

Formwork Support (Falsework) Applications

General

- Footings and/or foundation shall be satisfactory to support the imposed loads and prevent differential settlement.
- All Standards shall be erected plumb.
- After squaring up the initial Standards on the first bay, plan bracing is helpful to maintain squareness.
- Each bay must have Ledgers/Transoms connected at the cup positions nearest the Adjustable Bases or Adjustable U-Head Assemblies, for example at top and bottom of each leg (and at intermediate positions at design lift heights).
- The most recommended type of falsework is built by having continuous lines of Ledgers or transoms in both directions.
- When very long runs of falsework are to be constructed consideration shall be given to dividing the structure into smaller sections to avoid the build up of adverse tolerances.
- No more than one spigot joint per Standard is allowed between vertical lifts of Ledgers/Transoms.
- Spigot Joints must be avoided in Base Lifts.
- Joints in Standards should be staggered if possible.

Bracing

- Bracing shall satisfy two conditions:

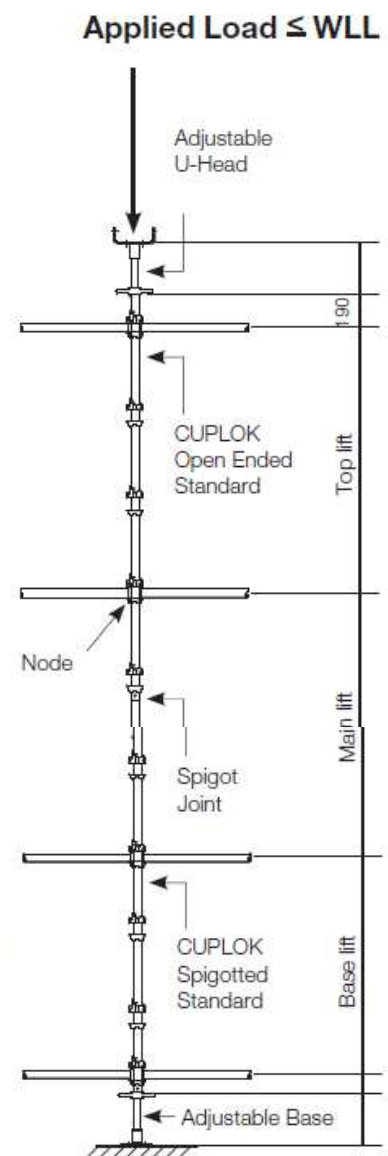
- (1) Provide nodal restraint.
- (2) Transfer transverse forces to supports.

AS3610-1995 requires that each restraining element be designed to transfer a transverse load equal to the sum of 0.025 times the axial force in the compression member at the location of the restraint and an additional load equal to half that value for each additional compression member being restrained, up to a maximum of seven members. This load shall be assumed to act in addition to other loads.

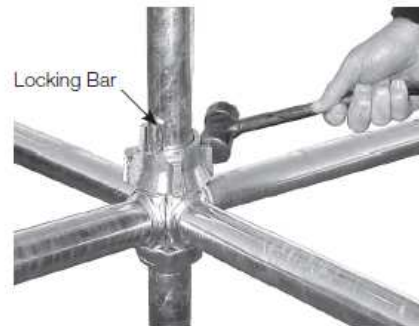
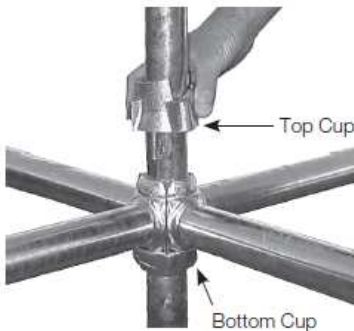
- All nodal points which are considered in defining lift heights shall be restrained.
- The correct amount of bracing shall be calculated, however a minimum amount must always be used. This requires every row of standards to have a top to bottom bracing system installed at a maximum of 4 bays apart along its length. This applies in both directions.

Bracing can be provided externally (for example, using the permanent structure to act as a brace, in this case it shall be stated in the project documentation with the magnitude of the force) or internally by the bracing system.

- Bracing shall be installed immediately after each lift has been erected, and as close as possible to the node points (not more than 100mm from the node point).
- Transverse loads must act at node points on the Standards where Ledgers/Transoms are fitted (no secondary bending moments are permitted).
- If any brace is not continued to the support and is terminated within the structure, the vertical compression component of the bracing force must be added to all other vertical compression forces and the total shall not exceed the published WLL. The horizontal component of the force must also be transferred to a suitable support, ie via butting/tying to a suitable structure or other suitable bracing system as required.
- When the formwork deck is not restrained (for example, no permanent structure like walls or columns to provide lateral restraint) particular care shall be taken in the design to restrain the formwork deck and top Adjustable U-Heads.
- Individual towers or narrow falsework systems shall be fully and effectively braced and the stability of the system be investigated in the design. The slenderness ratio of the system as a whole shall not be greater than that of the individual compression members.



Simple Method of Component Connection

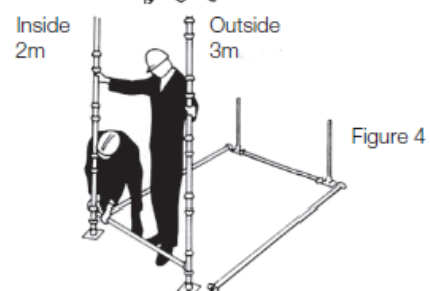
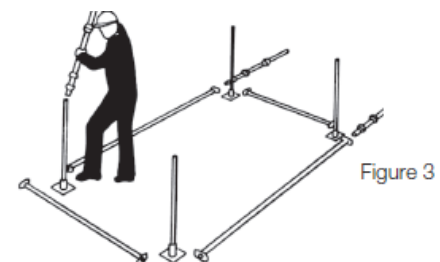
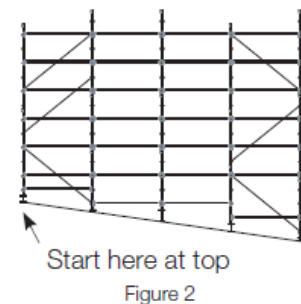
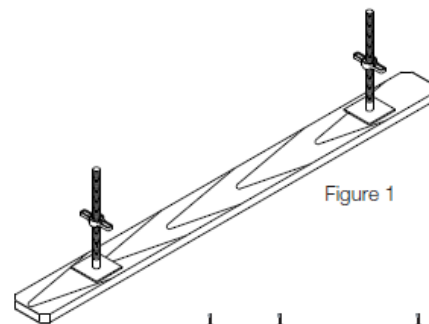


Blade ends of horizontal members (Ledgers or Transoms) are located in the bottom cup. The top cup is then slid down over the top of the blades and is rotated until it engages the locking bar.

The top cup is tightened by striking its lugs with a scaffold hammer. The inclined spiral top edge of the top cup acts against a fixed locking bar on the Standard to wedge the top cup tightly around the blades providing a positive and firm connection.

CUPLOK Assembly Recommendations

- 1 Before commencing the erection of any CUPLOK scaffold, care should be taken to check that the ground is suitable and clear of loose rubble to provide a stable base and clear access for erection. The scaffold must be erected on adequate soleplates and the foundation on which the soleplates are placed must have sufficient bearing capacity to support the imposed loads transferred from the scaffold. As a general rule, each soleplate should be long enough so that it supports at least two Standards. Bricks or masonry blocks are not suitable and must not be used. Refer Figure 1.
- 2 Check whether or not platform brackets are required adjacent to the workface. If so, you will need to make allowance for the width of the platform brackets and increase the distance between the workface and the closest adjacent Standard to the workface.
- 3 Commence erection - where possible - on the highest point of the ground and work down the incline - this will make levelling easier as the scaffolding progresses.
Set the nut on the first Adjustable Bases to close to the bottom of the stem to allow maximum adjustment as the scaffold progresses to lower levels. Refer Figure 2
If the scaffold is founded on sloping ground, then the ground should be benched to provide a level surface for soleplates.
If the scaffold is founded on sloping solid foundation, eg concrete, then adjustable bases should be wedged.
- 4 Lay out the Adjustable Bases, Ledgers and Transoms for the first bay in their approximate positions. Then insert an Adjustable Base into each of the first pair of Standards and position Adjustable Bases onto the soleplates. Refer Figure 3



5 Connect the Standards with a Transom in the lowest cup joint, by inserting the blades into the bottom cups. Approximately level the transom by raising or lowering the Adjustable Base. Always start the scaffold with a 3 metre Standard on the outside face and a 2 metre Standard on the inside. Refer Figure 4.

Do not tighten top cups - yet.

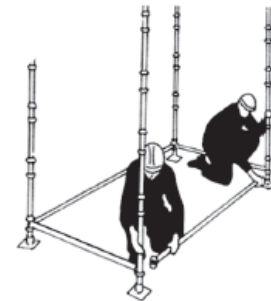


Figure 5

6 With one erector still holding the first pair of Standards, the second erector inserts an Adjustable Base into the third Standard and connects it to the first pair with a Ledger. The top cups can then be dropped temporarily into the locking position. The structure is now self supporting and the fourth Standard can now be connected by a further Ledger and Transom and the bay levelled. Refer Figure 5.

7 The bay can now be levelled. Starting from the highest point use a spirit level to adjust the bases so that Ledgers and Transoms are level. Accuracy in levelling at this stage makes for a good start. Refer Figure 6.

Do not tighten top cups - yet.



Figure 6

Level both ways

8 The bay should now be squared in plan and correctly located in relation to the structure being scaffolded. Check squareness across the diagonally opposite Standards. Checking squareness is assisted by placing the recommended number of Planks between Transoms and ensuring that Planks sit correctly with an even gap between the ends of the Planks and the supporting Transom. Refer Figure 7.

If the Standards are moved an appreciable distance in the squaring up process, then recheck the levels. Refer Figure 8.

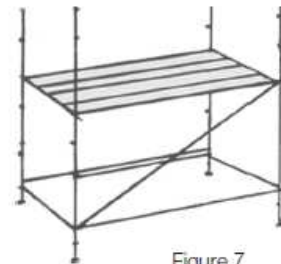


Figure 7

Fix a Diagonal Brace to the outer face and end face of the first bay. Always start by fixing the top end of brace to the upper cup first: this makes for safer handling.

The first bay of CUPLOK is completed by locating the upper Ledgers and Transoms.

**Top cups can now be tightened in this first bay.
No need for heavy hammering.**

9 Now it is a simple matter to extend the scaffold structure by connecting Ledgers, Transoms and Standards to the existing bay checking the alignment of the Standards as the scaffold progresses.

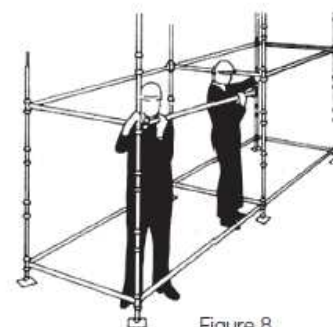


Figure 8

10 The Working Platform can now be constructed using Scaffold Planks as decking and toeboards. Refer Figure 9.

Planks are supported by the flanges of Transomes and Toeboards are attached to Standards using Toeboard clamps.

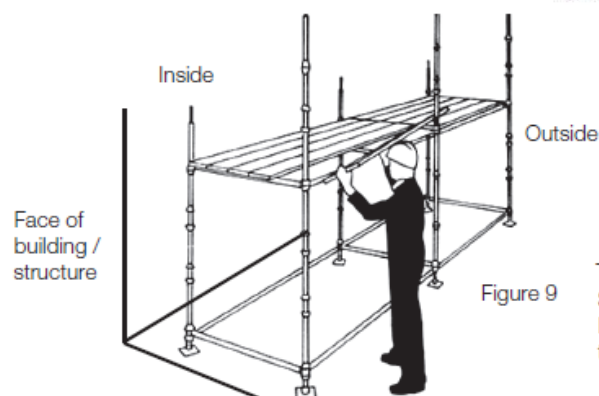


Figure 9

The height of the Standards has been reduced in the diagram

11 Now complete the base layout by adding bays horizontally, levelling and positioning each bay as you go before tightening cups. Continue the 2m and 3m Standard combination for the full run. Refer Figure 10.

Note: Erection and dismantling of scaffold bays should be carried out from a fully decked platform or as required by Code of Practice published by local Statutory authorities. Refer to local statutory regulations for further requirements.

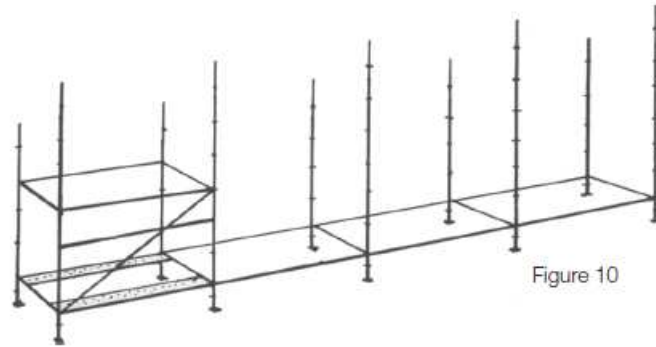


Figure 10

12 Planks are now moved up to fully deck out the the first lift. Refer Figure 11. When these Planks remain in place as a Working Platform, Ledgers are positioned at 0.5m and 1m above the planked level to form a **guardrail and mid rail on the outer face**. For working platforms, **toeboards** on the outer face are also required. A Mesh Panel which incorporates a toeboard 1m high can be used in lieu of a midrail and toeboard.



Figure 11

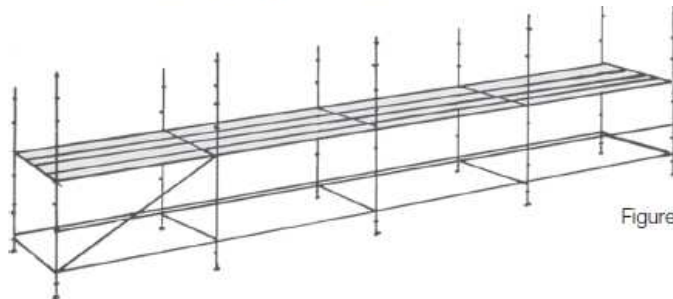
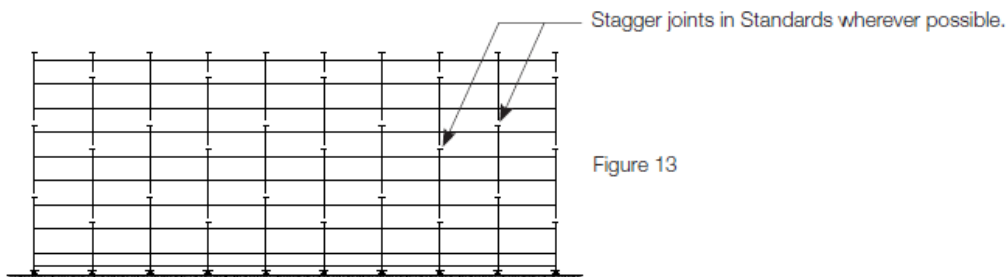


Figure 12

13 Additional lifts can now be constructed by adding further Standards into spigots of the Standards of the lower lift and staggering joints wherever possible. Transoms and Ledgers are placed at platform levels. Refer Figure 13.

Working levels should be fully decked out and the outside face fitted with guardrails, midrails and toeboards (or Mesh Guards) at the required positions.

Fully complete the longitudinal erection of a lift before progressing to the next lift.



Stagger joints in Standards wherever possible.

Figure 13

14 Face Bracing

All scaffolds require a certain amount of diagonal face bracing to eliminate any tendency for the scaffold to distort or sway.

Before the scaffold goes beyond the second lift, Bracing should be added to the outside face and on the ends. Braces attach to the outward facing of the cup on the Standard.

Further bracing must be placed on the scaffold as it progresses in length and height. Braces should span from lift level to lift level and cross over joints in Standards and be positioned all the way to the top of the scaffold.

Refer Figure 14.

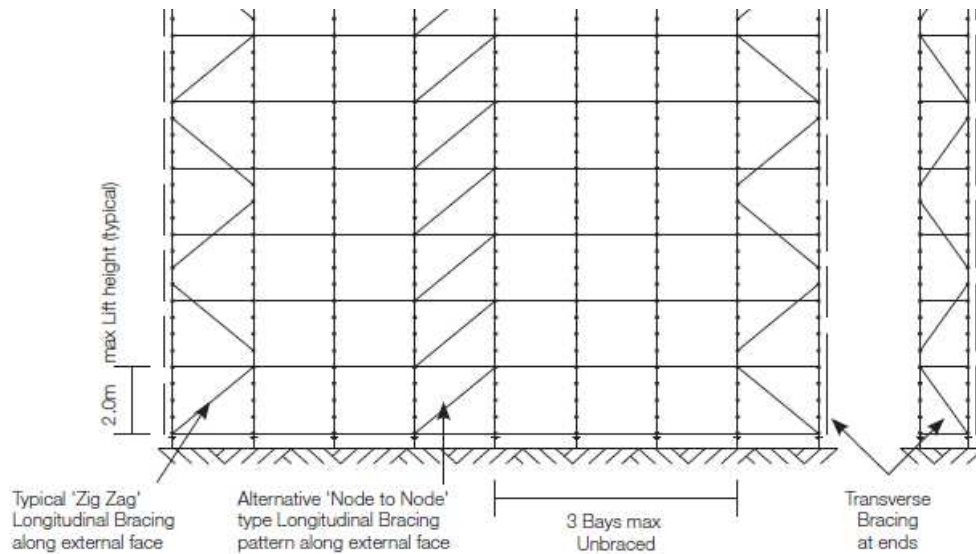


Figure 14

Diagonal Braces provide stability to the scaffold and are used to brace adjacent Standards longitudinally or transversely. Face Diagonal Braces are positioned in the end bays of a scaffold run on the external face of the scaffold. They extend from the first cup near ground level to the top working level. They are typically arranged in an alternating (zig-zag) manner to provide more stability to the scaffold. For scaffold runs exceeding 5 bays in length, intermediate bracing is required where a maximum of 3 bays can be left unbraced. Variations to this spacing must be checked by the appropriate designer and specified in the design layout.

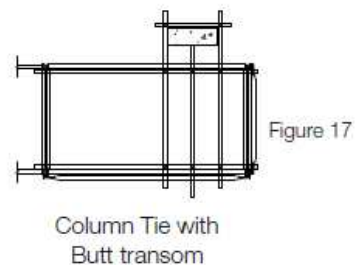
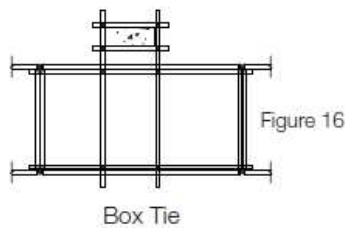
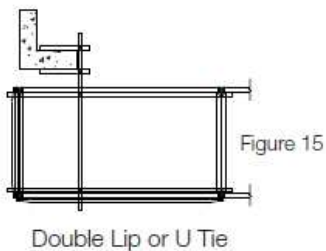
End Diagonal Braces are used between end pair of Standards in the transverse direction. They extend from the first cup near ground level to the top working level in an alternating manner.

15 TIES

It is essential that scaffolds be tied to the building or suitable structure to resist a minimum design force 6kN (600kg) to prevent inwards or outwards movement of the scaffold. As such they provide stability and enable effective performance of the scaffold structure as it grows in height and length. As general rule, ties need to commence where the scaffold height exceeds 3 times its least width. Typically ties comprise scaffold tube and right angle scaffold couplers and are connected to the Standards with right angled scaffold couplers. Care must be taken that ties do not obstruct clear access along the full length of the working and access platforms.

The scaffold must not be built to allow it to cantilever more than 4m without cladding beyond the last level of ties (refer Figure 20). If cantilevered section is clad, then consult AF&S Engineering for limits on cantilever height. The following examples show tie configurations for assembling around columns and through openings.

Note: In the examples shown, tie tubes are not connected direct to Standards but to horizontal tubes spanning between Standards, as shown in Figure 18.



15 TIES (cont)

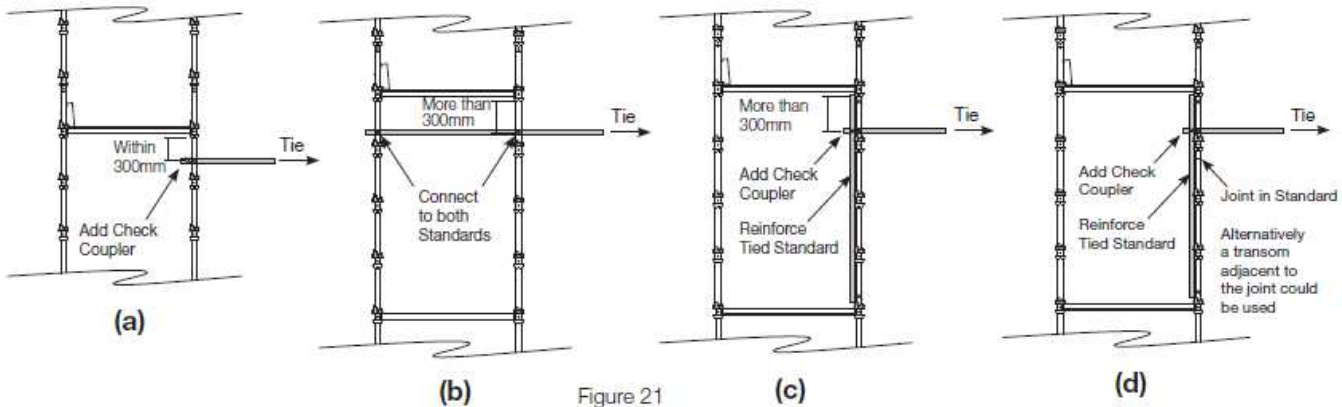
Tying to Standards

Ties tubes must be connected to Standards and be parallel to transoms at a position adjacent to the junction of the Transom and Ledgers, with the following restrictions:

- Within 300mm from the underside of the cup at the junction - connected to the front Standard with addition of a Check Coupler.
- Further than 300mm from underside of the cup at the junction - Tie connected to both front and rear Standards.
- If unable to connect to two Standards then reinforce front Standard for the full height of the lift with scaffold tube and swivel couplers with couplers attached at 900mm centres.
- If tying is to a Standard with a spigot within the lift then the Standard needs to be reinforced using a verticle tube or alternatively, if space permits, by installing an extra transom adjacent to the joint.

Note:

The 300mm distance given in (a), (b) and (c) may need to be reduced, subject to the amount of tie force.



Increased distance between tie points

In cases where ties cannot be placed in the correct position, where ties have to be removed, where tie spacings exceed those given in these assembly recommendations or in scaffolds which extend above the building, with the result that typical tie spacings given in these Assembly Recommendations cannot be achieved, then **consult your local Acrow Formwork & Scaffolding Engineering Representative for technical design assistance with tie spacing and configurations to suit your specific needs.**

Maximum Height of Scaffold

When determining the maximum height of a scaffold, a number of factors must be considered.

- Live load of working platforms, for example Heavy Duty, Medium Duty or Light Duty.
- Number of Working Platforms.
- Live load of Platform Brackets.
- Dead load of scaffold, for example Standards, Transoms, Ledgers, Guardrails, Mesh Guards, Platform Brackets, Planks, Bracing, shadecloth and chainwire mesh.
- The position of the top tie in relation to the top of the scaffold.
- Wind Loading (in relation to tie forces).
- Strength of the supporting structure for the scaffold.