

Safe system of work for equipment at height



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1. Introduction

Construction industry's industrial accidents is more than other industries. The accident rate per 1000 workers was 35.9. Among which the highest number of deaths involved in working at height. Which were related to "fall of person from height". Working at height in the construction work involving of temporary or transient working environment condition means a lot of inherent hazards and potential hazards. Construction work, safety in the work place is very important, it is essential. Therefore, must take the necessary security measures to ensure the safety operation.

2. Background

I am a manager of the Engineering Department of Excellent Property Management Limited. Recently, I observe that fatal accidents involving working at height is a major trend in 2013. While the workers of our company and the outsourced contractors in the estates and plazas are using various facilities in performing their jobs in working at heights.

3. Objective

A study of four commonly used equipment for working at height: ladders, mobile type tubular scaffolds, elevated working platforms and bamboo scaffolds. Analyze their function, limitations, risk and encountered in the work processes. Provide relating local safety legislations, Codes of Practices and guidance to the workers.

It should to develop for the safe system of work. Which procedural inspected work tasks to find the potential hazards, Inherent risks. Providing the safety

and health policy or strategies in controlling the hazards and demonstrate the understanding of common health and safety management system.

4. Equipment for working at height

The common of equipment in working at height: ladders, mobile type tubular scaffolds, elevated working platforms and bamboo scaffolds.

Ladders

Ladders are the most common ancillary tools for working at height. A simple tools for gaining access to higher levels. Therefore, involving highest number of workers are injured while working at height.

Functions of ladders:

- Portable, easy and convenient.
- Widely used in various construction units.
- Easy storage

Limitations for use of ladders:

- Inspect the ladder before every times and regularly afterwards.
- Must check the ladder side and ladder steps has burst, it has broken rung ladder before use, and whether there are loose or anti-slide pedal to lose and so on.
- Indicate whether the ladder meets safety standards.
- Pay attention to the ladder's safe working load, make sure not to exceed the load when using.
- Where a handhold is available on the ladder.
- Ladder placed on a firm and level ground

- Ladders must be firmly in supporting the matter, if not fastened to the ladder, the ladder should be located under one reference help.
- Ladders only for 2 meters below the lightweight work
- Not suitable for long duration or high frequency for work at height.
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- At a height of 2m or more, ladders only be used for access and egress, and not a place to work
- During ascent, work and descent on ladder, worker should be capable of retaining three points of contact with the ladder.
- Ladders must be at the proper angle eyes on the supports, the angle is too large or too small can lead to accidents.
- Strict compliance with the manufacture's instructions and safety warnings.

Risk for use ladders: fall of person from height

- The footwear is from mud or grease before climbing up a ladder.
- The ladder is unstable and resting on an uneven and soft soil ground.
- The insufficient space behind the steps to provide a proper footing.
- Never overload the ladder, more than one person is working from a ladder

Which should be avoided as far as possible for using ladders:

- Use any ladder that is already bent or ladder steps has burst
- Connect short ladders together to form long ones.
- Overstretch the body to either sides of the ladder.
- Position the ladder at the place where working

- Paint something on ladder to cover up crack and defects.
- Ladders are used as a working platform.
- Not following the manufacture's instructions and safety warnings.
- Not compliant with international safety standards.

Training for worker:

- The worker for use ladder must have related safety training or supervise to guidance to the workers.
- The correct technique for climbing of ladder. (Three-point contact)

Elevated Working Platforms

The elevated working platforms is very convenient for ancillary tools for working at height. This is considered to be work equipment that prevents a fall. It is a manned to working at height, such as ceiling maintenance work , repair and cleaning the height air conditioning, lighting or external wall.

Limitations for use of elevated working platform:

- Consider the work requirement the carrying capacity, height of elevation, mobility and stability.
- The elevated working platform should be match for operation site, on the road and environmental conditions and limitation.
- The safety passageway for access and egress from the elevated working platforms
- The important point is the manufacturer or the agents company provides training course on operations, inspection, identify risks, initial fault strain, Fault reporting mechanism and operation of the elevated working platforms.

- Start to inspect and test the platform before use every time
- Calculate and record the every time loading weight for manned and equipment to be ensure not exceed the limitation maximum safety work loading.
- Ensure the elevated working platforms have guard-rails is hard, stable and secure.
- Has a slip-resistant floor.
- Install of the toe-boards round at the edge of the platform.
- Ensure the operation is horizontal level during the rising and falling, does not occur uneven phenomenon.
- Enclosed working area of the elevated working platform to avoid endangering others persons
- Must wear safety harnesses with lanyards securely attached to platform's anchorage points.

Risk for use elevated working platforms:

- Fall of person from height for guard-rail loose or broken.
- The workers by injured on elevated working platform due to the platform move.
- The elevated working platform and worker are falling due to exceed the limitation maximum safety work loading.

Which should be avoided as far as possible for using elevated working platforms:

- Move the elevated working platforms when the workers still on it
- Not secure all guard-rails of the elevated working platforms.

- Excessive dependence and sit on guard-rails of the elevated working platforms.
- Riding on the guard-rails up to higher level for working.
- Lean over out of the work platform outside.
- Ignore the examine, test and maintain the platform regularly.
- Work in the absence of adequate of adequate training and instructions

Training for worker:

- The worker for use elevated working platform must have related safety training or supervise to guidance to the workers.
- The worker should be have the following knowledge, before starting to work:
 - detailed safety operating procedures specified by the manufacturer;
 - limitations on using the elevated working platform;
 - limitations on working loading;
 - items to check before using the elevated working platform; and
 - demonstration and practice on the operating procedures.

Mobile type tubular scaffolds

Mobile type tubular scaffolds is for temporary structure to support work and access platforms. Mobile type tubular scaffolds can be used for different purposes in different construction activities. To building, dismantling and modifying of scaffolding must be carried out in compliance with the Construction Sites (Safety) Regulations and Codes of Practice for Bamboo and Metal Scaffolding Safety of the Labour Department.

Limitations for use of mobile type tubular scaffolds:

- The safety passageway for access and egress from the mobile type tubular scaffolds.
- Suitable tail: 900mm - 1150mm top rail, 450mm -600mm mid rail and minimum 200mm high toe board.
- Toe boards must rise at least 200mm.
- Has a fencing and outriggers in mobile tower
- Not suitable for outdoor work in strong winds and inclement weather.
- Provide enough supporting point to fixing the scaffolding to the building.
- That could have an adverse effect of weather conditions on the scaffolding work should be constantly monitored and should be taken and provide to maintain the stability of the scaffold and the plant, equipment and works.
- The Scaffolding should be provide and setting with double guard rails and toe boards. Additional measure such as nylon net is also required to prevent materials, tools or equipment falling.
- The boards and planks should be unpainted so that any defects are readily visible.
- To building, dismantling and modifying of scaffolding must be conducted by trained worker under the immediate supervision of a competent person.
- Boards and planks used in the construction of working platform should be protected against splitting.

- Mobile type tubular scaffolds placed on a firm and level ground, on different ground surface require different support:

Hard surface – is sufficient hardness and thickness to support the scaffolding, but preferably to be placed on a base plate.

Other surfaces – is any type of flooring or paving which would be penetrated by a standard with a base plate beneath it or if there is doubt about the surface, should be used base plates or metal packing plates at the bottom of the standards.

- The supports for a scaffold should be maintained in an adequate condition during the life of the scaffold.
- The width of working platform of the scaffold not less than 400mm.
- The group of boards across the width of the scaffold should be consistent with the same length, with all boards of the same thickness.
- The angle of ladder for the ratio of vertical with horizontal level not more than 4 to 1.

Risk of toppling when using mobile type tubular scaffolds:

- Over the carrying capacity for the top of the working platform.
- A ladder is placed on the top of working platform to extend to gaining access higher level.
- The tower is placed on sloping or uneven ground.

Which should be avoided as far as possible for using mobile type tubular scaffolds:

- Move the elevated working platforms when the workers still on it
- Climb a mobile type tubular scaffold when the wheels are unlocked.

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- In windy or severe weather conditions to use a mobile type tubular scaffold for outdoor work.
- Move the mobile type tubular scaffold when workers or materials still on the working platform.

Training for worker:

- A trained workman has satisfactorily completed a formal training in metal scaffolding works equivalent to any of those mentioned for a competent person or has satisfactorily passed the intermediate trade test for metal scaffolder of the CICTA and possesses at least 1 year of experience in metal scaffolding works. (Under the Construction Workers Registration Ordinance).
- Inspected by a competent person before being taken into use for the first time.
- Inspected by a competent person at regular intervals not exceeding 14 days immediately preceding each use of the scaffold.
- In respect of scaffolding safety, the worker are subject to the requirements of the following regulations: 38A, 38AA, 38B, 38C, 38D, 38E, 38F, 38H, 38I, 48, 49, 52,

Bamboo scaffolds

Bamboo scaffold is a temporary structure to work and access platforms.

Common in the construction , renovation and repair work. Bamboo scaffold use natural material, cheap and can be recycled. While its flexibility suitable for use on any project, workers can quickly change or bamboo cut to the desired length and shape. Bamboo is lightweight, easy to transport, erect and modify and dismantle is shorter time than other type scaffolding.

Limitations for use of bamboo scaffolds:

- Erection and dismantling the bamboo scaffolding must be in compliance with the Construction Sites (safety) Regulations and Codes of Practice of Bamboo and Metal Scaffolding Safety of the Labour Department.
- The bamboo higher than 15m, should be designed and approved by professional engineer.
- Should be provide sufficient support point to secure to the bamboo scaffold with the building or structure to prevent collapse.
- For avoid materials from material, tools and debris from falling should be erect catch-fans, nylon net and protection screen at the bamboo scaffold.
- Ensure the Form 5 is duly signed and valid.
- Suitable tail: 900mm – 1150mm top rail, 450mm -600mm mid rail and minimum 200mm high toe board.

Risk of using bamboo scaffolds:

- Toppling when over the carrying capacity for the bamboo platform.
- Material or tool from falling when no provide sufficient additional measure to prevent from falling.
- Toppling when no provide sufficient measure to secured the bamboo scaffold to prevent severe weather.

Which should be avoided as far as possible for using bamboo scaffolds:

- In windy or severe weather conditions to use bamboo scaffold for outdoor work.

- Working when the bamboo scaffolding is unfinished state.
- Use incorrect and unsafe method to dismantle bamboo scaffolds.
- Avoid the demolition bamboo falling on the ground directly and immediately, workers should be one pass one or use vertical transport measure to the ground.

Training for worker:

- Erection, alteration and dismantling of bamboo scaffold must be conducted by trained workmen under the immediate supervision of a competent person.
- Trained workmen must have formal training in, and possess at least 3 years of experience of, bamboo scaffolding work.

Legislative requirements and guidance materials

- Codes of Practice for Bamboo and Metal Scaffolding Safety
- Codes of Practice for Metal Scaffolding Safety
- Practical Guide to Working at Height: Ensuring Safe Work Practices
- Safe System of Work
- Safety Guide for Bamboo Scaffolding Work
- Safety at Work – A Guide to Ladders and Elevated Working Platforms
- Beware of Fall at Work
- Guidance Notes on Classification and Use of Safety Belts and their Anchorage System
- Construction Safety – Working at Height
- Construction Sites (Safety) Regulations
- Statutory General Duties Requirements under Factories and Industrial Undertakings Ordinance –Section 6.

Conclusion & Recommendation

For the above measure for working at height, there should be avoid working at outdoor when under windy or severe weather environment conditions. In tools, should be provide workers with tool straps to prevent the tools from falling and provide the tools can be extended to avoid: the worker to lean over out of the work platform outside; riding on the guard-rails up to higher level for working; overstretch the body to either sides of the ladder; connect short ladders together to form long ones.

Mark the carrying capacity indicates on the measure prominently displayed to ensure not overload. Clean up the ground near at working at height to reduce the workers from falling additional damage.

Use the ladders for working at height should be provide more one worker to accompanied the work, who is responsible for tool storage to avoid the ladder user loss of balance.

Considering work preparation and authorization requires at the start of any job. Ensuring safe work methods and necessary measures and including a safe means of access and escape.

References:

Codes of Practice for Bamboo and Metal Scaffolding Safety – (Labour Department)

Codes of Practice for Metal Scaffolding Safety – (Labour Department)

Practical Guide to Working at Height: Ensuring Safe Work Practices – (Hong Kong Housing Authority)

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Safety Guide for Bamboo Scaffolding Work - (Labour Department)

Safety at Work - A Guide to Ladders and Elevated Working Platforms -
(Labour Department)

LC Paper No. CB(2)279/13-14(05) - (Legislative Council Panel on Manpower)

Code of Practice on the Design and Construction of Tower Working Platforms
- (Electrical and Mechanical Services Department)

Industry-based Committees Bulletins 41th Issue, Safe Use of Mobile
Aluminum Towers - (Occupational Safety's Health Council)