

Practice Notes For Construction Managers
PNCM 7: Timber Formwork – First Issue, January 2006

(Index under: Temporary Works)

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PRACTICE NOTES FOR CONSTRUCTION MANAGERS

PNCM 7: TIMBER FORMWORK

1. Scope of this Practice Note

This practice note covers the usual good practice of a construction manager in carrying out his/her professional duties as related to “Timber Formwork” under normal circumstances.

2. Statutory Ordinance, Regulations and Guidance

- Factories and Industrial Undertakings Ordinance, Chapter 59
- Factories and Industrial Undertakings (Woodworking Machinery) Regulations
- Factories and Industrial Undertakings (Lifting Appliances and Lifting Gear) Regulations
- Construction Sites (Safety) Regulations
- Building (Construction) Regulations
- British Standard 5975 – Code of Practice for Falsework
- British Standard 5268-2:2002 – Structural use of timber
- Guidance Notes: Safety at Work (Falsework – Prevention of Collapse) by Labour Department

3. General Guidelines

(a) Terminology

- ✧ Formwork (refers only to Timber Formwork in this Practice Note) means any type of wooden construction, including structural support, designed to enable concrete, cement or other materials to be poured into in a fluid state to assume a particular shape upon setting.
- ✧ Falsework is any temporary structure used to support a permanent structure, at the time when the permanent structure is not self-supporting, for either new construction or refurbishment.

- ✧ **Competent Engineer**
should have adequate training and experience and should normally be a Registered Engineer who is able to justify how and why the formwork and falsework can safely resist the effects of the loads without undue movements in accordance with recognized engineering principles.
- ✧ **Method Statement**
is a written statement outlining the procedures required to carry out a particular function or task safely.
- ✧ **Personal Protective Equipment (PPE)**
includes protective or safety clothing and equipment worn or used by workers in circumstances where there is a risk of individual health and safety.

(b) Design and Planning

- ✧ The system of formwork and falsework should be designed by a competent engineer in accordance with relevant regulations, guidance and codes of practice.
- ✧ The design should clearly state the method and sequence of erecting and stripping of formwork / falsework, the number of re-use cycle and sequence of replacement that should all be checked by another competent engineer, independent of the original designs before the implementation of formwork and falsework.
- ✧ The system should be designed to support the weight of the formwork and concrete and other additional live loads such as pumps, workers, mixers and pouring of concrete.
- ✧ Alteration and addition should be approved by the designer in writing before the works commence.
- ✧ All drawings, specifications and associated documents should be presented in a way that is easily understood by persons erecting/ stripping of the formwork system and should be available for inspection at the site.

- ✧ The construction project should be well planned so as to avoid the necessity to excavating service trenches under, through or adjacent to any formwork system.
- ✧ Provide suitable, safe and easy access to and from every works location.
- ✧ Before on-site works commence, a hazard identification and risk assessment process should be conducted and safety systems should be in place.

(c) Erection

- ✧ Formwork and falsework should be erected safely and constructed in accordance with the approved drawings, specifications, method statement and any other associated document that include a method statement.
- ✧ Formwork and falsework should be erected by persons who have received appropriate training relevant to the system being used.
- ✧ All substandard materials or damaged components for both formwork and falsework should not be used.
- ✧ Workmanship should be controlled to ensure that the final concrete structure is completed within the limits of acceptable dimensional tolerances and satisfied the finish requirements .
- ✧ Precautions should be taken to prevent dislodgment of any part of the formwork system arising from inclement weather.
- ✧ Ground conditions, where the formwork system is to be erected, should be checked and made stable.

(d) Inspection and Concrete Placing

- ✧ Inspections should be conducted prior to and during the placement of concrete to ensure the formwork is constructed according to the drawings, specifications, method statement and associated documents.

- ✧ Critical and heavy falsework should be inspected and certified by a competent engineer before it is loaded/struck off. Where appropriate, independent checking(s) by an Independent Consulting Engineer is necessary.
- ✧ The formwork system and falsework should be inspected and certified by the competent engineer after any alteration and addition.
- ✧ The materials such as joists, bearers, plywood, support frames and U heads should comply with the specifications and relevant codes and should be used in accordance with manufacturers' recommendations.
- ✧ All timber structural members such as joists, beams or waling should comply with the grade stress as specified by the competent engineer.
- ✧ All timber structural members should be checked to ensure that no timber with longitudinal joints/cracks are used and any damaged /deteriorated formwork panels should be replaced.
- ✧ The gap between formwork panels should be checked and kept to the practically acceptable minimum, to avoid cement grout loss.
- ✧ Inspections should be conducted after a typhoon, heavy rainfall and flooding to ensure the system of formwork and falsework are stable and safe at all stages.
- ✧ Full records of inspection and re-inspection should be kept in the site office and remain available for reference when necessary.
- ✧ Placement of concrete should be carried out by skilled workers.
- ✧ Concrete should be placed consistently and overloading should be avoided.
- ✧ For cantilever structures, concrete should be placed on the inboard part of section before proceeding to the cantilever.

(e) Stripping of Formwork

- ✧ Stripping of formwork and falsework must be undertaken in accordance with the drawings, specifications, method statement and associated documents.
- ✧ Stripping of formwork and falsework should comply with Section 61, Building (Construction) Regulations and should not be commenced until the permanent structure has attained sufficient strength and special conditions, if any, are noted and observed.
- ✧ All stripping works should be carried out in a safe manner and should strictly comply with safety requirements and procedures that is planned and controlled systematically throughout the whole process.
- ✧ All persons carrying out the stripping works should have received appropriate training.
- ✧ Stripping of formwork and falsework should be carried out in a manner that ensures the gradual transfer of the load from the formwork to the permanent structure.
- ✧ All formwork panels after stripping should be thoroughly cleaned and free of cement paste before re-use.

4. General Safety Rules

- A hazard identification, risk assessment and risk control process should be conducted for all works. This process requires regular monitoring to ensure the implemented control measures perform as originally intended.
- All materials should be properly stored to reduce safety hazards.
- All nails should be removed from the formwork materials during the process of stripping.
- All persons in the area of formwork construction should wear suitable safety shoes and helmets.

- All lifting operations should be well planned by personnel having appropriate expertise to ensure that the operations are carried out safely and that all foreseeable risks have been taken into account.
- All woodworking machines should be used and maintained in a proper manner in compliance with the FIU (Woodworking Machinery) Regulations.
- Safety measures should be provided for persons exposed to the risk of falling from a height of 2 meters or more.
- Smoking is prohibited at all times when processing, erecting and stripping of formwork/ falsework.
- Excess form release agent on the floor, after application, should be cleaned immediately to prevent hazards to workers.
- Used / damaged formwork or falsework materials should be stacked in proper order. Deteriorated / damaged formwork/falsework should be cleared away from site at a regular time interval.
- Routine inspections should be conducted for the erection and stripping of formwork and falsework. Inspection records should be kept in the site office.
- Noise assessments should be conducted to determine the level of noise affecting the employees and the nearby noise sensitive receivers. Control measures should be implemented if the noise level is in excess of the noise exposure limits.
- Personal Protective Equipment (PPE)
 - The PPE, like safety helmets, eye protection devices, safety gloves, safety footwear, masks, ear plugs, safety belts and protections from sunlight, should be provided as necessary.
 - All PPE should comply with international standards.
 - All PPE should be regularly inspected and replaced as necessary.
- Training and Instruction
 - Safety training in the erecting and stripping of formwork and falsework should be provided to all workers to remind them to work

in a safe manner and to avoid health risks .

- Appropriate safety training should be provided for the correct use of, the care in and the storage of the PPE as well as tools and individual fall arrest equipment.
- Refresher training should be provided for the use of plant and associated equipment including electrical safety and the control of hazardous substances.

5. Common Malpractice and Mistakes

- Inadequate on site training and supervision.
- The setting up of falsework does not strictly comply with the drawings, specifications, method statement and associated documents.
- Overloading of formwork or improper placement of concrete.
- Poor installation of bracing and ties.
- Substandard formwork materials or components are used.
- Failure to observe the minimum elapsed period before striking formwork and falsework.
- Carry out the stripping of formwork and falsework not in a safe manner and does not strictly comply with the drawings, specifications, method statement and associated documents.
- Removal of propping in the course of stripping off formwork.
- Removal of re-propping and cantilever propping before minimum time requirement at floors below is attained.
- Formwork system is erected on unsuitable base supports or foundations.
- Neglect verticality check for every 3 to 5 floors.

6. Responsibilities of Construction Managers

- Ensure the design of formwork and falsework is in accordance with relevant regulations and codes of practice.
- Liaise with all parties concerned to ensure effective communication of all parties throughout the construction process.
- Ensure that hazards are identified and control measures are put in place before the commencement of formwork and falsework erection.
- Enforce safety management and appoint a safety officer to conduct routine inspections for risk assessments and risk controls.
- Ensure that all persons who carry out the erecting and stripping of formwork and falsework have had appropriate training or experience.
- Ensure that the formwork system is constructed safely and is in line with the approved design documentation and that there are sufficient supervision during the construction of formwork and falsework.
- Ensure that formwork and falsework are checked and accepted before the formwork system is loaded or struck off.
- Ensure that formwork and falsework are re-inspected and certified by the competent engineer after every alteration and / or addition.
- To ensure uniform placement of concrete and avoid overloading.
- Ensure that the materials of formwork and falsework delivered to site are inspected and comply with the designs and specifications. Substandard materials should be rejected and removed from site.
- Ensure that damaged or deteriorated formwork panels are not used and that workmanship on the final concrete structure is controlled to achieve the standard within the acceptable dimensional tolerances and finishes.
- Ensure that the stripping of formwork and falsework commences after the

minimum elapsed period as specified in Section 61, Building (Construction) Regulation and that it is carried out in a safe manner.

7. Flow Chart

Flow Chart for Construction of Timber Formwork

