2. **Mandatory Signs:** Mandatory signs give clear directions that must be followed. The icons are white circles that have been reversed out of a blue circle. On a white background, the text is black.

Fig. 7.1.3 Mandatory Signs

3. **Warning Signs:** Warning signs are the safety information communication signs. They are shown as a 'yellow colour triangle'.

Fig. 7.1.4 Warning Signs

4. **Emergency Signs:** The location or routes to emergency facilities are indicated by emergency signs. These signs have a green backdrop with a white emblem or writing. These signs convey basic information and frequently refer to housekeeping, company procedures, or logistics.

Fig. 7.1.5 Emergency Signs

7.1.5. Personal Protective Equipment

Personal protective equipment, or "PPE," is equipment worn to reduce exposure to risks that might result in significant occupational injuries or illnesses. Chemical, radiological, physical, electrical, mechanical, and other job dangers may cause these injuries and diseases.

PPE used for protection from the following injuries are:

Injury Protection	Protection	PPE
Head Injury Protection	Falling or flying objects, stationary objects, or contact with electrical wires can cause impact, penetration, and electrical injuries. Hard hats can protect one's head from these injuries. A common electrician's hard hat is shown in the figure below. This hard hat is made of nonconductive plastic and comes with a set of safety goggles.	
Foot and Leg Injury Protection	In addition to foot protection and safety shoes, leggings (e.g., leather) can guard against risks such as falling or rolling objects, sharp objects, wet and slippery surfaces, molten metals, hot surfaces, and electrical hazards.	 
Eye and Face Injury Protection	Spectacles, goggles, special helmets or shields, and spectacles with side shields and face shields can protect against the hazards of flying fragments, large chips, hot sparks, radiation, and splashes from molten metals. They also offer protection from particles, sand, dirt, mists, dust, and glare.	
Protection against Hearing Loss	Hearing protection can be obtained by wearing earplugs or earmuffs. High noise levels can result in permanent hearing loss or damage, as well as physical and mental stress. Self-forming earplugs composed of foam, waxed cotton, or fibreglass wool usually fit well. Workers should be fitted for moulded or prefabricated earplugs by a specialist.	

Injury Protection	Protection	PPE
Protection against Hearing Loss	Hearing protection can be obtained by wearing earplugs or earmuffs. High noise levels can result in permanent hearing loss or damage, as well as physical and mental stress. Self-forming earplugs composed of foam, waxed cotton, or fibreglass wool usually fit well. Workers should be fitted for moulded or prefabricated earplugs by a specialist.	
Hand Injury Protection	Hand protection will aid workers who are exposed to dangerous substances by skin absorption, serious wounds, or thermal burns. Gloves are a frequent protective clothing item. When working on electrified circuits, electricians frequently use leather gloves with rubber inserts. When stripping cable with a sharp blade, Kevlar gloves are used to prevent cuts.	
Whole Body Protection	Workers must protect their entire bodies from risks such as heat and radiation. Rubber, leather, synthetics, and plastic are among the materials used in whole-body PPE, in addition to fire-retardant wool and cotton. Maintenance staff who operate with high-power sources such as transformer installations and motor-control centres are frequently obliged to wear fire-resistant clothes.	

Table 7.1.1 Personal protective equipment

7.1.6. Basic Ergonomic Principles

The basic ergonomic principles for construction are:

1. Work in neutral space.

Whether working seated or standing and moving throughout the day, it is essential to maintain a neutral posture. Several parts of the body are typically affected by this principle. The foremost is the rear. A healthy spine has an S-curve, and it is essential to maintain this curve when working to prevent back pain. When working in a seated position, lumbar support is essential. When standing stationary, it can be advantageous for those who stand or move around a facility to rest one foot on a footrest, and when lifting, it is important to lift using your legs rather than your back.

Neck, elbows, and wrists are additional parts of the body that may be misaligned. To lessen tension on these areas and maintain their alignment, try modifying your equipment or work position so that your muscles remain in a relaxed state.

2. Reduce the necessity for excessive force.

Imagine a time when you had to move an object using your entire body weight. This is what the principle refers to. Heavy pushing, pulling, and lifting can strain your joints, potentially leading to weariness or injury. Instead of employing unnecessary force, look for equipment or methods that can lighten the load you must move. It may be as easy as using a cart or hoist to transport heavy objects, or you may need to modify your workflow to reduce the distance you must go or the number of objects you must transport.

3. Keep materials easily accessible.

Try extending your arms in front of you and drawing a half-circle with them. This is your reach envelope, and you should keep goods you use regularly within this semicircle at your desk. To accommodate your reach envelope, you may need to rearrange your space so that you no longer have to reach for often used goods. Adjusting your seat and armrests can help alleviate fatigue by bringing machine controls within reach.

Also applies while reaching into boxes or containers. Before reaching into a box, tilt it or lay it on a lower surface instead than straining your shoulders to reach higher.

4. Work at the appropriate height.

A work surface that is either too high or too low might cause back, neck, and shoulder strain. Standing or sitting, the majority of normal tasks should be performed at elbow height. Nonetheless, if you work with heavy instruments, you may need to change your position to work below elbow height. On the other hand, precision work may necessitate working at heights above the elbow.

5. Reduce needless movements.

Manual repetition can result in overuse injuries, thus it is essential to consider the motions you repeat throughout the day and identify solutions to prevent excessive motion. Is it conceivable, for instance,

to replace a screwdriver with a drill, so eliminating the need for manual motion? Additionally, you might seek for possibilities to alter your position or the arrangement of your workspace in order to operate in a more ergonomic manner.

6. Reduce fatigue resulting from static stress.

There may be tasks at work that need you to maintain the same position for a lengthy period of time. This is known as static load. Static load can impact various regions of the body, including the legs while standing for an extended period of time and the shoulders when holding the arms overhead for more than a few seconds. These types of tasks might create muscle fatigue and discomfort that persists long after the work is completed. You may be able to prevent the weariness generated by static load by altering the orientation of your work area, repositioning your body, or using tool extenders.

7. Minimize contact stress.

When a tool or surface repeatedly comes into contact with the same part of your body, contact stress occurs. Sometimes referred to as pressure points, these places of contact can be painful. When you habitually squeeze a tool, such as pliers, or hold a heavy object, such as a nail gun, that exerts pressure on a portion of your hand, this is an example of contact stress. Adding padding, wearing gloves, or selecting equipment with a padded grip can be beneficial. Consider adding anti-fatigue mats to standing surfaces to reduce heel contact stress.

8. Leave adequate clearance.

This idea is straightforward: you must have adequate space for your head, knees, and feet. Adjust your seat to allow sufficient legroom if you perform your duties while seated. Remove above obstacles to avoid head injuries. Visibility also plays a role in this scenario. It is essential to have a clear perspective of your surroundings regardless of where you are working or what equipment you are employing.

9. Stay active and flexible throughout the day.

Sitting or standing in one posture for too long is unhealthy for the human body. Take time to stretch and exercise your muscles. If you are sedentary for an extended amount of time, take frequent breaks to walk around. If you are on your feet all day, wear supportive shoes and rest during your breaks. And if your profession is physically demanding on specific sections of your body, it may be beneficial to stretch before to undertaking tough duties.

10. Keep your atmosphere comfortable.

Depending on your sector and position, work conditions vary widely, but lighting, temperature, vibration, and noise are a few common factors you may want to consider. Consider strategies to reduce glare or improve lighting in dimly lit places. Whenever feasible, maintain a pleasant temperature in the workplace, and when working outside, dress appropriately for the weather. And if the tools produce excessive noise or vibration, give hearing protection and seek methods to attenuate the vibrations.

7.1.7. Emergency Response Plan for Construction Site

Construction projects are commonly recognised as one of the most accident-prone activities. It must be realised that the size and complexity of a project determines the associated dangers and risks. In the majority of cases, poor response, a lack of resources, or the absence of trained staff on a building site will result in chaos. In order to reduce human suffering and financial losses, it is strongly suggested that the emergency response plan be developed prior to project launch.

The Emergency Response Plan must address the following factors:

1. Statutory Obligations

The entity must comply with all applicable Central and State Rules and Regulations, such as The Building and Other Construction Workers' Act of 1996, the Environment (Protection) Act of 1986, the Factories Act of 1948, the Inflammable Substances Act of 1952, the Motor Vehicles Act of 1988, the Public Liability Insurance Act of 1991, the Petroleum Act of 1934, the National Environment Tribunal Act of 1995, and the Explosives Act of 1874, etc.

Incorporate applicability and compliance status into the Emergency Response Plan.

2. Emergency Preparedness

a. The process of hazard identification and risk assessment entails a thorough review of construction activities such as Excavation, Scaffolding, Platforms & Ladders, Structural Work, Laying of Reinforcement & Concreting, Road Work, Cutting /Welding, Working in Confined Space, Proof/Pressure Testing, Working at Heights, Handling & Lifting Equipment, Vehicle Movement, Electrical, Demolition, Radiography, Shot blasting

b. Listing On-Site (Level I & II) and Off-Site (Level III) Emergency Scenarios in accordance with their effects and available resources.

3. Measures for Emergency Mitigation

To ensure safety during construction activities, the business must have an appropriate Health, Safety, and Environment Management System in place.

a. Health, Safety, and Environment (HSE) Policy;
b. Duties and Responsibilities of Contractor/Executing Agency;
c. Site planning and layout;
d. Deployment of Safety Officer/Supervision;
e. Safety committees with fair participation of workers;
f. Safety audits and inspections shall be conducted using prescribed checklists.
g. Work permit system h) PPE I Safety awareness and training, etc.

4. Measures for Emergency Preparedness

a. Emergency Drill and Exercise on Identified Scenarios and Evaluations

b. Emergency Response Training

c. Mutual Aid

5. Disaster Recovery Procedures

The entity must develop well-planned and documented response procedures. The action plan may be documented for both On-site and Off-site disaster scenarios.

6. Organization and Responsibilities during Emergencies

The entity must create an organisation chart (emergency action flowchart) and specify the roles and duties of key individuals in order to properly handle an emergency scenario on the project site. Clause 14.0 of the PNGRB (ERDMP) Regulations may be consulted in order to establish the emergency organisation and responsibilities.

7. Resources for Emergency Management

1. The following emergency control systems and facilities must be provided on the project/ construction site: -

   a. Fire and gas detection system
   b. Fire protection and firefighting system (Active and Passive)
   c. Ambulance facility on-site; if not, on urgent call basis.
   d. Rescue facilities and personal protective equipment (PPEs)
   e. First aid stations.
   f. Medical facility on-site or affiliation with a local hospital or medical centre
   g. Internal and External Communication Facilities as well as a Notification System
   h. Gathering places
   i. Escape route and evacuation zones

2. Internal and External Emergency contact information for police, fire, hospitals, mutual assistance industry, factory inspectors, Board, State Pollution Control Board, Petroleum and Explosive Safety Organization (PESO), etc.

3. Addresses and Telephone Directory of Technical Support Services and Professional Emergency Responders

8. Emergency Recovery Method

Following the emergency, the following tasks must be completed in detail.

a. Information to legal authorities (Refer to Clause 23.0 for Incident Reporting to PNGRB).
b. Incident examination.
c. Damage evaluation.
d. Product salvage, decontamination, clean-up, and restoration.
e. A comprehensive report shall be compiled based on the complete incident experience, including restorations, restrictions, and lessons learned.

Notes

Unit 7.2 Fire Safety

Unit Objectives

By the end of this unit, participants will be able to

- Explain the classes of fire and types of fire extinguishers.
- Demonstrate the operating procedure of the fire extinguishers.

7.2.1. Fire and its Classes

Fires can be catastrophic. Burning, hurting, and even murdering people. causing property and equipment damage. Disrupting corporate operations. Fire may take lives and destroy businesses.

Fire prevention is the most effective technique to prevent fire from affecting you or your organisation. In addition to preventing fires from starting, you should also have a plan in place for responding to flames if they occur.

There are five distinct classes of fire:

Class A: Ordinary solid combustibles, including paper, wood, fabric, and certain polymers.

Class B: Flammable liquids such as alcohol, ether, oil, gasoline, and grease that should be smothered.

Class C: Electrical equipment, appliances, and wiring where applying a nonconductive extinguishing chemical minimise electrical shock-related injuries. Don't use water.

Class D: Certain combustible metals, including sodium and potassium. These items are not often found at the Medical Center.

Class K: Flames caused especially by cooking fat or oil.

7.2.2. Fire Safety

Fire safety is a set of actions aimed at reducing the amount of damage caused by fire. Fire safety procedures include both those that are used to prevent an uncontrolled fire from starting and those that are used to minimise the spread and impact of a fire after it has started. Developing and implementing fire safety measures in the workplace is not only mandated by law but is also essential for the protection of everyone who may be present in the building during a fire emergency.

The basic Fire Safety Responsibilities are:

- To identify risks on the premises, a fire risk assessment must be carried out.
- Ascertain that fire safety measures are properly installed.
- Prepare for unexpected events.
- Fire safety instructions and training should be provided to the employees.

Prevention of a Workplace Fire

- Workplace fire drills should be conducted regularly.
- If one has a manual alarm, one should raise it.
- Close the doors and leave the fire-stricken area as soon as possible. Ensure that the evacuation is quick and painless.
- Turn off dangerous machines, and don't stop to get personal items.
- Assemble at a central location. Ascertain that the assembly point is easily accessible to the employees.
- If one's clothing catches fire, one shouldn't rush about it. They should stop, descend on the ground, and roll to smother the flames if their clothes catch fire.

7.2.3. Fire Extinguisher

Fire extinguishers are portable devices used to put out small flames or minimise their damage until fire-fighters arrive. These are maintained on hand in locations such as fire stations, buildings, workplaces, public transit, and so on. The types and quantity of extinguishers that are legally necessary for a given region are determined by the applicable safety standards.

Types of fire extinguishers are:

There are five main types of fire extinguishers:

1. Water.
2. Powder.
3. Foam.
4. Carbon Dioxide (CO2).
5. Wet chemical.

1. **Water:** Water fire extinguishers are one of the most common commercial and residential fire extinguishers on the market. They're meant to be used on class-A flames.

2. **Powder:** The L2 powder fire extinguisher is the most commonly recommended fire extinguisher in the Class D Specialist Powder category, and is designed to put out burning lithium metal fires.

3. **Foam:** Foam extinguishers are identified by a cream rectangle with the word "foam" printed on it. They're mostly water-based, but they also contain a foaming component that provides a quick knock-down and blanketing effect on flames. It suffocates the flames and seals the vapours, preventing re-ignition.

4. **Carbon Dioxide (CO2):** Class B and electrical fires are extinguished with carbon dioxide extinguishers, which suffocate the flames by removing oxygen from the air. They are particularly beneficial for workplaces and workshops where electrical fires may occur since, unlike conventional extinguishers, they do not leave any toxins behind and hence minimise equipment damage.

5. **Wet Chemical:** Wet chemical extinguishers are designed to put out fires that are classified as class F. They are successful because they can put out extremely high-temperature fires, such as those caused by cooking oils and fats.

Notes

Unit 7.3 Safety Measures at Workplace

Unit Objectives

By the end of this unit, participants will be able to

- Explain the importance of housekeeping works.
- Demonstrate safe housekeeping practices.
- Explain the importance of participation of workers in safety drills.
- Explain the purpose and importance of vertigo test at construction site.
- List out basic medical tests required for working at construction site.
- Demonstrate vertigo test.
- Demonstrate different methods involved in providing First aid to the affected person
- Demonstrate safe waste disposal practices followed at construction site.
- Explain different types of waste at construction sites and their disposal method.

7.3.1. Safety, Health and Environment at Work Place

The Indian Constitution gives explicit standards for people's rights and the Directive Principles of State Policy, which offer a framework for the acts of the government. The government is dedicated to regulating all economic activities for the management of safety and health risks at workplaces and to implementing steps to provide safe and healthy working conditions for every man and woman in the country. This commitment is supported by both these Directive Principles and international instruments. The government recognises that worker health and safety contribute to both economic growth and worker output.

7.3.2. Good Housekeeping

Good housekeeping on construction sites refers to the practice of keeping your site clean and tidy. After all, construction work is messy, and cleaning up now will only result in more mess later.

A clean work environment reduces the likelihood of accidents and improves fire safety. There are fewer things to trip you up if there are no materials, waste, or discarded tools.

10 housekeeping rules for a clean site. Implement these, and you should see a decrease in slip and fall accidents and near misses among your employees.

1. Make a separate area for trash and waste.

Make a waste disposal area. After all, if you want your workspace to be free of waste materials, you'll need a place to store them. Depending on the amount of waste, this could be a skip or another waste disposal bin. Segregating waste types for reuse, recycling, or landfill is a best practice solution.

2. Safely stack and store materials.

Poorly stacked materials can obstruct access routes or topple over, resulting in crushing injuries or property damage. You will need materials and tools throughout your project; store them safely to avoid them becoming hazardous.

3. Maintain a safe working environment.

On a construction site, your job will almost certainly generate daily waste. Whether it's packaging, demolition, or leftovers. Check and clean up your work area regularly throughout the day. If trip hazards and clutter are beginning to accumulate, address them as soon as possible.

4. Maintain clear access routes.

A safe working environment includes access and egress. It is how you arrive at work and how you leave. Leave no materials/tools/benches in gangways/corridors where they could obstruct someone's escape or cause a trip hazard (it might be you or a colleague who needs to get out in a hurry).

5. Place tools at designated place after use.

Put away tools and equipment after you've finished using them. It's easy to leave items lying around, but if you won't need them again soon, store them. If it's not in use, it should be out of sight, or at the very least out of your way!

It is not your responsibility simply because it is not yours. If you see anything lying on the floor, stairwell, or passageway that could cause people to trip and fall, pick it up and put it somewhere safe - don't wait for someone else to move it; the next person could be the one who gets hurt.

6. If something is broken, fix it.

Fix it or get rid of it. Good housekeeping also entails keeping things in working order on-site. Damaged tools or equipment must be removed from service so that they can be repaired or replaced.

7. Avoid tripping over cables.

Equipment trailing leads and cables are common trip hazards, especially when using portable equipment. You may not have a socket nearby, but make sure the lead is routed away from walkways or access routes. Cables should be routed so that they do not present a tripping hazard to you or others.

8. Avoid fire hazards.

Make sure that waste or material storage does not accumulate in fire escapes, as you may need to use these escapes at some point. Clearing up and removing waste is also a good way to keep fires at bay on the job site. Because fire requires fuel, do not store waste materials near sources of ignition. If all garbage is collected on a regular basis and placed in a skip, the danger is contained and more easily dealt with in the event of a fire.

9. Inform others.

Everyone must work together to keep the workplace clean. Use our free good housekeeping toolbox talk to raise awareness on your site. If everyone follows the same good housekeeping routines, you will be well on your way to a clean and safe site for everyone.

7.3.3. Safety Drills at Construction Site

Construction is a hazardous field in which employees must become proficient. Fortunately, safety training can reduce workplace injuries while informing employees of necessary precautions to take. Here are five types of construction industry safety training you should be aware of.

Safety in Excavation and Trenching

Training on excavation and trenching safety emphasises the dangers associated with working in excavation sites and confined spaces. The training enables workers to navigate these areas safely in order to prevent falls and fatalities. In addition, the programme emphasises preplanning and protective systems (which fall under OSHA-compliant safety material). Workers will be educated on the various excavation methods and techniques in order to perform their duties safely.

Fall Prevention and Safety Measures

Fall prevention and protection training is another type of safety training that all construction workers must receive. Falls are one of the leading causes of death in the industry; therefore, it is essential that workers protect themselves. Fall prevention programmes illustrate fall protection principles, fall arrest system components, and fall hazard recognition. Moreover, demonstrations familiarise workers with fall protection equipment.

Hazard Communication

On a daily basis, construction workers are exposed to hazardous materials and chemicals at their work sites. A worker's health and safety may be compromised by repeated exposure to such substances. Training on hazard communication includes the numerous types of chemicals used in the workplace as well as methods for minimising worker exposure. In addition, employees are taught how to read material safety data sheets and identify product labels.

Crane Hazards Management

Cranes pose a distinct hazard in the construction industry because of the diverse causes of these injuries. For instance, improper placement of loads, contact with overhead electricity lines, and structural failures can result in injuries and fatalities. Nevertheless, crane hazard management develops a grasp of OSHA compliance rules, which enhances job site safety and decreases the likelihood of employee accident.

Construction Industry OSHA Course

OSHA courses for the construction sector equip novice and seasoned workers with a general understanding of diverse construction sites. In addition to an introduction to OSHA, employees will receive training on issues including material handling, ergonomics, access into restricted spaces, and site-specific policies. This course is designed to cover industry-wide themes and handle safety issues.

7.3.4. Medical Examination for Construction Workers

The government has mandated that industrial enterprises undertake annual health checkups on their employees. In accordance with the Factories Act of India from 1948, both contractual and permanent employees in manufacturing businesses are required to undergo periodic health examinations. These examinations aim to protect the health and safety of factory workers.

The type of medical examination varies according to an employee's job description or the nature of the industrial process in which he is involved. For instance, if an employee works in the food business, their hands are routinely inspected for skin disorders. If someone is involved in a hazardous manufacturing process, chest X-rays may be part of the medical checkup.

Consequently, depending on the nature of the production process and the job profile, an employee may be subjected to all standard and specific tests.

In addition, the frequency of medical examinations varies. According to the Maharashtra Plant Rules, for instance, if the factory is involved in the production of lead, workers are inspected once every month.

Medical Check-up Prior to Employment: A young person must have a pre-employment medical examination by a Certifying Surgeon to determine and confirm his fitness to work in a factory, according the Factories Act of 1948. The certificate of fitness is only valid for one year from the date it was issued.

Medical Examinations for Workers in Hazardous Occupations: According to the Factories Act, a plant that engages in hazardous procedures is required to have its employees examined by a competent medical professional prior to employment and on a recurrent basis thereafter. Workers employed in a "hazardous process" are medically tested once before to employment by a Factory Medical Officer to determine their physical fitness and appropriateness for employment in a hazardous process.

Once every six months, the health status of all workers exposed to occupational health hazards must be determined.

Form 7 is completed, and if the medical findings reveal any abnormality or unsuitability of a person employed in the hazardous process, or if the worker has manifested signs and symptoms of a notifiable disease (as specified in the Third Schedule of the Factories Act), the worker must be removed from the process for health protection and cannot be employed in the same process. Alternatively, if the worker is totally handicapped, he or she will receive appropriate rehabilitation. Only after obtaining a Fitness Certificate from the Certifying Surgeon and Form 7 in accordance with the Factories Act may a withdrawn employee be rehired for the same process.

List of Recommended Medical Tests under the Factories Act:

1. Complete Physical Examination
2. Blood Group, Rh factor
3. Blood CBC, ESR, RBS
4. Urine Test (Routine & Microscopic)
5. Creatinine
6. Electrocardiogram (Computerised ECG)
7. Chest X-Ray (Standard Size)
8. Lung Function Test
9. Vision Test (Screening)
10. Audiometric Test
11. HIV & HBS Tests

7.3.5. Vertigo Test

Vertigo is a symptom, not a condition in and of itself. Vertigo is a sort of dizziness that is frequently described as the sensation that one is spinning or that the world is spinning around them, especially when they alter their position. Vertigo affects people of all ages. Middle ear pathology is typically the culprit in younger patients. The danger of falls and associated sequelae necessitates a specialised assessment of the elderly. The key to arriving at a diagnosis is distinguishing vertigo from other causes of dizziness or imbalance, as well as distinguishing central causes of vertigo from peripheral causes.

Vertigo is a symptom that is associated with numerous medical disorders. Your doctor may require one or more tests or procedures to better understand your underlying issue. Numerous of these tests require specialised equipment and experienced personnel.

Some exams are brief and painless, while others are lengthy and unpleasant. Your doctor can recommend the relevant tests for your condition.

Diagnostic Procedures Typically Employed for Vertigo

Following a discussion of your symptoms, a review of your medical history, and a general physical examination, your physician may recommend one or more of the following tests:

Dix-Hallpike Maneuver

If your doctor suspects you have benign paroxysmal positional vertigo (BPPV), the most frequent type of vertigo, he or she may employ the Dix-Hallpike manoeuvre. This procedure can also assist your doctor in determining if your vertigo is caused by an inner ear disorder or something in your head.

The physician will rotate your head 45 degrees to one side. Then, you will immediately lie on your back with your head off the edge of the table for at least 30 seconds. Your physician will examine your eyes and inquire whether you feel dizzy. The process is repeated on the opposite side.

You should be aware that this examination could induce vertigo. If you experience symptoms during this examination, your physician will conclude that you have vertigo.

Head Impulse Test

The head impulse test examines the coordination between your eyes and inner ears. It is frequently utilised when vestibular neuritis is suspected. Your doctor will quickly twist your head to search for rapid eye movements and reflexes that may indicate a problem with the semicircular canals of the inner ear.

Romberg Test

The Romberg test requires that you stand with your feet together. You will then close your eyes. Your doctor will evaluate the degree to which you wobble or fall to establish the cause of your vertigo.

Fukuda-Unterberger Test

The Fukuda-Unterberger test consists of a blindfolded march. To determine which side of your body is afflicted by vertigo, your doctor will evaluate how your body deviates from the midline.

Electronystagmography (ENG) or Videonystagmography (VNG)

Electronystagmography (ENG) and Videonystagmography (VNG) are used to identify aberrant eye movements and assess if vertigo symptoms are caused by an inner ear condition.

ENG employs electrodes and VNG uses small cameras to monitor eye movements while the head is put in various postures or while the subject is requested to track specific visual targets. Air or water may also be utilised to regulate the temperature of the ear canal. Typically administered in a dark setting, these examinations may induce jerking eye movements.

Rotation Test

To determine how well the eyes and inner ear work together, rotation tests are administered. Eye movements are analysed while the head is slowly moved from side to side. Different types of rotation tests exist. You may be required to sit in a chair that swivels or to look at a stationary target while moving your head back and forth or up and down.

7.3.6. First Aid

First aid is the treatment or care given to someone who has sustained an injury or disease until more advanced care can be obtained or the person recovers.

The aim of first aid is to:

- Preserve life
- Prevent the worsening of a sickness or injury
- If at all possible, relieve pain
- Encourage recovery
- Keep the unconscious safe.

First aid can help to lessen the severity of an injury or disease, and in some situations, it can even save a person's life.

Need for First Aid at the Workplace

In the workplace, first aid refers to providing immediate care and life support to persons who have been injured or become unwell at work.

Many times, first aid can help to lessen the severity of an accident or disease.

It can also help an injured or sick person relax. In life-or-death situations, prompt and appropriate first aid can make all the difference.

Treating Minor Cuts and Scrapes

Steps to keep cuts clean and prevent infections and scars:

- **Wash Hands:** Wash hands first with soap and water to avoid introducing bacteria into the cut and causing an infection. One should use the hand sanitiser if one is on the go.

- **Stop the bleeding:** Using a gauze pad or a clean towel, apply pressure to the wound. For a few minutes, keep the pressure on.

- **Clean Wounds:** Once the bleeding has stopped, clean the wound by rinsing it under cool running water or using a saline wound wash. Use soap and a moist washcloth to clean the area around the wound. Soap should not be used on the cut since it may irritate the skin. Also, avoid using hydrogen peroxide or iodine, as these may aggravate the wound.

- **Remove Dirt:** Remove any dirt or debris from the area. Pick out any dirt, gravel, glass, or other material in the cut with a pair of tweezers cleaned with alcohol.

7.3.7. Waste Management

The disorderly nature of construction sites can make it difficult for workers to remain productive. By applying waste management methods from the outset of the project, one will aid in maintaining order and keeping everyone focused on their jobs.

- **Avoid Accidents:** To prevent accidents, the workers must ensure that waste and debris are properly disposed of. Ensure that they are aware of which objects are hazardous in the event of a fire or an object being thrown into machinery.

- **Reduce Cost:** Managing garbage on-site can assist decrease costs by minimising the cost of removal, in addition to improving safety.

- **Maintain a wholesome working atmosphere:** To maintain a healthy building site, workers will need a variety of equipment and supplies, such as wheelbarrows for transporting dirt and pallets for storing bricks and other heavy items. Ensure that there are always sufficient rubbish bins available so that the workers may dispose of the trash without difficulty.

- **Keeping Material Records:** All building materials must be accounted for at all times to prevent their accidental disposal. This contributes to cost control and time management. If using Reo mesh for wall stability, one would not want to waste such a valuable resource. This occurs frequently on construction sites and may be controlled with simple procedures. This can be as easy as choosing various colours for waste piles or maintaining a log. Materials that are no longer required should never be discarded until they have reached the end of their functional life on the site; in other words, until nothing can be salvaged from them.

- **Environmentally Responsible:** Waste management is also essential since it ensures the environmental friendliness of a project. If garbage is not disposed of in an environmentally responsible manner, it can negatively impact the local ecology and nearby places by contaminating streams and contributing to air pollution.

Waste and Debris Management on the Construction Site

On the construction site, one must be mindful of how they handle waste and garbage. Having a plan for managing these goods is necessary to protect the safety of both workers and the general public. Here are some waste management strategies:

- Before disposing of them in the dumpster, place any hand tools in containers with lids.
- Place empty paint cans in the trash instead than spilling them down drains or onto pavements.
- Rinse disposable cups and other food containers before placing them in a recycling bin. This will help prevent litter from being blown onto the property during windy or rainy weather.
- Recycle equipment and other metal objects by utilising a magnet or air compressor to remove all non-metal components, such as nails, screws, nuts, bolts, electrical wiring, etc. These are then segregated by category prior to proper recycling.

- Insulation should be disposed of in the garbage as opposed to being poured down drains or onto pavements, as it can clog sewer systems.
- Use a tarp to pile dirt, rocks, bricks, and other heavy things into the bed of a truck before hauling them away when the work is complete. This will make future clean-up easier.
- Instead of discarding excess lumber, wrap it in plastic to prevent it from becoming wet and infected with termites.
- Use a leak-proof container or urn to transfer hazardous liquids away for proper disposal; this will keep the workers and others on-site dry and healthy.
- Regularly cleaning up will reduce the amount of debris.
- Using trash cans with lids to prevent rubbish from falling to the ground.
- On your site, provide workers with safety vests for simple identification and protection from concealed threats such as electrical cables and sharp instruments.
- Ensure that there is a designated space for recyclable materials such as glass, plastic, cardboard, and metal containers so that they may be sorted later.

It is necessary to have a plan for waste management on construction sites, which are typically untidy places.

Exercise

1. Name the types of fire extinguishers.
2. Explain PPE in brief.
3. Explain the importance of workplace safety at construction site.
4. What do you understand by good housekeeping?
5. Why are safety drills at construction site important?

Notes

8.Employability Skills (30 Hours)

It is recommended that all trainings include the appropriate Employability skills Module. Content for the same can be accessed https://www.skillindiadigital.gov.in/content/list

Scan the QR code below to access the eBook

DGT/VSQ/N0101

Employability skills can be defined as those soft skills which employers look for in a potential employee. These skills equip the employees to carry out their role to the best of their ability and client satisfaction. For example, the ability to explain what you mean in a clear and concise way through written and spoken means, helps to build a better relationship with the client or the customer. Similarly, handling stress that comes with deadlines for finishing work and ensuring that you meet the deadlines can be done through effective self-management training. It can also be done by working well with other people from different disciplines, backgrounds, and expertise to accomplish a task or goal. In today's digital age, employers expect that the employees should be able to make use of elementary functions of information and communication technology to retrieve, access, store, produce, present and exchange information in collaborative networks via the Internet. Students need to develop entrepreneurial skills, so that they can develop necessary knowledge and skills to start their own business, thus becoming job creators rather than job seekers. Potential employees need to develop green skills, which are the technical skills, knowledge, values and attitudes needed in the workforce to develop and support sustainable social, economic and environmental outcomes in business, industry and the community. Thus, students are expected to acquire a range of skills so that you can meet the skill demands of the organisation that you would work for or to set up and run your own business.

This chapter is about employability skills, Constitutional values, becoming a professional in the 21st Century, digital, financial, and legal literacy, diversity and Inclusion, English and communication skills, customer service, entrepreneurship, and apprenticeship, getting ready for jobs and career development.

The scope covers the following :

- Introduction to Employability Skills
- Constitutional values – Citizenship
- Becoming a Professional in the 21st Century
- Basic English Skills
- Career Development & Goal Se?ng
- Communication Skills
- Diversity & Inclusion
- Financial and Legal Literacy
- Essential Digital Skills
- Entrepreneurship
- Customer Service
- Gettng ready for Apprenticeship & Jobs

The details of Employability module is available on eskill India. Please find below the link. https://

www.skillindiadigital.gov.in/content/list

Annexure-1

Annexure of QR Codes for Assistant False Ceiling and Drywall Installer

Chapter Name	Unit Name	Topic Name	URL	Page no.	QR Code
Chapter 1: Introduction to Assistant False Ceiling & Dry Wall Installer	Unit 1.1: Introduction to Construction Industry	Construction Industry	https://youtu.be/nndLyZrGfWc	7	Construction Industry
		Types of Construction	https://youtu.be/1WVzo2UFyo8		Types of Construction
	Unit 1.2: Role and Responsibilities of a Assistant False Ceiling and Dry Wall Installer	Assistant false ceiling and dry wall installer	https://youtu.be/Tfz2pWR8K6M	11	Assistant false ceiling and dry wall installer
Chapter 2: Erect and dismantle temporary scaffold	Unit 2.1: Erect and dismantle a scaffold	Scaffolding	https://youtu.be/96shGh3rfXw	27	Scaffolding
		Uses of Scaffold	https://youtu.be/5Vj-MosphpY		Uses of Scaffold
		Scaffolding Erection and Dismantle	https://youtu.be/OKawvyUhUkA		Scaffolding Erection and Dismantle
		Safety Checks	https://youtu.be/AoDWOZE8Wb4		Safety Checks

Chapter Name	Unit Name	Topic Name	URL	Page no.	QR Code
Chapter 3: Hand and power tools relevant to installation of false ceiling and dry wall	Unit 3.1 Hand and power tools used in false ceiling and dry wall installation	Hand and Power tools	https://youtu.be/nNh9wiKIAFE	41	Hand and Power tools
		Tools used in false ceiling installation	https://youtu.be/z8tDhkRmnMA		Tools used in false ceiling installation
		Tools used in dry wall installation	https://youtu.be/KpPb1sklA1E		Tools used in dry wall installatio

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