Carpentry

Level-II

Learning Guide-58

Unit of Competence: Construct Stairs and Stair Components

Module Title: Constructing Stairs and Stair Components

LG Code: EIS CRP2 M13 0919L04-LG-58

TTLM Code: EIS CRP2 M13 0919V1

LO4: Install treads and rises

Instruction Sheet	Learning Guide # 58

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

- Bracing assembled strings and newels temporarily.
- Fitting / fixing Treads, risers and newels.
- Fitting and wedging Intermediate treads and risers
- Checking Flight for true and square.
- Fitting Glue blocks to treads and risers

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:

Bracing assembled strings and newels temporarily.

- ✓ Assembles strings and newels temporarily braced in vertical position.
- ✓ Treads and risers and newels fitted/ fixed.
- ✓ Intermediate treads and risers fitted and wedged where applicable to fit tight to housings to specification
- ✓ Checking Flight for true and square.
- ✓ Flight checked for true and square.

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	Bracing assembled strings and newels temporarily

1.1 Bracing assembled strings and newels temporarily

The wall string bottom usually cut at its top end to sit over a joist and at its

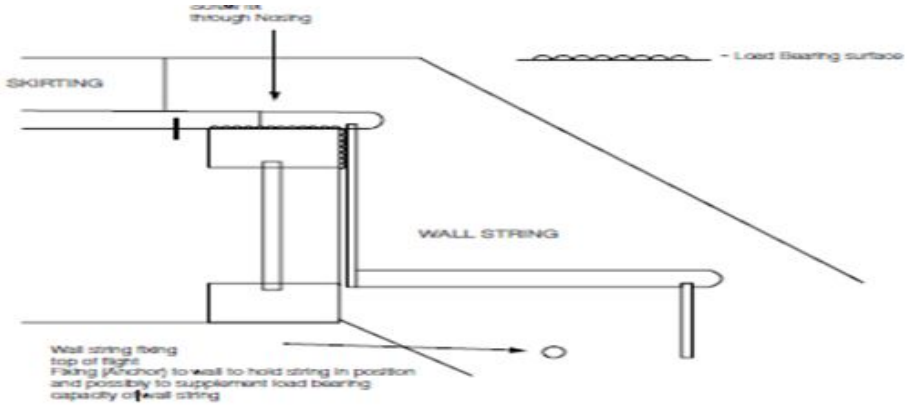


Fig –1 wall string bottom

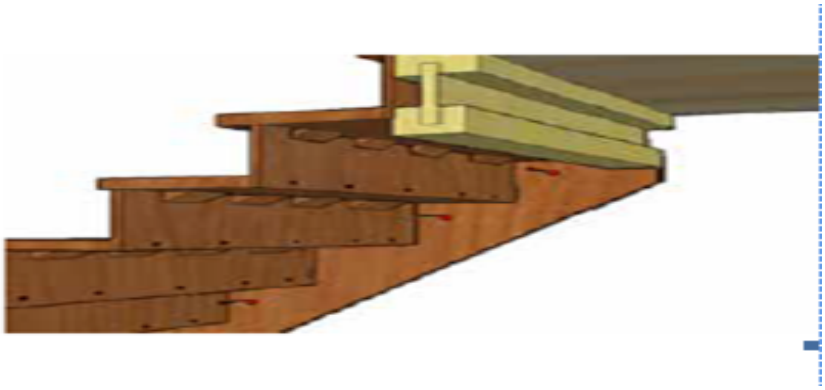


Fig-2 wall string top

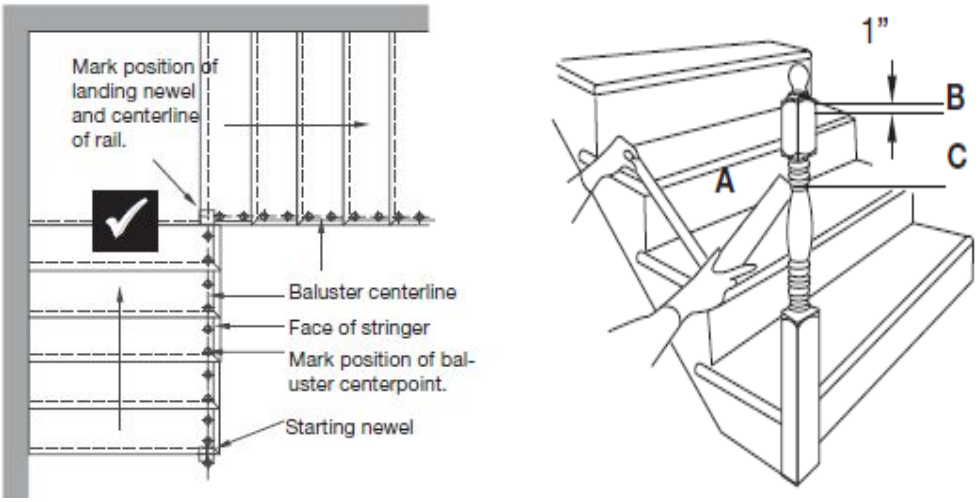
1.1.1 Outer String

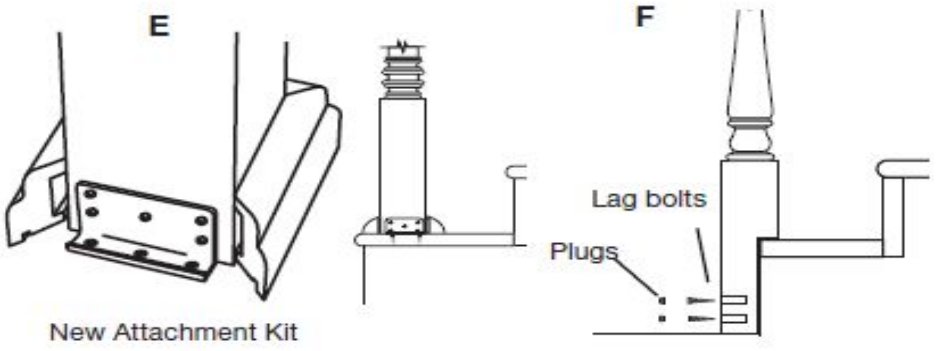
The outer string is usually jointed at the top and bottom ends into newel posts (or newel bases). The most common form of joint is a mortise and tenon joint, although stair manufacturers may provide an alternative method of securing the newels to the outer string.

Slide edge of square onto post as shown (**A**). Make mark.

• Measure down 1” from top of newel block (**B**). Make mark.

• Note measurement (**C**) between the two marks “A” and “B”.





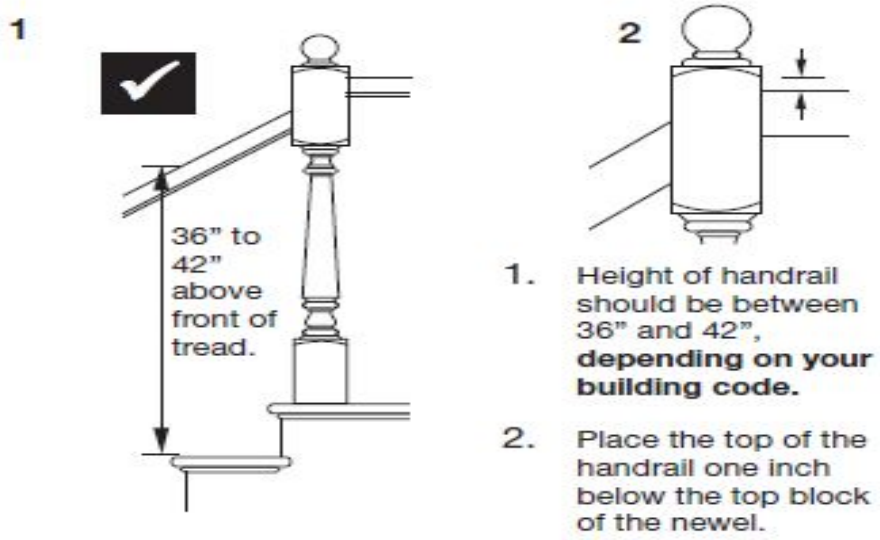


Fig- 4 Assembled strings and newels

Follow the instructions from the stair manufacturer to ensure the string-to newel joints are formed correctly. Before fixing, the newels to the outer string will need to be prepared as follows;

- ✓ Top of outer string screw fix
- ✓ Load must not go onto bottom flange of i-joist screw fix
- ✓ Fixings are to be structural screws, which are ce marked to en14592, 6mm x90mm
- ✓ Flight-joist newel solid joist

Notching top newel to fit over trimmer (bird's mouth). The back face of the newel will need to be notched to receive the trimmer. The notching should position the top of the top nosing flush with the surface of the floor and the back face of the top riser with the same clearance as created by the cutting of the wall string. Note: Notch the newel to the depth of the trimmer, but do not fit the newel over the flooring. Remove the flooring (i.e. chipboard) to accommodate the wall string, newel and top nosing.

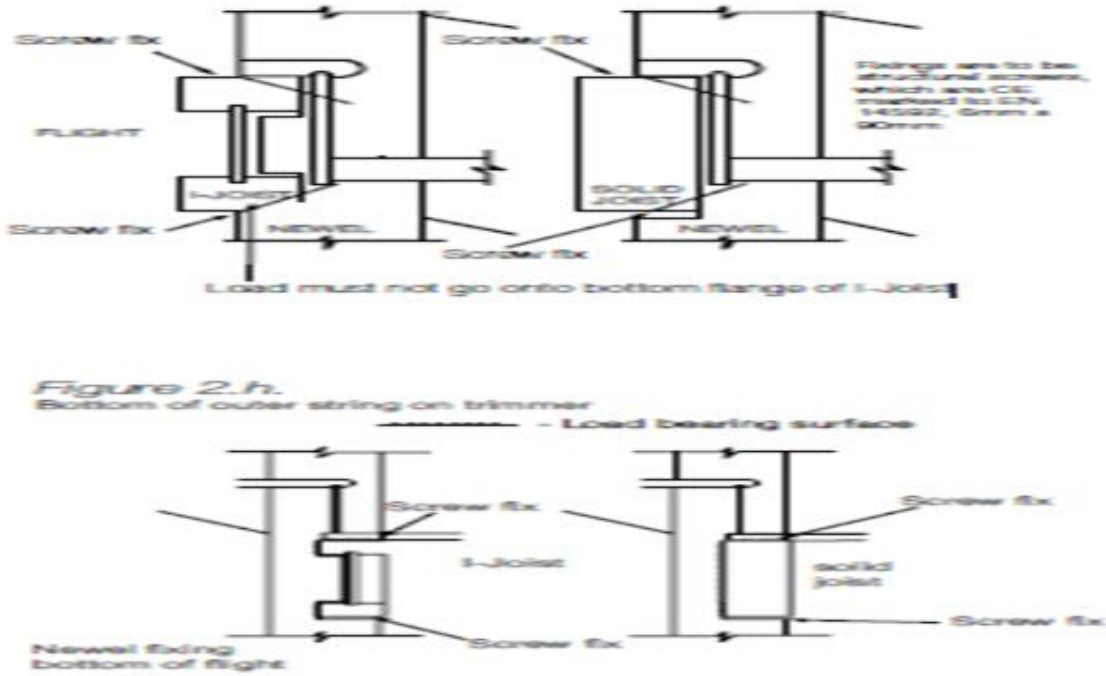


Figure 2.h.
Bottom of outer string on trimmer
- Load bearing surface

Fig- 3 top outer string

1.2 Assembly

This will allow the boarding to be replaced if it becomes damaged. To maintain the rise of the bottom step is consistent with the rest of the flight, an allowance equal to the thickness of the boarding of the landing will need to be made when cutting the string or newel and bottom riser for height.

1.3 Quarter landing

Quarter landings will need to be able to support the same loads as the floors of the property into which the stair is being installed. The newel forming the corner of the stair where the outer string turns through 90 degrees will need to be notched to receive and support the outer corner of the landing, unless the newel is designed to be face fixed. If the newel is to be notched, it will need to act as both a “top” and “bottom” newel for the outer strings and be prepared in two directions accordingly.

The joist sizes should be as given above for half landings in Table 2. (Trimmers are not required for quarter landings.)

1.4 Winder flights

Winder flights are usually formed of three or four tapered treads radiating from a central newel. This newel will be housed to receive the narrow part of some of the treads and one side of the risers in between. The winder flight may form the top or bottom of the stair or may have straight flights continuing the stair above and below.

Where the winder flight is at the top of the stair, the newel and wall string will need to be prepared to fit over the trimmer in a similar manner to the top of a straight flight. If the winder flight forms the bottom of the stair, the newel and wall string will need to be prepared..

1.5 Newel Post

Main newel posts and intermediate newel posts should be a minimum of 90 mm x 90 mm. Intermediate newel should always be manufactured in 1 part unless test evidence exists to prove that the 2 part components can withstand relevant loadings.

Fig -5 Newel Post

Operation sheet -1	**Bracing assembled strings and newels temporarily**

Procdures bracing assembled strings and newels temporarily

Steps

1. Layout your staircase directly on your treads and landings (**FIG 2-1**). Mark newel and baluster position and centerlines. See diagram at right.

2. with newel in position where it is to be mounted (**FIG 2-2**), slide short end of framing square along the slope of the stairway.

This is the measurement to use when cutting the bottom of the newel.

3. Trim and fasten starting newels (**FIG 2-3**)in place using Newel Attachment Kits (**E**) or lag bolts and wood plugs (**F**).

4. for 2nd floor and balcony newels (**FIG 2-4**), rail should be set 1” below the top of square part of newel. **Check local building codes for proper rail height**.

Lap test 1	Written test

Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions: Given necessary equipments, tools and materials you are required to perform the following tasks within 2 hour.

Task1 Bracing assembled strings and newels temporarily

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

Information sheet #2	Fitting / fixing Treads, risers and newels.

2.1 Fitting / fixing Treads, risers and newels.

Design of components the following clauses gives guidance on the joints within a stair. In the absence of test evidence or calculation, these recommendations should be considered as a minimum.

2.1.1 Fitting / fixing Treads

Timber members of more than one piece should be jointed as specified in BS 1186-2.

2.1.2 Fitting / fixing risers and newels.

MDF or plywood risers should be fixed to the the edge of the tread using a suitable adhesive and minimum 5.0 x 35 mm fully threaded countersunk screw of equivalent tested mechanical fixing system. The fixings should be positioned 70-100 mm from each end and at centers not exceeding 230 mm. Penetration should be not less than 23 mm or 1.5 times the riser thickness. The top of each riser should be located into a groove in the underside of the tread with a minimum depth of 5mm up to a maximum depth of a quarter of the tread thickness. This joint should be further supported by angle blocks 75 mm long and 38 mm width on the shorter edges, glued to the riser and tread. The number of blocks will vary according to the width of the stair. Width up to 900 mm, minimum 2 blocks Width between 900 mm and 990 mm, 3 blocks. Width between 990 mm and 1200 mm (and tapered treads over 1200 long), minimum 4 blocks.

Strings should be housed to receive the treads and risers to a depth of 12 mm or 0.4 times the string thickness, whichever is the greater. These housings should be tapered to receive wedges to support the tread and riser. The wedges should be fitted with adhesive to form a rigid joint. Where the aesthetics demand, wedges may be omitted, but an alternative side restraint system will be needed. Where strings are fitted into newels, the ends of the strings should have tenons formed to fit into the newels. The tenons should be not less than 12 mm thick and not less than 45 mm long. However, where two strings are joined to a newel one or both tenons may be reduced in length or hunched to allow both tenons to be accommodated. For winder stairs, the upper and lower strings may need to be enlarged to accommodate the

housings of the winders where the stair turn occurs. Where a stair is to be supported on timber carriages the design and fabrication should be checked by a person qualified in structural detailing.

2.1.3 Fitting / fixing newel

Newels should be housed not less than 12 mm deep to receive the ends of the treads and risers and should be mortised for strings and handrails as required.

2.1.3.1 Intermediate newel post

Any main newel or intermediate newel post should be manufactured in one part rather than sections unless test evidence exists to prove other designs withstand the required loadings.

Fig-1 Newel

Fig -2 Handrails and balustrades

Fig-3 Intermediate newel post

Prescriptive minimum component dimensions The data table 6.1 below illustrates the prescriptive minimum balustrade component dimensions generally accepted as minimum industry standards, unless test evidence exists to support an alternative design. The dimensions are restricted by limitations described in the accompanying paragraphs and previous chapter. Key to these limitations are the jointing methods of different components and should be as described in BS 585-1 unless test evidence exists to prove performance otherwise.

Table 6.1 shows minimum prescriptive dimensions for handrail components

Tables 6.2 shows prescriptive tread thickness dimensions relating to width of stair and species classifications of timber.

Tables 6.3 shows prescriptive string dimensions based on species classification of timber and pitch of stair.

Table 6.1 Prescriptive minimum dimensions for timber stair components

Component	Minimum prescriptive dimensions	Design note
Strings	Refer to tables 6.3	
Treads	Refer to tables 6.2	
Risers	9 mm (MDF or plywood)	Industry accepted minimum thickness, BS 585-1:1989
Winder treads	Refer to tables 6.2	
Main newel post	82 mm x 82 mm square	Industry accepted minimum dimensions. Newel post should be in one part.
Intermediate newel post	82 mm x 82 mm square	Industry accepted minimum dimensions. Newel post should be in one part.
Handrail * See note below	44 mm x 69 mm* See note below	Minimum overall dimensions, excluding groove. * See note below, and also reference BS 585-1:1989
Balusters to stair (900 mm high) and landings in domestic use	27 mm x 27 mm square (Current design guide 1)	

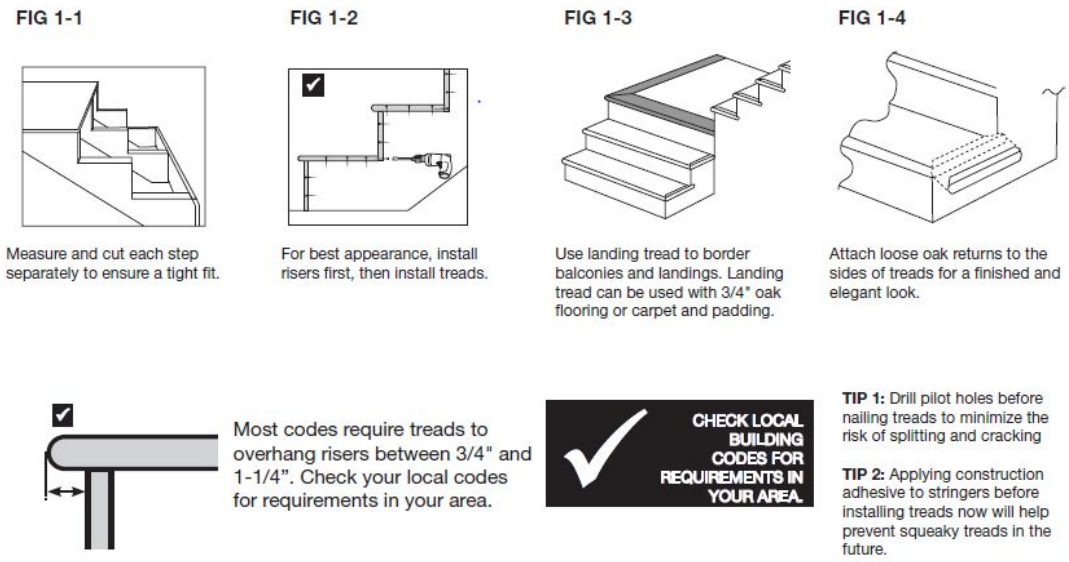


Fig -4 fixed tread, risers & newel

Operation sheet #2	**Fitting / fixing Treads, risers and newels.**

Steps Fitting / fixing Treads, risers and newels.

Steps

1. Remove existing wood balusters by cutting them 12-inches below where they are attached to the handrail. Twist to remove them, ensuring holes are clear of wood glue, nails or other debris.
2. Remove any carpet from surface of staircase to expose wood treads and risers.
3. Remove treads and risers using hammer or pry bar. Remove any nails and debris.
4. Once old treads and risers are removed, install new risers first. Apply bead of adhesive to face of stringer. Nail or screw risers in place.
5. Install treads (**FIG 1-1**) by applying bead of adhesive to stringer run. Place treads on stringer. Nail or screw in place (**FIG 1-2**).

6. Install landing tread at landings and any balconies (**FIG 1-3**). Apply bead of adhesive on subfloor and nail in place.

7. Landing tread (**FIG 1-3**) can be used with 3/4” oak flooring along a landing when solid oak treads are used. Use landing tread on balconies and at the top of your staircase.

8. Add a finished look by applying oak returns (**FIG 1-4**) to the ends of exposed treads on open stairs. Apply with wood glue and nails.

Information sheet #3	Fitting and wedging Intermediate treads and risers

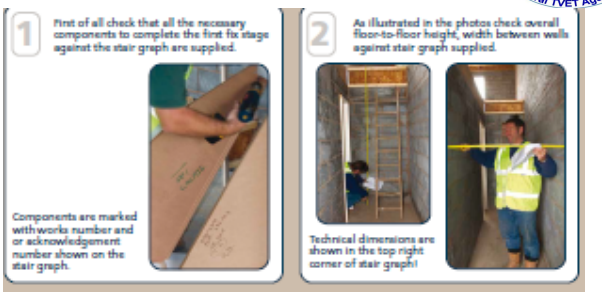
3.1 Fitting and wedging Intermediate treads and risers

Wedging flights are usually formed of three or four tapered treads radiating from a central newel. This newel will be housed to receive the narrow part of some of the treads and one side of the risers in between. The winder flight may form the top or bottom of the stair or may have straight flights continuing the stair above and below.

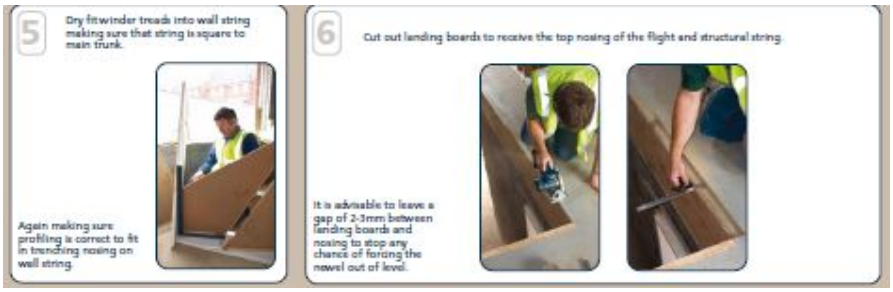
Where the winder flight is at the top of the stair, the newel and wall string will need to be prepared to fit over the trimmer in a similar manner to the top of a straight flight. If the winder flight forms the bottom of the stair, the newel and wall string will need to be prepared.

When fitting a 3 tread winder to the top or bottom of your flight, follow the below

Fig -1 fitting a top or bottom winder


1
First of all check that all the necessary components to complete the first fix stage against the stair graph are supplied.
Components are marked with works number and or acknowledgement number shown on the stair graph.
2
As illustrated in the photos check overall floor-to-floor height, width between walls against stair graph supplied.
Technical dimensions are shown in the top right corner of stair graph!


3
Dry fit winder treads into newel post, you may have to pare treads down in thickness to fit.
Make sure the profiling of nosing is correct to fit in newel housing. (If not done correctly it can force newel post out of level).
4
Cut out for trimmer so string can hook over, cut string at bottom to floor level,
then on both top and bottom string cut for depth of skirting board.


5
Dry fit winder treads into wall string making sure that string is square to main trunk.
Again making sure profiling is correct to fit in trenching nosing on wall string.
6
Cut out landing boards to receive the top nosing of the flight and structural string.
It is advisable to leave a gap of 2-3mm between landing boards and nosing to stop any chance of forcing the newel out of level.


7
Offer loose newels to strings, mark through bore hole on newel post onto tenon of string.
Remove newel. Using 10mm drill bit, drill through tenon creating draw bore action by offsetting hole 2mm closer to shoulder of tenon.
This will pull string tight to newel post.
Glue tenon and mortice, offer newel to string and fix using dowels provided.
8
Offer top newel to main string. Trim tenons, if necessary follow same procedure as section 3 to fit newel to string.
Note: the newel must be square of the last tread!
(propping the newel up does this and checking for square-ness)


9
Assemble all loose sections together using glue between all joints, dowelling provided to draw newel to string, glue between all loose treads and risers and screwing these risers to treads.
Make sure glue blocks are glued on all loose risers. Screw and glue winder treads to newel posts making sure at all times the newel is square to the last tread and loose wall string is square to main string.

Fig -4 fitting of risers

Operation sheet # 3	**Fitting and wedging Intermediate treads and risers**

Steps to fitting and wedging Intermediate treads and risers

Step 1

With your newel post fitted, locate the first winder step which follows on from the straight run of steps. Slide the winder fully into the wall stringer and newel post housing, the winder should fit perfectly in the housing with the back of the tread in line with the above riser trenching do not trim or modify any treads, these are cut accurately on a CNC machine, if it doesn't fit you may have the tread in the wrong place. If you have a problem, please call us.

Once you are happy the winder fits into its housing, apply a bead of glue to the newel post housing and to one of the larger (approx 300mm long) winder wedges and drive it into the trenching under the tread using a hammer, ensure the winder tread remains fully seated within the stringer housing (it may sit 1-2mm shy from the bottom of the newel post housing, you must ensure the newel post remains at 90° to the tread!). Next, use a screw to secure the newel post end of the winder tread, you will need to drill and pilot drill where appropriate.

Step 2

Slide the next winder (kite shaped) fully into the stringer (ensure you have the correct one as they will be different). Slot the loose stringer into place to ensure the corner

tread fits into this adjacent stringer, using a square make sure the stringers are 90° to each other. Now you are happy with how the tread fits we can secure it into place.

On a bottom winder If you are assembling the winder box before fitting the staircase you may find it easiest to fix the corner winder into the housing on loose stringer first of all as its difficult to drive a wedge in once this is fitted.

Glue the stringer tenon into the mortise slot, you can screw through the back of the upper stringer to hold this in place.

Using the same method as before, fix the final winder (and bull nose step) into place.

The next step is fitting your riser

Step 3

This stage is very important, and if done correctly your staircase should be forever squeak free! Dry fit each riser around the newel posts, trimming where required. Be aware longer risers are for the kite winders.

Once you are happy the riser fits, run a small bead of glue (we recommend PU Adhesive) within the newel housing and along the back of the tread where the riser will be screwed. Beware not to over glue this joint, especially if the flight is not being carpeted as the glue can be difficult to remove from the face of your staircase - it's best to run the bead of glue towards the under edge of the stair.

Step 4

You are now ready to screw the riser to the tread, if your treads and risers are MDF we recommend 40mm screws, on timber 30mm should be ample to fix a 10mm riser. Use 3-4 screws in the pre-drilled holes, be careful not to over tighten or let the screws spin. If screwing into a hardwood tread you will need to drill a pilot hole approximately 2-3mm in diameter. You can also use 1-2 screws to secure the riser into the newel post housing.

The next step is to glue the angle blocks in place with generous amounts of glue, it is very important that these are fixed properly, and the glue is allowed to set before use.

Lap Test # 3	Practical Demonstration

Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions: Given necessary equipments, tools and materials you are required to perform the following tasks within 2 hour.

Task1. Fitting and wedging Intermediate treads and risers

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

Name: _____ Date: _____

Score = _____

Rating: _____

Information sheet # 4	Checking Flight for true and square.

4.1 Checking Flight for true and square

Designing the staircase depends on many factors: the place in which the staircase is going to be situated (inside or out), the size of hole in the slab and the type of building they're serving (residential, commercial or industrial)

- ✓ Usual slopes for the flight of stairs .The relation between the length of the tread (l) and the height of the riser (h).

Observation: the treads of big slope staircases should be made without risers is that the sole of the foot may have a larger contact area, thus going under the tread above.

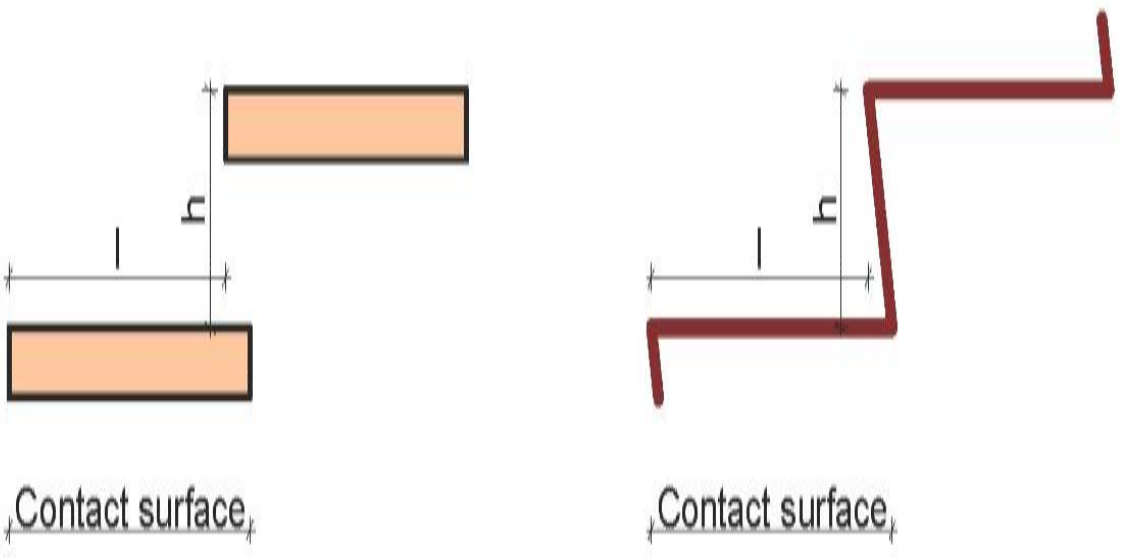


Fig -1 flight of stairs

The relation between the length of the tread (l) and the height of the riser (h) defines the slope of the flight of stairs. In his book “Architecture course”, Jacques-Francois Blonde (1705 – 1774) introduced a two factors equation that allows a proper design of a staircase: 2h + l = 62 – 64

Where 62 and 64 are the optimum interval (measured in cm) in which the result of the sum 2h + l must ft in. For example, for a length l =28 cm that we want to achieve, the right height can be calculated using: The minimum optimal height

2h + 28 = 62

2h = 62 - 28 = 34

h = 34:2 = 17

The maximum optimal height

2h + 28 = 64

2h = 64 - 28 = 36

h = 36:2 = 18

The ideal height of the riser for a 28 cm tread will be between 17 is 18 mother formula is known even today as “Blonde’s formula”.

Over time, accumulated expertise lead to the development of specific ratios that involve other parameters, according too the use of the stairs, their use or the type of construction method.

For example, for staircases that have very low/high riser, this equation is recommended

3h + l = 80 – 85

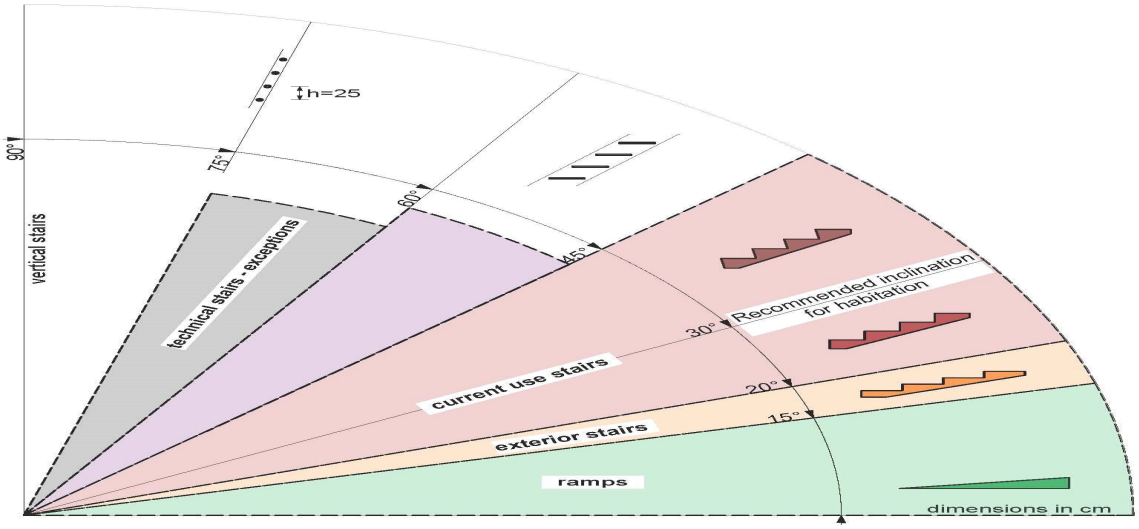


Fig -2 stair height calculation

For stairs situated inside buildings and used by small children (kindergartens, schools)

2h + l = 58 – 60

The diagram below features some common slopes for flights of stairs:

4.1.1 Slopes for flights of stairs

Ramps and stairs with low slopes are generally used outside, for entering the building or for the inside, where access for the disabled is needed.

European legislation demands the existence of access ramps for all types of building ,with the mention that the slope may vary depending on if the ramp is covered or not. The maximum slope for a ramp with no canopies a maximum of 8% and for the covered ones it can reach to a maximum of 11%.

Most common staircases start from a slope of approximately 20 degrees and can reach a maximum of 45 degrees ,with the mention that the optimum slope is 30 -35 degrees, no matter it's building material or its area of use .

Ramps and staircases with low slopes

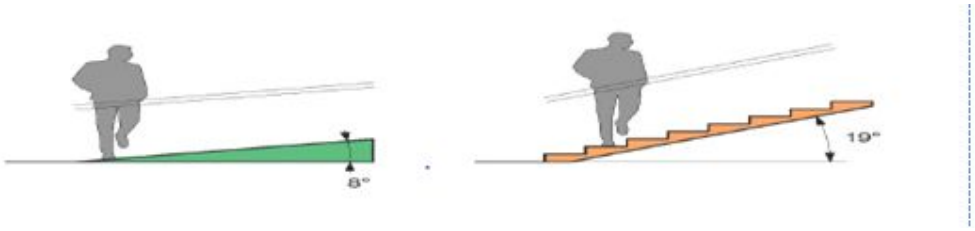


Fig-3 Stair with common slope

Fig-4 stair cases with a steep slope

Ramps and stairs with low slopes are generally used outside, for entering the building or for the inside, where access for the disabled is needed.

European legislation demands the existence of access ramps for all types of building with the mention that the slope may vary depending on if the ramp is covered or not. The maximum slope for a ramp with no canopies a maximum of 8% and for the covered ones it can reach to a maximum of 11%.

Most common staircases start from a slope of approximately 20 degrees and can reach a maximum of 45 degrees ,with the mention that the optimum slope is 30 -35 degrees, no matter it's building material or its area of use .

4.1.2 The width of the ramps

It's an important factor one must consider to allow a smooth flow of circulation. The width of the flight of stairs represents the circulation space between the wall and the rail or between 2 rails. Depending on the type of building and the number of floors, code regulations demand certain minimum widths for smooth flows of circulation .In the table below, the minimum widths ate presented according to the type of building.

4.1.2.1 Minimum widths (recommended) for flights of stairs

NO	Building type	Width main staircase /m	Width secondary staircase /m
1	Industrial buildings	1.20	1.10
2	Tall and high rise buildings	1.50	1.20
3	Hospital buildings	1.50	1.50
4	Kindergarten, senior retreats	1.20	1.20
5	Educational buildings maximum 500 students	1.50	1.20
6	Educational buildings over 500 students	1.70	1.20
7	Public buildings maximum 200 people	1.50	1.20
8	Public buildings over 200 people	1.70	1.20
9	Residential buildings maximum 2 floors	1.05	0.90
10	Residential buildings 3-5 floors	1.15	1.00

11	Residential buildings 6-8 floors	1.25	1.10
12	Residential buildings over 9 floors	1.30	1.20
13	Buildings with overcrowded halls – public evacuation	1.70	1.20
14	Buildings with overcrowded halls –bureaus	1.30	1.20

The width of the landing must be at least equal to the width of the widest flight of stairs that intersects it and in order to hinder circulation, opening doors on the landing must be avoided.

The headroom is the height between the sheer surface of the staircase and the sheer plane of the inferior part of the flight of stairs or the slab above. Generally, in order to avoid circulation problems, the minimum of 2.1 m is considered acceptable, case in which any danger of accidents during circulation is eliminated.

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. (2 mark each)

_____ 1. Public buildings over 200 people width of stair is 1.7 meter

_____ 2. Residential buildings maximum 2 floors width of stair is 1.05 meter

_____3. Public buildings over 200 people width of stair is 1.7 meter.

_____ 4. Residential buildings 6-8 floors width of stair is 1.25 meter

_____ 5. Residential buildings 3-5 floors width if stair is 1.15 meter

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.

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

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

Score = _____

Rating: _____

Information sheet #5	Fitting Glue blocks to treads and risers

5.1 Fitting Glue blocks to treads and risers

Glulam is manufactured from small sections of plane timber boards or lamella bonded together with structural adhesives. Hence, it is able to form larger members with mechanical properties that are stronger than normal timber boards. It is produced in a similar method as CLT, but with the grain aligned in the same direction.

Fig-1 Glued laminated timber

Fig-2 Fitting Glue blocks to treads and risers

Glulam can be used for structural beams, columns or truss elements and offers many advantages. These include:

5.1.1 Design flexibility

Glulam can be manufactured in a wide variety of shapes, sizes and configurations. It is ideal as a structural beam and can be manufactured curved or straight. Curved glulam can take the form of a simple curved beam, a pitched and tapered curved beam, or a complex arch configuration.

The material can either have a 'homogeneous' layup, where all the laminations are of the same class of strength, or 'combined', where the outer laminations (one-sixth of the depth on both sides of the neutral axis of a beam) are of a higher strength class.

For those with a combined layup, the position of the lamination grades within the overall beam layup is determined by referencing the BS EN 14080. Besides using different layup combinations for the engineering properties of the material including bending strength and stiffness, some manufacturers may advise to use specific classes of laminations for certain parts of a structure to ensure practicality of supply.

5.1.2 Good strength-to-weight ratio

Glulam beams are able to carry loads similar to steel or concrete beams, while being lighter due to their high strength-to-weight ratio. The section size of the glulam beams generally tends to be bigger than those of steel and concrete.

Glulam elements are available in various sizes and shops (refer to the manufacturer's technical guidance). However, their sizes may be limited due to transportation restrictions or the supplier.

Common sizes can exceed (i.e. block glue) on a case-by-case basis depending on the structural requirements. However, the customization of sizes may increase cost.

5.1.3 Design of components

The following clauses give guidance on the joints within a stair. In the absence of test evidence or calculation, these recommendations should be considered as a minimum.

5.2 Treads

Timber members of more than one piece should be jointed as specified in BS 1186

5.3 Risers

MDF or plywood risers should be fixed to the edge of the tread using a suitable adhesive and minimum 5.0 x 35 mm fully threaded countersunk screw of equivalent tested mechanical fixing system. The fixings should be positioned 70-100 mm from each end and at centers not exceeding 230 mm. Penetration should be not less than 23 mm or 1.5 times the riser thickness. The top of each riser should be located into a groove in the underside of the tread with a minimum depth of 5mm up to a maximum depth of a quarter of the tread thickness. This joint should be further supported by angle blocks 75 mm long and 38 mm width on the shorter edges, glued to the riser and tread. The number of blocks will vary according to the width of the stair.

Width up to 900 mm, minimum 2 blocks Width between 900 mm and 990 mm, 3 blocks. Width between 990 mm and 1200 mm (and tapered treads over 1200 long), minimum 4 blocks.

Self check # 5	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. (2 mark each)

_____ 1. Glulam have good strength-to-weight ratio**.**

_____ 2. Glulam can be manufactured in a wide variety of shapes, sizes and configurations

_____3. Glulam elements are available in various sizes and shops

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: _____

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

Answers key for self check information sheet LG 58

Self check -4

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

Self check-5

1. True
2. True
3. True

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