



# HOW-TO-BUILD GUIDE

## TIMBER STAIRS AND STEPS

### WHAT YOU CAN BUILD USING THIS GUIDE

This guide shows you how to order (and explains the construction of) a factory-made internal single flight of stairs for a house. It also covers two options for building a simple set of outdoor steps.

### BEFORE YOU BEGIN

Timber stairs are normally custom-built in a joinery shop. When ordering a timber stair unit you will need to provide initial information on the total rise, the total going, preferred minimum tread and riser sizes, pitch and nosing (see Figure 1 for terms) as well as the materials to be used (timber species or MDF) and the finishes required.

The New Zealand Building Code Compliance Document D1/AS1 sets minimum design criteria for stairways. This can be downloaded for free from [www.dbh.govt.nz/UserFiles/File/Publications/Building/Compliance-documents/clause-d1.pdf](http://www.dbh.govt.nz/UserFiles/File/Publications/Building/Compliance-documents/clause-d1.pdf).

The ratio of tread depth, or going, to riser height determines a stairway's pitch (Figure 1). For main stairways within a house there is a maximum permitted pitch of 37° with a maximum riser height of 190 mm and minimum tread depth of 280 mm, with all riser height and tread depths being equal over the stair. Note that stairs that have a pitch less than 30° can be uncomfortable to use for most active people.

### SETTING OUT THE STAIRS

Get the joiner to site measure once floors are constructed.

Determine the total rise, i.e. the height from finished floor level (FFL) to finished floor level. Head room should be greater than 2000 mm – 2100 mm is better.

Determine the number and height of the risers by the following:

- Divide the total rise by the maximum permitted riser height for the stairway type (190 mm for the main stairway in a house). The result will generally not be a whole number so the actual required number of risers will be the whole number plus 1. Divide the total rise by the required number of risers to get the exact riser height.

Determine the plan length (total going) of the stairway by determining the number of treads using the following:

- Number of treads = number of risers – 1. (The highest tread is the FFL of the upper floor, so is not part of the stairway requirement.)
- Select the tread size from D1/AS1 Table 6.
- Calculate the total going by multiplying the tread depth by the number of treads.

Determine the stairway pitch based on tread and riser dimensions. For the main stairway in a house, the pitch can be no greater than 37°.

### **CONSTRUCTION**

#### **Interior stair**

This section covers the construction steps the joiner will follow. Interior timber stairs can be constructed as shown in Figures 2a and 2b. Solid timber or medium density fibreboard sheet (MDF) may be used in the construction. MDF is normally used for treads and risers. It is glued and screwed while solid timber may be nailed and screwed.

Stairs are constructed using solid timber stringers as support for the treads and risers. The treads are housed in rebates in the stringer and held in place by wedges and glue blocks (Figures 2a and 2b). A stringer that closes off the ends of the treads and risers is a closed stringer. If the stair is built between walls the stringer may be called a wall stringer. In this case the stringer is attached to the wall and transfers the stair load directly to the wall. It is generally sized to accommodate the tread and riser, and align with skirtings.

Stringers may be sized for the horizontal span using the joist tables from NZS 3604. Where the stringer is rebated to house the treads (Figure 2b) and spans between the floor levels, the thickness of the stringer should be increased by the rebate depth.

The stringers are routed out to a minimum rebate depth of 13 mm.

It is important that the wedges hold the treads and risers securely into the rebated stringer. Failure to secure the treads and risers will cause 'creaking' of the stairs.

Fit sufficient glue blocks to tie the treads and risers securely together.

Treads should be rebated into the base of the risers to prevent these members separating. The rebate will hold the tread to resist sagging.

A typical detail at the top riser of the stair is shown in Figure 3.

#### **Exterior timber steps**

A simple form of stair can be constructed from solid timber to provide access to exterior deck areas (Figures 4 and 5) using H3.2 treated timber (H4 where in ground contact). The treads can be attached to the stringers with by 50 x 50 mm brackets. The stair timber and fixings used should meet the same durability requirements as the deck construction. Exposed bolts and other fastenings will need to be type 316 stainless steel or epoxy coated hot-dip galvanised steel.

Timber treads need to be coated with a non-slip finish or grooved to provide a slip resistant surface.

Balustrades and handrails will be needed if a fall greater than one metre is possible. Refer to Building Code Clause F4/AS1 and B1/AS1.

Open treads that have a gap of more than 100 mm between treads are not suitable where the stair may be accessed by the public, e.g. the front steps to a house.

Figure 1

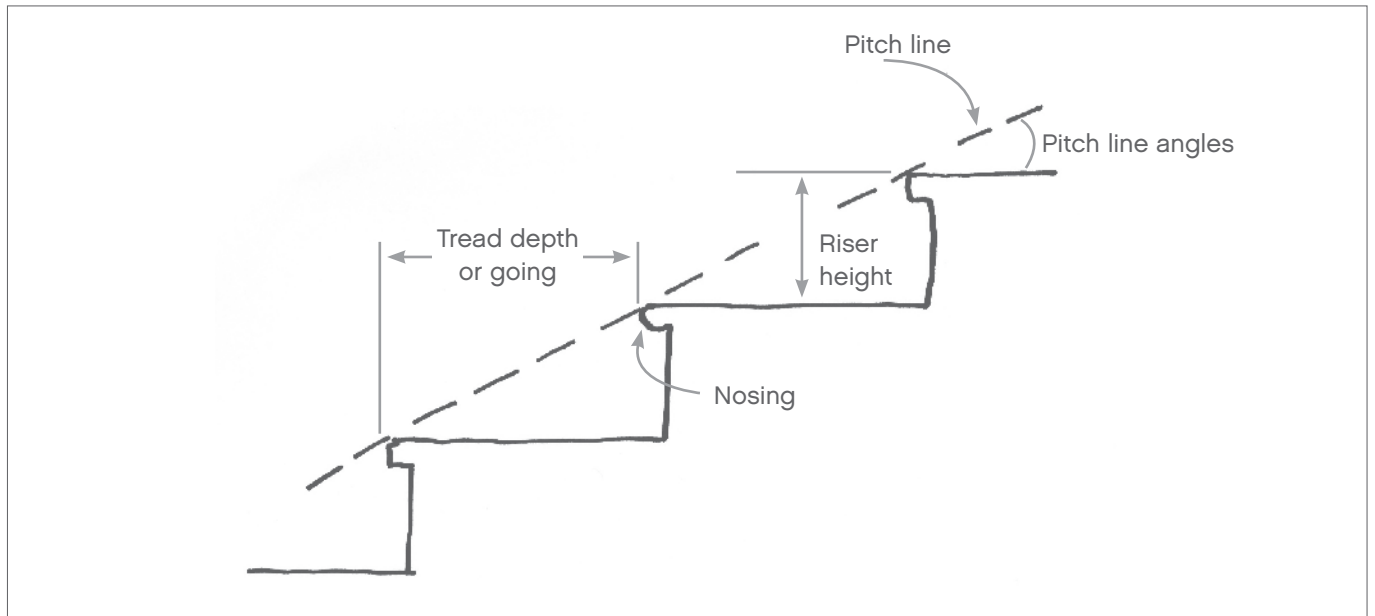


Figure 2 (a)

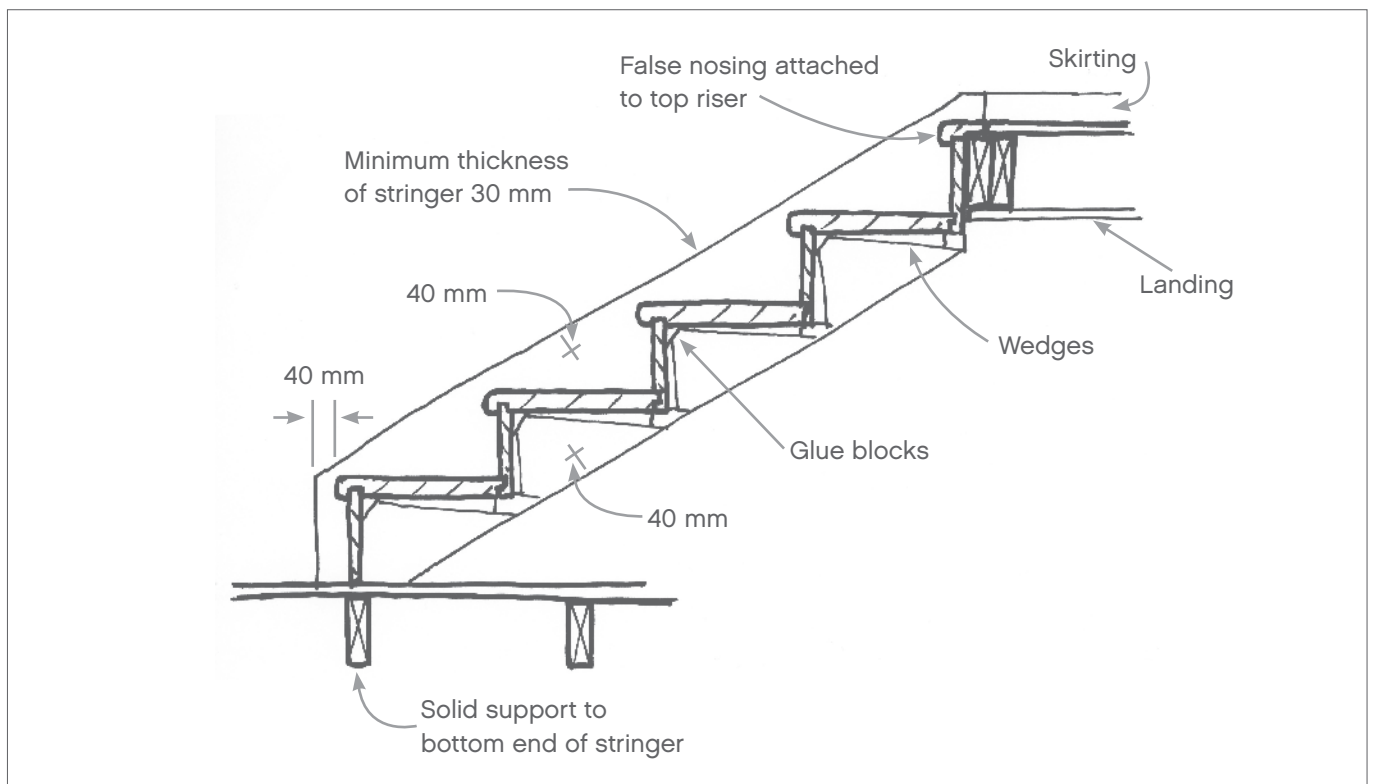


Figure 2 (b)

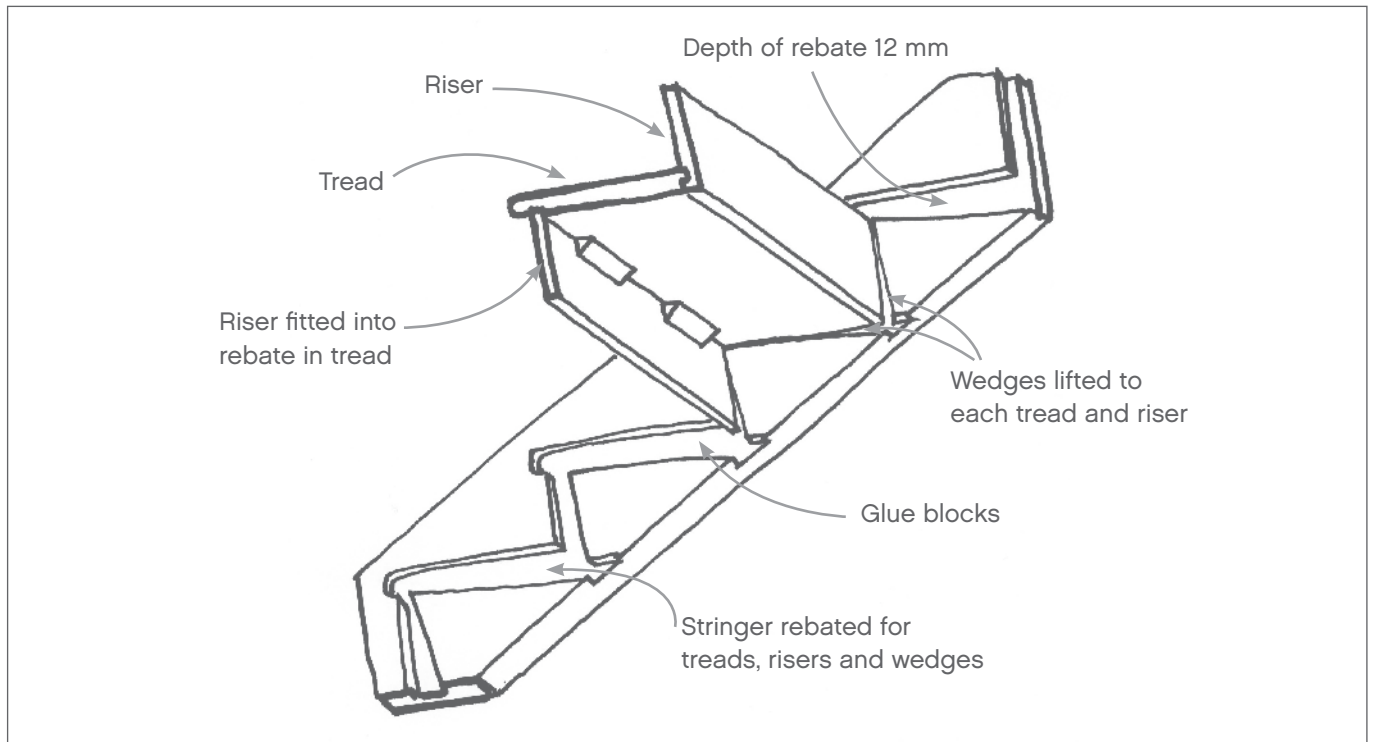


Figure 3

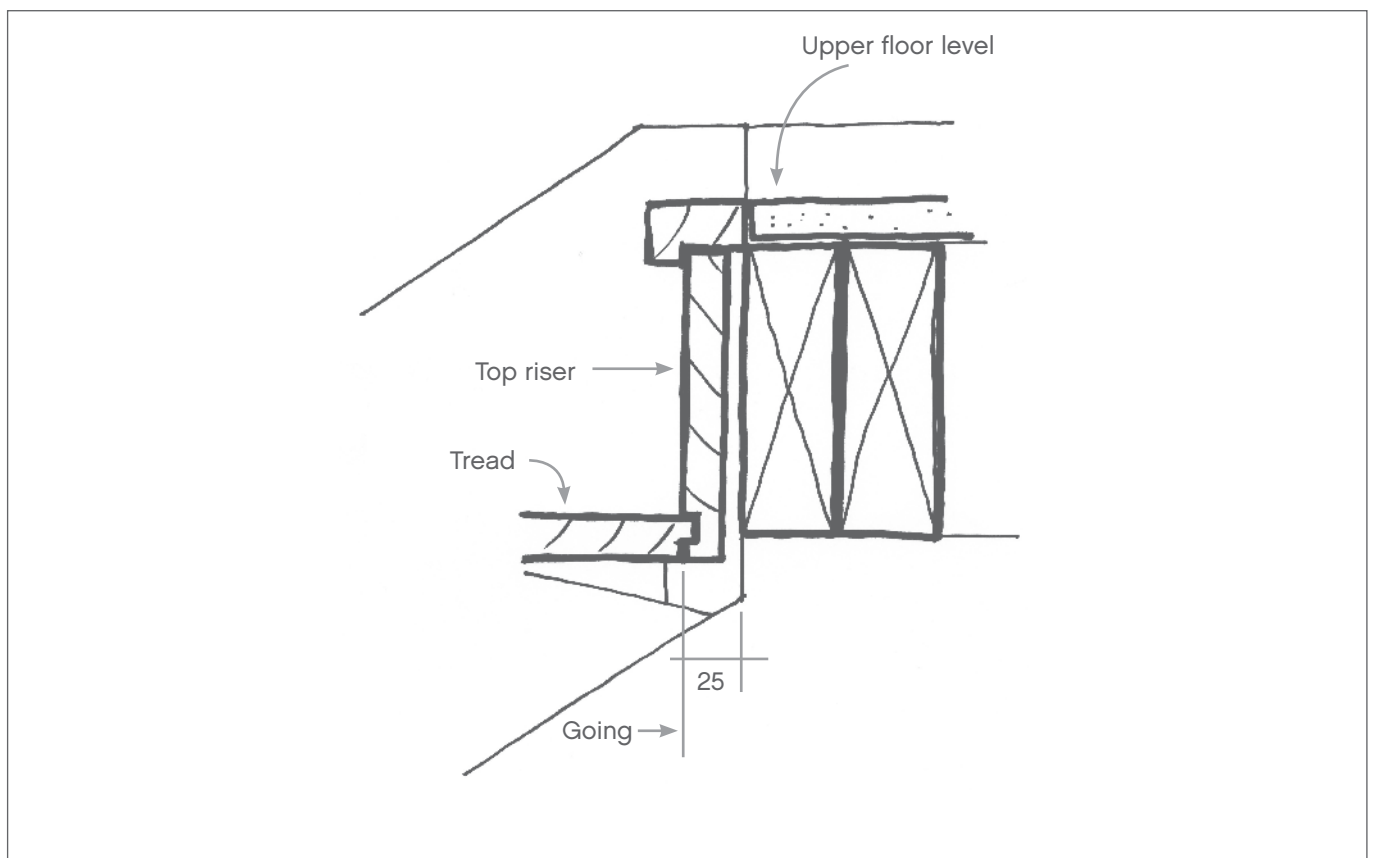


Figure 4

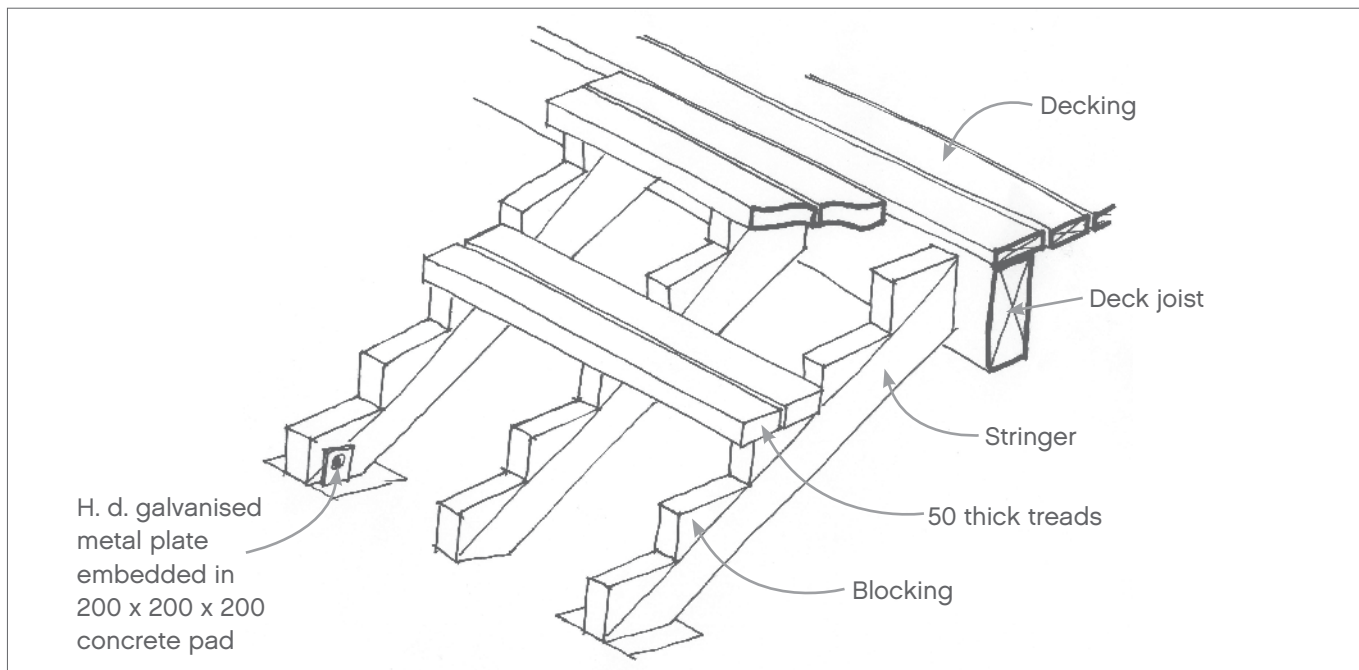
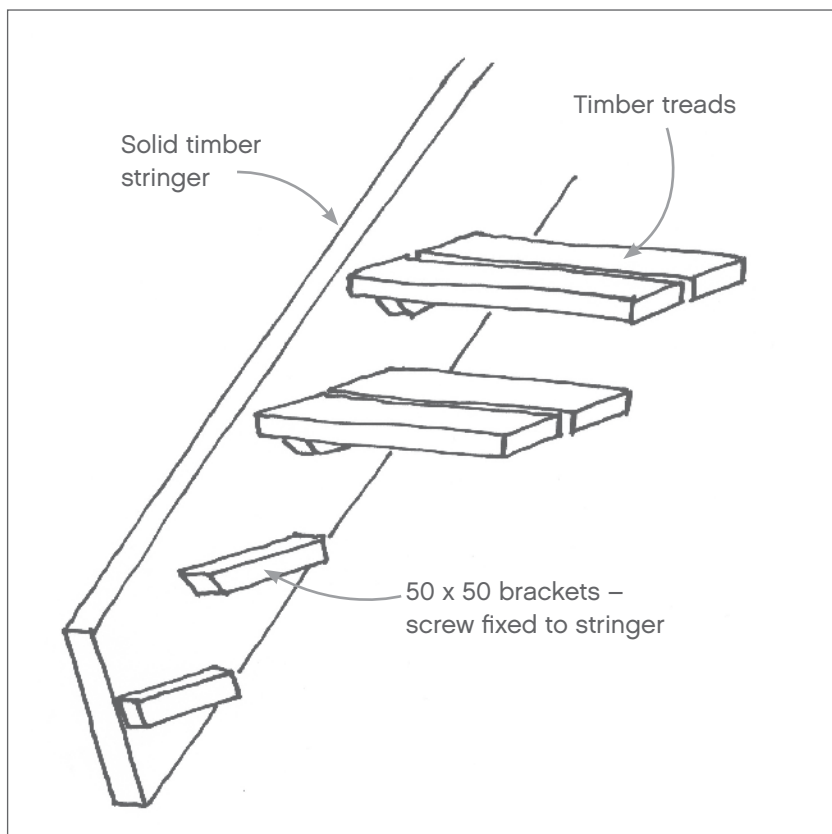


Figure 5



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