

STANDARD AND GUIDE ON SCAFFOLDING SAFETY



Introduction

Section 1

1.1 // Objective

The Standard and Guide aims to provide a quick reference of industry good practices on the scaffolding work for the industry stakeholders to enhance safety. This Standard and Guide should be taken reference following with the updated requirements of legislation and codes of practice.

1.2 // Structure of Standard and Guide

In this Standard and Guide, it provides information of the roles and responsibilities of key personnel, major risks associated with the relevant operation, industry good practices, innovative technologies, and relevant references.

1.3 // Usage of Standard and Guide

Industry stakeholders can make use of the content mentioned in this Standard and Guide to plan ahead the specific operation, develop the operational procedures or review the existing operation.

1.4 // Limitations

It is important to note that compliance with this publication does not itself confer immunity from legal obligations in Hong Kong. Readers are reminded to observe and comply with statutory provisions, relevant codes of practice and other government departments' requirements to discharge their legal and other pertinent duties related to the relevant operation mentioned in the Standard and Guide.

Scaffolding Safety

Section 2

2.1 // Major Hazards of Scaffolding Work

2.1.1 Fall from Height

Workers fall from height due to failure to properly erect the guard-rails or planks on the working platforms, or the workers do not use a suitable access and egress to enter the scaffolds.

2.1.2 Falling Objects

Falling objects due to various causes, such as failure to properly clean up the waste on the scaffolds and protective screens, failure to properly erect the toe-boards on working platforms, and hand tools are not equipped with hand tool lanyards while using by workers.

2.1.3 Collapse of Scaffold

The working load of the working platform exceeds its safe working load, the working platform is erected on an uneven foundation, the scaffolding components are dismantled and altered without authorisation, or due to strong wind etc.

2.2 // Roles and Responsibilities of Key Personnel

2.2.1 Trained Workmen (Applicable to Bamboo Scaffolds and Metal Scaffolds)

Responsible for erection, substantial addition, alteration and dismantling of scaffolding on site under the immediate supervision of a competent person.



2.2.2 Competent Person

(Applicable to Bamboo Scaffolds and Metal Scaffolds)

- Immediate supervise the erection, substantial addition, alteration and dismantling of scaffolding.
- A competent person should focus on monitoring the scaffolding process, including the work to be carried out in accordance with the design drawings, specifications and scaffolding construction methods. The competent person should monitor the safety of trained workmen and should not engage in the scaffolding work.
- Inspect the scaffolding regularly, including before the scaffold is being taken into use for the first time, at regular intervals not exceeding 14 days immediately preceding each use of the scaffold, after any exposure to weather conditions likely to have affected its strength or stability or to have displaced any part; sign and issue " Form 5 " to ensure that the scaffold is in safe working order.

2.2.3 Professional Engineer of the Structural Discipline

(Applicable to Bamboo Scaffolds)

- Design and approve a bamboo scaffold of more than 15m in height and verify the stability of a bamboo scaffold less than 15m in height.
- Design a truss-out bamboo scaffold to meet its own required safe working load.
- Participate in risk mitigation design meetings prior to the commencement of works, and eliminate the risks through planning and management of scaffolding design.



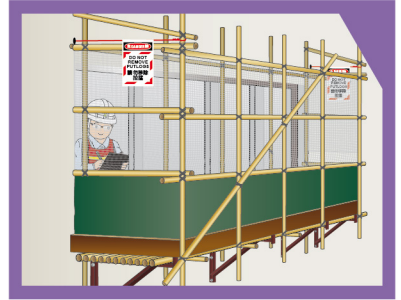
2.2.4 Professional Engineer of the Structural Discipline

(Applicable to Metal Scaffolds)

- Design metal scaffolds with reference to the manufacturer's instructions and in accordance with recognised engineering principles or other national / international standards or provisions.
- If the original design and drawings of the metal scaffolds needed to be modified, the scaffolds should be redesigned.
- Participate in risk mitigation design meetings prior to the commencement of works, and eliminate the risks through planning and management of scaffolding design.

2.2.5 Technically Competent Person T1 (Applicable to Bamboo Scaffolds and Metal Scaffolds)

- Refer to the Code of Practice for Site Supervision issued by the Buildings Department, scaffolds of certain building works and street works should be checked on a daily basis to ensure that they are adequately secured to the buildings to prevent collapse; catch fans, catch platforms and protection screens are adequately installed so as to secure against falling objects.
- Other Technically Competent Persons of higher grades should carry out inspections for the scaffolds in accordance with the site inspection frequencies specified in the supervision plan for the site (if applicable).



2.2.6 General Worker (Applicable to Bamboo Scaffolds and Metal scaffolds)

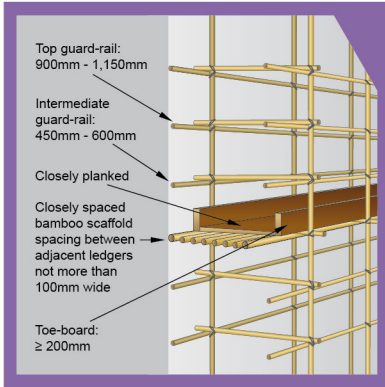
- Proper use of working platforms and personal protective equipment.
- Strictly adhered to maximum safe loading imposed on the scaffold.
- The scaffold should not be altered without permission. If it needs to be modified, the foreman should be notified for processing.

2.3 // Industry Good Practice

2.3.1 Design for Safety Management

- In the design stage, professional engineer of the structural discipline should participate in the risk elimination design meetings with relevant scaffolding stakeholders; take into account the working environment, nature of work and required load weight when designing suitable scaffolds so as to eliminate or reduce risks from the sources.





2.3.2 Bamboo Scaffold

- The erection, substantial addition, alteration and dismantling of a bamboo scaffold shall be carried out by trained workmen under the immediate supervision of a competent person.
- The bamboo scaffold shall be designed as a closely spaced bamboo scaffold, and a suitable working platform shall be erected at every working location on a lift.
- Safe access to and egress from a working platform should be provided.
- The proper use of working platforms by workers should be managed and supervised.

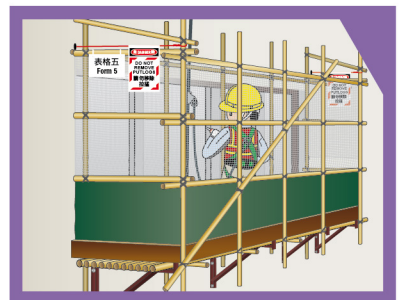
2.3.3 Putlogs for Bamboo Scaffold

- The putlog should consist of anchor bolts, bamboo struts (ledger with diameter equal to or greater than 40mm), and mild steel bar with a diameter of at least 6mm.
- Each set of putlogs should be provided at a horizontal spacing not greater than 3m; the vertical spacing should not be greater than 4.2m (if the bamboo scaffold is erected at a height of 100m or more above the ground); the vertical spacing should not be greater than 6.3m (if the bamboo scaffold is erected at a height of less than 100m above the ground).
- Consider painting bright colours and affixing warning signs to the putlog (metal ties) to enhance workers' attention.
- Unauthorised dismantling of the putlog is prohibited.



2.3.4 Truss-out Bamboo Scaffold

- A trained workman in respect of truss-out bamboo scaffolding works, refers to a person who holds a valid certificate of "Advanced Level Truss-out Scaffolder Safety Training" or "Intermediate Level Truss-out Scaffolder Safety Training" issued by the CIC.
- Secured support such as bracings, I-shaped metal brackets or T-shaped metal brackets should be provided for the truss-out bamboo scaffold.
- The horizontal and vertical spacing of putlogs should not exceed 3m.
- A working platform and toe-boards must be erected for the truss-out bamboo scaffold before use.



2.3.5 Metal Brackets for Truss-out Bamboo Scaffold

- Each metal bracket must be fixed with 3 or more anchor bolts to ensure its stability. The anchor bolts should have a tensile capacity greater than 7kN.
- The horizontal distance between two adjacent metal brackets should not be greater than 1.3m.
- Metal bracket shall be installed on the structural elements of buildings, such as solid external concrete walls. The truss-out bamboo scaffold should not be erected on brick walls or plastering surface.

2.3.6 Contingency Plan for Adverse Weather Conditions

- Before and after the adverse weather that could have adverse effect on the structural strength and stability of scaffold, a competent person should carry out inspection and make improvements or enhancement over the scaffolds as required.
- Prior to the occurrence of typhoon or strong wind, contractors should ensure the protective screens of bamboo scaffolds are lowered and tied up or removed, and materials are removed from the bamboo scaffolds.



2.3.7 Adoption of "Climbing Fall Arrest System"

- While erection, substantial addition, alteration and dismantling of a bamboo scaffold on the highest floors, consideration may be given to the adoption of a "Climbing Fall Arrest System" whereby a retractable fall arrest is mounted on metal uprights that can be climbed floor by floor to provide anchorage for workers of working at height.

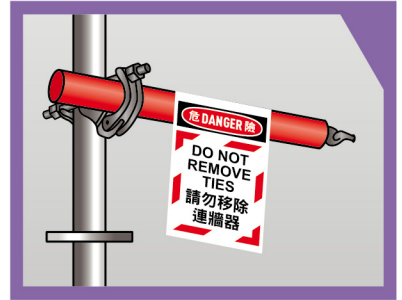


2.3.8 Metal Scaffold

- The erection, substantial addition, alteration and dismantling of a metal scaffold shall be carried out by trained workmen under the immediate supervision of competent person.
- The working platforms on the scaffolds should be provided with suitable and safe access and egress, closely boarded platforms, and suitable guard-rails and toe-boards.
- When it is impracticable to erect a safe working platform or provide safe means of access and egress, a full body harness should be worn and attached to a secure anchorage point or independent lifeline.

2.3.9 Ties for Metal Scaffold

- Ties should be inserted and maintained at a frequency of one for every 40m² of the scaffold surface (ties will not be removed during the use of a scaffold).
- Ties should be maintained at such a frequency that there is always one for every 25m² of scaffold area (ties may be temporarily removed).
- Unauthorised dismantling of the ties is prohibited.
- Consider painting bright colours and affixing warning signs to the ties to enhance workers' attention.

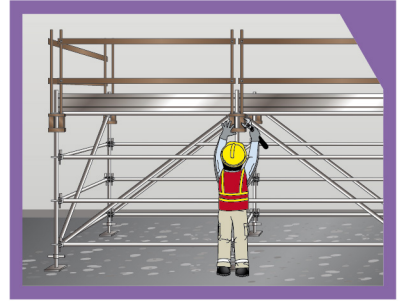


2.3.10 Using Mobile Working Platforms

- The ground should be firm, level and suitable for erecting the scaffold.
- The outriggers of mobile working platforms should be fully extended in accordance with the manufacturer's requirements.
- Do not overstretch the body outside the working platform. Do not lean on the guard-rail of the working platform.
- When a mobile working platform is used outside a building, its height to the least base dimension ratio should not be greater than 3; when it is used within a building, its ratio should be limited to 3.5.

2.3.11 Adoption of "Advance Guard-rails" Workflow

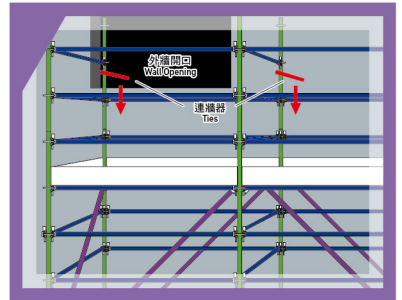
- Consider adopting an "Advance Guard-rail" workflow by using specially designed guard-rails and guard-rail sockets during the erection of metal scaffolding working platforms to ensure that the guard-rails of the working platform are installed before the workers reach the upper lift of the working platforms, thus eliminating the exposure to the high level of the scaffold where the workers lack edge protection.



2.4 // Innovative Technology

2.4.1 Building Information Modelling (BIM)

- BIM is the process of generating three-dimensional, digital representation of building data throughout its life cycle. Designers, engineers and construction industry stakeholders could optimise the planning, design and coordination of scaffolding works through BIM in order to enhance the level of site safety.
- For example: utilise BIM to review the positions of scaffolding ties, in case the ties could not be installed on the featured facades or wall openings, the construction team could identify solutions in advance through proactive coordination.



2.4.2 Intelligent Drone System for Scaffolding Inspection

- PA Code: PA22-033 (Code on Pre-Approved Lists under Construction Innovation and Technology Fund)
- Intelligent Drone System offers metal scaffold inspections through image analysis powered by A.I. technology. It records the conditions of the scaffold and is able to identify abnormal conditions, e.g. safety net damages, accumulated debris, deformation of the scaffold, etc.

2.5 // Reference Materials

Code of Practice for Bamboo Scaffolding Safety (Labour Department)

<https://www.labour.gov.hk/eng/public/os/B/Bamboo.pdf>

Code of Practice for Metal Scaffolding Safety (Labour Department)

<https://www.labour.gov.hk/eng/public/os/B/mss.pdf>

Guide on Construction and Work Safety of Truss-out Bamboo Scaffolds (Labour Department)

https://www.labour.gov.hk/eng/public/pdf/os/D/TOS_Guidance_notes_eng.pdf

Overview of Work-at-Height Safety (Labour Department)

https://www.labour.gov.hk/eng/public/os/D/Overview_of_Work_at_Height_Safety.pdf

Code of Practice for Site Supervision 2009 (Buildings Department)

https://www.bd.gov.hk/doc/en/resources/codes-and-references/code-and-design-manuals/SS2009_e.pdf

Guidelines on Safety Enhancement of and Notification Arrangement for Truss-out Bamboo Scaffolds (Construction Industry Council)

[https://www.cic.hk/files/page/50/Guidelines%20Enhancement%20Bamboo%20\(Eng\).pdf](https://www.cic.hk/files/page/50/Guidelines%20Enhancement%20Bamboo%20(Eng).pdf)

Guidelines on Planking Arrangement for Providing Working Platforms on Bamboo Scaffolds (Construction Industry Council)

https://www.cic.hk/cic_data/pdf/about_cic/publications/eng/guidelines/Guidelines%20on%20Planking%20Arrangement_Work%20Platforms_Bamboo%20Scaffolds-V2-e.pdf

Reference Material on Safety Roles and Responsibilities of Key Stakeholders in the Hong Kong Construction Industry (Practical Reference Guidance On Erection and Dismantling of Scaffold or Platform) (Construction Industry Council)

[https://www.cic.hk/files/page/51/RM%20PRG%20Scaffold_Platform%20\(Eng\).pdf](https://www.cic.hk/files/page/51/RM%20PRG%20Scaffold_Platform%20(Eng).pdf)

Reference Materials on the Design for Safety Management System for the Hong Kong Construction Industry (Construction Industry Council)

<https://www.cic.hk/files/page/51/CIC%20DfS%20-%20Reference%20Materials.pdf>

Work at Height Safety Handbook (Construction Industry Council)

<https://www.cic.hk/files/page/51/J190303%20WAH%20Booklet-Final%20version%202.pdf>