

L4-CAPPA401: PARTIONING

Introduction

- A partition wall may be defined as a wall or division made up of bricks, studding, glass or other such material and provided for the purpose of dividing one room or portion of a room from another.

ADVANTAGES OF WOODEN PARTITION WALL

- Divide the whole area into a number of rooms.
- Provide privacy to the inmates from sight and sound.
- Are light in weight and cheaper in cost of construction.
- Occupy lesser area
- Easily constructed in any position.

REQUIREMENTS OF A GOOD PARTION

- Thin in cross-section so that maximum floor area can be utilized.
- Provide adequate privacy in rooms both in respect of sight and sound.

- Constructed from light, sound, uniform, homogeneous, durable and sound insulated materials.
- Simple in nature, easy and economical in construction having proper coherence with the type of building structure.
- Offer sufficient resistance against fire, heat, dampness, white ant or fungus, etc.
- Rigid enough to take the vibrations caused due to loads.
- Strong enough to support sanitary fittings and heavy fixtures.

Types of partition walls:

- Brick partitions,
- Hollow block partitions,
- Clay block partitions,
- Concrete partitions,
- Glass block partitions,
- Wooden partitions,
- Plaster slab partitions,
- Metal partitions,

LEARNING UNIT 1: Prepare materials, tools, equipment and workplace

Learning Outcome 1.1: Identification of tools and equipment

1. Type of tools used for wooden partition wall construction:

- Holding: **eg: cramps**
- Setting out **eg: tape measure, try-square**
- Shaving and cutting **eg: hand plane, hand saws, chisels**
- Boring **eg: braces**
- Fixing **eg: Mallets, hammers, screw drivers**

2. Type of machines used for wooden partition wall construction:

- Portable machines of different types
- Heavy machines of different types

3. PPE (Personal Protective Equipment) used for wooden partition wall construction:

- Helmet**
- Gloves**
- Safety shoes**
- overall**

Learning Outcome 1.2: Prepare the workplace

Prepare the workplace includes activities of preparing the existing structures by which elements of the partition wall should be fixed on such as:

- Pavement
- Wall
- Roof

This includes appropriate measuring and holing the structural members so that the partition wall can be well fitted and well hung.

Measuring methods

- By using tools: eg: measuring by using a tape measure
- By using equipment: measuring by using a theodolite
- By passing: measuring by using passes.

Learning Outcome 1.3: Prepare materials

Introduction to partitioning materials

Identification of boards

Type of boards

- Gypsum
- MDF
- Plywood
- Glasses
- Tile boards

- Metal Cornice
- Drywall

Other materials

- Adhesives
- Preservatives
- Finishing
- Insulators

Steps involved in preparation of partition elements:

- Measuring
- Marking
- Planning where applicable
- Cutting

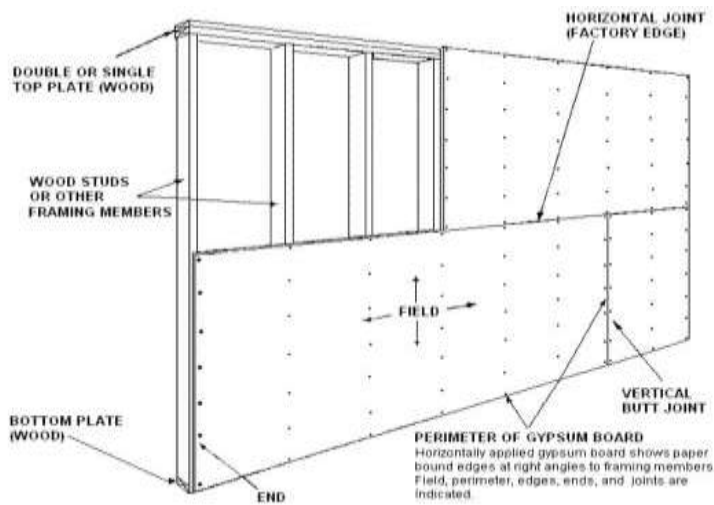
I. GYPSUM BOARD CONSTRUCTION

WHAT IS GYPSUM BOARD?

Gypsum board is the generic name for a family of panel products that consist of a non-combustible core, composed primarily of gypsum, and a paper surfacing on the face, back and long edges. Gypsum board is one of several building materials covered by the umbrella term “gypsum panel products.”

All gypsum panel products contain gypsum cores; however, they can be faced with a variety of different materials, including paper and fiberglass mats.

Gypsum board is often called drywall, wallboard, or plasterboard. It differs from other panel-type building products, such as plywood, hardboard, and fiberboard, because of its non-combustible core and paper facers. When joints and fastener heads are covered with a joint compound system, gypsum wall board creates a continuous surface suitable for most types of interior decoration. A typical board application is shown in Figure 1.



Gypsum is a mineral found in sedimentary rock formations in a crystalline form known as calcium sulfate dihydrate $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$.

. Gypsum rock is mined or quarried and transported to the manufacturing facility.

The manufacturer receives quarried gypsum, and crushes the large pieces before any further processing takes place. Crushed rock is then ground into a fine powder and heated to about 350 degrees F, driving off three-fourths of the chemically combined water in a process called calcining.

Advantages of Gypsum Board Construction

Gypsum board walls and ceilings have a number of outstanding advantages:

- Ease of installation
- Fire resistance
- Sound isolation
- Durability
- Economy
- Versatility

Ease of installation

Gypsum board building systems are easy to install for several reasons. Gypsum board panels are relatively large compared to other materials. They come in 48- and 54-inch wide sheets and in lengths of 8, 10, or 12 feet, so they quickly cover large wall and ceiling areas. Gypsum board assemblies require only a few tools for their construction. Gypsum board can be cut with either a utility knife or a variety of saws, and it can be attached with a variety of fasteners, including screws, nails, and staples. It can also be adhesively attached to many substrates. Gypsum board is a lightweight material. Two workers can easily handle most panels and cover large areas in very short time periods. Gypsum board is easily finished using either a few hand tools or relatively modest machines. Gypsum board installers can quickly learn most application techniques in a few hours.

Fire resistance

Gypsum board is an excellent fire-resistive building material. In North America, it is the most commonly used interior finish where fire resistance classifications are required. Its noncombustible core contains nearly 21% chemically combined water, as described earlier, which, under high heat, is slowly released as steam. It very effectively retards the transfer of heat and the spread of fire. Even after complete calcination, when all the water has been released from its core, gypsum board continues to serve as a heat-insulating barrier.

Sound isolation

Preventing the transfer of unwanted sound to adjoining areas is a key consideration when designing a building, specifically when taking into account the intended activities of the occupants in the various parts of the building. For example, a building containing office spaces adjacent to manufacturing facilities requires more noise-reducing features than are typically necessary in a building that has only office space in it. Gypsum board wall and ceilings systems effectively help control sound transmission.

Durability

Gypsum board is used to construct strong, high quality walls and ceilings that offer excellent dimensional stability and durability. Surfaces created using gypsum board are easily decorated and refinished.

Economy

Gypsum board is readily available and easy to apply. It is an inexpensive wall surfacing material that provides a fire resistant interior finish. Gypsum board building systems can generally be installed at significantly lower labor costs than most alternate systems.

Versatility (Flexibility)

Gypsum board satisfies a wide range of architectural requirements for design. Ease of application, performance, ease of repair, availability, and its adaptability to all forms of decoration combine to make gypsum board unmatched by any other surfacing product.

Standard size gypsum boards are 48 inches wide and 8, 10, 12 or 14 feet long. The 48 inch width is compatible with standard framing methods in which studs or joists are spaced 16 inches and 24 inches (Other lengths and widths of gypsum board are available from the manufacturer on special order.)

APPLICATION OF GYPSUM BOARD

Gypsum board can be applied over wood or metal framing or furring. It can be applied to masonry and concrete surfaces, either directly or to wood or metal furring strips. When applying board directly to masonry or concrete surfaces, smooth or fill in any irregularities to ensure proper attachment and an acceptable final finished surface.

. Do not allow gypsum board to directly contact surfaces, such as concrete or soil, with potentially high moisture contents.

Storage and Handling

Store boards or panels flat and protected from the elements. Be sure that materials used as storage supports (risers) are at least 4 inches in width and of uniform depth or length. As the units of gypsum board are tiered, align risers carefully from bottom to top so that the load of each tier is transferred directly to the next level of risers, thus avoiding sagging or otherwise distorting the plane of the boards.

Tools

Gypsum board installation and finishing require only some basic tools. While there are also many specialized hand and power tools available for gypsum board installation, here's a list with brief descriptions of the basic tools necessary for a typical wallboard job:

Measuring tape – A steel retractable measuring tape, usually 25 feet in length.

Gypsum board T-square – Square edge for measuring and cutting gypsum board to length and for cutting out holes for square outlet boxes and other openings.

Utility knife – Standard cutting tool with replaceable/reversible blades for scoring and cutting gypsum board.

Hammer – Drives nails through gypsum board into wood framing.

Keyhole saw – Small triangular saw for cutting out holes for outlet boxes, pipes, and other penetrations.

Rasp – A tool for smoothing rough edges of wallboard after it has been scored and snapped.

Assorted trowels and taping knives – Bladed tools for applying and smoothing tape and joint compound over joints and fastener heads.

Mud tray – Box to contain joint compound while finishing joints and fastener heads.

Sanding pole – Tool that enables sanding walls from floor to ceiling and standard height ceilings without the use of a ladder.

Screw gun – Power tool that drives all types of gypsum board screws through gypsum board and into framing or substrate.

Insulation Matters!

Climate change and the challenge of reducing carbon emissions are now foremost on the agenda of Governments, Councils, Industry and consumers.

Of all the energy efficiency measures available for buildings, insulation is amongst the most immediate and cost effective. Insulation is not just about reducing greenhouse gas emissions.

Insulation will:

- reduce peak power loading in extreme weather conditions
- in all seasons, reduce costs and save money by reducing energy bills
- provide healthier living conditions and wellbeing for occupants
- Reducing sound transmission through buildings.
- Installing insulation is a once only cost. Choosing the right insulation, correctly installed, will deliver its benefits for the life of the building.

3.0 Principles of Energy Efficiency and Insulation (Thermal and Acoustic)

3.1 What is Insulation?

Insulation provides a level of flow resistance to heat, cold or noise. This level of resistance can be created using any bulk insulation material which slows the flow of heat, cold or noise. Glass wool or Rockwool batts last a lifetime and are a safe, energy saving materials that reduce heat entering your home in summer and heat loss in winter. Reflective Foil Laminates provide a level

of thermal resistance when installed within an airspace adjacent to the reflective surface. These non-ventilated reflective air spaces (minimum 20mm) provide a level of heat flow resistance.

3.2 Product Description & Applications

Batts are lightweight, flexible and durable. They are specially designed for the thermal insulation of ceilings, walls and floors in domestic and commercial buildings. Batts have the added benefits of being an effective sound absorber and so contribute to both the thermal and sound comfort of building occupants.

The comprehensive range of sizes and R-values available ensures there is an efficient and effective batt suitable for any application. Batts are stiffened to fit securely between standard spacing wall studs, both timber and steel, without sagging and should be installed at the time of construction before fixing internal inside layer.

Reflective foil laminates are typically applied externally to the wall framing and roof trusses of a dwelling. Reflective Foil Laminates generally come in rolls and are utilised to sack the dwelling and also provide a second skin membrane for weather and dust.

This manual does not cover guidelines for sarking roofs or floors.

3.3 Is Insulation Sustainable?

Glass wool (coat) and Rockwool batts are sustainable. Households, businesses and industry are in a position to save significant amounts of energy through the informed use of insulation.

Benefits associated with using batts include:

- reduction of greenhouse gas emissions which also reduces air pollution
- batts are manufactured from renewable resources (sand and basalt rock) and recycled content (Up to 80%)
- requires no maintenance
- reduce sound transmission through building structure.

Reflective foil laminate insulation, correctly installed, will:

- reduce greenhouse gas emissions
- has a long life
- Requires no maintenance.

3.4 How Does Insulation Work?

1. The number one rule to remember when talking about heat transfer is that heat will always move from a hot place or region to a colder place or region. The greater the temperature difference the faster the rate of heat transfer.
2. By installing batt insulation you reduce heat transfer resulting in great savings on energy bills
3. Batts can reduce summer heat in homes by up to 8 - 12 °C.
4. Furthermore batts are non-combustible and can be used with confidence around down-lights when installed as per the insulation manufacturer's recommendations.

3.5 What is an 'R-value'?

R is a symbol for the term Thermal Resistance. An R-value is an internationally accepted unit of measure of a material's resistance to heat flow. The higher the R-value, the less thermal (or acoustic) transfer, and the more effective the insulation

R-values are calculated:

R-values are calculated:

$$R = \frac{t: \text{thickness (m)}}{k: \text{conductivity (W/mK)}}$$

W: w

att : m

METER

K: Kelvin

Bulk insulation performance is a function of its nominal thickness. When installing, if the thickness of the insulation does not recover to its claimed value, then the thermal performance will be reduced.

Total R-values are based on the sum of all components of the building system including indoor and outdoor air-films, building materials used in the system and air-spaces.

LEARNING UNIT 2: Assemble frame

Elements to consider in setting out frame

1. Measurements of distance of the frame's elements

Tools used in marking the working surface:

- Chalk line
- Marker pen
- Pencil
- Nail

2. Notions on setting the frame on vertical and

horizontal position Recommended sizes of the frame

members

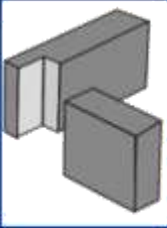
While making a wooden partition wall the main criteria to consider its strength which can be affected by sizes of frame members, moisture content, nature or type of timber being used and amount of defects for pieces in activity. In case of recommended sizes, these are the standard sizes for wooden partition wall frame members (wide& thickness).

Bottom-plate	75 x 40	
Studs	75 x 40	
Nogging	75 x 40	
Braces	50 x 20	75 x 20


Different joints that can be used in wooden partition wall construction While assembling a wooden frame and while fixing the plasterboard different joints should be used. Those are some of the common used joints:

1.

Rabbet Joint



- Characteristic: Always on the end or edge of a board.
- Goes with or across the grain.
- Used to insert a back panel into the back of a cabinet.
- Cut 1/4" deep.
- Cut as wide as the board going into it.



2.

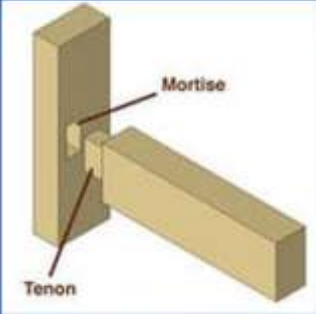
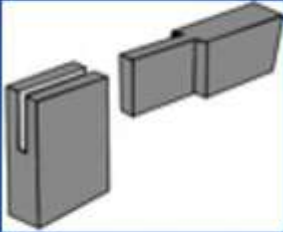
Dowel Joint



- Very Strong
- Used to make butt joints stronger

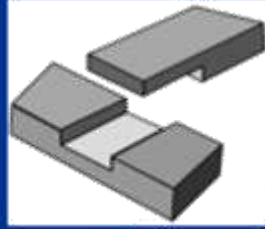
3.

Mortise & Tenon Joint



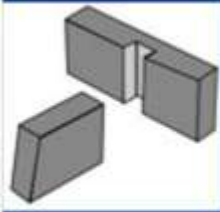
- Very Strong
- Used on leg and rail construction

Lap Joint



4.

Dado Joint



- Characteristic: Across the Grain and in the middle of a board.
- Cut $\frac{1}{4}$ " deep, As wide as the board going into it
- Used to hold a fixed shelf

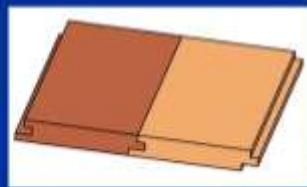


5.

Tongue & Groove



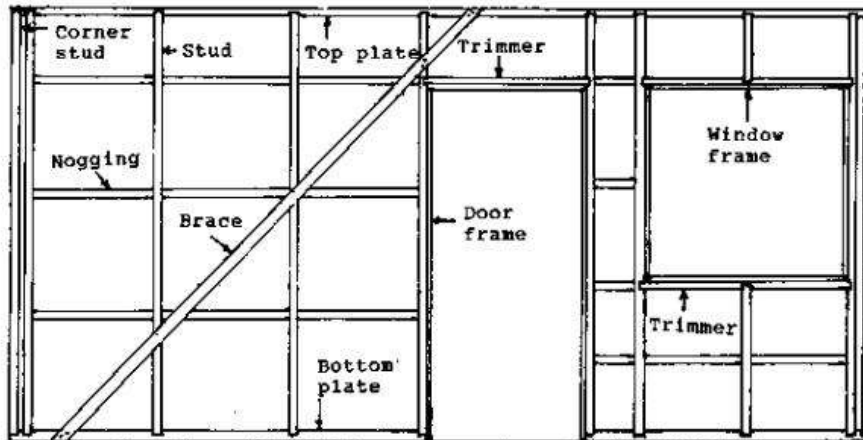
- Used on hardwood Flooring



6.

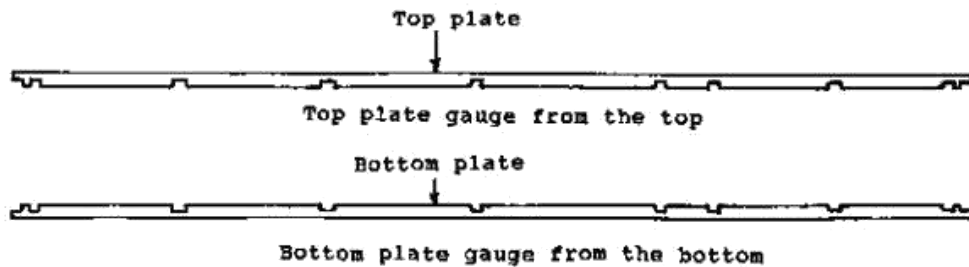
7. Erecting wallframes is difficult to demonstrate on a model house. We only can explain it verbally.

11.1 Parts of a wallframe

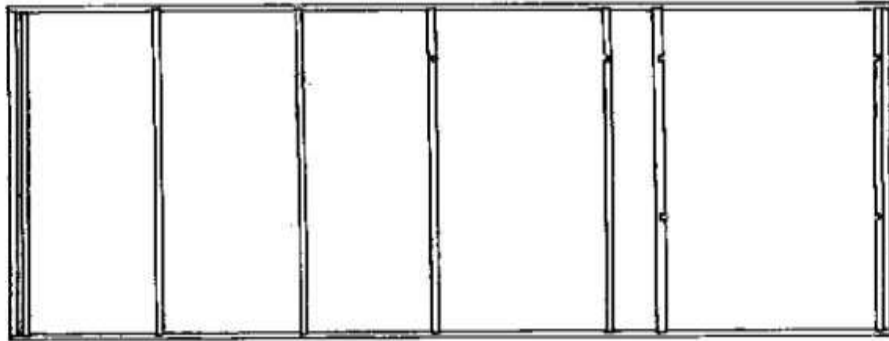


11.2. Procedure of making a wall-frame

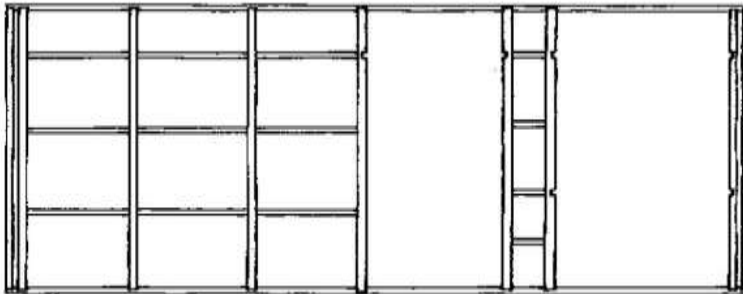
a) **Top and Bottom plate:** - To join the studs to the top and bottom plate, we use housing joints. Gauge the housing joints with a marking gauge or combination try square, on the top-plate from the top and the bottom plate from the bottom. Using this method, we achieve the correct depth of the housing joints even if the timber is not cut at a uniform size. The depth of the housing joint is 5 mm - 10 mm



b) Studs: - Mark corner studs, doors and window studs first, using the straightest pieces. When completed, mark all the other studs using double studs at the corners. Nails are used to fasten studs to bottom and top plate.

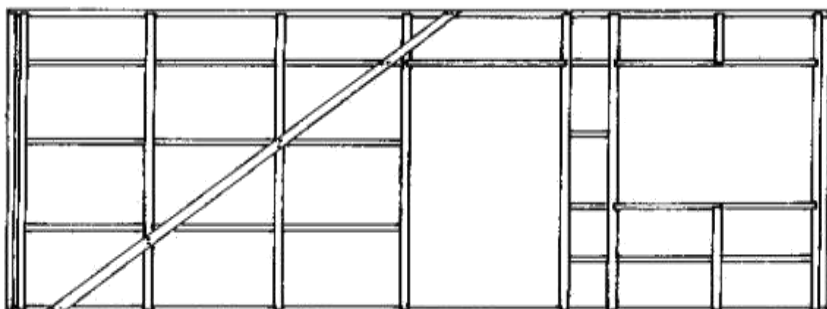


c) Noggins: - Fit the noggins so that the studs are held straight.



d) Trimmers: - To join the trimmers to the studs use the housing joint. When fitting the trimmers allow **enough space for the door and window frame.**

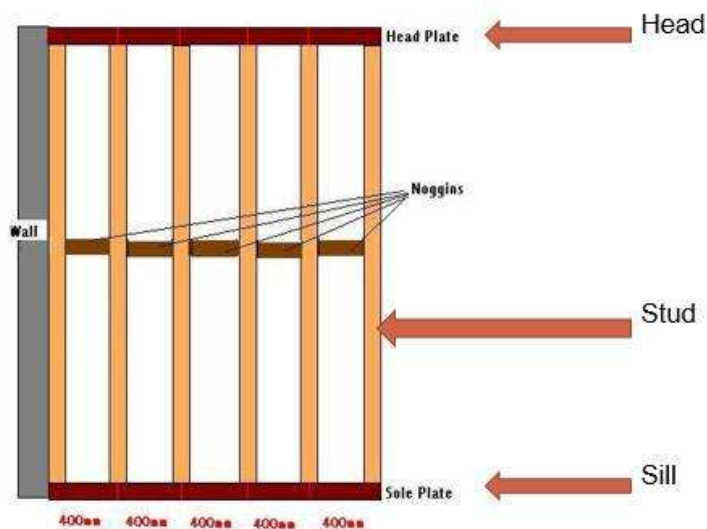
e) Braces: - Before braces are fixed to the frame you must check that the frame is square. This is best done by measuring the diagonals while the frame is lying horizontal on a flat surface. If the frame is squared and braced before it is erected you can be sure that the external corners are plumb.



11.3. Erecting a wall frames

a) **Erecting Wall frames:** - When the walls are ready to be erect, they should be firm and strong enough to take the weight of the ceiling and roof construction without loosing their shape. Before erecting the wall frames, mark the correct place for fitting them on the floor joists with the aid of a string. Start with the outside frames. Use a spirit level or plumb bob to set them correctly vertical. Fit enough braces to hold them in place. Afterwards fit the inside walls.

MAIN ELEMENTS OF A WOODEN PARTITION WALL



PRACTICAL EXERCISE ON PARTION WALL CONSTRUCTION

Construct and elect a partion wall below:

Required measurements on the site:

1. A frame with window opening is having 1800mm long to 1900mm height
2. A frame with door opening is having 1800mm long to 1900mm height
3. A window opening is having 500mm to 500mm size

4. A window opening is located at 200mm from the top and 400mm from right side of the frame
5. A door opening is having 1700mm height to 800mm wide
6. A door opening is located at 200mm from the top and is at right corner at which the frame will be fixed

