

# Precast Flooring Federation

## Site Supervisor's Guidance for: **THE SAFE INSTALLATION OF PRECAST CONCRETE FLOORING AND ASSOCIATED COMPONENTS**



2017



## Foreword

The Precast Flooring Federation (PFF) Code of Practice for THE SAFE INSTALLATION OF PRECAST CONCRETE FLOORING AND ASSOCIATED COMPONENTS represents a significant step in reducing the risk of accidents and injuries in the installation of floors and staircases.

This guidance document for site supervisors is based on the fourth edition of the PFF Code of Practice. It cannot replace the Code of Practice, but it does contain important information taken from the Code of Practice that is directly relevant to the installation of floors and staircases on construction sites. For this very reason the book is pocket-sized. Please do take it with you onto site.

We advise you to take a detailed look at the content of the full Code of Practice whenever you are involved in a precast flooring project. You can download the Code of Practice (and this guidance document) from the PFF website. Just visit [www.precastfloors.info](http://www.precastfloors.info).

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# Content of safe working method statements

Safe Working Method Statements must be concise but informative and should contain the following information as a minimum.

## Part 1: Management and control

**Principal Contractor:** The name of the Contractor in charge of the site.

**Precast company client:** The name of the sub-contractor/client of precast company.

**Site address:** The address at which the proposed work is to be carried out.

**Site manager/agent/contact:** The point of contact at the site.

## Part 2: Description and information (contract, site and plant)

**Description of contract:** Brief description of the work to be carried out - may include the number of visits that will be necessary to complete the contract.

**Method of installation and sequence of work:** How the units will be lifted and positioned and other relevant requirements, e.g., where will work commence and which areas need to be installed first and last?

**Temporary works:** Will any areas need to be temporarily propped? Will the propping system be installed prior to precast flooring being placed? If props need to be installed

after flooring units are landed, who will be doing this and who will be in charge and control the operation? Is the ground able to support crane loadings? Is a designed platform needed? What are the site handover procedures to ensure that all temporary works are ready to be loaded before use?

**Crane contract arrangements/type/position and lift plan:**

Whether the lift has been arranged as a 'contract lift' to be under the control of the crane supplier, or as a 'crane hire' where the principal contractor or the precast component installer organises and controls the lifting operations.

The crane type (rating and style, tonnage, mobile, tower, outrigger loadings etc). General location of the crane, the location of any obstructions or nearby hazards including overhead and underground services, voids, tanks etc.

The lift plan may comprise a separate document drawn up by a lifting specialist (the appointed person) and setting out the lifting arrangements including stating a) who will supervise each type of lift and b) who will act as slinger/signaler.

**Maximum component weights and crane working radius:**

The maximum weight/radius' for each component type must be stated and any recommendations from the crane suppliers must be considered.

**Deliveries and site access:** The form of transport by which the components are to be delivered, offloaded and the access and egress requirements, e.g. hardstanding preparation and maintenance requirements, How will vehicles be marshalled onto and off site.

**Loading, unloading and storage requirements:** Design information to ensure that the precast units are correctly supported on bearers and correctly lifted to ensure that each

unit is not overloaded and damaged by the compression face/side being placed into tension.

### Part 3: Stability and bearings

**Stability and bearings:** The adequacy of bearings and the Principal Contractor's responsibility for checking them prior to work commencing. The Principal Contractor's responsibility for ensuring stability and the sequence of installation.

### Part 4: Personnel

**Foreman:** The name if known or a statement allowing the Foreman to make himself known on arrival at site.

**Lift planner (appointed person), Slinger/Signaller, (Banksman) Installer:** Statement to confirm the competence and training of the Appointed Person, Crane Operator, Slinger/ Signaller and Installers who will be involved in the installation.

**Other site operations/ third parties:** Where co-operation and coordination with other site operations/ third parties is required, this must be stated.

### Part 5: Health and safety management and control measures

**Personal protective equipment:** List of PPE requirements at the site and general statement showing that all Operatives and Installers will comply with current/site requirements.

**Access to work area:** A safe means of access and the Contractor's responsibility to supply. The use of scaffolding, temporary access, etc.

**Positioning of components:** Standard and non-standard/unusual methods of positioning and installing components.

**Access to and Working at height:** Statement regarding the means of access to the work area and the provision of handrails and other means of protection.

**Leading edge protection:** The use of fall prevention/arrest equipment, e.g. birdcage scaffolding, decking systems, safety nets/ airbags. Means of rescue from the fallen position. Plus the use of barriers or edge protection to close off open edges that will not be completed for some time.

**Welfare facilities:** Provision of facilities, e.g., first aid, restroom and toilets.

## Part 6: Amendments and additional information

**Amendments to the Method Statement:** Should any part of this Method Statement require amendment or alteration, this must be notified for agreement by all relevant parties prior to it being enforced.



## Pre-start daily checks

The Precast Company must ensure that prior to any work commencing a pre-start check has been completed and signed off by a Competent Person. This covers the following areas:

- Crane and lifting requirements.
- Work at height.
- Structural stability.
- Ground conditions.
- Proximity hazards.
- Welfare facilities.

The Competent Person/Site Representative needs to check and sign off the above on the day of the visit to site.

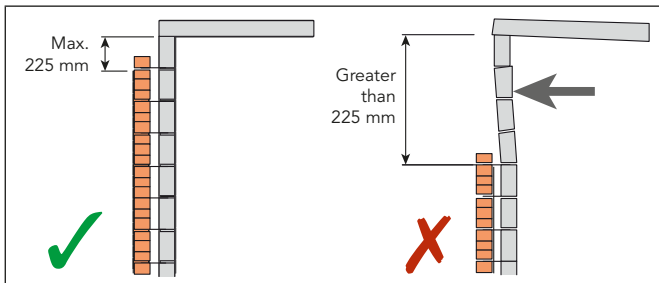
Any problems found should be reported to the Company and the Contractor's Site Representative.

## Installation of precast concrete floors onto masonry

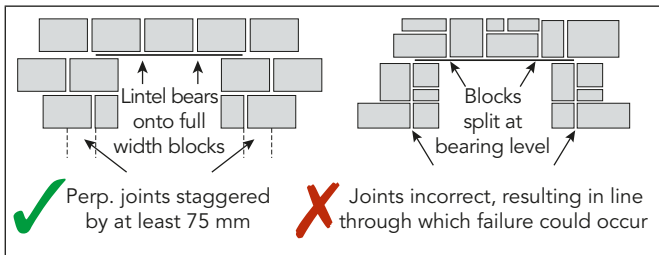
The following good practice applies to all types of masonry used in construction of cavity walls:

- For all installations where traditional mortar is used and where the inner leaf of the cavity is less than 190 mm thick (less than 140mm in the case of clay block structural walling and thin joint systems) refer to Figure 1.
- For lintels and steelwork refer to Figures 2 to 5.
- For walls less than 190 mm thick refer to Figures 6 and 7.

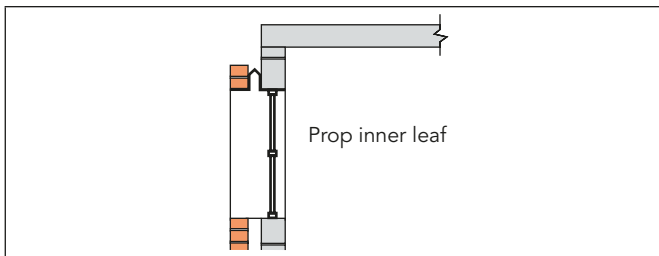
- Inner non-loadbearing walls should be left at least one course down to assist with the positioning of the flooring system in the construction phase.
- The top bearing course should be constructed with full blocks and not cut or coursing blocks unless the flooring system is specified using coursing blocks as part of the system. Guidance should be sought from the supplier of the masonry on the availability of and use of coursing blocks.
- The bearing surface should be clean, level and free from mortar snots.
- With all mortars and thin joint adhesives/proprietary mortars, sufficient curing time must be allowed so that the supporting structure achieves sufficient strength.
- Barring of precast floor elements should not be permitted on thin-joint masonry systems unless approved by the Principal Designer. Where possible lifting pins/points with safety chains should be used.
- Where the inner leaf is constructed from a minimum 140 mm thick, thin-joint masonry systems, such as Porotherm:
  - A maximum of 2 storeys is constructed at any one time before the outer leaf is installed, with a maximum of 4 storeys overall.
  - The height of the blockwork is no greater than 2.7 m for each storey.
  - Generally, unrestrained walls should be limited to a maximum length of 6 m.



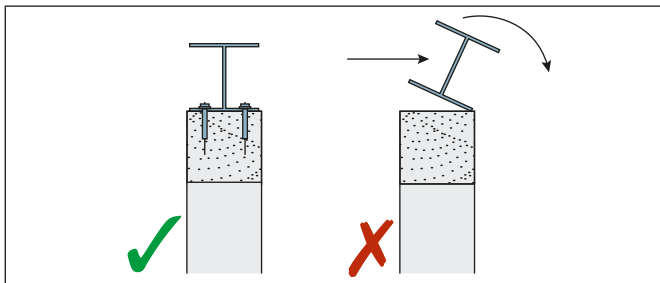
**Figure 1** – Relative height of inner and outer masonry leaves, including location of brick ties.



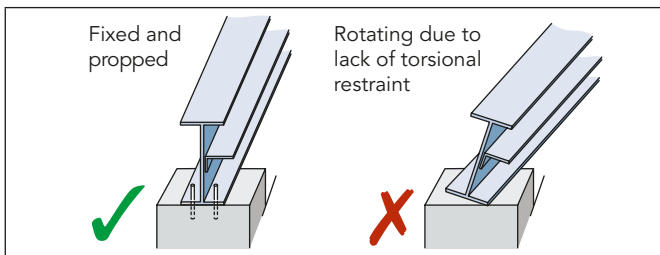
**Figure 2** – Use of blocks above and below lintels



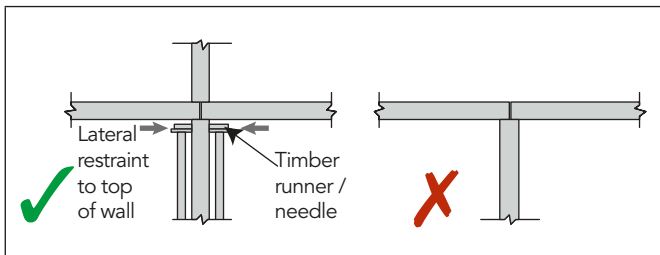
**Figure 3** – Propping of steel lintels must be done for openings of 900 mm or greater



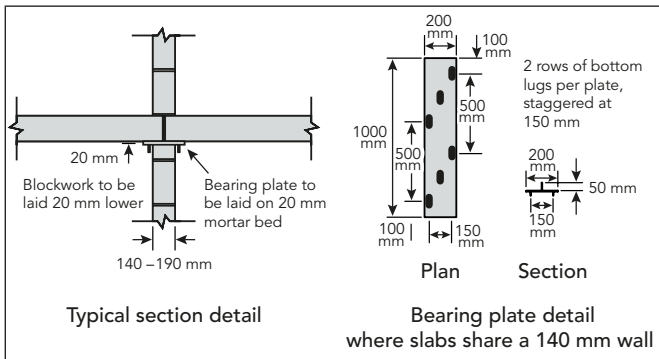
**Figure 4** – Fixing steel to padstones set on blockwork **NOTE:** Where it will be loaded unevenly, the lintel may require additional temporary support to prevent rotation during the installation of precast floor units.



**Figure 5** – Fixing of isolated steels where the 'fixed' steel beams are likely to torsionally deflect during installation of the precast floor units.



**Figure 6** – Temporary propping support for wall less than 190 mm thick.

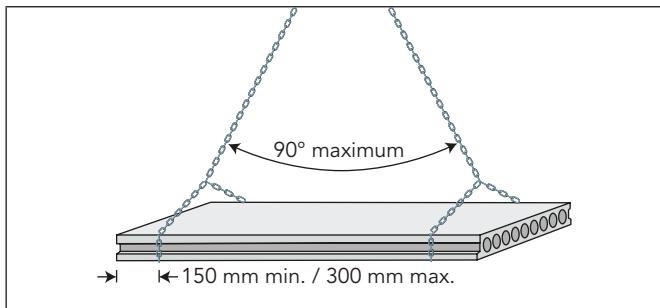


**Figure 7** – Fixing floor to wall less than 190 mm thick

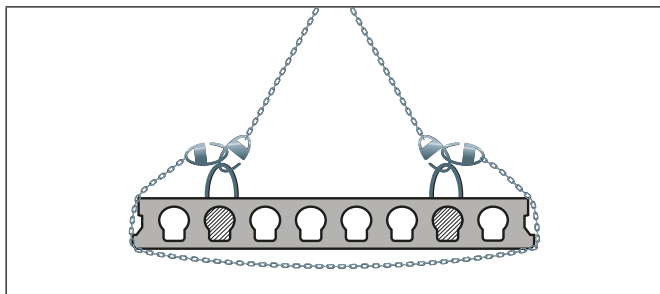
**NOTE:** When installing floors on loadbearing walls less than 190 mm thick:

- Bearing plate to be laid on a mortar bed by Main Contractor before installation of precast slabs.
- Blockwork to be built 20 mm lower at bearing plate locations to allow for mortar bed and bearing plate depth.
- Flooring units must be installed on alternate bays.
- When landing on a bearing plate, installer must ensure that the slab is landed on centre of bearing plate.
- Shorter span to be installed first.

## Off-loading



**Figure 8** – Use of slings where proprietary lifting systems are not provided

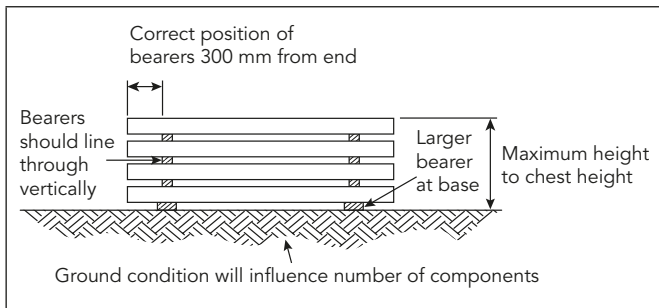


**Figure 9** – Lifting points with safety chains

- Every precast floor, balcony or stair unit must be inspected before lifting from the delivery transport and/or stockpile on site for obvious signs of damage, e.g., hairline cracks (especially on the plank edge), debonded reinforcement that has contracted into the plank end leaving a hole; and complete failure that could collapse or drop pieces if lifted.

- Where a unit is seen to be damaged, the Foreman must telephone a competent person in the Company for advice on what action should be taken in respect of the damaged unit.
- Where proprietary cast-in lifting anchors are provided in the units, all anchors must be used strictly in accordance with the anchor manufacturer's recommendations and Company procedures.
- Any specialist lifting equipment, e.g. grabs, must be used strictly in accordance with the manufacturer's recommendations.
- Where proprietary lifting systems are not provided, choke-hitched chains or slings should be positioned between 150 mm and 300 mm in from the ends, unless specific permission has been received from the precast component manufacturer. Lifting chains or slings should be of sufficient length so that the included angle is not greater than 90° (45° from vertical) unless otherwise agreed by the Appointed Person (Figure 8).
- Special consideration may be needed for cantilever units where weight distribution is uneven. Non-standard units that do not have even weight distribution across their length require additional support whilst lifting.
- Before removing chains, components must be measured to ensure that the correct bearing can be achieved and the Company contacted in any case when the Foreman is in doubt.
- A further visual inspection must also take place after the units have been installed and before the area is handed over to the Contractor. A check must also be made to ensure that all units have adequate bearing and that all areas have been sufficiently grouted.

# Stacking



**Figure 10** – Correct stacking method

**NOTE:** When stacking units:

- Care must be taken to ensure that the ground or surface on which the components are to be stacked is suitable.
- The ground must be firm and level, and wherever possible stacking of components should be on firm hardcore or oversite concrete.
- The bearers to each layer should line through vertically to avoid shear planes.
- The height to which components can be safely stacked on site should be the height to which a man can reach to pass lifting chains or slings around the components.
- Similar length beams should be stacked together. Do not climb onto stacked components to secure chains or other means of lifting.
- When destacking each flooring unit should again be checked to ensure it is structurally sound and undamaged.



# Safe use of cranes

## Outriggers

- The difference in level between any two outrigger supports should be less than 300 mm.
- When working, monitor the outriggers frequently. If there is any concern regarding stability of the outrigger or support pads, work should stop immediately to enable further assessment of the crane hardstanding area.

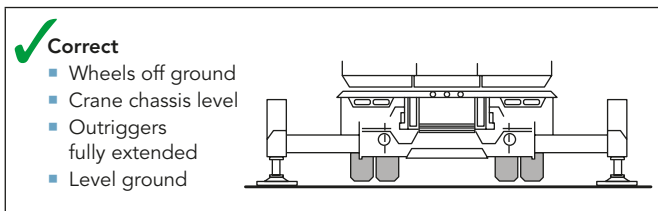


Figure 11a – Correct use of outriggers

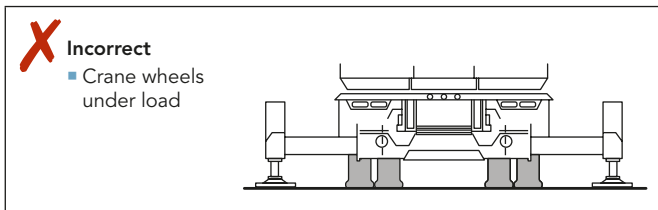
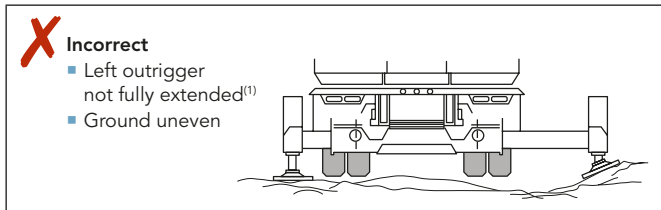


Figure 11b – Incorrect use of outriggers



**Figure 11c** – Incorrect use of outriggers

<sup>(1)</sup> This may not be a problem if a proprietary variable outrigger system is being used.

## Overhead electricity lines

- Whenever possible, work under or close to electricity lines should be avoided.
- HSE Guidance Note GS6 should be complied with, which requires all work on or near an electrical system to be carried out so as to prevent danger, so far as is reasonably practicable.
- Also refer to the Energy Networks Association (ENA) publication *Look Out Look Up! A Guide to the Safe Use of Mechanical Plant in the Vicinity of Electricity Overhead Lines*. This advises establishing exclusion zones around the line and any other equipment that may be fitted to the pole or pylon. The minimum extent of these zones varies according to the voltage of the line, as follows:
  - Low-voltage line 1 m
  - 11 kV and 33 kV lines 3 m
  - 132 kV line 6 m
  - 275 kV and 400 kV lines 7 m

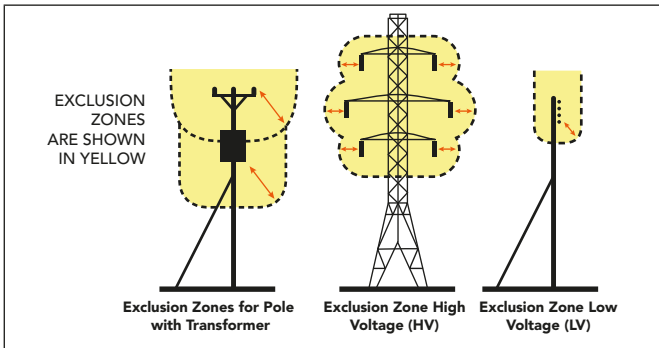
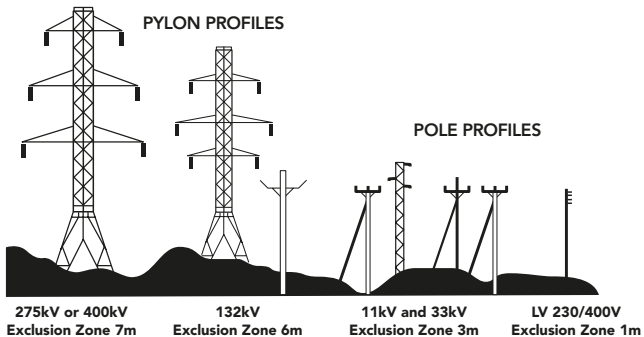


Figure 12a – Exclusion zones

- You must not allow any part of your plant to enter the **EXCLUSION ZONE**.
- The diagram below shows typical types of overhead lines and provides a guide to help you assess the line voltage of lines on wooden poles or steel pylons. The minimum **EXCLUSION ZONE DISTANCE** is shown for each example.



- Please note that these are absolute minimum distances that should under no circumstances be infringed. ***If you do – it could prove fatal.***

Figure 12b – Safety margins near electricity lines

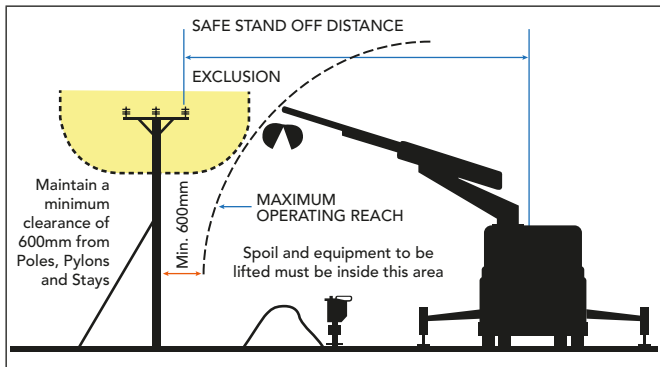
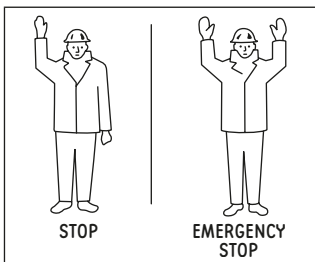
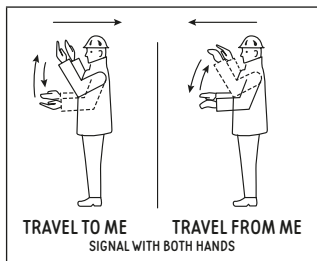
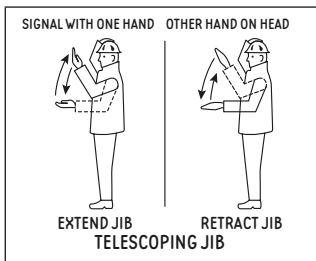
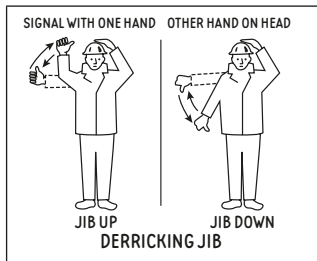
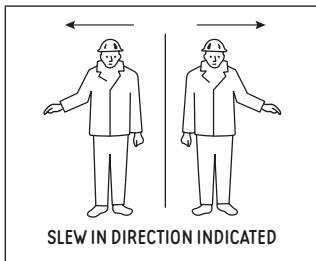
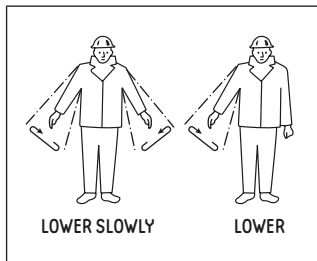
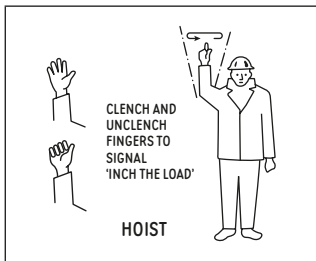


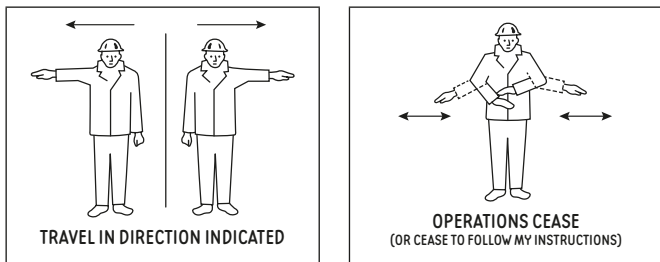
Figure 12c – Safe stand off distances

## Crane signals

Ensure that the Crane Driver can identify and understand those who are to give signals and that all are aware of the code of signals that are to be used (Figure 13).





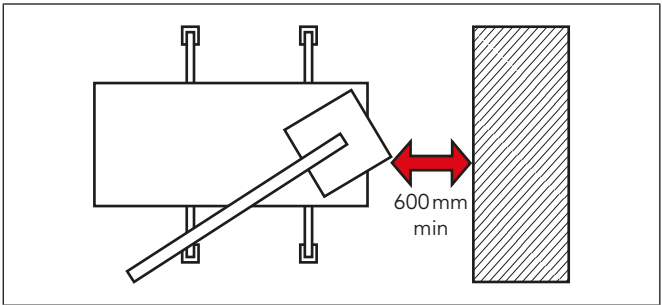


**Figure 13** – Recommended crane signals

## General aspects of lifting operations

- Ensure that the lifting accessory is of adequate Safe Working Load (SWL), of suitable chain leg length for sling angle and that a hand line is available for use if required.
- When using a lifting clamp ensure that you have the correct user manual and that you understand how the clamp is to be used.
- When lifting from transport off site or with the crane positioned off site, particular attention must be given to segregation of pedestrians and traffic management.
- Ensure that the load/lifting equipment is clear of obstructions at all times.
- Monitor the lifting operation continuously to ensure that it progresses safely.
- Be prepared to stop the operation if personnel or the crane are working unsafely, or for any other reasons.
- At any place where a crane or its load passes an obstacle, the following applies:

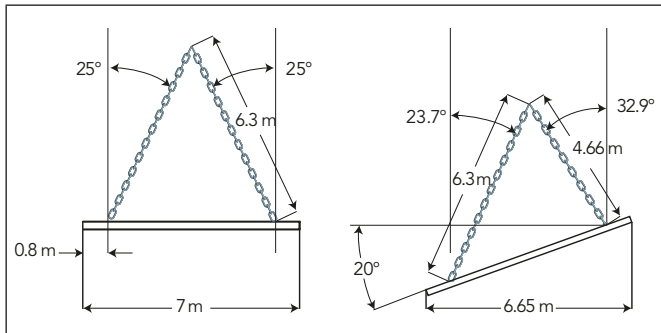
- Where practicable, the crane path should be clearly defined to ensure that it is kept free from obstruction, and a clearance of not less than 600 mm should be arranged between any part of the crane and any obstacle (Figure 14).
- Where it is not reasonably practicable to achieve this clearance, effective precautions shall be taken to prevent access to any trapping hazards.



**Figure 14** – Illustration of a trapping hazard

## Lifting operations with units at an angle

- Units can be lifted at an angle with the same capacity chains (as described below) provided the chain leg is always less than 45° to the vertical.
- Lifting units at an angle depends upon:
  - Unit integrity.
  - Grip by choke hitch.
  - Suitability of bearings to land angled units.
- Guidance should be sought from the manufacturer.



**Figure 15** – Lifting prestressed flooring units at an angle. Diagram is for guidance only.

## Chain slings

- All lifting tackle should be:
  - Marked with its SWL (Safe Working Load) or WLL (Working Load Limit).
  - Provided with information that indicates its SWL for each configuration.
  - Thoroughly examined every 6 months.
  - Certified either with a Declaration of Conformity, Thorough Examination Report or Original Test Certificate.
- Chain slings used for general lifting purposes should be manufactured to current standards for Grade 8 chain and be rated for ranges of angles from 0° to 45° to the vertical or from 45° up to and including 60° to the vertical.



- Each sling should also have relevant information on an affixed tag, showing:
  - Number of chain legs.
  - Nominal size of chain in mm.
  - Lifting capacity at 45° to vertical, angle  $\beta$ .
  - Lifting capacity at 60° to vertical, angle  $\beta$ .
- The capacity of chains cannot be increased by reducing the included angle.

## Movement of units by other means

### Barring

Components should be positioned as near as possible to their final position to minimise barring. However, the use of pinch or crowbars to move components is common to all types of floor unit. In whatever situation barring is carried out, there are basic precautions that must be observed:

- The Installers must carry out a visual assessment to satisfy themselves as to the robustness of the bearings before carrying out this operation and seek professional advice if unsure.
- Only competent Operatives should carry out barring operations.
- Only authorised personnel should be allowed within the working area and whilst barring is taking place, no person should be allowed within the exclusion zone(s), as set out in the Safe Working Method Statement.

- If barring cannot be avoided and the bearings are not considered robust enough, the units must not be positioned until the bearing is improved, or some temporary measures taken, such as properly designed temporary support to the components or bracing of the bearings.
- Barring should be carried out by two Operatives, moving the unit simultaneously at each end of the unit.
- The bar itself must be of sound construction and of adequate strength, and should be long enough to enable the person barring the component to stand upright.
- Components should not be moved by this method unless there are sufficient units or other elements of structure to provide a suitable platform on which the person(s) carrying out the operation can stand. Such a platform must be of sufficient size to enable the person(s) to properly brace themselves and to ensure that, in the event of bar slippage, the person will not fall through a void, or over an edge.
- Components must be positioned or moved by a succession of small movements. No attempt should be made to slide or lift units for distances that would cause the operatives involved in the operation to lose their balance, or to hold excessive weight on a bar.

## Jacking

- The use of jacks to raise precast floor units is uncommon and should be avoided wherever possible.
- The use of jacks to raise precast stair units is more common.
- Jacking should only be implemented after a full risk/design assessment has been undertaken.

- These jacking works should be short-term, for the purpose of adjusting unit height and level and should not be used for temporary support. All jacking operations must be supervised and undertaken only by persons with the necessary skills, knowledge training and experience to carry out the work activities safely. In all cases jacks must be used in compliance with the instructions and recommendations of the manufacturer.

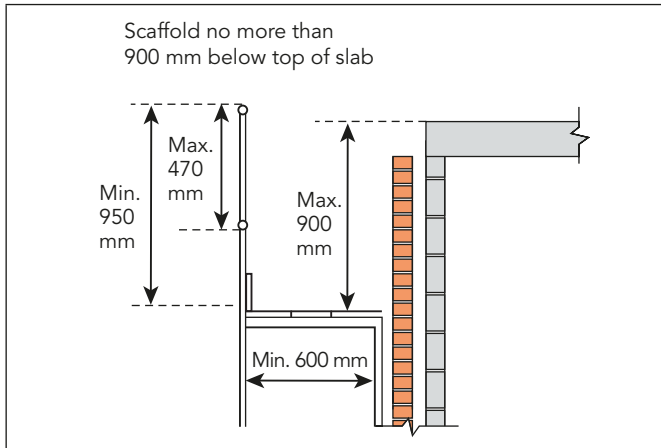
## Additional on-site work

- Gaps left between installed floor planks should be infilled as soon as practicable with a suitable concrete mix designed by a competent person, e.g., an engineer. Until the flooring has been completed an inspection will be required in order to reveal any movement of elements and before general access onto the floor is allowed.
- On completion of a phase of installation a final check should be made to ensure each flooring unit is in good condition and correctly settled onto its bearings; and that supports have not been damaged, dislodged or showing any other signs of distress.
- Temporary props or supports may need to be left in place until the floor is completed. The time of removal and the sequence to be followed should be as set out in the temporary works design.

# Working at height

## Masonry construction

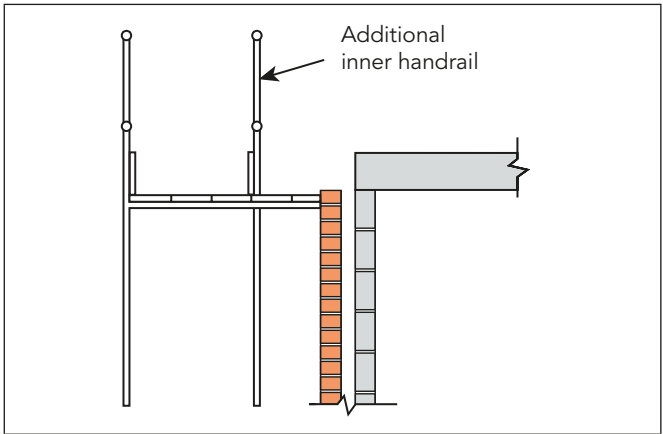
Scaffold standards must not extend above the upper handrail to a position where they will interfere with the operation of the crane or the installation of the precast flooring.



**Figure 16** – Scaffolding for masonry construction

**Note:** that the distance from the top of the precast unit to the access/working platform should be kept as low as possible, i.e., close to the 200mm gap necessary to remove lifting chains.

Access to the working platform must be restricted or prevented unless an additional inner guardrail is in place (Figure 17) or the passive fall arrest is deployed



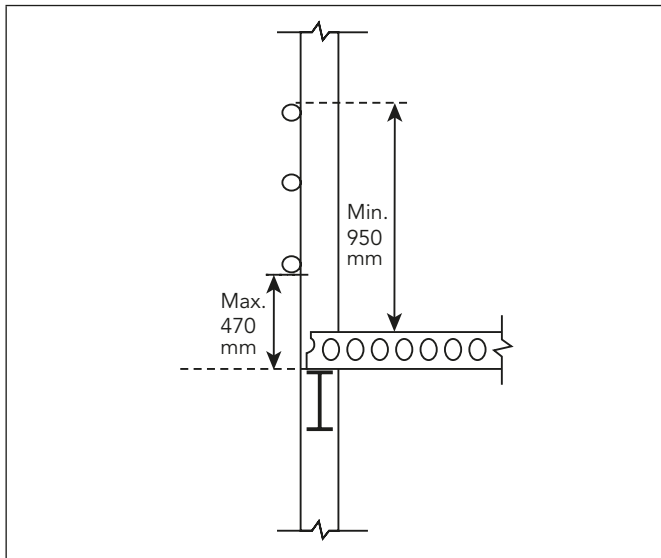
**Figure 17** – Additional inner guardrail fitted

**Note:** The platform pictured is suitable for a safe working access path for the full working perimeter before passive fall protection is in place. Access through the inner edge protection for pre-cast product installers can be provided via personnel gates (of the type normally used at ladder openings). These should be locked in the closed position until passive fall protection is in place and then progressively opened as work advances. Alternatively the inner edge protection can be removed progressively but always trailing the protected area.

## Steel frame construction

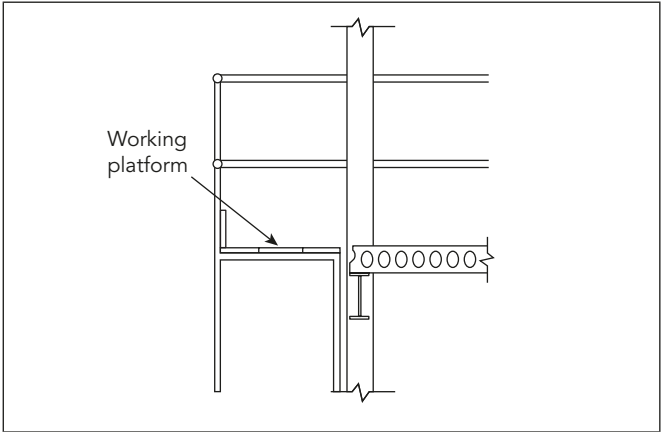
On steel frame buildings handrails are required to the external face of the building so as not to interfere with the installation of the flooring.

Additional guardrails rails may be required if the distance from the top of the floor to the top rail is below 950 mm and to ensure that the gap is no greater than 470 mm. The lowest guardrail to be set at 470 mm from the top of the steel.



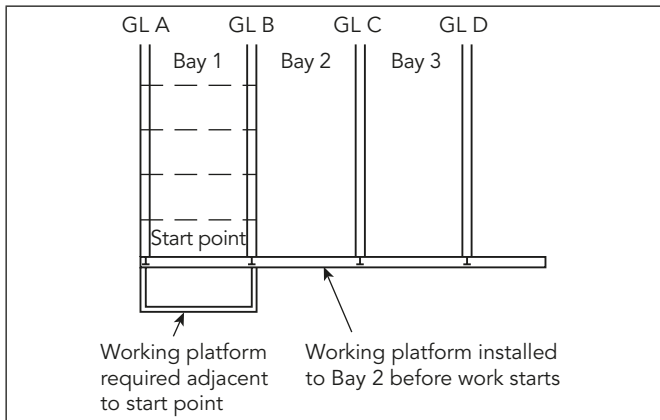
**Figure 18** – Position of handrails around perimeter of floor

A working platform to the perimeter of the building is required adjacent to where the first precast unit is to be installed. A safe means of access must be provided to the working platform (Figure 19).



**Figure 19** – Working platform adjacent to first precast unit

Unless it is practical to install a perimeter working platform to all bays, upon completion of Bay 1, operatives will work from Bay 1 floor units (with adequate fall protection being in place) to install the Bay 2 perimeter unit (see Figure 20). If access is needed to isolated steelwork during installation of perimeter units, e.g., to GL C during installation of Bay 2 perimeter unit, then this should be achieved by provision of a working platform.

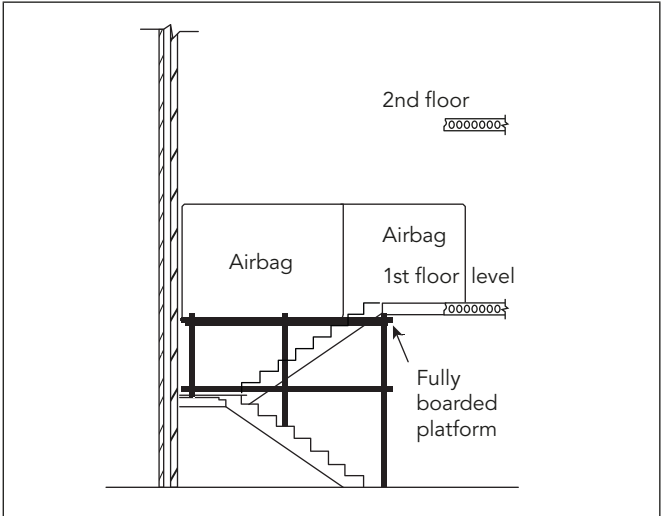


**Figure 20** – Provision of working platform for steel-framed building

### Installing flooring product around/close to the stairwell

- The surrounding floor should be installed around the stairwell before the stair flights / landings are installed. This will form a working platform when installing the top of the stairs.
- The stairwell void should be protected via the most practicable means, e.g., scaffold handrails or by means of passive fall arrest or a combination of both, before installation of the surrounding floor or stairs in that area commences.
- When installing flooring at second and upper floor levels, fully boarded platforms should be set immediately below soffit level at the previous floor level.
- Scaffold standards to be kept below or capped off immediately above this platform.





**Figure 21** – When fixing second floor and above

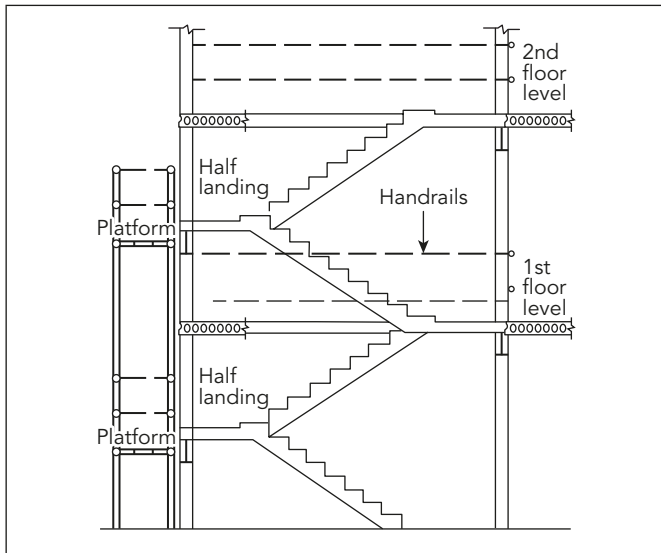
## **Installing stair flights/landings into steel-framed buildings**

Access is required to each 'floor' landing level and each intermediate landing level (where the intermediate landing level cannot be reached from the level below). In most instances the access to the 'floor' landing level will be formed by the precast floor units.

Intermediate landings will normally require scaffold provision.

On stair-only contracts or in situations that necessitate the stair flights and landings being installed independently of the floor units, access and working platforms must be provided to all intermediate and 'floor' landing levels.

The following diagram gives guidance and some examples of control measures that can be adopted when installing the stair flights, landings and the adjacent floor units.



**Figure 22** – Stairs in steel-framed building

- Prior to installation of the stairs the perimeter of the stairwell should be protected (via scaffold handrails). This will protect against falls into the stairwell during and after the installation of the surrounding floor units.
- Where it is not practical to provide the handrails, passive fall protection must be installed to the stairwell area (i.e. safety nets) prior to installation of flooring.

- Passive fall protection to be removed after installation of the top landing units. Installers should then use work restraint/ fall arrest equipment attached to the installed product, scaffold handrail or the structure where practicable whilst installing the stairs. This should also be used when standing on stair flights to remove chains.
- On steel frame structures access/platforms will be required to all bearing positions. Working platforms provide safe access to install intermediate landing and stair flight.
- The surrounding floor will normally be installed around the stairwell before the stair flights/ landings are installed. In turn this will form a working platform when installing at floor level.

### **Installing stair flights/landings in a masonry structure (upper floor level)**

The perimeter of the stairwell void should be protected (by installing scaffold handrails or by means of passive fall arrest or a combination of both), before installation of the surrounding floor or stairs.

The protection may need to be adapted to enable stair placement.

The surrounding floor will normally be installed around the stairwell before the stair flights/landings are installed. In turn this will form a working platform when installing the top of the stairs.

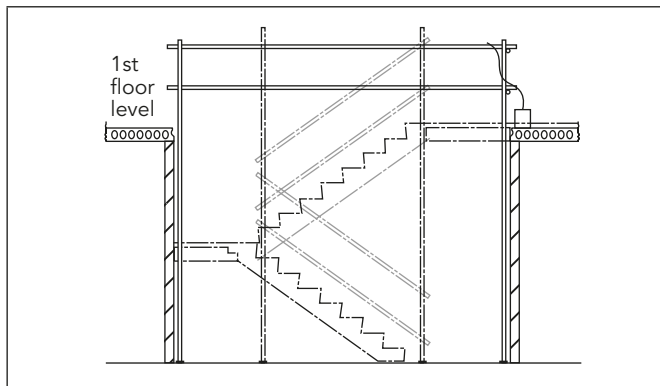
The following examples of good practice may assist with decisions about the installation sequence and the type of fall protection needed.

- Ensure surrounding floors are installed prior to installation of stair units as this provides a suitable working platform.

- Where possible a scaffolder should be in attendance throughout the stair installation to modify and adapt working platforms at suitable intervals.
- Restrict access to the working area to essential personnel only involved in the stair installation.

## After the stairs and surrounding floors have been installed

Immediately after installation of each stairwell is complete, protection must be provided against falls into the formed stairwell whilst working on the surrounding floor area. In addition, the stairs must not be considered safe for access until handrails and edge protection has been provided (Figure 23).

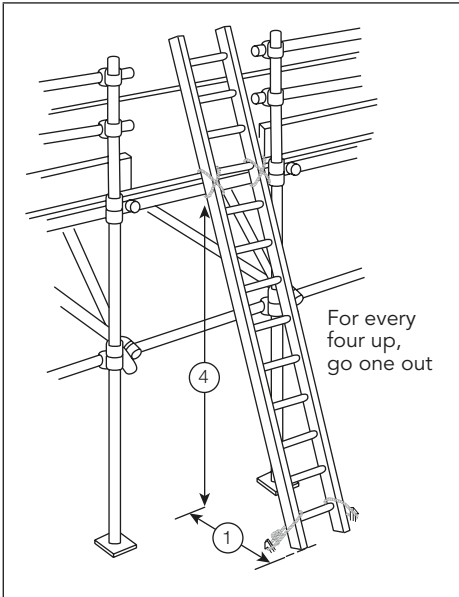


**Figure 23** – Example of protection following installation of stair units

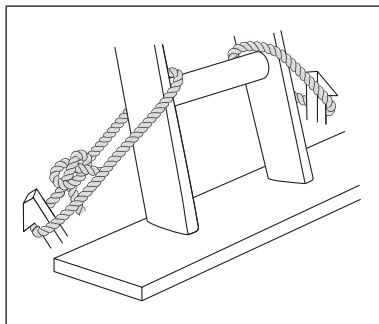
## Use of ladders

Ladders should be used only as access or for light work of short duration.

Ladders must be at the correct angle – for every four up go one out (Figure 24) and secured at foot and landing point (Figure 25).



**Figure 24** – Correct ladder angle



**Figure 25** – Secure ladder fixing





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