Quick Built Subfloor Construction Guide

The construction process assumes that all the design criteria and engineering aspects have already been addressed, prior to manufacture and delivery of the material. If for some reason it hasn't then please refer to your provider.

These are generic instructions only and will cover a range of matters which may or may not be applicable to you, depending on your qualifications and/or experience. We suggest that you read through thoroughly prior to commencing any work and determine if you are competent to undertake the work or whether you need to seek the assistance of a licenced contractor/builder.

Site Preparation

Design and engineering will have addressed the soil type and footing size and you should refer to those details for your particular site. In general terms, generic engineering and plans include a 450mm diameter footing. The depth will be dependent on soil type and other factors assessed in the engineering process but usually they'll be atleast 500mm but will extend to natural ground/rock etc.

A survey will have been carried out previously and a peg out done to determine the location and height (FFL, Finished Floor Level) of the building, in accordance with the relevant building/construction approvals.

Footings

The correct placement of the footings is a key component to making the rest of the build happen as effortlessly as possible. Quick Built Bearers and Joists are generally constructed using an inline system (joists connected to the inside of the bearers and therefore finishing at the same height of the bearers). Traditional building has the joists run over the top of the bearers, but this is usually only used with the Quick Built system when a cantilever situation is required. This will have been covered in the design and engineering phase, which is a separate to the actual build.

The pegout generally indicates the outside line of the building, taking into account the cladding that has been specified on the plans. Appropriate adjustments will need to be undertaken to allow for the cladding, to ensure the frame is built in the correct position. The floor plan of the building indicates the frame size of each room, which should be followed. If any doubt exists, please consult/clarify with the appropriate people prior to commencement. If brickwork is the cladding then the footings are often incorporated into the strip footings for the brickwork, which will need to be done prior to commencement of the sub floor.

If there is an existing structure, in the case of an extension, then care needs to be in respect to the existing structure and services as to where you would start but the principles are generally the same.

For a new build, there will be a side of the building closer to a boundary than the others. This is usually a good place to start as you need to ensure that you do not encroach on any minimal boundary setbacks.

Commencing with first footing listed on the outside corner of the selected bearer, the centre of this footing will be approx. 100 to 125mm in from the end of the bearer. This centre should be marked on the ground and the rest of the centres for the setout (measuring where the footings/components etc need to be) should be marked on the ground ready for the auger to dig the holes. Try and make sure the auger remains as close as possible to the mark. The footings can be dug by hand, should that be your preference but a square hole will need to be slightly larger (a 450 diameter usually equates to 500 x 500) but again confirm with the engineer, prior to commencement.

Remember to check for existing services prior to digging. Don't forget that when doing the setout on a sloping block that it needs to be done level and then the positions transferred to the ground. Marking out the measurements on the slope will put the footings in the incorrect position and depending on the steepness of the block, the posts may miss the footings altogether and it will become an expensive mistake to fix.

If it's an addition to an existing building, make sure you check to see that the existing wall is square to the new work, if not you will need to adjust accordingly. The footings should be poured to just above the ground level to ensure the footings do not have water sitting around them, in accordance with engineering. The top of the footing should be trowelled with a minimal fall to one side, to ensure the base plate has good bearing and does not hold water under the base plate. This will save time at installation because if there is a poor finish that effects the bearing of the base plate and/or potentially holding watering. If there is a poor finish then the top of the footing will need to be ground smooth with a minimal fall to one side, prior to fitting the base plate.

It is important to remember that the concrete poured in the footings needs time to cure, prior to building.

Preparation of Bearers and Joists

Bearers

Prior to standing any framework it has been found to be more efficient to setout and install the end caps for the joists on the bearers ahead of time. If the frame is precut, it will have the bearers 4mm short of the length to allow for the endcaps to be installed and adjusted to the correct length for the bearer. Make sure that the bearer is pushed firmly or clamped into the end cap and the end caps are square as the joist end caps are aligned/installed through the holes on the side. If the end caps are not square at this stage then the joists will not be plumb when installed.

Prior to installing any end caps, it is a good idea to identify which side of the bearer is going to be the inside, so that the endcaps are installed on the correct side and the right way up. Ensure the outside bearers and joists are placed so that the clipping edge is at the top when on the outside. This is to ensure once the flooring is on, that

water does not run into and become trapped for long periods of time in the outside clipping edge/bottom of the beam, if it's on the outside face.

Always start with your outside bearers, if you install on the wrong side you can usually turn that outside bearer into the central bearer or alternatively it will depend on the cladding. If its brickwork the clipping edge will already be protected from the elements going forward but a bead of silicone could assist during any delays in the building process. If its another form of cladding then you may wish to consider starting the cladding lower on the bearer or something similar, to give weather protection to the clipping edge.

Most of the time the bearers are not of a length that allows the joists to be installed at 450 centres from either end. The position of the joists need to be aligned, it is best to mark out all the bearers together starting at the same end, to ensure there are no alignment issues when installing the joists later. Whilst the system is designed for 450 centres, we have found composite decking is better suited for to 400 centres.

End Caps

Depending on the location and the environment, what level of protection may be required on the end caps. This should have already been addressed during the design stage but generally the following will assist.

Unless installation is going to be in a harsh/marine type of environment then the standard Zincalume/Aluzinc joist end caps are usually fine. They are not fully exposed to the elements being protected by the bearers and the flooring. Whilst the edges are cut and therefore have no protection the zinc coating is usually regarded as self-sacrificing, which will slow an attack on the base metal. Generally, the endcaps that are exposed are more likely to need additional protection i.e. decks or cantilevered joist ends. In such circumstances E-Coat, Zinc coated or any of our coloured end caps (our powdercoated end caps are always primed before colouring) would be suitable. If there is any doubt regarding the environment and the end caps made available, then a proprietary cold gal spray should be used to any unprotected edges

End caps are usually 4 hole or 8 hole. Generally, on a sub floor only 8 hole end caps are used but where coloured perimeter beams (bearers and/or joists), then 4 hole end caps will usually be supplied for the bearers. If there are 4 hole end caps provided, install these on the bearers and the 8 hole end caps are for the joists. If there are no 4 hole endcaps, the 8 hole ones are equally fine on the bearers, but you may wish to consider installing a 4mm coloured rivet in each hole, depending on whether the holes will be covered by the cladding or not.

The top of the joist end cap should sit flush with the top of the bearer unless there is a set down. During the joist end cap installation make sure the bearer remains tightly clipped together before the end caps are installed or clamp the bearer, where necessary, to assist during the install process. The base of the joist end cap will sit slightly lower than the bearer, when the bearers and joists are of equal size.

Decks using normal decking boards are usually set down 30mm but if tiles are being used then at least 50mm, which will mean the bottom re-punched holes will not be used. The bottom of the end cap should be secured with two tek screws, cutting new holes but being aligned to secure into the overlap of material, near the bottom of the bearer.

Joists

If joists are pre-cut then they will easily be placed between the bearers but if they are to be cut on site, then they should be cut 14mm shorter than the distance required between the bearers. This allows for the thickness of the joist endcaps and sufficient clearance to miss the tek heads on the inside of the joist end cap.

When installing the joists into the end caps you need to press down near the ends of the joists to ensure it is a firm fit whilst fixing it into place. Also check that the clipping edge has not slipped over the edge of the end cap, making it sit proud.

Posts

After the posts are cut there will be exposed base metal and this needs to be protected by spraying the ends with a proprietary cold gal. As described elsewhere the posts can be cut to the correct/individual size or slightly shorter and then use the adjustment on the post to bearer caps to bring them up to the right height during installation.

Assembly

Start with the same bearer selected at the setout, mark out the corner bearer/joist frame line on the footing. The first base plate position is the key to getting the rest of the base plates in the correct position. The base plate is designed for the long side to be placed on the bearer frame line, previously marked on the footing. The end of the base plate needs to be set in from the outside joist frame line by 25mm if 50mm joist, increase as appropriate. On this basis the post to bearer support, when sitting on the post will have a flush line to the outside of the bearer with no fixings to get in the way of the selected cladding.

The fin of the post to bearer support is on the inside of the bearer and is to be fixed with tek screws at a later stage. In setting the edge of the base plate in line with the frame line, when the posts are plumb, the bearer will be in the correct position for the frame. Minor adjustment is allowed to plumb the posts with the internal connector on the base plates, being slightly smaller.

There are then a few different methods to set the rest of the base plates and assemble the framework. We have list the two most common below

1. Mark out the position of the remainder of the base plates and install them following basis:

a. Once the base plates are marked out, position them into place and check that the joists (end caps already installed on bearers) will not be in the way of the posts. There is usually enough scope to adjust the posts/base plates to cater for the joists but sometimes not, as it still needs to comply with

engineering. Quickly assessing by eye, the joist/post location before installing the base plates can be done by placing the bearer next to the footings.

b. If the posts/bases can't be changed its not a major issue, remove the end cap for the joist. Cut the rear/bottom corner/edge out of the endcap so that it neatly fits over the weld of the fin on the post connector. Cold gal the cuts and re-install the endcap to the inside of the post cap fin through to the bearer.

c. Care should be taken when mechanically installing the screw anchor's through the base plates. They should be tensioned to approx. 40Nm but it is important not to overtighten as it can overstress the anchor. This could lead to several problems including a stripped thread in the concrete, broken or damaged anchors and could lead to a failure of other components at some later stage.

d. If there is one or more central bearers it is important to know which way the base plates and bearer to post caps are to be positioned on the post. The base plate setout and post caps need to align with the design, giving the direction that each faces. If this is not done prior to installing the base plates, the joists may be too long or short depending on the circumstances and require the base plates to be re-installed, to correct the problem.

e. Once the base plates are installed, use a reading from a laser level on the high side of each of the base plates, close to the connector, number each footing on the plan and record the laser height at each footing/post position. Cut posts to the calculated height (explained separately) and number each post to ensure they are fitted later to the corresponding base plate. Install post to bearer caps to the post with 6 tek screws, making sure the post is aligned correctly inside the cap (pack up the other end of the post to allow for the thickness of the cap) before fastening.

f. Stand the posts in place with the bearer caps facing the correct direction, do not install tek screws as this point.

g. Start with an edge bearer first and place it on the post caps and clamp the bearer to the post caps, holding the bearer in place. This will make it easier to align and pin the post at each end of the bearers first.

h. Pin the end posts on the bearer, once plumb, with two tek screws (one on each side) at the base of each post (make sure you leave room for another tek to be installed later next to it). Either of the teks 12-24x32 or 12-14x20 can be used for post to post bases (Ultimately 4 per post).

i. The post base connector has its fin for the screws at the narrow ends of the base plates (once the post goes over the connector, it is difficult to see which side of the posts needs to have the teks installed). It is important with all teks screws that they are not overtightened/stripped (see below).

j. Once each of the bearers are pinned in place, check the bearers are level. Occasionally a post has been cut incorrectly or a welding dag could make a post sit high. If the post is high, check the height required and undo the clamp and remove post with cap still attached to post. Cut the bottom of post to the required length, cold gal and reinstall. If the post is low, undo the post cap and raise to correct height. It is important to ensure the tek screws are not partially into the previous holes in

the post. If any doubt exists, rotating the post may assist or change the position of the teks altogether on the post cap.

k. Install the remaining outside joists at one end of the frame. Check the measurement between the bearers is correct and then pin the joist with one screw at each end of it. It may need to be adjusted later but pinning will hold in place for the time being.

l. It depends on the height of the floor, for ease of access to insert the rest of the joists, you will need to make your own assessment on this issue. Walking in from one end to insert the joists is generally quicker and easier at a low level than pinning the other outside joists at the other end first. Trying to get the remaining joists over the installed outside joists can take longer than walking them in but care needs to be taken as the bearers are still only resting in place and not secure.

m. Insert the remainder of the joists into the end caps, measure again between the bearers and pin the remaining outside joists at the other end of the bearers, if not already done

n. Check the joists are level. Whilst the bearers have been individually checked they may not be level to each other, if a mistake was made with a row of posts or end caps incorrectly installed.

o. Check the diagonals and square up the frame and fully install the corner posts. Re-confirm diagonals after corners are in place. Where there are central bearers run a string line between the ends of the edge bearers, this will allow alignment of the central bearer to the correct position and then install end posts.

p. Run a string line along the face of the outside bearer and if required, straighten the bearer into place.

q. Measure the correct distance between bearers and pin joists near the posts as a start, with equal gap at each end of the joist. Confirm the bearer is straight and as each post is plumbed into position, install and continue to check the bearers are straight and the measurements are correct.

r. Once all the posts are fully plumbed and installed and the diagonals are re-affirmed as correct, the bearers are straight, the remaining joists are then to be installed.

s. If any blocking is required, install it after the joists have been fully installed

2. Install the corner posts of the bearers first and then clamp or pin the bearer in place with a tek screw. Install the reminder of the posts as follows:

a. Cut posts to the approximate size (approx 50mm of adjustment in post cap) and install the post cap to the correct position on the bearer, as required in the design and engineering.

b. Plumb down to the footing and install the base plate and post

c. Adjust the post cap height on the post until the bearer is at the correct height and install the post cap onto the post, making sure the post is still plumb.

d. It is essential that there is sufficient post height that all six tek screws on the post cap have enough post available for the teks to be secure. Don't overextend the post cap or this will weaken the structural integrity of the sub floor.

e. Ensure the bearers are level

f. Install joists as indicated in 1. above.

Irrespective of which method is used, it is important to make sure all tek screws are firm but not overtightened/stressed. It depends on the skill of the installer as to what speed they use on the driver. If there is doubt refer to the tek driver manual or use the tek setting if one is available. This is important as there is reliance on the sheer value of the teks to keep the sub floor height correct and solid. Alternative safe guard is to cut post to exact height and cap sits directly on it as noted in 1 above.

Bracing

Not all structures need bracing (refer to engineering details) but it is still a good practice to assess by hand, on site. If there is movement or doubt exists, put in some bracing.

At 900mm and above, the sub floor is engineered to have some bracing installed, 50 x 4mm EA (Equal Angle) is currently supplied for up to one storey high. Measure the length of bracing required and install on the inside of the structure as detailed below:

1. Start at the highest corner and measure from the Post to Bearer Connector (post cap has a 4mm wall thickness), to the base area of the next post along. It is a good idea to use a plumb cut and then cut off the sharp corner, so that a sharp angle is not sticking out and potentially dangerous.

2. Make sure the EA is not cut to be let in to the post, this reduces effectiveness of the bracing.

3. Clamp the EA into the correct position, this reduces vibration when installing with the teks. If correctly clamped the 12-24x32 (series 500, long screw tip) will go straight in without snapping off or pre-drilling required, if using the tek speed on your driver. Also make sure the tek is being installed at 90degrees and whilst this speed is a little slower on the tek speed, it is well worth the time to do it just once per tek screw. The series 500 screws are needed as there is the 4mm on the angle and the 4mm wall thickness on the post cap and then the 2mm on the post. Standard teks are unable to drill through prior to the thread starting to bite and are likely to snap off.

4. Spray the ends of the bracing with cold gal
It has been our experience, that if all the footings are in place correctly, then two people should have the average sized sub floor erected in a day to a day and half, depending on site access. Should you be unsure of any instructions and need clarification please do not hesitate to contact Quick Built for clarification