Carpentry

Level-II

Learning Guide-55

Unit of Competence: Construct Stairs and Stair Components

Module Title: Constructing Stairs and Stair Components

LG Code: EIS CRP2 M13 0919L-1LG-55

TTLM Code: EIS CRP2 M13 0919V1

LO 1: Plan and prepare

Instruction Sheet	Learning Guide # 55

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

- Obtaining and confirming Work instructions,
- Following Safety requirements,
- Identifying and implementing Sign/barricade requirements,
- Reporting problems by Selecting tools and equipment,
- Calculating Material quantity requirements,
- Using materials appropriately to the work application,
- Identifying Environmental protection requirements and applying regulatory obligations.

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

- ✓ Work instructions, including plans, specifications, quality requirements and operational details are obtained and confirmed.
- ✓ Safety requirements are followed in accordance with safety plans and policies.
- ✓ Sign/barricade requirements are identified and implemented.
- ✓ ***Tools and equipment*** are selected to the need of particular job; in the case of problems report to the concerned body before the next work is started.
- ✓ Material quantity requirements are calculated in accordance with plans and/or specifications.
- ✓ ***Materials*** appropriate to the work application are identified, obtained, prepared, safely handled and located ready for use.
- ✓ Environmental protection requirements are identified for the project in accordance with environmental plans and regulatory obligations and applied.

Learning Instructions:

Read the specific objectives of this Learning Guide.

Follow the instructions described below

Read the information written in the information Sheets below

Accomplish the Self-check

If you earned a satisfactory evaluation from the

Do the “LAP test” (if you are ready).

Information Sheet #1	Obtaining and confirming Work instructions

1.1 Obtaining and confirming Work instructions

Are documents that clearly and precisely describe the correct way to perform certain tasks that may cause inconvenience or damage if not done in the established manner? That is, describe, dictate or stipulate the steps that must be followed to correctly perform any specific activity or work. A document describing specific activities and tasks within the organization. It contains the greatest amount of detail.

As a component of a process, “defines how one or more activities in a procedure should be executed in detail, using technology or other resources.

Here are some examples of documented work instructions which may be found on a typical construction site:

Working Drawings issued for construction such as Plans , elevations, sections etc

Safety in use – particular consideration must be given to the risk of users to improve the safety in use of the stairs. Open riser stairs should be designed so that the rear of each tread is overlapped by the tread above by at least 16mm. Where there is the possibility of children below the age of 5 using the stairs care should be taken ensure any aperture formed by the components of the stair is capable of access by a child is less than 100mm i.e. a 100mm ball should not be able to pass through the gap. Any configuration of balustrade should be designed as to be incapable of being climbed.

The design, construction and arrangement of stairways are dictated by the applicable code requirements. Code requirements, including local amendments, are determined by the local authority having jurisdiction. The most commonly used code requirements are based on the International and local codes. Stairway Load Combinations and Design Loads, Load combinations and design loads are dictated by the governing code. Designers should determine the applicable load combinations and design loads based on the stairway usage and project requirements.

Self check # 1	Written test

Name: _____ Date: _____

Part:-True or false item

Direction: if the statement is correct write true provided if the statement is wrong write false on space provided.

_____ 1. To construct stair only by using local codes. (2 mark)

_____ 2. Stair constructs without safety. (2 mark)

Note: Satisfactory rating – above 50% **Unsatisfactory - below 50%**

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

Name: _____ Date: _____

Answer sheet

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

---------- 2.

Score = _____

Rating: _____

Information Sheet-#2	Follow Safety requirements

2.1 Follow Safety requirements

Objective- After completing this learning element, the trainee should be able to list and explain all safety precautions to prevent accidents give proper care for hand tools, equipment's and should also perceive those safety rules during the construction of stair.

2.2 General Safety on building site

A neat and tidy site safes time, eases the work, avoids accidents. If things like not used tools, battens, boards, stones, cables, steel bars etc. are lying around, somebody may trip up and fall down.

Care and order support the building process and avoid

What means an accident?

Personally:

Worries for the family

Sometimes- Permanent damage of the body

Always: Pain and working handicap

Dead

Always: lost of salary and cost for medical

For the company and society:

Reduction of public health and public wealth

Disturbances of the building process

Loss of working time

Colleagues are in

Basic safety signs for personal protection

Fig-1 personal safety

2.2.1 Personal safety, working clothes and shoes

2.2.1.1 Personal safety

It is dangerous to work with sharp edge tools and talk at the same time. Be agreeable with your neighbor workman. Respect his right and privileges. Remembering accidents prevented today will help make a living tomorrow. Some safety procedures should be followed at all times. Pay close attention to what is being done.

The primary important to protect the workman from accidents is to identify possible hazards and take the necessary safety measures to eliminate the hazardous. Before you go to work on any job, make sure your entire body is properly protected and provided other personal protective equipment.

Safety elements or hard hats should be wearing by workers in all construction sites where they might be exposed to head injury from falling objects.

Fig- 2 helmet

2.2.1.2 Safety equipment

- ✓ **Helmet:** - Protects the carrier from down falling items. It should be a must for everybody who works or moves on a building site.

- ✓ **Ear protection**: - Protects the carrier from damages of the ears.

Continuously working in a very noisy environment harms the eardrums forever. Once the eardrums are damaged there is no way of restoring the sense of hearing again.

Fig-3 Ear protection

- ✓ **Safety boots: -** are equipped with three safety measures.

It must have:

1. Toes protection hood A steel hood to protect the toes from down falling heavy thing
2. A steel layer inside the soles protects the carrier from stepping into a turned up nail. Benzene and oil resistant soles.

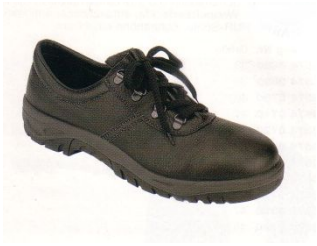


Fig-4 Safety boots

- ✓ **Safety goggles**

Necessary during chiseling and grinding work, protects against chips sparking around from the work piece

Fig- 5 Safety goggles

Nylon webbing with locking device and drop D-ring, adjustable length, to be used also with tool pockets, to meet recognized safety standard, (has width of 45mm).

- ✓ **Wearing clothes:**

  These are generally worn as a means of protecting. Such protective clothing should be changed and washed quickly and is best kept in a locker or store at the place of work.

2.2.1.3 Safety rule in stair

Safety is very important whenever you construct stair. Be sure to know or remember those safety rules before you starting working.

Safety rules in f stair construction are essential in order Use tools properly & Safe the person from injuries

- **Body care**

1. Never depend up on your muscles in lifting something heavy. Get someone to help you.
2. Test the sharpness of tools on wood, not on your hand.
3. Be careful when using your thumb as a guide during cutting the wood.
4. Make sure your hands are not in front of sharp edged tools that are in use.

- **Clothing**

Dress properly for work. It may often be desirable to wear an apron or coveralls over your clothing.

2.3 Materials /Tools

Never use defective tools. Hammers with loose heads are particularly dangerous.

Strongly tighten the tool and the formwork members with a nails or screw or bolts.

Properly select the material for the appropriate work.

Check the accuracy of the formwork that properly constructed.

- **First aid**

Whenever you perform formwork activities in any building site should have a first aid box which has minimum contents: -

1. Plasters;
2. Bandages;
3. Ointments;

4. Disinfectant.

Someone on site should be in charge of the box and know how to with broken bones, burns and electric shocks.

Deposit all the safety precautions taken on construction sites to prevent injury to the work force, accidents do happen and you may be the only other person able to take action to assist a colleague.

If you are not a qualified first aide, limit your help to obvious common sense assistance and call for help, but do remember that if a colleague's heart or breathing has stopped as a result of an accident, they have only minutes to live unless you act quickly.

A construction site should have a first aid box which has

1. Plaster
2. Hand ages
3. Ointment
4. Disinfectant

The following first aid procedures should be practiced.

Bleeding (cutting of body by sharp tools)

If the wound is dirty, rinse it under clean running water. Clean the skin around the wound and apply a plaster, pulling the skiing together.

If the bleeding is severe, apply direct pressure to reduce bleeding and raise the limb if possible. Apply a sterile dressing or pad and bandage firmly before obtaining professional advice.

- **Eye injuries**

Eye injuries must be treated seriously. The eye can be cut or bruised from a direct blow or by fragments of concrete ingredients. Eye injuries can be very painful.

Lie the injured person down, support their head and keep it skill. Ask the casualty to close their injured eye and cover it with an eye pad or sterile dressing.

Do not attempt to remove any foreign body from the eye yourself; this is best left to a qualified person.

- **Broken bones**

Make the casualty as comfortable as possible by supporting the broken limb (part) either by hand or with padding.

- **Chemical etc. in the eye**

Chemicals, petrol and corrosive substances can splash in to the eye and cause serious injury. You should try to wash the eye with gently running water.

Do not allow the person to rub the eye.

If possible, protect the uninjured eye with a pad or cloth curing washing.

- **Fainting**

Lay the individual down and raise his/her legs slightly. Ensure there is a plentiful supply of fresh air and the individual is in the shade. Loosen clothing and if breathing is difficult place in the recovery position until consciousness returns. Gradually sit individual up and then give sips of water.

Self check # 2	Written test

Name: _____ Date: _____

Part:-True or false item

Direction: if the statement is correct write true provided if the statement is wrong write false on space provided.

_____ 1. To construct stair always safety rules. (2 mark)

_____ 2. Eye goggle is one of safety equipment (2 marks)

_____3. Helmet is to protect our legs. (2 mark)

Note: Satisfactory rating – above 50% **Unsatisfactory - below 50%**

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

Name: _____ Date: _____

Score = _____

Rating: _____

Answer sheet

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

---------- 2.

----------3.

Information sheet # 3	Identifying and implementing Sign/barricade requirements.

3.1 Identifying and implementing.

Hygiene, human health and environmental protection requirements can be considered complied with if the construction and finishing materials emit no pollutants.

Reinforced concrete stairs can have load bearing flights of stairs, made of monolithic reinforced concrete or prefabricated and with steps finished with other materials. The flight's structural system is of the smooth or wrinkled load bearing slab type.

The usual construction system made of monolith reinforced concrete shows the following: advantages in execution:

Simple and economical casings, inventory casings can also be used;

1. simple reinforcement system;
2. Convenient casting.
3. Disadvantages in execution:

The stair is being executed by different teams of workers (smiths - benders and other workers specialized in finishes, tiling, carpentry, etc), in different work stages; work accuracy is different for the two categories of workers;

"work-site" circulation is more difficult and requires troubleshooting with improvised devices, until resolving the raw steps or directly the finished steps. In this situation the finishing workmanship (including the raw concrete steps) is more expensive but more accurate.

The construction system of the "wrinkled slab bearing with rigid knots" type is more difficult to calculate and execute. For this reason, the solution is used for decorative stairs in unique buildings. the type of construction system consisting of the load bearing slab made of prefabricated reinforced concrete has the following features: the raw steps are executed along with the resistance structure; they have controlled geometry, enabling the reduction of manual labor when executing the finishes; there are also already finished prefabs, generally produced by specialized companies; it ensures time savings for the manual labor on the construction site; it requires powerful cranes (the weight of prefabricated elements is between 1,000 and 5,000 kg), which justify their use

for high-rise buildings. With load bearing prefabricated steps and monolithic or prefabricated cast stringers. they can be installed on the building site by lightweight lifting machines (the weight of the prefabricated elements is generally less than 500 kg (rarely 800 kg)), and they can be used on small sites with few levels; the solution is interesting especially for prefabricated elements already finished, produced by specialized firms.

Metal stairs can be used for decorative stairs or technical stairs. Metal is used for both steps and stringers. Generally, the metal used is steel, in the form of sheets and laminated or pressed profiles. It is advisable to use "cortex" steel, more resistant to corrosion than carbon steel.

Other metals used for stairs are:

- ✓ Stainless steel (chemically and mechanically resistant, polished or matte - satin finished look);
- ✓ aluminum, especially in the form of extruded or pressed castings, profiles or sheets
- ✓ brass and copper, in the form of laminated profiles or pressed metal sheet, for decorative pieces or aesthetic;
- ✓ cast iron, used in the nineteenth century, both for the resistance elements as well as for the decorative;

3.2 Sign/barricade requirements

Steel must be protected against corrosion by painting and requires repainting at certain time intervals, depending on the material, stair Position (interior or exterior) and stair manufacturer's recommendations (if any).

In the case of stainless steel, aluminum, copper or brass stairs, the problem of maintenance over time consists of avoiding mortifying the shiny surfaces, especially on the stepping surface in the area most used, perhaps by chemical treatment of surfaces and mortifying. In the case of stairs with heavy traffic degradation of surfaces (even the matte ones) due to scratching should be considered.

3.2.1 Metal steps can be made

Metal steps of: gratings, checker plate, upholstered with rugs, supporting rigid boards (wood, prefabricated of stone); Metal structure steps filled with other materials and that have a wear layer of wood, carpet, stone, cast mosaic, ceramic.

3.2.2 Metallic stringers can be made

Current laminated profiles, composite or special (expanded laminated profiles), tubular pipes;

Trusses; they are done either from laminated profiles, or tubes with circular or rectangular section, assembled by welding. Stringers - very high truss can be made, even forming the stair railing;

For decorative stairs, stringers can have smooth edges or one or both toothed edges.

Stone stairs - are stairs with load-bearing stone steps; they can be supported on the ground, embedded in the masonry walls, or supported on stone or brick arches.

The stone blocks end in a parallelepiped shape in order to be easily concealed by weaving together with the masonry blocks.

To finish the stairs with usual conformation there are specially designed plinth profiles or regular plinths can be used for floors, with the amendment that in the case of stairs with a complex profile special attention to joints must be paid.

Decorative profiles, in the case of stairs, refer to the finishing of the risers or of the visible side. Usually it is made of plaster and glued in place along with other finishes. As finishing versions there are also expanded polystyrene profiles.

Mixed stairs may have reinforced concrete stringers (monolithic or prefabricated), or out of metal and load-bearing steps from other materials than the stringer (prefabricated concrete, wood, metal, stone, glass). Steps are fixed locally on the stringers, mechanically or with special cemented or welded pieces.

3.2.3 Accessories for steps, stairs

For finishing steps and stairs in general there are several types of profiles, plinths and decorative elements. Among the most important are the edge/banding profiles that allow

finishing the step edge, providing durability, but also the possibility of implementing anti-slip profiles, which prevent slipping on stairs. They are usually made of aluminum or metal, but there are also white or colored PVC versions.

Self check # 3	Written test

Name: _____ Date: _____

Part- II fills the blanks space

Direction: fill the blank space with proper words

1. Metallic stringers can be of made of (10 mark)

   _____ _____ _____ _____

Note: Satisfactory rating – above 50% **Unsatisfactory - below 50%**

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

Name: _____ Date: _____

Score = _____

Rating: _____

Answer sheet

1. ----------,----------,----------

Information Sheet #-4	Reporting problems by Selecting tools and equipment

4.1 Reporting problems

To report by using standard format the condition of the tools & equipment. Anti-slip profiles can be purchased separately, are made of rubber and can be mounted on any type of step, if not provided when building, or in special areas provided by the manufacturer.

4.1.1 Equipment, Tools and Materials

- ✓ Timber and nails
- ✓ Bolts and nuts,
- ✓ Measuring tapes/rules
- ✓ Hammers, spirit levels, shovels, spanners
- ✓ Squares (combination/tri), nail bags
- ✓ Chisels, hand saws, power saws, power drills
- ✓ Power planers, power leads, saw stools, string lines
- ✓ Bevels, Marking Equipment
- ✓ Nail Guns, Air Compressors And Hoses
- ✓ Steel Squares And Fence/Stair Clips
- ✓ Template Boards And Routers

4.2 Selecting tools and equipment

Objective After completing this learning element, the trainees should be able to Identify & describe hand tools, equipments which are use full for the construction of formwork.

4.2.1 Measuring and marking tools

- **Folding Rule** – When using the folding rule, place it flat on the work. The “O” end of the rule should be exactly even with the end of the space or board to be measured. The reading on the rule indicates the correct distance. A very accurate reading may be obtained by turning the edge of the rule toward the work. In this position, the marked gradations of the face of the rule touch the surface of the board.

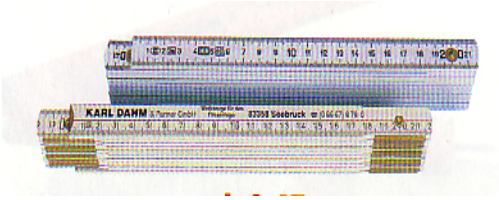


Fig-1 folding rule

- **Steel tape or roller tape**

It extends smoothly to full length. It returns quickly to its compact case when the return button is pressed or winds it up by crank handle. It used to measure and determine the size of the object.

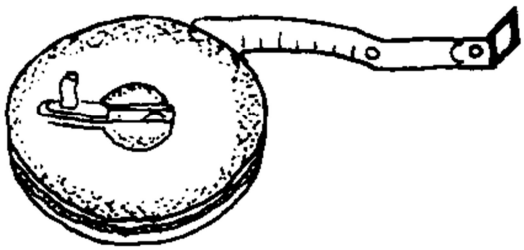


Fig-2 Steel tape or roller tape

- **Try square**

Try squares are used to provide a guide for marking straight, square and /or parallel/ lines. If one edge is straight and the handle part of the square is placed against this straight edge, then the blade can be used to measure the wood perpendicular to the edge.

Fig -2 try square

- **T- Bevel**

This tool looks like a square, but has a movable blade that can set to layout any angle.

- **Plumb bob**

A plum bob is made of metal. When suspended from a vertically attached string, it is employed to check the vertical alignment of surface of formworks. A freely hanging plumb bob gives exactly the vertical alignment, because any undisturbed freely hanging mass points to the center of the earth.

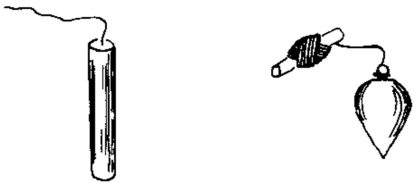


Fig-3 Plumb bob

4.2.2 Marking tools

- **Sharp pencil:**

It is used to indicate the point that you required to show the point or cut point. Start the mark with the point of the pencil in contact with the nark on the rule move the pencil directly away from the rule while making the mark.

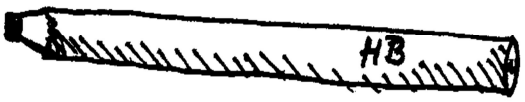


Fig- 4 Sharp pencil

- **Scratch awl:**

Scratch awl is a handy tool for a carpenter. It can be used to mark wood with a scratch mark.

- **Scriber or marking knife**:

It is used to draw lines parallel with the edge of the timber.

4.2.3 Cutting tools

On the construction site, the workman uses a number of different saws. These saws are designed for specific types of work. Many are misused. They will still do the job, but

they would do a better job if used properly. Most of these saws are used with a push motion in contrast.

- **Ripsaw**:

It is used for sawing with the grain or fiber of the wood. The tooth is chisel shaped are set alternately to the right and left.

- **Coping saw:-** i

  It Is used to make small irregular curved cut.

- **Backsaw:**

It is a cross cut saw with a thin blade and fine teeth. A heavy piece of steel fitter over the back of the thin blade. Prevents it from buckling. The blades of backsaw are from 20cm to 45cm long. It is designed for fine accurate work.

- **Hacksaw:**

The hack saw form is used with a variety of interchangeable metal cutting blades, which are used, for cutting soft metals and hard metals such as nails, angle Iron and reinforced steel.

- **Bow saw:**

Carpenters usually use Bow saw in the construction site in order to cut like eucalyptus wood. The upper section to the tension arm should be provided with an eye for easy opening and should be designed to support the hand; supplied blade of hardened tooth points.

Fig-5 bow saw

- **Carpenters axe:**

This tool is used mainly to cut tree and chop the wooden plugs. But also has many other uses. It has a hickory handle, steel head forged in one piece, fine grain steel, hardened and tempered edge.

4.2.4 Cleaning tools

Cleaning tools are very essential to remove loose particles, dusts, grasses, etc before and after using the tools and also from the formwork sheathing material.

- **Cleaning tools are**: - fiber brush, brooms,

Cleaning machine and Single bag dust extractor

Fig-6 broom

4.2.5 Other hand tools

- **Connecting devices**

The type of connecting devices used to join pieces of wood or steel together will depend on the following factors.

1. The strength requirements of the joint
2. The finished visual requirements of the joint
3. Availability of the devices and the material type
4. The characteristics of the materials being joined
5. Adjustable end wrench is a convenient tool for attaching certain kinds of hard-ware to cabinets, bolts etc.

- **Pliers**

There are many types of pliers in common use and to perform different tasks.

They are used to tighten bolts, cut wires, etc. in the construction site.

- **Spanners**

Spanners are available in a variety of types. The most common are

1. Open ended
2. Ring
3. Box

They are used tightened more securely the nut screws or others.

- **Clamps**

The clamps most used to clamp boards like plywood and others. There are different types of clamps. Such as

1. A steel bar clamp
2. Hand screw clamp
3. The c- clamp etc.
4. Laying out angles

Fig-7 steel bar clamp

First, adjust the sliding T-bevel to the angle you want. Then, fasten the screw on the handle; this tool is very useful far laying out acute angle or obtuse angles finally, hold the handle of the bevel firmly against the case or edge of the board. And then, mark along the edge of the blade.

- **Laying out lines.**

Mark a line around the edge of the board by continuing the face line. Hold the handle of the try require firmly against the board or face of the wood board while you mark along the blade.

- **Leveling**

Before placing the concrete materials on the formwork, first keep the leveling of the formwork. This leveling can be done by:

- **Water level**

The rubber water tube is filled with water until the level is half way up both glass tubes and them sealed when not in use. Based on the principle that water finds its own level, so this apparatus used to find horizontal levels over longer distance.

Fig-8 Rubber tube

- **Hose level (water level)**
- **Spirit level**

In order to have the formwork level, this tool is very essential. When the air bubble in the level tube is located centrally between the markings on the tube. Then the straight edge makes horizontal or vertical.

Fig-9 Spirit level

4.2.6 Equipment and machine

- **Bolts vs. screws**

Main article: Screw § Differentiation between bolt and screw

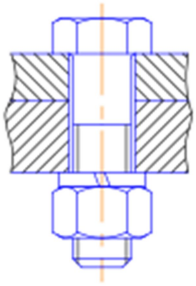


Fig 10 Bolted joint in vertical section

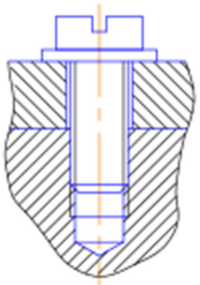


Fig-11 Screw joint

The distinction between a bolt and a screw is commonly misunderstood are several practical differences, but most have some degree of overlap between bolts and screws. The defining distinction, per Machinery's Handbook, is in their intended purpose: Bolts are for the assembly of two unthreaded components, with the aid of a nut. Screws in contrast are used in components which contain their own thread, and the screw may even cut its own internal thread into them.

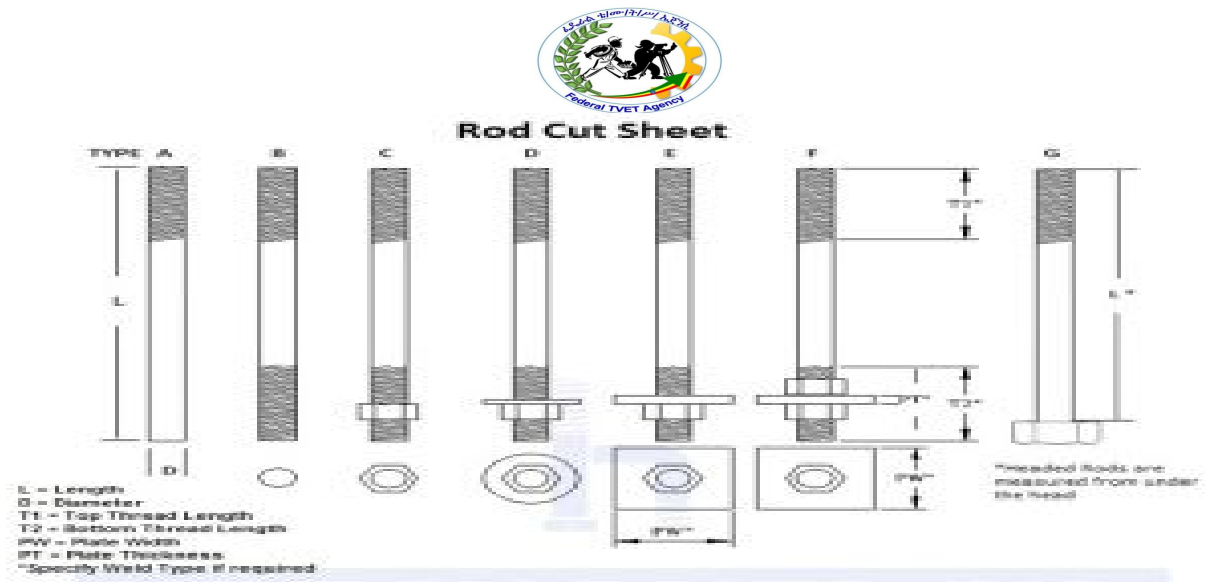


Fig –12 Rod cut sheet

In concrete to support structural steel columns, highway sign structures, industrial equipment, light poles among many other applications. Rods come in various configurations, IE rods with threads at ends (Tie-Rods), rods with a plate washer or nut tack welded on, rods with steel sleeves etc., Diameters: 1/2″ through 4″ Length: Up to 40′ length in 2″ diameter rods, 24′ in diameters greater than 2″

Grades: F1554-Grade 55 S1, F1554-Grade 105, A354-BD, A449, A193, 303 SS, 316 SS

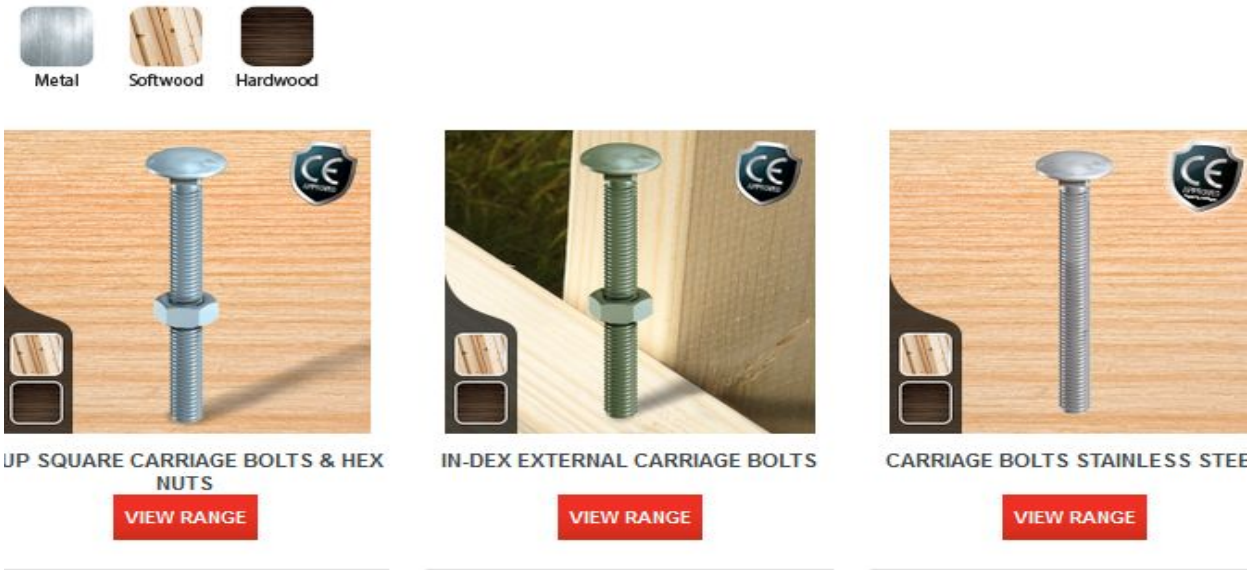


Fig-13 wood screw

Fig-14 Roofing bolts

- **Steel Squares And Fence/Stair Clips**

Round Iron Balusters Round Iron and Tubular Steel stair balusters in this series. From simple circular and square railing bars to ornately decorates panels, our range of wrought iron stair spindles. Fixing brackets for metal 12mm stair spindles. Balusters help define the unique appearance of your custom stairs.

- **How an Air Compressor Powers a Nail Gun**

An air compressor uses an engine to convert power into potential energy stored as pressurized air via a pump. As air is pumped into a storage tank it raises the pressure, which can then be controlled through a release to provide power elsewhere – such as to a pneumatic nail gun. Compressors can use either an electric or gas powered engine and can come in a wide variety of sizes to use for various jobs. They can be large and require a permanent mount or small and be easily portable. Obviously, for the purpose of using a compressor with a nail gun, you will most likely need a more portable design as tools are much easier to bring the project rather than the project to the tool.

- **Portable Air Compressor Styles**

There are many different styles of portable air compressors to choose from. Differences in design, size, and how they run are all details to pay attention to when deciding what might be best for your needs. Below are some of the most common differences in popular, portable styles for you to consider for nail gun use.

Fig -15 portable air compressor

- ✓ **Pancake Compressor**

These 4 to 6-gallon tanks are named such due to their rounded, flat bottom shape. They are amongst the most popular portable compressors available.

- ✓ **Pontoon Compressor**

These long, horizontal, cylinder-shaped tanks can hold 2 to 3 gallons and are also considered highly portable for a wide variety of jobs.

- ✓ **Trim Compressor**

Compact and highly portable, these compressors hold one 1 to 2-gallon tanks protected by a frame. These are popular for small, quick jobs.

- ✓ **Twin-Stack Compressor**

Aptly named, these are often larger compressors built onto wheels to allow for easy portability, greater air capacity, and greater pressurized power.

- ✓ **Single vs Two Stage Air Compressors**

Since an air compressor requires a pump to draw in natural air to store under pressure in the tank, you need to know the difference between single and two stage compressors. Before these are defined, you need to understand what PSI and CFM stand for.

Fig -16 portable air compressor gauge

- **Benefits of Pneumatic Tools**

Compared to many other energy sources, compressed air is one of the most convenient and powerful to use with many different tools. The use of air tools is long and varied, and the benefits often far outperform compatible products. Air tools generally offer:

Fig -17 Pneumatic Tools

Torque control and range of speed

1. Longer lasting life compared to conventional tools
2. Operate at lower temperatures and do not generate heat
3. Do not pose a fire hazard or electrical shock
4. Are environmentally friendly
5. Provide superior power in proportion to their weight
6. Provide consistency in power for a wide variety of jobs

- **Templates for Router Success**

A straight router bit can cut out just about any shape you want. All if needs is a little guidance from you.

- **Choose Your Equipment**

A straight router bit can cut out just about any shape you want. All it needs is a little guidance from you.

The first time you use a router, you're delighted to realize that it's capable of doing almost anything you want it to do. Soon after that, you're dismayed to realize that it's also capable of doing what it wants to do, such as veering off course when you try to freehand it along a line.

- **Make Your Preparations**

In most cases, 1⁄4 “tempered hardboard makes the best choice for template material. It's inexpensive and easy to work with.

How are you going to draw the shape you want? If you're not too handy with a pencil, you can find lots of useful samples from scroll saw pattern books and kids' coloring books.

- **Now, Cut It Out**

A rubber or foam pad will hold your work piece in place on your bench top while you rout. Stick the template on the work piece with a few days of hot-melt glue. If you're going to rout all the way through the work piece, attach it to a backer board with hot-melt glue.

Use a straight or spiral up cut bit with the same cutting diameter as the bushing to produce a piece nearly the same size as the template. Or, try a V-groove bit to create a carved look. Set your bit to the desired depth, and rout counterclockwise around a positive-image template, or clockwise around the inside of a negative-image template. Make sure to keep the bushing pressed firmly against your template at all times.

To make a recessed shape, use the arrangement shown below. If you want the shape to stand proud of the surface, go with the set-up shown in the photo below. Once you're done routing, pop the template off the work piece with a chisel

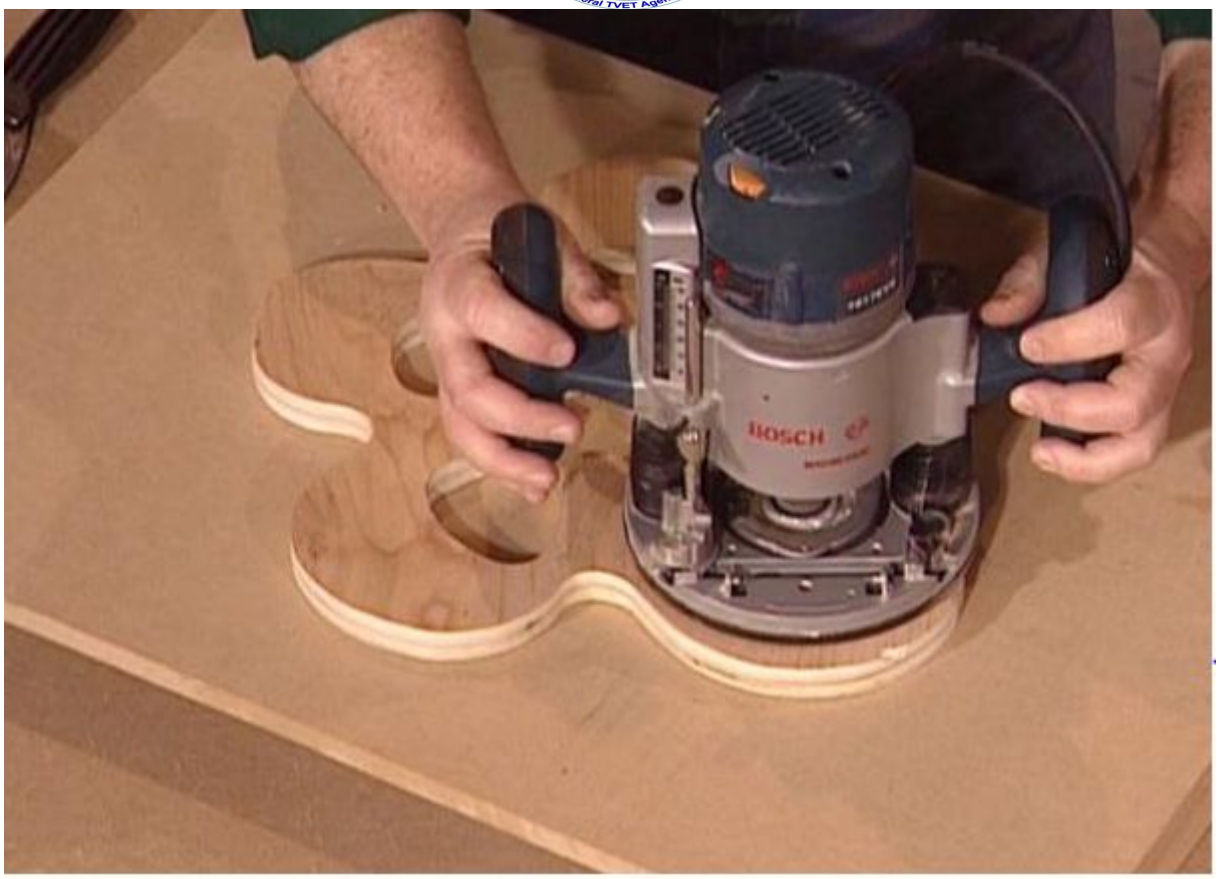


Fig -1 Templates for Router

- **Chisels**

There are many types of woodworking chisel used for specific purposes, such as:

- **Firmer chisel** has a blade with a thick rectangular cross section, making them stronger for use on tougher and heavier work.
- **Bevel edge chise**l can get into acute angles with its beveled edges.
- **Mortise chisel** thick, rigid blade with straight cutting edge and deep, slightly tapered sides to make mortises and similar joints.
- **Paring chisel** has a long blade ideal for cleaning grooves and accessing tight spaces.
- **Skew chisel has:** - a 60 degree cutting angle and is used for trimming and finishing across the grain.

- **Dovetail chisel made**:-specifically for cutting dovetail joints. The difference being the thickness of the body of the chisel, as well as the angle of the edges permitting easier access to the joint.
- **Butt chisel short**:-chisel with beveled sides and straight edge for creating joints.
- **Carving chisels:** - used for intricate designs and sculpting; cutting edges arm many; such as gouge, skew, parting, straight, paring, and V-groove.
- **Corner chisel:** - resembles a punch and has an L-shaped cutting edge. Cleans out square holes, mortises and corners with 90 degree angles.
- **Flooring chisel:** - cuts and lifts flooring materials for removal and repair; ideal for tongue-and-groove flooring.
- **Framing chisel:** - used with mallet; similar to a butt chisel, except it has a longer, slightly flexible blade.
- **Slick** a very large chisel driven by manual pressure, never struck.

- **Lathe tools**

A lathe tool is a woodworking chisel designed to cut wood as it is spun on a lathe. These tools have longer handles for more leverage, needed to counteract the tendency of the tool to react to the downward force of the spinning wood being cut or carved. In addition, the angle and method of sharpening is different; a secondary bevel would not be ground on the tool.

- **Metal working**

Chisels used in metal work can be divided into two main categories: hot chisels and cold chisels.

- **Cold chisel**

Fig -18 cold chisel

- **Cold chisel**

A cold chisel is a tool made of tempered steel used for cutting 'cold' metals, meaning that they are not used in conjunction with heating torches, forges, etc. Cold chisels are

used to remove waste metal when a very smooth finish is not required or when the work cannot be done easily with other tools, such as a hacksaw, file, bench shears or power tools.

The name cold chisel comes from its use by blacksmiths to cut metal while it was cold as compared to other tools they used to cut hot metal. Because cold chisels are used to form metal, they have a less-acute angle to the sharp portion of the blade than a woodworking chisel. This gives the cutting edge greater strength at the expense of sharpness.

- **Hot chisel**

A hot chisel is used to cut metal that has been heated in a forge to soften the metal. One type of hot chisel is the hot cut hardy, which is used in an anvil hardy hole with the cutting edge facing up. The hot work piece to be cut is placed over the chisel and struck with a hammer. The hammer drives the work piece into the chisel, which allows it to be snapped off with a pair of tongs. This tool is also often used in combination with a "top fuller" type of hot cut, when the piece being cut is particularly large.

Fig -19 hot chisel

A toothed stone chisel, used by stone sculptors and stonemasons

- **Stone chisels** are used to carve or cut stone, bricks or concrete slabs. To cut, as opposed to carve, a brick bolster is used; this has a wide, flat blade that is tapped along the cut line to produce a groove, then hit hard in the centre to crack the stone. Sculptors use a spoon chisel, which is bent, with the bevel on both sides. To increase the force, stone chisels are often hit with club hammers, a heavier type of hammer.

Fig-20 stone chisels

- **A bolster chisel**

Masonry chisels are typically heavy, with a relatively dull head that wedges and breaks, rather than cuts. Often used as a demolition tool, they may be mounted on a hammer drill, jack hammer, or hammered manually, usually with a heavy hammer of three pounds or more. These chisels normally have an SDS, SDS-MAX, or 1-1/8" Hex connection. Types of masonry chisels include the following:

- **Moil (point) chisels**
  - Flat chisels
  - Asphalt cutters
  - Carbide bushing tools
  - Clay spade
  - Flexible chisels
  - Tamper
- **A plugging chisel**

Has a tapered edge for cleaning out hardened mortar. The chisel is held with one hand and struck with a hammer. The direction of the taper in the blade determines if the chisel cuts deep or runs shallow along the joint.

Gouge

Fig-21 Different gouges and a wooden mallet

In addition to varying blade sweeps, bevels, and widths, blade variations include:

- **Crank-neck gouges** in which the blade is offset from the handle by a small distance, to allow working flat to a surface
- **Spoon-bent gouges** in which the blade is curved along its length, to allow working in a hollow not otherwise accessible with a straight bladed gouge
- **Fishtail' gouges** in which the blade is very narrow for most of its length and then broadens out near the working edge, to allow working in tight spaces.

All of these specialized gouges allow a craftsperson to cut into areas that may not be possible with a regular, straight-bladed gouge.

- **Table saws**

Table saws are one of the workhorses of any workshop or garage. Table saws are very simple, a circular saw blade is spun at high speeds at a stationary position and the operator pushes the wood into the blade. There is some room for customizability, especially with regards to the blade, which can be changed to accommodate different kinds of jobs.

Fig- 22 table saw

- ✓ **Working Principle:** The circular table saw blade fixed on an arbor revolves at a very high speed. The work piece is fed against the rotating blade to make the cut.

Uses of Table Saw: They are widely used in the woodworking industry. You can use a table saw to cut wood, plywood, medium-density fiberboard or MDF, plastic and even soft metals like aluminum.

Advantages of Table Saw: You can use a table saw to make different types of cuts easily. You can rip wide boards, crosscut and cut at an angle using miter gauges. Depending on the model, you may also get to cut bevels by tilting the blade. With the right blade, you can even make dados.

Disadvantages: Table saw is not highly portable and takes up more space in a workshop. Not an ideal tool for miter cuts and re sawing. Safety is another major concern. According to the number of accidents reported, the table saw is one of the most dangerous tools. Always follow the table saw safe working practices to avoid injuries.

- **Circular saws**

A circular saw is a versatile tool that offers high portability. The main purpose of a circular saw is to cut wood and other soft materials; in this sense, they are essentially portable table saws. You can also this saw to cut tough materials like metal with the appropriate circular saw blade. The working principle of a circular saw is opposite of a table saw.

How Circular Saw works: A circular saw it a handheld power tool with a rotating blade that is pushed across the work piece to cut through it. That means the work needs to be stationary and the rotating circular saw blade moves to make the cut.

Fig-23 circular saw

- ✓ **Pros: Advantages of a circular saw.**

A highly versatile power saw with which you can make a variety of cuts. Highly portable and requires very less storage space.

You can slice through long pieces of wood and work-pieces that cannot be loaded on a table saw.

- **Miter saws**

Miter saws are a more specialized kind of saw but despite this, they are fairly common, especially in professional workshops. A Miter saw, as the name implies, is designed to make one specific kind of cut, miter cuts. Miter cuts are cuts made at any angle other than 90-degrees along the length of the width of the wood. Don't get me wrong; miter saws can make crosscuts (90-degree cuts) perfectly fine.

Fig-24 circular saw

- ✓ **How Miter Saw works:** A large revolving circular saw blade that is fixed on a swing arm is brought on to the work piece which is fixed on the miter saw table to perform the cutting action. The work piece is held against the miter saw fence to make sure that they are square to the miter saw blade.
- ✓ **Use of Miter Saw:**

You can do crosscuts, miter cuts, bevel and compound cuts on wood, plastic, plywood and a number of other soft materials.

Miter saws are especially important in woodworking and carpentry because of how useful they are when it comes to building complicated things like furniture, cabinets, frames, etc.

Dual bevel miter saws are also widely used for trim jobs such as trimming crown molding.

- **Chop Saws**

This is a specialized kind of saw that is designed to cut tough materials. Although they look very similar to your miter saw, chop saws fulfill a different role. Whereas miter saws cut through wood with ease, chop saws cut through hard materials like metal, brick, concrete, and masonry.

Fig-25 chopping saw

✓ **How it works**

An abrasive disc that rotates at very high rpm on a swing arm is fed onto the work piece that is held on the table. As you can see the working principle of a chop saw is similar to a miter saw. However, the major difference between the two types of saws is that in a chop saw an abrasive disc is the cutting tool whereas in case of a miter saw the cutting tool is a toothed steel blade.

- **Radial arm saws**

Radial arm saws are a unique kind of saw. Rather than having the blade attached to the table, the blade is instead attached to a mobile arm. You could imagine it as the opposite of a table saw. The work piece is held stationary on the table, while the rotating blade along with the blade head moves in a straight line along the arm.

Fig-26 Radial ram saw

A carpenter using a radial arm saw to cut the wood into size. The main purpose of a radial arm saw is to provide an all-in-one cutting saw. Radial arm saws can make all kinds of cuts, including crosscuts, miter cuts, compound cuts, etc.

Radial arm saws were very popular in the past and now they are largely replaced by miter saws.

- **Chainsaws**

A chainsaw uses chains of linked teeth to cut through a variety of materials, but primarily wood. It does not deliver accurate cuts, but it is a fast and efficient way of cutting through large amounts of wood in a short amount of time.

Fig-26 chain saw

Before you start working, it is extremely important that you make sure that you can handle this saw for a longer period of time. Read all the safety instructions and get used to its weight and grip before you even think of switching the chainsaw on.

- **Reciprocating Saws**

Reciprocating saws work differently than the other kinds of saws that I have covered so far. With a reciprocating saw, the blade is pushed forward and then pulled back; this is repeated at a rapid pace. This constant pushing and pulling produce a “sawing” motion that cuts through wood.

Fig-27 Reciprocating Saws

✓ **Uses Reciprocating saws:-**

Reciprocating saws are used for pruning trees, cutting through wood, bricks, and tiles. These kinds of saws are most useful for demolition and remodeling work because of their ability to rapidly cut through wood and other tougher material.

Reciprocating saw which is also known as Sewall is very useful in replacing drywall, installing doors and windows, cutting PVC pipes, cutting through wood with nails, removing floor tiles, etc.

All you need is to replace the blade to cut different materials. With the right reciprocating blade, it can also penetrate hard materials like bricks and tiles.

- **Jigsaws**

Jigsaws work similarly to reciprocating saws, except with two key differences. Firstly, unlike with regular reciprocating saws, the blade on a jigsaw aims downward, instead of jutting out from the nose of the saw. Secondly, jigsaws are designed specifically to make curved or otherwise non-straight cuts.

Fig-28 Jigsaw Saw

✓ **Uses of Jigsaw:**

The jigsaw is a very versatile tool that can be used to cut straight and curved cuts on different materials including wood, plastic, metal, granite, tiles, and metal. One of the most common applications of a jigsaw in a household is to install countertops.

Another advantage of a jig saw is that you can use it to cut internal profiles. All you need to do is drill a start hole for the blade to enter and you are ready to cut straight, angled and curved shapes.

- **Band Saws**

Band saws are saws that work by moving a continuous band of metal through two wheels to create cutting power. They are designed to cut tubes, piping, and curved objects (similar to what jigsaws do, but with more power). They come in two models; vertical and horizontal. There are stationary band saws, which are quite bulky, and portable band saws, which are obviously a lot smaller.

Fig-29 Band Saws

How does a band saw work: The band saw blade that is installed between two rotating wheels is a continuous band of metal with teeth on one side? In case of a vertical band saw, the work piece is continuously fed against the rotating blade. On the other hand, in a horizontal band saw, the rotating blade is on a swing arm, which is brought down on to the work-piece to cut through it.

Uses of band saw: Vertical band saws are very popular in woodworking. They can be used for ripping through long lumber, doing crosscuts to size the boards, and you can also make miter cuts with the help of a miter gauge. Vertical band saw is the ideal machine tool for re sawing.

- **Scroll saws**

Scroll saws are a highly specialized kind of power saw. Much like band saws, scroll saws work by having two wheels manipulate a band of continuous metal. Scroll saws are highly specialized power saws because they are intended for extremely accurate cutting. If you need to make very intricate cuts or create patterns on wood, then a scroll saw is the tool for you. For this reason, the saw is popular among woodworkers who create wooden toys, wood art, etc.

Fig-30 scroll Saws

- ✓ **uses of Scroll Saw**

They are used for cutting patterns, making intarsia, jigsaw puzzles, lettered signs, parquetry, templates, wooden toys, and numerous other crafts.

- **Panel Saws**

A panel saw is meant for one purpose; to cut larger panels into smaller sections. Panel saws are essentially very large table saws. However, in a panel saw the blade moves across the table along the track to make the cut. In this respect, panel saws are similar to track saw, but they have a very different purpose.

- ✓ **uses Panel Saw**

The main purpose of a panel saw is to slice large wooden boards or other sheet materials to smaller rectangular pieces. They can be used to cut wood, plywood, Oriented strand board (OSB), MDF, laminated sheets, acrylic sheets, etc. You may also

change the blade and use it slice aluminum and plastic sheets. Panel saws are commonly used in cabinet making shops where they have to cut huge volume of large panels into smaller boards.

Fig-31 panel Saws

- ✓ **Types of Panel Saws**

They are available in two designs; horizontal and vertical. A horizontal panel saw looks similar to a large table saw and takes up a lot of space. On the other hand, a vertical panel saw requires less floor space and hence is a preferred choice for many.

In short, a panel saw will not replace your table saw. But if you have to cut a lot of large sheets, panel saw is an excellent choice.

- ✓ **Track Saws**

Track saws are essentially circular saws, but with an added metal track attached. The metal track is designed to enhance the accuracy and stability of the saw.

Fig-32 Track Saw

How does it work?

You will attach the metal track on to the sheet or work piece. Then plunge the circular saw blade into the work and push forward to cut. Track saws are also known as plunge-cut saws. The riving knife behind the saw blade eliminates kickback producing a smooth cutting action.

- ✓ **Advantages of a Plunge-cut Track Saw**

You might be wondering why you should get these kinds of saws which are basically identical to circular saws. Let's see some of the advantages of this saw.

First of all track saws are not just a circular saw with a straight edge. Unlike a straight edge, there is no sideways movement or jerk in case of a track saw. It can only move forward or backward along the precision track. This enables the track saw to produce perfectly straight cuts.

- **Tile Saws**

As the name implies, these kinds of power saws are meant to cut through thick tiles. They can cut ceramic tiles, glass tiles, granites, stones, marbles, and porcelain tiles.

A regular circular saw or table saw cannot cut tiles easily. Because ceramic tiles are hard and brittle and require a special saw. Usually, tile saws are equipped with

specialized diamond blades that give them the cutting power necessary to cut through hard material like tiles.

Depending on the type of cut, there are wet tiles saws and dry cutting saw. The advantage of wet tile saw is that it will keep both the blade and the work piece from over-heating and thus produces a clean cut.

- **Flooring saws**

Flooring saws are an uncommon, but very useful kind of power saw. As you might guess from the name, they are meant to help you with cutting flooring. Flooring saw tends to be relatively compact, which allows you to use them in small spaces. Using a flooring saw is simple; you just lay the metal table on the floor put the wood on top, and then glide the blade through the wood.

- **uses of flooring saw**

Flooring saws are very useful for professionals who do a lot of laminated flooring work. For DIY enthusiasts who are doing home remodeling, I would say that a jigsaw would do just fine. The major advantage of a flooring saw is its ability to do rip cuts, miter and crosscuts fairly easily. Furthermore, they are highly portable making it a good choice for building contractors and professionals.

Do you desire to be a modern wood worker? Then an electric hand planer is the tool for you. For many years, we have known a hand planer as the carpenter's main tool.

Electric planers were introduced recently. They do the same work as hand planers just that they are driven by a motor.

A typical hand planer has a width of 3-¼ inches with a 5 amp motor operating at a speed of 15, 000 rpm. The electric hand planers are best suited for carpentry, building type construction and renovation as opposed to fine woodworking.

Are you stuck on how to use an electric hand planer?

Don't fret…..

Self check 4	Written test

Name: _____ Date: _____

Part: 1 matching

Directions: match column" A" with column" B" (2 mark each)

A	B
1. marking tool	A. table saw
2. measuring tool	B. sprit level
3. leveling tool	C. pencil
4. cutting tool	D. cross cut saw
5. power machine	E. tape rule

Note: **Satisfactory rating – above 50%** **Unsatisfactory - below 50%**

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

Name: _____ Date: _____

Answer Sheet

Score = _____

Rating: _____

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

----------2.

----------3.

----------4.

----------5.

Information sheet # 5	Calculating Material quantity requirements

5.1 Calculating Material quantity requirements

5.1.1 Specifications/Contract specifications

Table -1 speciation of some wooden members.

S/N	CARPENTRY & JOINERY	Unit	Quantity	Unit price	Total price
1	Supply 40 x 50 mm zigba wood battens with c/c spacing of 600 mm both ways, corner list and all other necessary accessories to complete the work.	m^2	166.25	390.00	64,837.50
1.	Supply and fix 300x25mm zigba wood fascia board price include three coats of oil paint	M	48.00	135.00	6,480.00
	Supply and fix 300x25mmx4000mm zigba wood lumber board price include three coats of oil paint		-		
3.	a)zigba wood upper & lower members Dia. 250 mm.	Ml	481.00	35.00	16,835.00
4.	b)zigba wood vertical & diagonal members Dia. 100mm.	Ml	416.00	35.00	14,560.00
		Ml	175.00	40.00	7,000.00
	Summery				

Sizes The sizes and spans for stringers and treads for external stairs shall be in accordance with Table 2 and 3

Table 2: Stair stringers (maximum stair width 1800 mm

Timber Type		Stringer – [Depth (mm) x Thickness (mm)](1)				
Species/Group	Grade(2)	200x38	200x50	250x38	250x50	300x50
		Maximum Stringer Span (mm)(4)				
Messmate, Spotted Gum, Blackbutt, Kwila, etc	F27	2900	3200	3600	3900	4500
Vic Ash, Tas Oak, Jarrah	F22	2800	3100	3400	3700	4300
Spotted Gum, Blackbutt, Ironbark, Kwila, etc	F17(3)	2600	3000	3300	3600	4200
Douglas Fir (Nth American)	F11	2400	2700	3000	3400	3900
Radiata, Hoop, Slash, etc	F8	2300	2600	2900	3200	3700
H3 treated pine	F5	1600	2200	2400	2800	3400

Notes: 1. the size of stringers given in the Table are nominal sizes. Design allowances have been made for dressing (depth 10 mm max, thickness 5 mm max). Allowance has also been made for trenching stringers to accommodate treads (10 mm max).

2. Timber grading should be in accordance with the appropriate Australian Standard for milled products (i.e. AS 2796 and AS 4785). The stress grades used for design in accordance with the loading requirements of the BCA are as indicated and can be determined for AS 2082 and AS 2858 as appropriate.

3. The F17 grade included in the Table is intended for unseasoned hardwood, to be used for external stairs only. 4. Stringer span is the centre line length of the stringer.

Table 3. Stair treads (with open flights)

Timber Type		Stair Width [Tread span] (mm)				
Species/Group	Grade[2]	750	1000	1200	1500	1800
		Minimum Thickness of Tread (mm)[1]				
Messmate, Spotted Gum, Blackbutt, Kwila, etc	F27	26	32	38	48	58
Vic Ash, Tas Oak, Jarrah	F22	28	34	40	50	60
Spotted Gum, Kwila, Ironbark, etc	F17[3]	28	36	42	53	65
Douglas Fir (Nth American)	F11	31	40	46	58	70
Radiata, Hoop, Slash, etc	F8	32	42	50	62	73
H3 treated pine	F5	40	46	54	70	N/A

1. The thicknesses in the Table are minimum design thicknesses and may not represent commercially available thicknesses.
2. Timber grading should be in accordance with the appropriate Australian Standard for milled products (i.e. AS 2796 and AS 4785). The stress grades used for design in accordance with the loading requirements of the BCA are as indicated and can be determined for AS 2082 and AS 2858 as appropriate.
3. The F17 grade included in the Table is intended for unseasoned hardwood, to be used for external stairs only.

5.2 quantity requirements

Actual framing, connections and layout of stairway should be based on specific project requirements.

Stairs should be designed so as to provide easy, quick and safe mode of communication b/n the floors. The following are the general requirements which a stair should fulfill.

1. Location:
2. Width of stair:
3. Length of flight:
4. Pitch of stair:

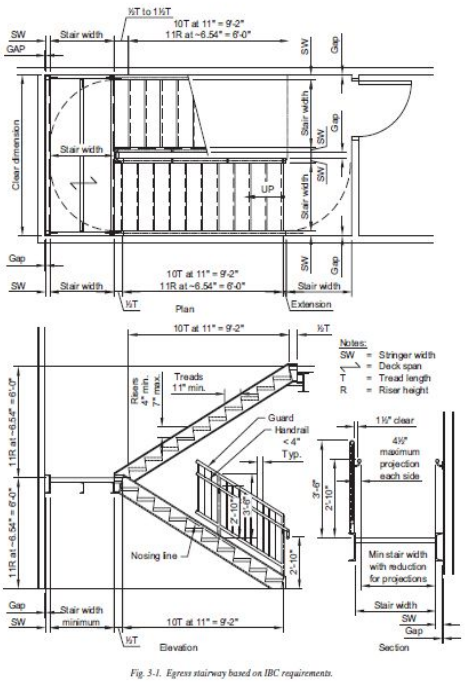


Fig. 3-1. Egress stairway based on IBC requirements.

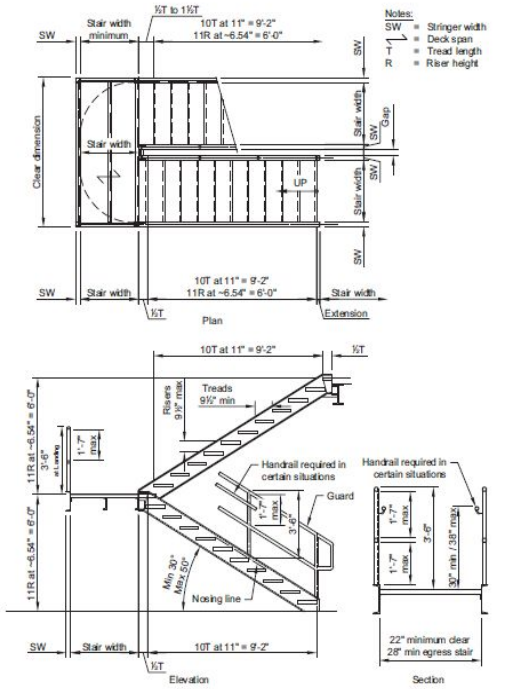


Fig. 3-2. Stairway based on OSHA regulations.

Fig-1 pan of stair

Stairway opening examples

Example 3.1—Minimum Clear Width of Opening

Given:

For a typical IBC egress stair in a concrete core using (a) channel stringers, (b) HSS stringers, and (c) plate stringers, determine the required clear width.

Solution:

(a) For channel stringers

The clear width is:

W open = 2 (Edge gap) + 4 (Stringer width) + 2 (Egress width) + 1 (Center gap) (3-3)

= 2 (2 in.) + 4 (3 in.) + 2 (44 in.) + 1 (2 in.)

= 1012 in. or 8 ft 52 in. clear dimension

(b) For HSS stringers

The clear width is:

Wo pen = 2 (Edge gap) + 4 (Stringer width) + 2 (Egress width) + 1 (Center gap) (3-3)

= 2 (2 in.) + 4 (2 in.) + 2 (44 in.) + 1 (2 in.)

= 972 in. or 8 ft 12 in. clear dimension

(c) For plate stringers

The clear width is:

W open = 2 (Edge gap) + 4 (Stringer width) + 2 (Egress width) + 1 (Center gap) (3-3)

= 2 (2 in.) + 4 (2.5 in.) + 2 (44 in.) + 1 (2 in.)

= 942 in. or 7 ft 102 in. clear dimension

Construction method statements

5.2.1 Quality requirements

1. Location

- They should be located near the main entrance to the building.
- There should be easy access from all the rooms without disturbing the privacy of the rooms.
- There should be spacious approach.
- .Good light and ventilation should be available.

2. Width of stair

It should be wide enough to carry the user without much crowd on inconvenience. In Residential building, a 90 cm wide stair is sufficient while in public 1.5 to 1.8 m width may require.

2. Length of flight

The number of steps should not be more than 12 & less than 3 from comfort point of view.

5.2.2 Design Documents

Design documents should provide adequate information to ensure that the stairway fabricator, detailer and specialty structural engineer (SSE) have adequate information to meet the project architectural and structural design requirements.

At a minimum, this information should consist of:

1. Plans, sections and elevations at each stairway
2. Stairway dimensional requirements
3. Clear distances at stairs
4. Clear distances at landings

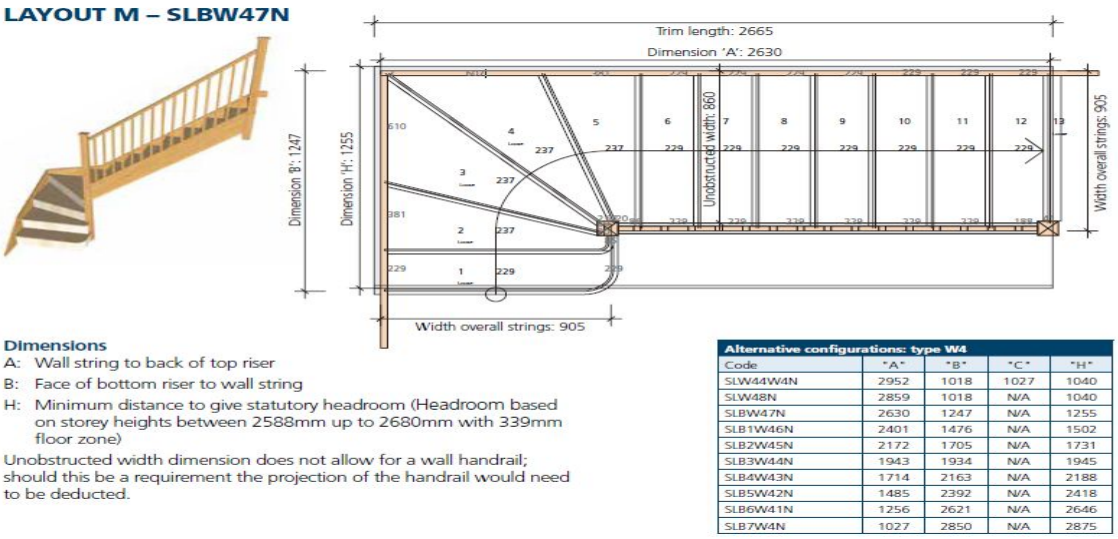
5. Guard layout
6. Handrail position
7. Preferred or required member types
8. Layout of stair elements
9. Slab openings

Details where stairs attach to the building structure (fully detailed or conceptual) any other special requirements Many times, design documents may only show the general design intent for the stairways. The architect and SER should provide additional information as needed when special details or design elements are to be incorporated into the stairway. If the SER provides complete connection design for the stairs, then the drawings and details should include the information required in AISC Code of Standard Practice.

5.2.3 Project Specifications

Project specifications should provide additional information and guidance for the design of stairways in conjunction with the design documents. It is important that specifications are properly reviewed and accurately match the design documents to avoid questions and delays due to discrepancies. It is particularly important that architectural requirements be provided by the architect and structural requirements be provided by the SER. Specifications for stairways and guard/ handrail should reflect the specific project requirements.

5.2.3.1 Operational details



Alternative configurations: type W4

Code	"A"	"B"	"C"	"H"
SLW44W4N	2952	1018	1027	1040
SLW48N	2859	1018	N/A	1040
SLBW47N	2630	1247	N/A	1255
SLB1W46N	2401	1476	N/A	1502
SLB2W45N	2172	1705	N/A	1731
SLB3W44N	1943	1934	N/A	1945
SLB4W43N	1714	2163	N/A	2188
SLB5W42N	1485	2392	N/A	2418
SLB6W41N	1256	2621	N/A	2646
SLB7W4N	1027	2850	N/A	2875

Fig-2 operational details

Check results with BCA requirements: Rise: 178 mm is within the range of 115 to 190 mm. Going: 246 mm is within the range of 240 to 355 mm. Number of treads is greater than 3 and less than 18. Slope relationship: 178 x 2 +246 (rise multiplied by 2 + the going) = 602 is within the range of 700 to 550 mm. The other BCA requirement, that a 125 mm sphere must not pass through treads, should also be checked.

The rise, 178 mm, less the tread thickness, 38 mm, must be less than 125 mm. 178 – 38 = 140. This is more than 125 and so is not within the BCA requirement. Add a cleat under the tread to close up the space.

5.2.4 Maintenance manuals

5.2.4.1 Fire protection and maintenance

In order to maintain coatings in good condition, the following procedure should be followed:-

1. Clean as required using a soft cloth and mild solution of warm soapy water. Do not saturate the surface.
2. Spills and heavy stains should be removed immediately using a mild detergent solution to avoid permanent discoloration of the coatings.

3. Avoid the use of aggressive and abrasive cleaning materials and cleaners containing wax and silicones. Avoid placing hot items directly onto the finished surface as this may result in permanent damage.
4. Avoid excessive heat and direct sunlight, which may result in discoloration.
5. It is possible to touch up light scratches provided the correct products are used.
6. After 5 years the coatings should be inspected annually and if necessary a maintenance coat of ES/VFR/TCW (or HW05 if a solvent borne Top Seal was used.) in selected sheen level should be applied. No longer than 10 years should elapse before maintenance topcoat is applied.

Self check # 5	Written test

Name: _____ Date: _____

Part:-True or false item

Direction: if the statement is correct write true provided if the statement is wrong write false on space provided.

_____ 1. Length is not the requirement of stair. (2 mark)

_____ 2. We can construction Stair without safety (2 mark)

_____3. Location is one of the requirements of stair. (2 mark)

Note: **Satisfactory rating – above 50%** **Unsatisfactory - below 50%**

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

Name: _____ Date: _____

Score = _____

Rating: _____

Answers sheet

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

----------2.

----------3.

Information sheet # 6	Using materials appropriately to the work application

6.1 Using materials appropriately to the work application

6.1.1 Materials used in construction of staircase

1. Timber
2. Metal
3. R.C.C.
4. Stone
5. Glass

- **Timber: -** Is a type of wood which has been processed into beams and planks? It is also known as “lumber” in US and Canada. Basically, timber or Lumber is a wood or firewood of growing trees. Any wood capable of yielding a minimum dimensional size can be termed as a timber or lumber. It is a stage in the process of wood production. Timbers are used for the structural purpose. Those woods which are adapted for building purposes are timbers. Finished timber is supplied in standard sizes for the industry. Timber is used for building houses and making furniture.
  - ✓ **Types of Timber and Lumber**

Timber can be divided into two categories –

- ✓ **Hardwoods and softwoods.** There are many types of timber under these two categories. They are- Bamboo ,birch, cedar, cherry, cross-laminated, glulam, green timber, lime, mahogany, oak, pine, plywood, sapele wood, tulipwood, walnut, wood ash, spruce, fir

- **Metal**

These can be produced in cast iron, mild steel or aluminum alloy for use as escape stairs or for internal accommodation stairs. They make a lot of noise and can be built in a smaller area. They are normally manufactured in a workshop and fixed on site, which makes it faster and will be functional immediately.

- ✓ Their main advantage is the elimination of the need for formwork.
- ✓ Spiral stairs are mainly made of metal.

- **Concrete stairs**

Have the following advantages:

Good quality control of finished product.

Saving in site space since formwork fabrication and storage will not be required. The stairs can be installed at any time after the floors have been completed thus giving full utilization to the stair shaft as a lifting or hoisting space if required. Hoisting, positioning and fixing can usually be carried out by semi-skilled labor.

Self check # 6	Written test

Name: _____ Date: _____

Part:-True or false item

Direction: if the statement is correct write true provided if the statement is wrong write false on space provided.

_____ 1. Timber not used for stair construction. (2 mark)

_____ 2. Concrete Stair is best one from all. (2 mark)

_____ 3. R c c stair is very strong stair. (2 mark)

Note: **Satisfactory rating – above 50%** **Unsatisfactory - below 50%**

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

Name: _____ Date: _____

Answer sheet

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

----------2.

----------3.

Score = _____

Rating: _____

Information sheet # 7	Identifying Environmental protection requirements and applying regulatory obligations

7.1 Identifying Environmental protection requirements and applying regulatory obligations

7.1.1 Identifying Environmental protection

Some facilities could harm the environment or human health unless they are controlled. The environmental permitting regime ('the regime') requires operators to obtain permits for some facilities, to register others as exempt and provides for ongoing supervision by regulators. The aim of the regime is to: protect the environment so that statutory and Government policy environmental targets and outcomes are achieved deliver permitting and compliance with permits and certain environmental targets effectively and efficiently in a way that provides increased clarity and minimizes the administrative burden on both the regulator and the operators encourage regulators to promote best practice in the operation of facilities

The regime is set out in the Regulations and described in this accompanying guidance. This guidance explains the concepts used in the Regulations and gives guidance as to what is covered by the regime and how it will work in practice. This guidance only explains the main provisions of the Regulations10. The Regulations set out the following: the facilities that need environmental permits or need to be registered as exempt the process for registering exempt facilities how to apply for and determine permit applications requirements that environmental permits contain conditions to protect the environment as required by directives and, where applicable, national policy how environmental permits can be changed and ultimately be surrendered a simplified permitting system called standard rules compliance obligations backed up by enforcement powers and offences provisions for public participation in the permitting process the powers and functions of regulators, the Secretary of State and the Welsh Ministers a simple transition to the new regime, and Provisions for appeals against permitting decisions.

7.2 Requirements and applying regulatory obligations

The principal offences under the Regulations are operating a regulated facility without a permit, causing or knowingly permitting a water discharge activity or groundwater activity without a permit, and failing to comply with a permit or an enforcement related notice.

Subject to legal requirements, the Secretary of State and the Welsh Ministers expect regulators to apply the Regulations in proportion to the environmental risk11 presented by the operation of the facility.

The nature and extent of the regulatory effort should be appropriate and proportionate to the risk posed by the operation of the facilities, the impact of that operation and the operator's performance in mitigating the risks and impacts. The regulator's effort should be concentrated on achieving the desired environmental outcomes. This approach should make the most effective use of the regulator's resources.

Regulators should exercise their functions in an open and transparent manner.

Self check # 7	Written test

Name: _____ Date: _____

Part: - I True or false item

Direction: if the statement is correct write true provided if the statement is wrong write false on space provided.

_____1.The nature and extent of the regulatory effort should be appropriate (2 mark)

_____ 2. Environmental permits can be changed and ultimately be surrendered a simplified permitting (2 mark)

Note: Satisfactory rating – above 50% **Unsatisfactory - below 50%**

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

Name: _____ Date: _____

Answer sheet

Score = _____

Rating: _____

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

----------2.

Operation Sheet 1	Obtaining and confirming Work instructions

Obtaining, confirming and applying Work instructions

Step 1- Interpreting Plans, drawings and specifications

Step 2 _ Applying workplace and equipment safety, and Quality requirements

Step 3- list out specific resources and tasks (material, equipment, man power, resources)

Step 4- Submit your report to your teacher/ instructor after the data is complete

Operation Sheet 2	Calculating material quantity requirements

Calculating material quantity requirements

Step 1 Interpreting Plans, drawings and specifications

Step 2- Calculate material requirements

Step 3- Find the total amount materials

Step 4- Submit your report to your teacher/ instructor after the data is complete

LAP Test	Practical Demonstration

Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within 1.5 hour.

Task1- obtaining confirming and applying work instructions?

Task2- how to calculating material quantity requirements?

Note: Satisfactory rating – above 100% **Unsatisfactory - below 100%**

Reference

https://en.wikipedia.org/wiki/Bolt_(fastener)

Tie-Rods, SAG Rods or Anchor Rods have many applications from being embedded

Safety, health and welfare on construction sites: A training manual

Geneva, International Labour Office, 1995

Answers key for self check information sheet LG 55 1-7

Self check -1

1. False
2. True

Self check-2

1. True
2. True
3. False

Self check-3

1. Stainless steel, aluminum, brass/copper , cast iron

Self check-4

1. C
2. E
3. B
4. D
5. A

Self check-5

1. False
2. False
3. True

Self check-6

1. False
2. False
3. True

Self check-7

1. True
2. True

The Trainers Prepare TTLM

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