



**DALHOUSIE
UNIVERSITY**

**Department of
Facilities Management
Occupational Health and Safety**

**Safe Job Procedure for Erecting Tube and
Clamp and All Around Scaffolding**

Service / Shop

This safe job procedure applies all shops or trades that use scaffolding.

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Known Hazards

- Falling objects
- No, or, improper supervision
- Employees falling
- Not using required safety parts and accessories.
- Scaffold tipping over
- Improperly planked platforms
- Loose, cracked, broken, missing, bowed, corroded or worn parts.
- Exceeding load restrictions
- Contact with electrical wires.
- Unstable footings, rough surfaces
- Improperly installed / assembled
- Poorly installed toe boards or railings.
- Irresponsible behavior or actions
- Scaffold collapse
- Falling from scaffolding
- Poor training in scaffold erection.
- Unsuitable access or egress

Job Specific Training Requirements

- Erection, Alteration, Dismantling and Proper use of Scaffolds
- Fall Protection
- Proper training in the use of all required PPE
- Proper training in the use of all required tools and equipments.

Applicable Regulations / Standards / Procedures

- NS Workplace Health and Safety Regulations
- Safe Job Procedures for tools and equipment that are to be used.

The following are standards that are to be referenced when assembling or dismantling scaffolds and there is a risk of falling exists:

- CSA Standard Z259.1-1995 "Fall Arresting Safety Belts and Lanyards for the Construction and Mining Industries"
- Z259.3-M1978, "Lineman's Body Belt and Lineman's Safety Strap"
- CSA Standard Z259.10-M90, "Full Body Harness"
- CSA Standard Z259.11-M92, "Safety Belts and Lanyards"
- CSA Standard Z259.2-M1979, "Fall Arresting Devices, Personnel Lowering Devices and Life Lines"

Personal Protective Equipment Requirements

- Eye Protection
- Protective Footwear
- Hard Hats
- Work Gloves
- Full Body Harness and Life Lines
- Any other PPE required by the hazard assessment for the job to be performed.

Safe Job Procedure

Job steps are listed in the order in which they must be completed. Key activities follow each step. Key steps and the associated activities must be followed in the order presented to achieve maximum efficiency in safety, production, quality and overall loss prevention.

Tube and Coupler (or Clamp) Scaffold

Most of the general rules that apply to frame scaffolding are also applicable to tube and clamp scaffolding. For example, the requirements for mudsills, platforms and guardrails are the same for both types of scaffolding. The added level of skill and knowledge required to safely and efficiently erect tube and clamp scaffolding is probably the most important difference.

Employees can use tube and clamp in conjunction with end frame to create a more secure and safe end frame structure.

- Prepare a sketch or drawing of the proposed tube and clamp scaffolding.
- A tube and clamp scaffold that exceeds a height of 10 m (33 ft) from its base support to the uppermost platform must be engineered.
- A copy of the design drawings must be available at the job site for inspection purposes.
- Scaffolding must be erected, dismantled or moved by qualified experienced employees that are supervised by a competent person.
- All tubes must be inspected before use and careful attention must be paid to checking clamps for damage or distortion.
- Ensure the surface on which the scaffold will be erected is firm, level and capable of supporting the load of the scaffold, workers, materials and equipment that will be used.
- If necessary, prepare the site using compacted crushed rock, etc. particularly any area where sills will be placed.
- Ensure you use adequate sills and base plates where any leveling adjustments will be required. Sills must be sound, rigid, and capable of supporting the maximum weight to be exerted on the scaffold without settlement or deformation.
- Ensure screw jack bases are only adjusted within the limits specified by the manufacturer, industry standards or relevant regulations.

- Ensure the adjustable bases have no thread damage and the base plates are not curled, cracked or warped.
- Ensure the jackscrews have no cracks in the weld where they attach to the top of the caster, no thread damage and the adjusting nut is tight.
- All medium duty tube and clamp scaffold standards, runners and braces used shall be of nominal 51.0 mm (2.0 inch) OD steel tube.
- Any couplers used must be of a structural type, such as a drop-forged steel, or malleable iron. The use of gray cast iron is prohibited.
- Remember to carefully check clams / couplers for damage to wedges or threads on bolts and distortion of the clamp body before use.
- Establish the load carrying requirements of the scaffold in order to determine the spacing of standards. Refer to Clause 5.11.2 of CSA Z797, "Code of Practice for Access Scaffold" for duty rating categories.
- Standards shall be accurately spaced and erected on suitable bases and kept plumb.
- The first level of transoms, ledgers, and plan braces shall be installed as close as possible to, but not more than, 0.45 m (18 in) above the base plates, in order to maintain alignment of the standards.
- Ensure that the first tier of scaffolding is plumb before erecting a second tier.
- For duties ratings and allowable spans for sawn lumber planks refer to in Clause 5.11.3.3 of CSA Z797.
- Place standards to adequately support anticipated loads.
- Refer to the manufacturers recommended duties ratings for manufactured platforms.
- Whenever possible tube and clamp scaffolding should have bay and elevation spacing of about 2.0 m (6 ½ ft) longitudinally and vertically.
- Front sway bracing should be located at approximately 45 degrees from the horizontal.
- Ledgers are to be connected to standards using right angle clamps.
- Transoms are to be placed above the ledgers and both are to be maintained in a horizontal position. Use a spirit level to check level.
- Transoms are to be connected to standards or ledgers by using right angle clamps.
- Joints in standards and ledgers are to be made with end to end clamps.
- Joints should be as close to the node points as the clamp arrangements will allow.
- Joints in vertically adjacent ledgers should not occur in the same bay, they should be staggered to provide rigidity.

- Install intermediate transoms if the scaffold will be supporting heavy loads. Do not exceed load ratings.
- Tie-ins are to be located at every second node vertically and every third standard horizontally.
- Tie-ins should be connected to either both standards, or, both ledgers.
- Tie-ins connected to ledgers should be close to standards to help provide rigidity. Connections should be made with right angle clamps.
- Ensure that tie-ins are capable of withstanding both tension (pulling) and compression (pushing) forces.
- Install end, face, and plan bracing according to the manufacturer's recommendations or, where applicable, the design drawings. Bracing connections shall be as close as possible to ledger and transom
- Internal bracing must be connected between standards using swivel clamps and should be clamped as close to nodes as possible.
- Internal bracing should be positioned at every third standard and should coincide with tie-in points.
- When preparing drawings or sketches ensure bracing is designed to provide stability and transfer horizontal loads to tie-in points.
- Always install bracing as the scaffolding progresses.
- Install face bracing from the bottom to the top of the scaffold on both the front and back faces.
- Reverse the direction bracing on the front and back faces.
- Always install face sway bracing to the full height of the scaffold either in a single bay or have it extend across several bays.
- If face bracing is installed in single bays it should be in end bays and as a minimum in every fourth bay longitudinally.
- As additional tiers are added ensure bracing or tie-ins are used every 4.6 meters (15 feet) vertically and 6.4 meters (20.0 feet) horizontally.
- Install plan bracing at every tier that has a tie-in and reverse the bracing pattern in at least one tier.
- Runners must be erected along the length of the scaffold, located on the inside and outside posts at even heights.
- When tube and coupler guard rails and mid rails are used on outside posts, they shall be used in lieu of outside runners.
- Large scaffolds shall be tied and securely braced at intervals not to exceed 20.0 feet horizontally and 15.0 feet vertically.

All Around Scaffolding

- An all around scaffold that exceeds a height 15 m (49 ft) from its base support to the uppermost platform shall be engineered.
- Starting at the highest point, of the surface on which the scaffold will be erected, place threaded base plates at the required centres.
- Use soleplates where necessary to distribute the load.
- Fit a collar over the threaded base plates.
- Connect collars using ledgers. Use the small holes of the rosette for right-angle connections.
- Then, level the base commencing at the highest point of the ground, by adjusting the wing nut.
- Fit standards, then at the next lift height connect one board bearer/ledger and two longitudinal ledgers (when using scaffold boards), or one U-transom and standard decking units with lock against lift-off plates.
- Installation of 2nd transverse ledger 0.5 m above the bottom transverse ledger (in the case of facade scaffolding structures with more than 60 % of the permissible standard load).
- Select lengths of standards in such a way that the joints occur at either deck level or transom level.
- End, face, and plan bracing shall be installed according to the manufacturer's recommendations or, where applicable, the design drawings. Bracing connections shall be as close as possible to ledger and transom nodes.
- All wedge connections must be knocked in with a 500 g hammer until 13 mm (0.5 inch) to 25 mm (1.0 inch) remains at top of wedge.
- For timber plank decking or when no decks are installed, longitudinal ledgers must be installed and, in every fifth bay, horizontal diagonal braces at each level.
- To extend scaffold further repeat steps (4), (5), (6) and (7).
- Insert standard decks as stiffeners every 2 m apart in the upward direction as building work progresses.
- Install decking (work platform) by following the manufacturer's recommendations.

Guardrails and Toe Boards

Guardrails and toe boards must be installed at all work platforms by following the manufacturer's recommended procedures and the following requirements specified in CSA Standard CSA Z797-09, Code of Practice for Access Scaffolds:

- Guardrails must be installed at all open sides of a scaffold platform and around any uncovered opening in a scaffold platform.
- The requirement for a guardrail; may be disregarded when the width of the gap between a wall and the edge of a scaffold platform doesn't exceed 0.30 m (12.0 inches).
- The top rail shall be installed at a height of 1.0 m + or – 75.0 mm (39.0 inches = or- 3.0 inches).
- A mid-rail must be installed midway between the top railing and the platform.
- A toe board must be installed so that it is securely attached to the posts and the structure to which the posts are secured. The toe board must have a minimum height of 90.0 mm (3.5 inches). Facilities Management recommends the use of a higher toe board.
- When the toe board will not be sufficient to prevent tools, materials or other objects from falling over the side of the platform, solid or mesh panels must be installed as required by Clause 5.17 of CSA Standard CSA Z797-09, Code of Practice for Access Scaffolds.
- When the access point to the platform is located at a guardrail a self closing swing gate, double chain gate or similar device with a minimum 0.56 m (22.0 inches) clear width opening must be used to replace the top rail, midrail and toe board.

Access to Scaffolding

Access to all built-up scaffolds must be by one or more of these means:

- **Portable Extension Ladders** – This type of ladder may be used inside or outside of frames. They must be secured at the top and bottom and the ladder must set up in compliance with standard ladder safe work practices.
- **Stand Off Vertical Component Ladders** (See scaffold manufacturer's instructions for installation of ladders.)
- **Scaffold Stairway Systems** (See scaffold manufacturer's instructions for installation of stairway systems.)

Access ladders must be positioned so their use will not have a tendency destabilize and tip the scaffold.

Do not use cross braces as a means of access.

Recommended Guidelines

Minimum Size of Members			
	Light Duty	Medium Duty	Heavy Duty
Maximum Intended Load	25 Pounds/foot ²	50 pounds/foot ²	75 pounds/foot ²
Posts, runners, and braces Note: Longitudinal diagonal bracing must be installed at an angle of 45° (±5°)	Nominal 2 inches (1.9 inches) OD steel tube or pipe	Nominal 2 inches (1.9 inches) OD steel tube or pipe	Nominal 2 inches (1.9 inches) OD steel tube or pipe
Bearers Note: Bearers must be installed in the direction of the shorter dimension.	Nominal 2 inches (1.9 inches) OD steel tube or pipe and maximum post spacing of 4 feet X 10 feet	Nominal 2 inches (1.9 inches) OD steel tube or pipe and a maximum post spacing of 4 feet X 10 feet. or Nominal 2½ inches (2.375 inches) OD steel tube or pipe and a maximum post spacing of 6 feet X 8 feet.	Nominal 2½ inches (2.375 inches) OD steel tube or pipe and a maximum post spacing of 6 feet X 6 feet.
Maximum runner spacing vertically	6 feet 6 inches	6 feet 6 inches	6 feet 6 inches