Carpentry

Level-II

Learning Guide-57

Unit of Competence: Construct Stairs and Stair Components

Module Title: Constructing Stairs and Stair Components

LG Code: EIS CRP2 M13 0919L03-LG-57

TTLM Code: EIS CRP2 M13 0919V1

LO3: Assemble strings and newels

Instruction Sheet	Learning Guide # 57

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

- Identifying Specific position for stair.
- Checking Floor level and making adjustments
- Assembling and fixing Strings and newels.
- Temporarily supporting and Fixing Strings in position

.

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:- identifying specific position for stair, checking floor level and make adjustments, assembling and fixing strings and newels & temporarily support and fix strings in position.

Learning Instructions:

Read the specific objectives of this Learning Guide.

- ✓ Specific position for stair identified particularly for whole of assembly in place.
- ✓ Floor level checked and adjustments made where applicable to foot of newels and strings.
- ✓ Strings and newels assembled to design and fixed to specification.

Follow the instructions described below

Read the information written in the information Sheet

Perform the operation sheet below

Accomplish the Self-check If you earned a satisfactory evaluation from the “Self-check” proceed to Operation Sheet

Do the “LAP test”

Information Sheet #1	Identify Specific position for stair.

1.1 Identify Specific position for stair

The structure doesn't generally dictate the location of the staircase, though there are some exceptions. Stair openings through floor slabs should not interrupt floor diagrams in such a way as to compromise the lateral capacity of the structure. In high rise buildings, a common choice is to place staircases, elevators and mechanical risers inside the concrete shear walls at the center of the building, which accomplishes three things.

The stairs are automatically contained in a fire safe, reinforced concrete box.

The stairs are centrally located, minimizing travel distance from all locations on the

1.1.1 Floor plan

Keeping the stairs in the center leaves exterior walls open for more desirable functions, such as living spaces and offices.

The location of staircases in a building is not really or cannot be predetermined. It generally depends on factors such as vast as well as things such as the brief of the client or climatic response.

However, it is ideal to place staircases along the periphery of the structure in order to get sufficient light into the stairwell and also, to conceal a great number of beams that are required to support the staircase. Also, it serves well functionally as it can be placed right at the entry sequence or can be hidden away elsewhere.

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Self check 1	Written test

Name: _____ Date:_____

Part: - I choose the best answers

Direction: schuss the best answers for the following questions from given alternatives on space provided. (2 mark each)

_____1. The location of staircases in a building is not really or cannot be predetermined.

A. True B. false

_____ 2. The stairs are automatically contained in a fire safe, reinforced concrete box.

A. True B. false

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	Check Floor level and make adjustments

2. Check Floor level and make adjustments

2.1 How to Level Stairs

Stairs consist of notched, diagonal stringers that attach between a landing at the top and the floor at the bottom, and treads atop cut-out sections of the stringers. Treads that aren't level can pose safety concerns as well as convenience issues. To level existing stairs, remove any baseboard or pull back the carpet to access the underside of the stringers at the floor. When installing stairs, level the stringers before installing the treads. With either application, a do-it-yourself enthusiast can do the job in a relatively short time.

- ✓ **Staircase Tread (Run) Depth: 10 to 11 Inches, Minimum**

Staircase tread is the flat, horizontal distance from the front edge, or nose, of the stair to the back part where it meets the riser. This distance of this depth should be at least 10 inches long. There is an exception to this rule, though.

- **For concrete floor**

Over time, concrete floors can settle unevenly or become uneven due to cracking and moisture. Whether you want to refinish an uneven basement floor, or replace or add new flooring on top of an existing concrete floor somewhere in your home, you most likely will need to level the concrete floor. With the right preparation, equipment, and self-leveling concrete mix, you will be able to do this job yourself in 1-2 days!

- ✓ **Fill any cracks with epoxy**. ...

Apply latex bonding compound over all the concrete when the floor is absolutely dry.

Mix the self-leveling compound with water, according to the manufacturer's instructions.

Pour the self-leveling compound immediately, because it can dry very quickly.

- ✓ **Wooden floor**

How to Level a Wood Floor Sub-Floor

Clean everything off the floor. ...

Examine the floor closely for nails or screws that are loose. ...

Set a long straightedge tool or a straight piece of 2-by-4-inch lumber on the floor.

Put on a dust mask. ...

Fill low areas with premixed cementations leveling compound applied with a trowel.

Self check 2	Written test

Name: _____ Date: _____

Part I: - choose

Direction: - choose the best answers for the following questions from the given alternative put the answers on the given spaces. (5 mark each)

1. Floor made of
   A. Wood B. concrete c. A&B
2. The Depth Staircase Tread Run of is how much?
   a. 10 to 11 Inches, Minimum B. 20 inches c. 30 meter

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: _____

3. Assembly and fixe Strings and newels

3.1 assembly and fixing newel

A large baluster or post used to anchor the handrail. Since it is a structural element, it extends below the floor and sub floor to the bottom of the floor joists and is bolted right to the floor joist. A half-newel may be used where a railing ends in the wall. Visually, it looks like half the newel is embedded in the wall. For open landings, a newel may extend below the landing for a decorative newel drop.

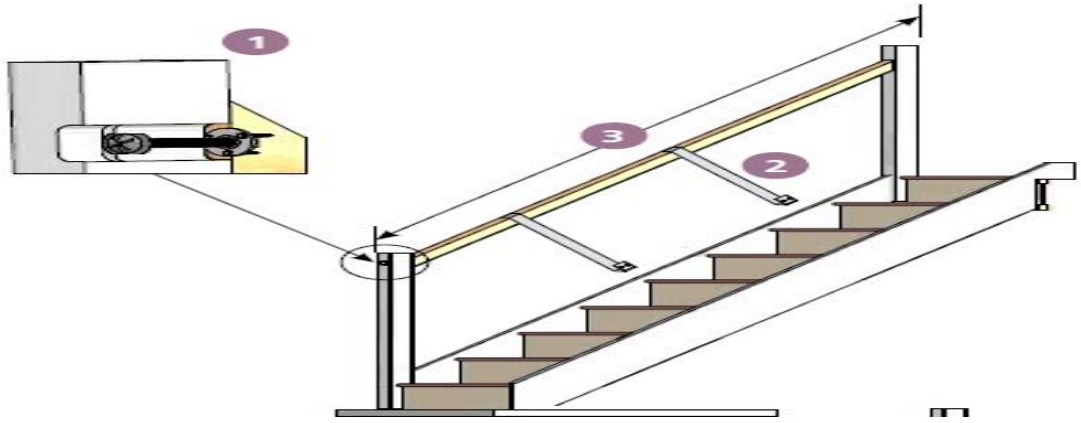


Fig-1 assembled newel

3.2 Assembling Fixing Stringer:

Support for the treads and risers; usually cut to have the treads sit on the horizontal plane and the risers nailed to a vertical cut.

3.2.1 String beam concrete stairs

Cranked slab stairs:-are very often used as a special feature, since the half space landing has no visible support being designed as a cantilever slab. Bending, buckling and torsions stresses are induced with this form of design. Creating the need for reinforcement to both, faces of the landing and slab or waist of the flights. The

amount of reinforcement required can sometimes create site problems with regard to placing and compacting the concrete.

Typical details of a cranked slab stair (which is also known as a continuous stair, scissor stair or jack knife stair) are shown in the figure.

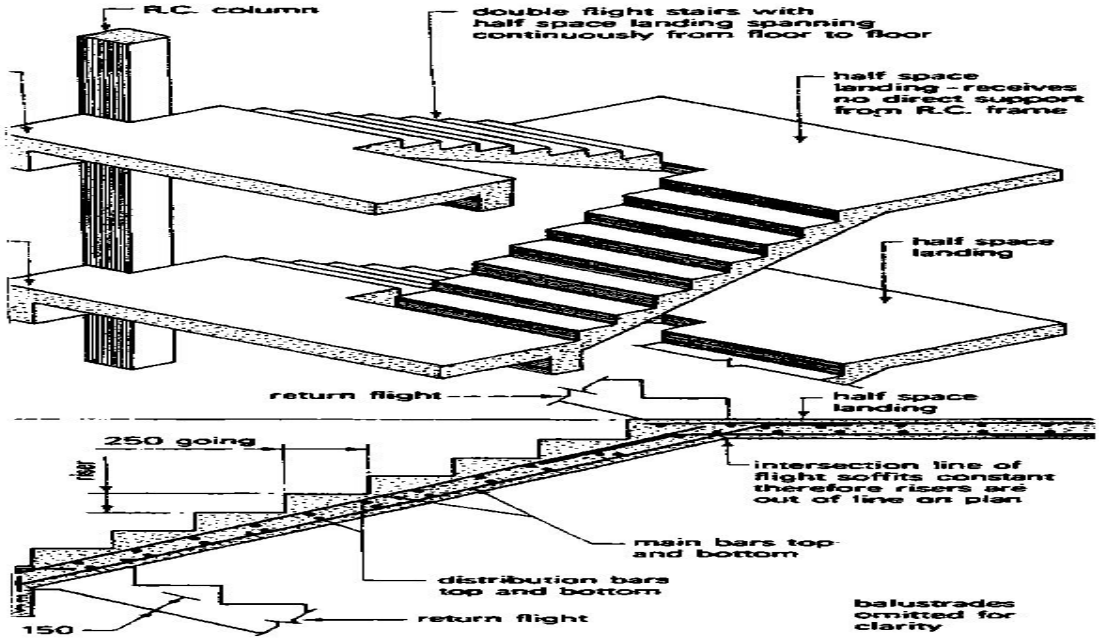


Fig-2 assemble stringer concrete

3.2.2 Cutting Stringers

Before laying out the steps decide how the stringers will join the deck. They're either attached directly to the rim joist so the top step is flush with the deck top, or to the framing under the deck, which is the way we did it (see drawing on previous page). When mounted under the deck, the stringers are either attached to the joists or to blocking placed between joists, and the stringer ends are cut long to reach the framing.

Mark the tread notches using a framing square fitted with stair gauges. These small brass fixtures clamp onto the square, providing an accurate way to mark several identical notches. Clamp one stair gauge on the square's tongue directly at the rise dimension. Attach the other gauge to the body of the square at the run dimension.

Then, lay the square on the 2 x 12 with the gauges pressed against the board's edge and mark the tread and riser.

Slide the square down, align it with the previously drawn notch, and add the next one. Cut the notches using a circular saw, being careful not to go beyond the lines. Finish the cuts with a jigsaw or a handsaw. Next, trim the bottom of the stringer an amount equal to the tread thickness. For example, if you're installing 2 x 6 treads, cut 1 1/2 in. from the bottom of the stringer. Use the first stringer as a template to mark the remaining stringers. We screwed each stringer to the deck-frame blocking, which was spaced 16 in. on center. With the stringers in place, check that each step is level, and use a block plane to shave down high spot.

Operation Sheet 1	**3 Assembly & Fitting instructions of newels & stringer**

Procedures Assembly & Fitting instructions of newels & stringer

Step 1

Install the pre-sized principal raking guardrail by fixing each end to the newel posts using the fixing bolts supplied.

Step 2

Hang both hanging brackets over the upper guardrail and position evenly from each end to create three equal gaps. Fix using 2 no. M4x40mm CE marked screws on each bracket.

Step 3

Measure the overall width of the guardrail system from the outer edge of each newel post as per illustration, and cut the mid-guardrail to suit this dimension.

Step 4

Locate the mid-guardrail into the hanging bracket as per illustration. Fix using 2 no. M4x40mm CE marked screws per hanger. Ensure the length of the mid-guardrail overhangs the newel post at both ends.

Step 5

The finished system should look as per illustration 5. Ensure all fixings are in place and secure. Please note the gap between the upper and mid guardrails will be determined by the hanging brackets, illustration for reference only.

Lap Test # 1	Practical

Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions: Given necessary equipments, tools and materials you are required to perform the following tasks within 3 hour.

Task1. Assembling and fixing newel and stringer

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

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

Name: _____ Date: _____

Information Sheet #4	Temporarily support and Fix Strings in position.

4. Temporarily support and Fix Strings in position

When installing a stair it is usual to start from the top and work down. There may need to be some preparation of joints and trimming to size of components, where required, before the components are fixed in position and this should be checked prior to starting the installation. Wall strings, newels and landings will need to be fixed to the supporting structure. Consideration should be given to the type of fixings used to ensure that they provide a suitable level of support and that they are appropriate for the timber, block or other material to which the stair is being fixed.

All fixing points should be prepared with clearance holes (through the piece being secured) and pilot holes (into the structure being secured to). Never force a fixing into any material, unless the fixing is intended for that purpose, as this will cause splitting of timber and will weaken the joint. Care when handling should be taken to protect the delicate bird's mouth joint that may have been cut into the wall.

Care should be taken when installing a stair as the nature of the work will present a risk of falling. Full protection to the outside of any stair will not be afforded until the complete guarding system, balusters or infill panels and handrails have been fixed in place. As an alternative, a suitably accredited temporary guarding system may be used until the final guarding is in place.

http://www.hse.gov.uk/construction

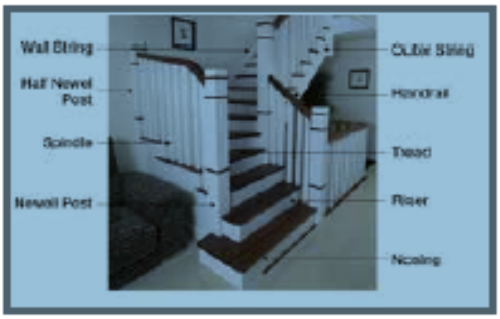


Fig -1 temporary string

4.1 Temporary fixing of stairs

A staircase will not be able to provide its full support until it is installed completely with all fixings in place. Until this is achieved there is a chance that elements of the stair could become dislodged from their positions, for example, a newel could fall from its location over a trimmer, or a missing fixing or anchor, could cause unexpected loading to a part of the stair leading to failure. During the installation process it may be necessary for the installer to use the stair, but this should only be undertaken with caution having ensured that temporary supports, such as a block at the base of the stair to prevent slipping, or temporary propping, is in place before the installer applies any load to the stair. At this time, no guarding will have been fitted so the installer should also consider any risks associated with falling from the stair. Before a staircase is used for access between storeys's the trunk should be fully installed and capable of supporting its intended loads with all fixings, packers and supports in place. Any edges where there is a risk of falling should be protected by the supplied guarding or balustrade or by adequate temporary guarding.

4.2 Clearances

The finished size of the stair should not be equal to the sizes measured on site, as this will not afford any flexibility while installing the stair and may not permit parts of the flight to be maneuvered into position. Consideration should also be given to any finishes that are yet to be applied to the walls of the stair opening, such as, dry lining or plastering. The finished size of a stair can be up to 40 mm less than the "tight" sizes measured on site but any clearances between the stair and any fixing points should be packed out prior to fixing.

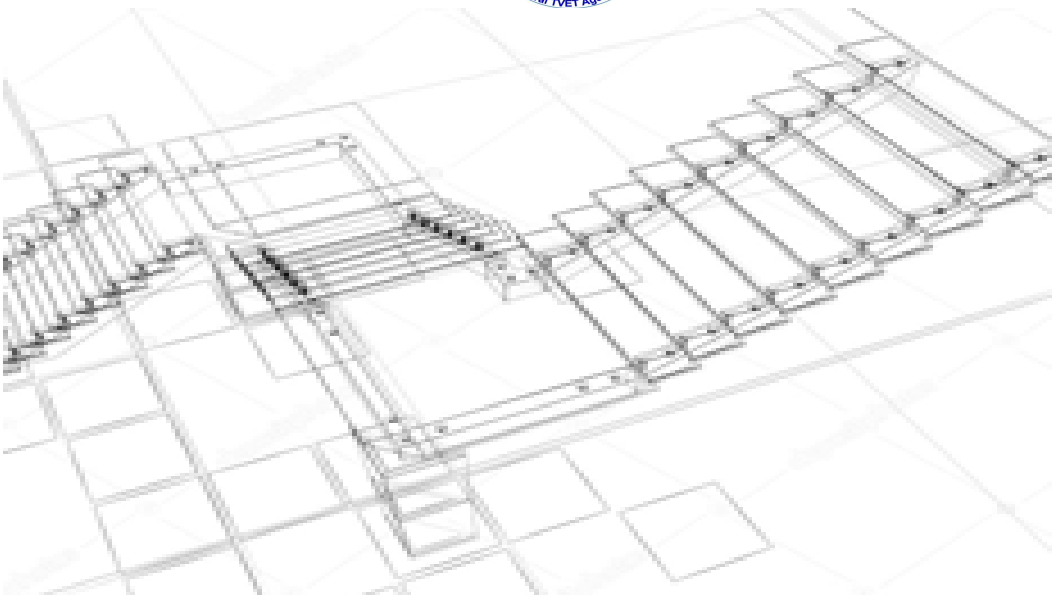


Fig -2 Wall string fixings

Structural screws, which are CE marked to EN 14592, should be used to fix wall strings to timber stud walls or masonry walls. The screws should have a nominal diameter of 5mm (10 gauge), and should either be of the self-drilling type, or should be installed in predrilled holes. The length of the screw should be chosen to achieve a minimum penetration of 50mm into the timber stud/noggin or into the masonry wall, and 50mm long wall plugs should be used in masonry walls (see Figure 1A). A continuous timber packer of sufficient width to avoid the possibility of splitting should be fixed directly to either the wall or the stair string to fill the gap between stair string and the timber/masonry wall. The centers appropriate for fixing stair wall strings (including winder strings) are given in Table 1, depending on the size of the gap between the stair string and the wall, and whether the stair is for private or general access.

Table 1 – Recommended Stair String Fixing Centres
(Using 5mm diameter screws penetrating min 50mm into the wall)

Stair usage	String-wall gaps up to 40mm	String-wall gaps exceeding 40mm
Private (domestic)	Max 600mm centres (see Fig 1c)	Max 300mm centres (see Fig 1d)
General access (eg flats)	Max 300mm centres (see Fig 1d)	Seek specialist advice from a structural engineer

Stair string fixing should begin with screws being provided beneath the top and bottom treads.

Working from these top and bottom fixings, additional screws should be inserted at centres no greater than those noted in Table 1, working toward the centre of the string. Note, that this will often result in two fixings being closer than the given centres toward the centre of the string.

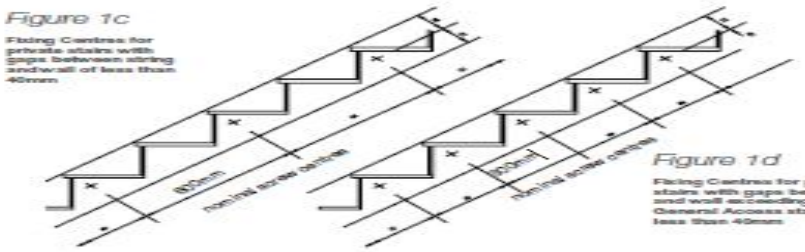


Figure 1c

Fixing Centres for private stairs with gaps between string and wall of less than 40mm

Figure 1d

Fixing Centres for private stairs with gaps between string and wall exceeding 40mm, or General Access stairs with gaps less than 40mm

To facilitate fixing into timber stud walls, planed all round (PAR) timber infill pieces should be provided between the vertical timber studs which follow the intended line of the fixings. These timber noggings should be a minimum of 45mm wide x 72mm deep, and be fixed to the timber studs at each end using 2No 75mm long screws inserted perpendicular to the nogging (see Figure 1). Alternatively, additional studs may be provided at 300mm c/c to enable direct fixing into studs and avoid the need for additional timber infill pieces.

Note: Steel stud partitions are generally not load bearing and therefore not suitable for supporting the installation of a staircase.

Figure 1g

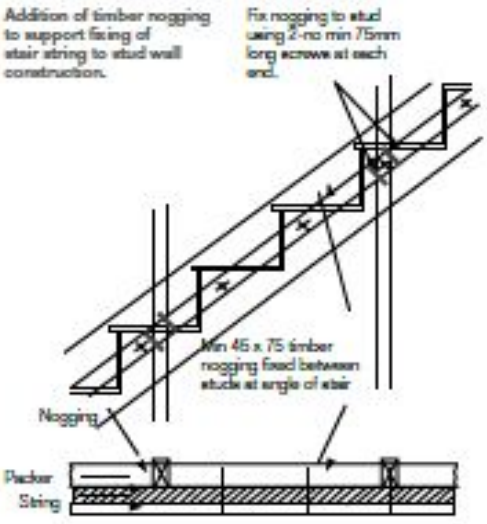
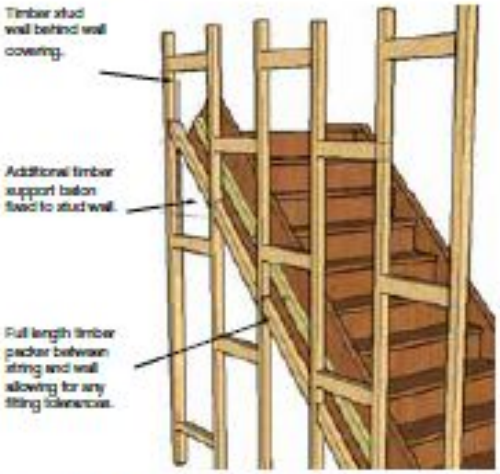


Figure 1.h.

Timber infill pieces should be provided between the vertical timber studs which follow the intended line of the fixings.

Figure 1.i.



Note: Wall finish, e.g. plaster, or single or double plaster board, should be accommodated between the structural part of the wall and the stair string.

Fig-1 fixing stud timber to the wall

Self check 4	Written test

Name: _____ Date: _____

Part: I true or false item

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

_____1. Wall strings, newels and landings will need to be fixed to the supporting structure.

_____ 2. Care when handling should be taken to protect the delicate bird's mouth joint that may have been cut into the wall.

_____3. The finished size of a stair can be up to 40 mm less than the "tight" sizes measured on site but any clearances between the stair and any fixing points should be packed out prior to fixing.

Reference

Publications about wood Order at www.swedishwood.com/publications.

Prepared by: Colin mackenzie Timber Queensland Limited First produced: April 2007 Revised: May 2012, October 2013

Www.jeld-wen.co.uk

Design Guide 34 Steel-Framed Stairway Design

Answer keys for learning guide -63

Answer key

Self-check-1

1. True
2. True
3. True

Self –check-2

1. True
2. True

Self –check -4

1. True
2. True
3. True
4. True

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