

Block B: Tools and Equipment



Plumbing Apprenticeship Program Level 1 Series

Block B: Tools and Equipment

BC Plumbing Apprenticeship, Level 1

SKILLEDTRADESBC

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Block B: Tools and Equipment of the Plumbing Apprenticeship Program Level 1 Series features Skilled Trades BC industry-authority content that builds on the safety foundations introduced in Block A by focusing on the correct selection, use, and care of essential plumbing tools and equipment. Safe work practices remain central, but the emphasis in this block is on developing hands-on technical competence in the tools apprentices use every day on the job.

In Block B, apprentices learn how to safely and effectively use hand tools and measuring tools; operate portable power tools; access work areas using ladders, scaffolds, and other access equipment; and perform rigging, hoisting, lifting, and positioning tasks. This block also introduces the safe use of soldering, brazing, oxy-fuel cutting, and welding equipment. Mastery of these skills supports workplace efficiency, reduces the risk of injury or equipment damage, and lays the groundwork for more advanced plumbing tasks in later levels of the apprenticeship.

Plumbing Apprenticeship Program Level 1 Series

The *Plumbing Apprenticeship Program Level 1 Series* offers comprehensive training materials designed to build on foundational skills and knowledge. The series is divided into four main blocks, each focusing on critical areas of plumbing systems and installations.

Block A: Safety Related Functions

(<https://a-safetyfunctions-bcplumbingapprii.pressbooks.tru.ca>)

A-1: Workplace Hazards

A-2: WorkSafeBC Regulations

A-3: Safe Handling of Hazardous Materials

A-4: Personal Safety Practices

A-5: Fire Safety

Block B: Tools and Equipment

(<https://b-handmeasuringtools-bcplumbingapprii.pressbooks.tru.ca>)

B-1: Use Hand Tools and Measuring Tools

B-2: Use Portable Power Tools and Use

B-3: Use Access Equipment

B-4: Use Rigging, Hoisting, Lifting and Positioning Equipment, and Rigging

B-5: Use Soldering and Brazing Equipment and Oxy-Fuel Cutting Equipment

B-6: Use Welding Equipment

Block C: Routine Trade Activities and Electrical Concepts (<https://c-tradeactivities-electrical-bcplumbingappri1.pressbooks.tru.ca>)

- C-1: Mathematics and Science
- C-2: Electrical Concepts and Principles of Electricity
- C-3: Drawings and Specifications
- C-4: Codes, Regulations and Standards
- C-5: Manufacturer and Supplier Documentation

Block D: Piping and Components (<https://d-pipingcomponents-bcplumbingappri1.pressbooks.tru.ca>)

- D-1: Install Pipe and Tubing
- D-2: Install Valves
- D-3: Install Fittings
- D-4: Penetrate Structures

Plumbing Apprenticeship Program Overview and Upcoming Resources

- **Plumbing Apprenticeship Program Level 1 Series** (<https://openpress.trubox.ca/2024/12/13/plumbing-apprentice-level-1/>) can be found in the TRU Open Press Collection.
- **Plumbing Apprenticeship Program Level 2 Series** (<https://openpress.trubox.ca/2024/04/26/bc-plumbing-apprenticeship-level-2/>) can be found in the TRU Open Press Collection.
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Safety Advisory

The current Standards and Regulation in BC can be obtained at the WorkSafeBC website: <http://www.worksafebc.com> (<http://www.worksafebc.com>)

Please note that it is always the responsibility of any person using these materials to inform themselves about the Occupational Health and Safety Regulation pertaining to their areas of work.

[From previous 2021 book – confirm this message with Skilled Trades]

Symbol Legend



Important Information



Potentially Toxic/ Poisonous Situation



Required or Optional Resources



Potentially Flammable Situation



Complete a Self-Test



Possibly Explosive Situation



Use Protective Equipment



Potential Electric Shock

Acknowledgements

The development of the *Plumbing Apprenticeship Level 1* learning resources was a collaborative effort driven by a commitment to excellence in trades education. These resources were created to support apprentices and journeypersons in mastering the skills and knowledge essential to the piping trades. This achievement would not have been possible without the dedication and expertise of *Skilled Trades BC* and the *Piping Trades Articulation Committee*, whose contributions, leadership, and guidance have been instrumental in shaping high-quality, industry-aligned training resources. We extend our sincere gratitude for their contributions and ongoing stewardship in advancing the piping trades.

The content for *Block B: Tools and Equipment* (<https://b-handmeasuringtools-bcplumbingapprl1.pressbooks.tru.ca/>) is adapted from the Piping Trades Apprenticeship Program from *SkilledTradesBC* (2019 Harmonized) and the Trades Access Common Core (TACC) (<https://collection.bccampus.ca/search/?q=%22Trades%20Access%20Common%20Core%22>) resources developed by Camosun College, originally created in 2015, revised in 2019, and made available through BCcampus:

- Line C: Tools and Equipment: Competency C-1: Describe Common Hand Tools and Their Uses (<https://collection.bccampus.ca/resource/BzEe9fcq>)
- Line C: Tools and Equipment: Competency C-2: Describe Common Power Tools and Their Uses (<https://collection.bccampus.ca/resource/zAYtfTec>)
- Line C: Tools and Equipment: Competency C-3: Describe Rigging and Hoisting Equipment (<https://collection.bccampus.ca/resource/hDUEqpfn>)
- Line C: Tools and Equipment: Competency C-4: Describe Ladders and Work Platforms (<https://collection.bccampus.ca/resource/7c8Ymhmk>)

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The Open Press

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- Open School BC
- Camosun College
- Trades Training BC

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To order printed copies of Program Outlines or learning resources (where available) for BC Trades, contact:

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Starting December 1, 2022, Industry Training Authority was officially renamed to SkilledTradesBC. Hear more in this video from SkilledTradesBC CEO, Shelley Gray, on what this means for the trades industry and British Columbians. Closed captioning and transcripts are available with this video, Introducing Skilled Trades BC (<https://www.youtube.com/watch?v=OQgwdP0rNog>) (2022) on YouTube.



One or more interactive elements has been excluded from this version of the text. You can view them online here: <https://b-handmeasuringtools-bcplumbingapprl1.pressbooks.tru.ca/?p=2446> (<https://b-handmeasuringtools-bcplumbingapprl1.pressbooks.tru.ca/?p=2446>)

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References

- Camosun College. (n.d.). *Line C: Tools and Equipment*. BCcampus. <https://collection.bccampus.ca/resource/BzEe9fcq/>
- SkilledTradesBC. (2025). Plumber program outline (Implementation date: August 18, 2025; Last revised: December 16, 2025) [PDF]. Province of British Columbia. <https://skilledtradesbc.ca/media/2776/download>
- SkilledTradesBC. (2022, December 1). Introducing Skilled Trades BC. YouTube. <https://www.youtube.com/watch?v=OQgwdP0rNog>

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Other Formats Available

- In addition to the web version, this book is available in a number of file formats, including PDF. The Print PDF has passed our Accessibility Check.

PART III

B-3 USE ACCESS EQUIPMENT

Plumber Apprenticeship Program – Level 1



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B-3 Use Access Equipment Introduction

Safe access equipment is essential in plumbing and pipe trades work, where tasks are often performed above ground level. Ladders and elevated work platforms allow workers to reach work areas safely, but they must be selected, set up, and used correctly to prevent accidents and injuries. Understanding the different types of access equipment and the safety requirements for their use is an important part of working safely on construction sites. In this section, you will learn about common types of ladders and elevated platforms, their key features, and the proper procedures for using them safely and effectively.

Learning Objectives

After completing this section, you should be able to:

- Describe ladders and elevated platforms.
- Use ladders and elevated platforms.



You will be required to reference publications and videos available online at WorkSafeBC. (<https://www.worksafebc.com/en>)

Terminology

The following terms will be used throughout this section. A complete list of terms for this section can be found in the **Glossary**.

- **allround system:** A modular scaffold system made of vertical posts and horizontal supports that connect at fixed points using special locking joints. The design allows scaffold sections to be assembled quickly and safely in many different shapes and heights. (Section B-3.1)
- **casters:** Small wheels attached to equipment so it can roll or move easily. (Section B-3.1)
- **cleats:** Flat wooden strips used as steps on some job-built ladders. (Section B-3.1)
- **coupling pins:** Metal pins used to connect and secure scaffold frames or sections together. They fit into

holes in the scaffold frames to keep the sections aligned and prevent them from separating during use. (Section B-3.1)

- **fillers:** Pieces of material used to fill gaps between parts so everything fits tightly and securely. (Section B-3.1)
- **guardrail:** A protective rail along an edge that helps prevent people from falling. (Section B-3.1)
- **hydraulic:** A system that uses liquid pressure to move or lift objects or equipment. (Section B-3.1)
- **ladder-jack scaffold:** A temporary work platform supported by brackets attached to ladders. (Section B-3.1)
- **levelling screw jacks:** Adjustable metal supports placed at the base of a scaffold that can be turned to raise or lower the scaffold frame. They are used to level the scaffold on uneven ground and provide a stable foundation. (Section B-3.1)
- **mudsill:** A strong board placed on the ground to spread the weight of a scaffold and keep it from sinking. (Section B-3.1)
- **out-of-plumb:** Not perfectly vertical or straight up and down. (Section B-3.1)
- **overlap:** The part where two sections of a ladder slide over each other to make the ladder longer and stronger. (Section B-3.1)
- **plan brace (goosener bar):** A metal support bar used on scaffolding to keep the scaffold frame square and stable. It connects parts of the scaffold to prevent the structure from twisting or shifting out of alignment. (Section B-3.2)
- **pneumatic:** A system that uses air pressure to move or lift things. (Section B-3.1)
- **rungs:** The round bars on a ladder that you step on when climbing. (Section B-3.1)
- **scaffold:** A temporary structure that allows workers to safely reach high work areas. (Section B-3.1)
- **scissor lift:** A machine that raises workers straight up using folding supports that move like scissors. (Section B-3.1)
- **self-supporting:** Able to stand on its own without leaning against another structure. (Section B-3.1)
- **slip-resistant safety feet:** Rubber or textured ends attached to the bottom of a ladder that help prevent it from sliding and keep it stable on the ground. (Section B-3.2)
- **spreaders:** Bars on a step ladder that hold the legs apart so the ladder stays stable. (Section B-3.1)
- **sway brace:** A support bar that helps keep a scaffold stable and prevents it from wobbling. (Section B-3.1)
- **toe-board:** A small board along the edge of a platform that prevents tools or materials from falling off. (Section B-3.1)
- **tolerance:** The small amount a measurement can vary from the exact value and still be acceptable. (Section B-3.1)
- **tube-and-clamp system:** A type of scaffold built from metal tubes connected with adjustable clamps. The tubes can be arranged in many different ways, allowing the scaffold to be built to fit different shapes and sizes of work areas. (Section B-3.1)

B-3.1 Describe Ladders and Elevated Platforms

The safe use of ladders and working platforms is required in all types of construction. Ladders and elevated work platforms must meet applicable Canadian Standards Association (CSA) or American National Standards Institute (ANSI) standards. Workplace regulations have set minimum standards for the production, assembly, and use of ladders and working platforms.

WorkSafeBC publishes Occupational Health and Safety regulations concerning ladders and elevated platforms in Part 13 (<https://www.worksafebc.com/en/law-policy/occupational-health-safety/searchable-ohs-regulation/ohs-regulation/part-13-ladders-scaffolds-and-temporary-work-platforms>), which can be found in the OHS Guidelines (<https://www.worksafebc.com/en/law-policy/occupational-health-safety/ohs-guidelines>) on the WorkSafeBC website. WorkSafeBC also publishes guidelines to help workers understand and comply with these regulations. It is your responsibility to be familiar with these regulations.

Types of Ladders

There are three basic types of ladders: step ladders, single (straight) ladders, and extension ladders. Step ladders and extension ladders are usually manufactured. Single ladders may be manufactured or built on the job site.

CSA Ladder Rating Scale

Table 1: CSA Ladder Rating Scale

Grade	Projected Use	Load Rating
1	Construction/Industrial	Heavy
2	Light Maintenance/Farm	Medium
3	Household	Light

Step Ladders

Step ladders are **self-supporting**, meaning that they do not need to lean against a structure. They must be placed on a level surface, and must not be used as a means to access other platforms or landings.

Step ladders are available in a wide range of sizes, styles, and materials. The longest step ladder readily available is 6 m (20 ft). They are hinged at the top, and can be folded flat for easy transport.

When using step ladders, take the following precautions:

- Fully spread the legs of the step ladder.
- Lock the **spreaders** at each side so that the legs cannot open or close during use.
- Never stand on the top two steps.
- Never use the fold-down shelf near the top of the ladder as a step.

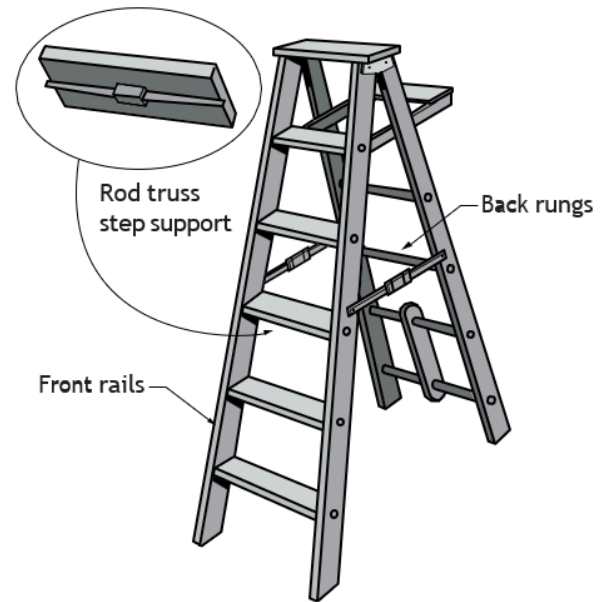


Figure 1 Step ladder (BC Industry Training Authority, 2019). CC BY-NC-SA 4.0 (<https://creativecommons.org/licenses/by-nc-sa/4.0/>)

Single (Straight) Ladders

Manufactured single ladders have **rungs** (a round cross-piece, typically metal). Job-built ones have **cleats** (typically a flat strip of wood). Before using a job-built ladder, make yourself familiar with the relevant workplace regulations.

Whether the ladder has rungs or cleats, the following regulations typically apply:

- Lumber for all components must be construction grade, No. 2 grade, and better.
- Plywood must not be used for any ladder component.
- Side rails must be 38–89 mm (2–4 in.) for ladders up to 5 m (16 ft) long.
- Side rails must be 38–140 mm (2–6 in.) for ladders up to 7.3 m (24 ft) long.
- Cleats must be 19–64 mm (1–3 in.) for ladders up to 5 m (16 ft) long.
- Cleats must be 19–89 mm (1–4 in.) for ladders over 5 m (16 ft) to 7.3 m (24 ft) long.
- Do not notch the side rails to receive cleats.
- Nail the cleats to the narrow edges of the side rails.
- Fill the spaces between the cleats with close-fitting, well-secured **fillers**, of the same thickness as the cleats (Figure 2).
- The distance between side rails must be between 380 mm (15 in.) and 500 mm (20 in.).
- Space the cleats at 300 mm (12 in.) centres.
- Nail cleats made of 19 × 64 mm (1 in. – 3 in.) material with two 57 mm ($2 \frac{1}{4}$ in.) nails at each end.
- Nail cleats made of 19 × 89 mm (1 in. – 4 in.) material with three 57 mm ($2 \frac{1}{4}$ in.) nails at each end.

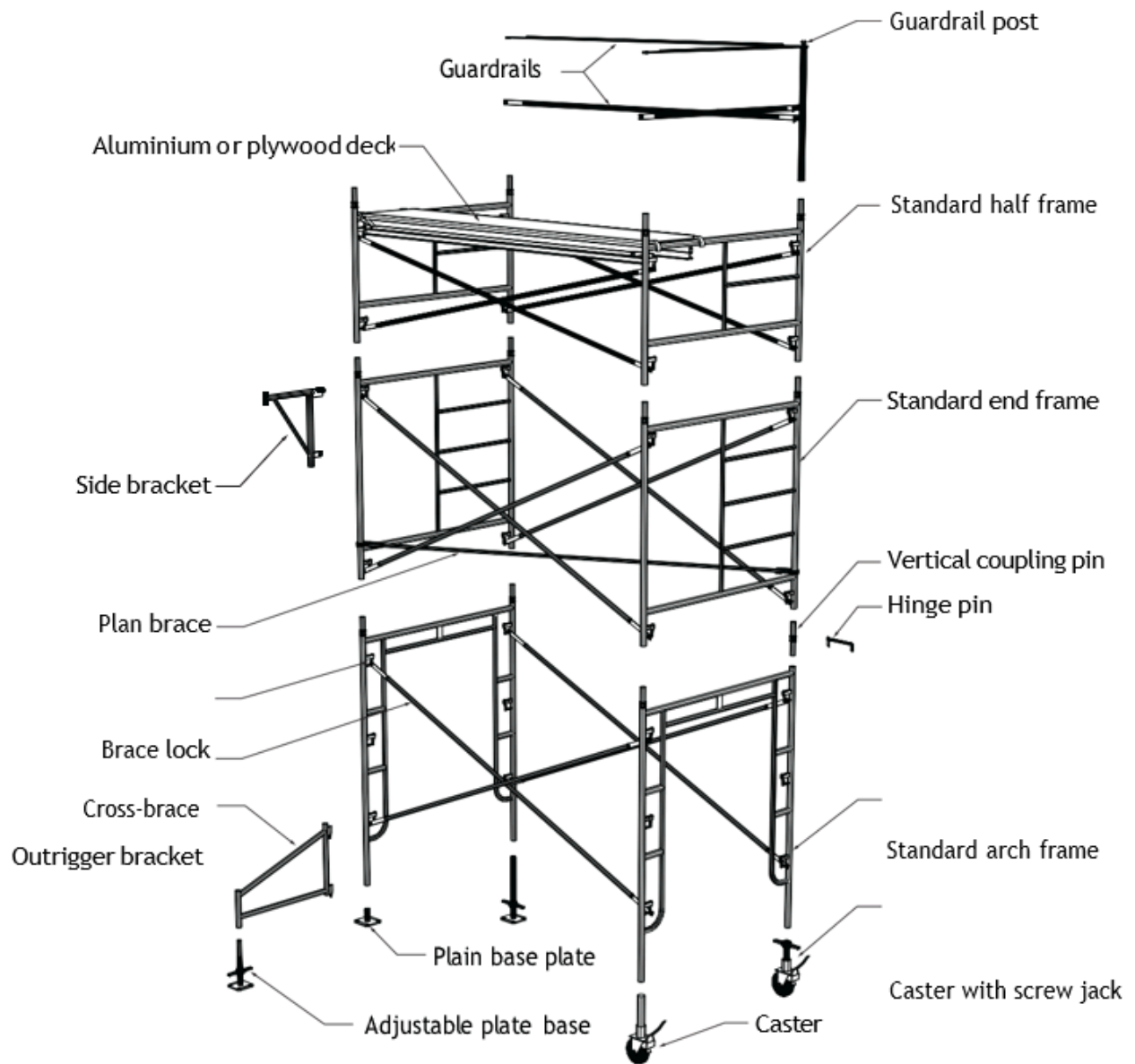


Figure 2 Welded steel frame scaffold (Courtesy WorkSafeBC). CC BY-NC-SA 4.0 (<https://creativecommons.org/licenses/by-nc-sa/4.0/>)

Extension Ladders

An extension ladder is similar to a single ladder. However, the extension ladder has two or three sections that **overlap**, allowing it to reach variable heights.

Brackets that rest on the rungs of lower sections support the higher extending sections. The area where the sections are still in contact with one another is referred to as the overlap section. Longer extension ladders require a longer overlap for strength.

- Grade 1 extension ladders with two sections may be up to 18 m (60 ft) long.
- Grade 1 extension ladders with three sections may extend up to 22 m (72 ft).
- Minimum required overlap is 1 m (39 in.) for ladders extending up to 11 m (36 ft).
- Minimum required overlap is 1.2 m (4 ft) for ladders extending to between 11 m (36 ft) and 15 m (48 ft).
- Minimum required overlap is 1.5 m (5 ft) for ladders extending to between 15 m (48 ft) and 22 m (72 ft).

Watch this WorkSafeBC (2026) video *Choose the Right Ladder and Use It Safely* | WorkSafeBC [2:45] on YouTube.



One or more interactive elements has been excluded from this version of the text. You can view them online here: [#https://b-handmeasuringtools-bcplumbingapprl1.pressbooks.tru.ca/?p=2851#oembed-1](https://b-handmeasuringtools-bcplumbingapprl1.pressbooks.tru.ca/?p=2851#oembed-1) (#oembed-1)



Figure 3 Extension ladder (BC Industry Training Authority, 2019). CC BY-NC-SA 4.0 (<https://creativecommons.org/licenses/by-nc-sa/4.0/>)

Types of Elevated Platforms

A safely erected **scaffold**, for example, provides a stable platform for workers to complete their work. Powered platforms, such as **scissor lifts**, must only be used by trained personnel.

Scaffolds

Workplace regulations do not give specifications for scaffolding accessories such as welded scaffold brackets and **ladder-jack scaffolds**. Many scaffolding accessories available have been tested in accordance with CSA standards and are approved for use as construction work platforms. Accessories that are custom built must be designed by a registered professional engineer and certified as safe for use.

It is the employer's responsibility to ensure that scaffolds used by workers are in safe condition and able to withstand the load, regardless of who erected the scaffold.

Scaffold Construction and Use

Only trained workers should construct and dismantle scaffolds. Do not use damaged materials or weakened scaffold parts when erecting a scaffold. When dismantling a scaffold, carefully remove each component. Pass the removed parts down to a co-worker by hand and use a tool bag to safely raise or lower small components from higher elevations to the ground. Remove any nails or other fasteners that might create a hazard.

Employers must ensure that all scaffolds are safe before use, but workers must also inspect scaffolds prior to use.

Take care not to overload the scaffold. Scaffolds are designed to support only workers and a suitable amount of material. Stockpiling materials is not recommended unless the scaffold is specifically designed to support the additional load.

Knowing how to assemble and use a steel scaffold safely does not guarantee freedom from accidents. Watch your step and be prepared to hold onto something if you lose your balance.

Erecting Scaffolds

Scaffolds are not permanent structures. Scaffolds must be assembled and disassembled quickly. Despite the temporary nature of scaffolds, they are structures, so they must be erected on proper foundations, laid out correctly, and built within specific **tolerances**.

- **Foundations**—Scaffolds are used to access many different work areas, some of which are very large or high. Like any structure, a scaffold needs an adequate foundation. A scaffold is a temporary structure, so there are usually no excavation or concrete footings. The foundation for a scaffold is usually a heavy wooden plank, called a **mudsill**.
- **Layout**—Larger scaffolds require approved plans and specifications to follow during construction. Build smaller wooden scaffolds according to the specifications laid out in the OHS Regulation. In any case, the layout of the scaffold base is critical. The scaffold will be unstable if the base is not square or does not meet the required dimensions.
- **Tolerances**—The tolerances for the construction of a scaffold are the same as for other structures. For prefabricated scaffolds, the overall dimensions are set by the dimensions of the scaffold frames or components. Tube-and-clamp or job-built wooden scaffolds can be constructed to any dimension. The dimensions of these scaffolds should meet the tolerances specified in their design plans.

The usual tolerance for **out-of-plumb** is 6 mm in 3 m ($\frac{1}{4}$ in. in 10 ft) to a maximum of 38 mm ($1\frac{1}{2}$ in.) overall.

Mudsills

When erecting scaffolds supported by the ground, the vertical supports must rest on a solid base. Where the ground is soft or the bearing pressure is high, spread the load over a larger area of the ground with a wood “mudsill” under each vertical support. If a mudsill is placed under a single upright, it should be built from plywood with dimensions of 38 mm × 300 mm × 300 mm (2 in. × 10 in. × 10 in.). It is preferable to have continuous sills, but if this is not possible, use a sill supporting two uprights or, as a last option, a single sill. Sills must be level.

Plumb and Level

Horizontal scaffold supports must be level, and vertical scaffold supports must be plumb. This is required for both aesthetic and structural reasons. A scaffold that looks good and is straight is a mark of a professional tradesperson and is usually safer.

Scaffold Stability

A free-standing scaffold that is more than three times higher than its minimum base dimension must be fastened to the building or supported by other means.

Guardrail and Toe-Boards

A standard **guardrail** (Figure 4) must be installed if the working surface of the scaffold is more than 3 m (10 ft) above the surrounding ground.

The standard guardrail shown in Figure 4 is for a steel-frame scaffold, but the dimensions relating to this type of guardrail apply to all scaffolds. Fibre or wire rope may not be used as guardrails or intermediate rails unless permission has been granted by the Workers' Compensation Board prior to their erection.

Toe-boards prevent tools, materials, or equipment from falling off the scaffold platform. Figure 5 shows how they are installed around the open sides of scaffolds. Toe-boards must extend 100 mm (4 in.) above the work platform and must have no more than

13 mm ($\frac{1}{2}$ in.) clearance between their low edges and the work

platform. Toe-boards may be omitted at access openings.

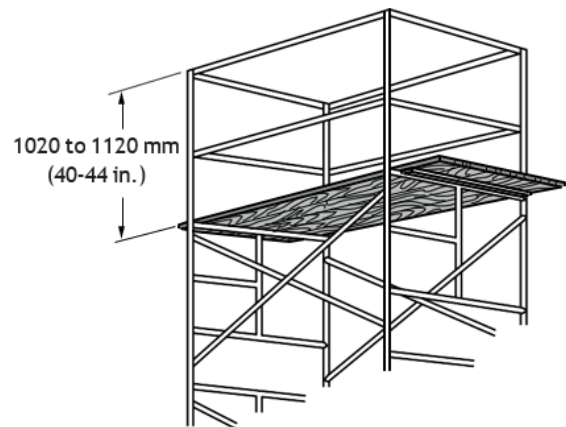


Figure 4 Standard guardrail (BC Industry Training Authority, 2019). CC BY-NC-SA 4.0 (<https://creativecommons.org/licenses/by-nc-sa/4.0/>)

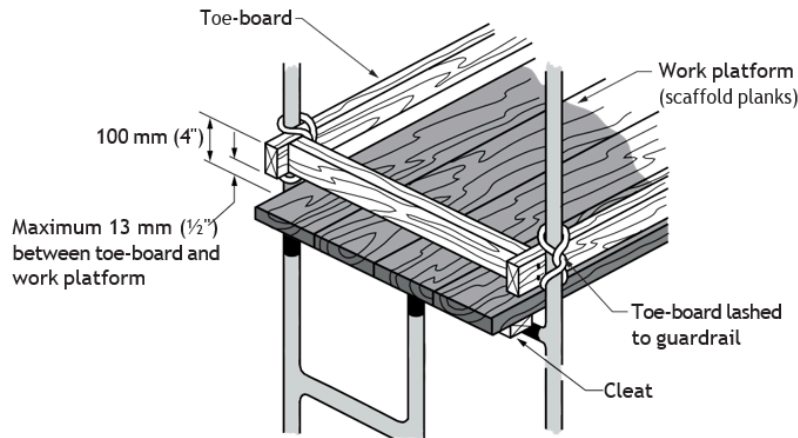


Figure 5 Toe-board on a steel frame scaffold (BC Industry Training Authority, 2019). CC BY-NC-SA 4.0 (<https://creativecommons.org/licenses/by-nc-sa/4.0/>)

Scaffold Planks

Scaffold planks are the work surface of the scaffold, and they must be treated with care. Before being installed, each scaffold plank, new or old, must be inspected. If the strength of any planks is in question, they must be tested.

Lumber Grades, Types, and Sizes for Scaffold Planks

Most regulations require that sawn-wood scaffold planks be “select structural scaffold plank” lumber meeting National Lumber Grades Authority grading rules or an equivalent standard. These planks must show the appropriate grade stamp. However, most sawmills no longer produce planks of this grade; therefore, strict compliance with this regulation is often no longer possible.

Most workplace regulations allow the following alternatives instead of using select structural scaffold plank lumber:

For a 3 m (10 ft) span:

- A double layer of 38–235 mm (2–10 in.) dressed planks (one placed on top of the other, with no need to nail or glue them together), graded No. 2 or better.
- Precautions must be taken where scaffold planking overlaps for continuous runs, as the 75 mm (3 in.) height difference may create a tripping hazard.

Alternatively, a single thickness of rough-sawn plank having actual dimensions of 48–251 mm ($1 \frac{7}{8}$ in. – $9 \frac{1}{4}$ in.), graded

No. 2 or better, may be used.

For a 1.8 m (6 ft) span:

- A single thickness of 38–235 mm (2–10 in.) dressed lumber, graded No. 2 or better.

- Hand-pick scaffold planks for minimal knots and straight grain to ensure they are suitable for scaffold use.

Use only the following species of lumber for scaffold planks:

- Douglas fir-larch
- Hem-fir
- Spruce-pine-fir
- Coast Sitka spruce

Rough lumber is stronger and provides a more slip-resistant surface. However, rough lumber is usually not graded and must therefore be inspected visually for defects before use. All planks must be of uniform thickness.

Manufactured Planks

Manufactured scaffold planks must be CSA-approved. Job-built planks are not approved by WCB unless a registered professional engineer certifies them.

A single manufactured extension staging (painter's plank, the type often used with a ladder-jack scaffold) may be used, provided that it supports only one worker.

Testing Scaffold Planks

If scaffold material is not certified as “tested” prior to shipment to the job site, it must be field-tested before use. To test scaffold planks, follow the procedures described in applicable local workplace regulations.

Plank Platforms

The minimum work-platform width is two planks or 500 mm (20 in.). Openings must not be wider than the width of one plank. If the work platform is sloped, it must be slip-resistant. The maximum slope is 600 mm (2 ft) vertical in 3 m (10 ft) horizontal, which is a 1:5 slope ratio.

Plank Support

Scaffold plank supports must be placed at intervals of at least every 3 m (10 ft) for light work, and at intervals of at least every 2.1 m (7 ft) for heavy work, such as bricklaying and masonry. The planks must extend no less than 150 mm (6 in.) and no more than 300 mm (12 in.) beyond the supporting members.

Scaffold Types

There are three basic types of tubular steel and aluminum scaffolding:

- Welded steel-frame system
- **Allround system**
- **Tube-and-clamp system**



Allround and tube-and-clamp system scaffolding requires a professional scaffolder for installation.

Welded Steel-Frame Scaffold Parts

On construction sites, welded steel-frame scaffolds are the most widely used. They are often rented by the contractor for a specific job. When a large amount of scaffolding is required, there may be a separate contract for the erection and dismantling of the scaffolds. Figure 6 shows a typical welded steel frame scaffold.

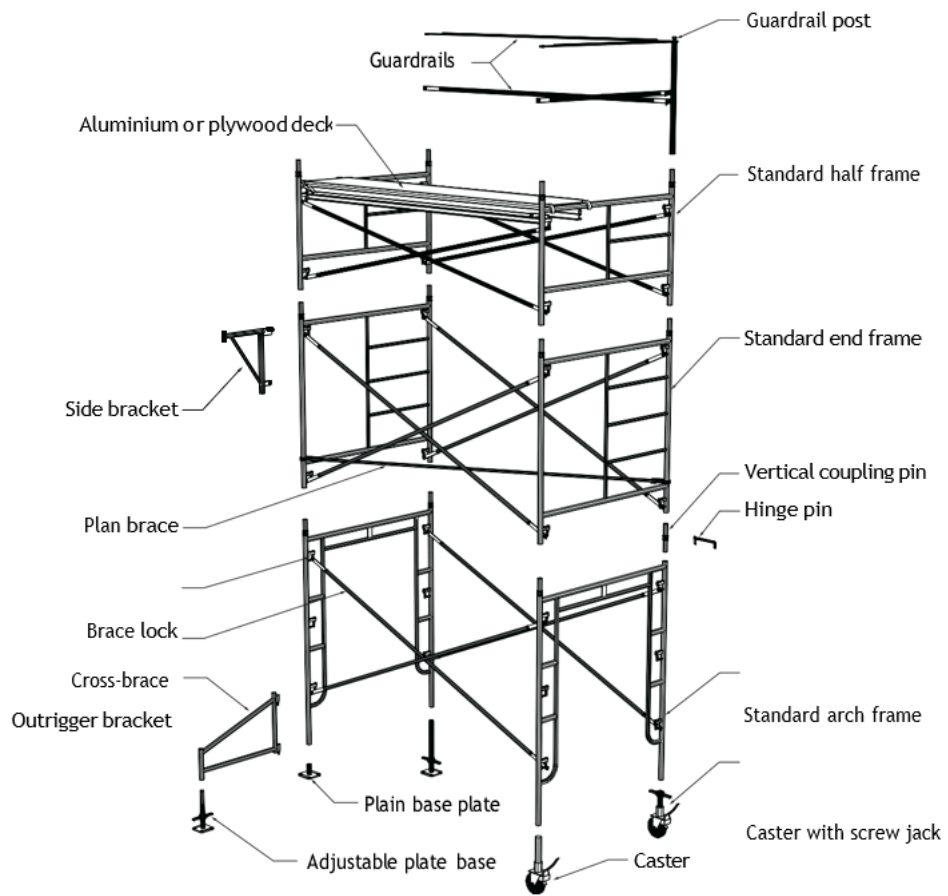


Figure 6 Welded steel frame scaffold
(Courtesy WorkSafeBC)

A welded steel scaffold has two parts: the end frame and the cross-brace (Figure 7).

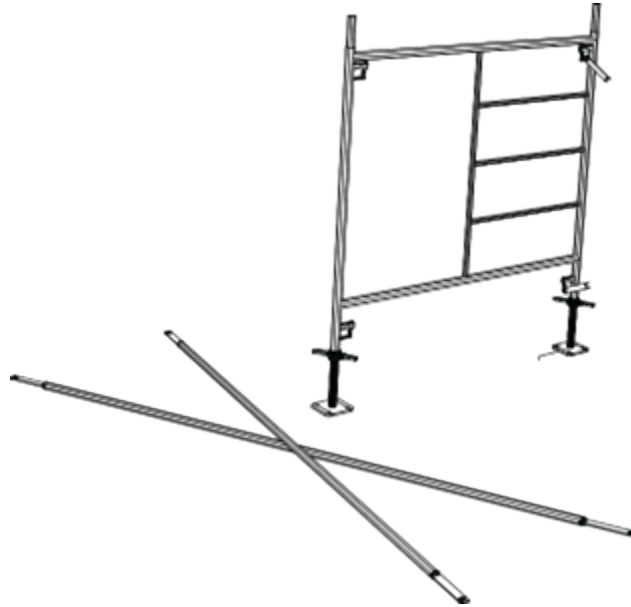


Figure 7 End frame and cross-brace
(Courtesy WorkSafeBC)

Assembling two end frames and two cross-braces forms a single basic unit, as shown below.

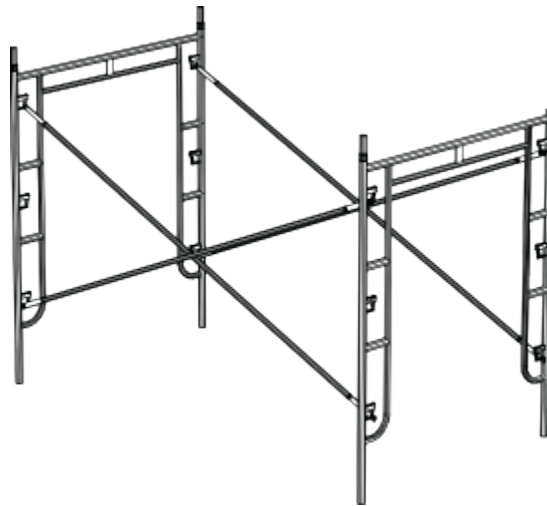


Figure 8 The basic unit of a welded steel scaffold
(Courtesy WorkSafeBC)

The scaffold can be expanded upward or sideways by assembling several basic units adjacent to each other. Use **coupler pins** to align and secure the units.

The scaffold frames must be level in both directions. Use **levelling screw jacks** if required.

When the scaffold is more than one unit high, the basic units are secured to each other by coupler pins inserted through the end frames. Bolts may be needed to secure the pins in place. The entire scaffold should be capable of being lifted by a crane without the frames separating.

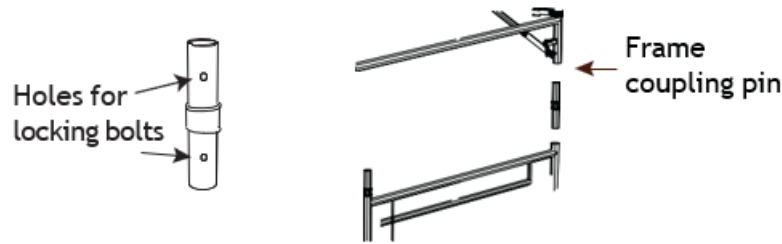


Figure 9 Coupler pin / frame coupling
(Courtesy WorkSafeBC)

Cross-bracing helps to keep the scaffold rigid. Basic units placed next to each other can be connected by cross bracing to form longer or higher units. Cross braces do not provide the required protection and therefore cannot be used as a guardrail. If the work platform is above 3 m (10 ft) from the surrounding grade, guardrails that meet the OHS Regulation must be installed.

Secure steel scaffolds to the building structure at horizontal intervals of 6.4 m (21 ft). The first vertical attachment to the building must be within three times the minimum base dimension, usually 4.6 m (15 ft), and then at intervals of 6 m (20 ft) after that.

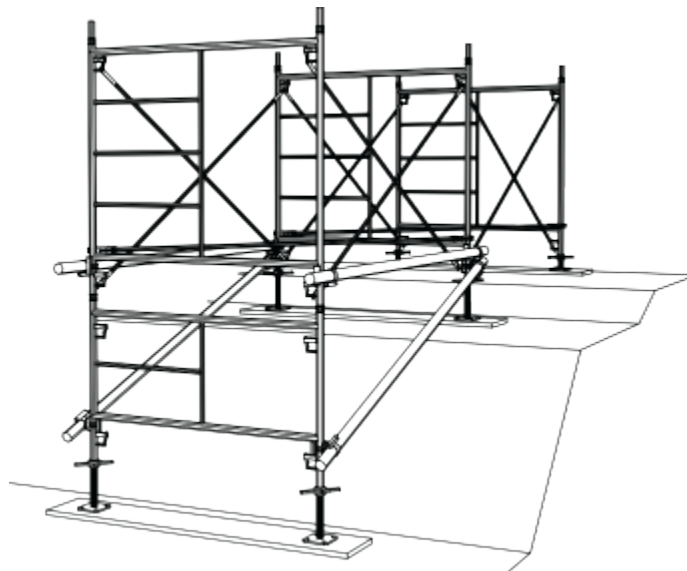


Figure 10 Frames connected by bracing to form a long scaffold
(Courtesy WorkSafeBC)



There is a danger of electric shock when using metal scaffolds near energized electrical equipment. The structure must be grounded or equipped with resilient, nonconductive tires.

Adjusting For Ground Conditions

Whenever scaffolds are erected, they must be level and placed on a firm base. Soil should be well-compacted to remove cavities.

Uneven Ground

If the ground is uneven, use screw jacks or **adjustable base jacks** to level the scaffold. Never use bricks, pallets, boxes, or building blocks to level the base of a scaffold.

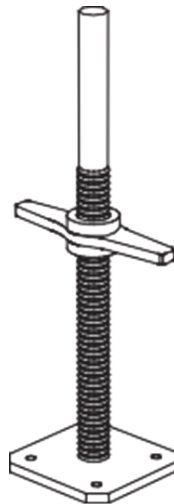


Figure 11 Screw jack
(Courtesy
WorkSafeBC)

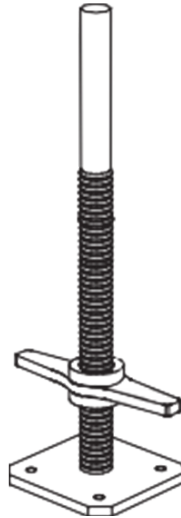


Figure 12 Adjustable base jack
(Courtesy WorkSafeBC)

Soft Ground

To prevent the vertical legs of the scaffold from sinking into soft surfaces, support them with mudsills. For long mudsills, use lumber no smaller than 38 × 235 mm (2 × 10 in.). If a mudsill is placed under a single upright, it should be built from plywood with dimensions of 38 × 300 × 300 mm ($1\frac{1}{2}$ × 12 × 12 in.). Use a base plate to spread the weight of the scaffold over the mudsill.

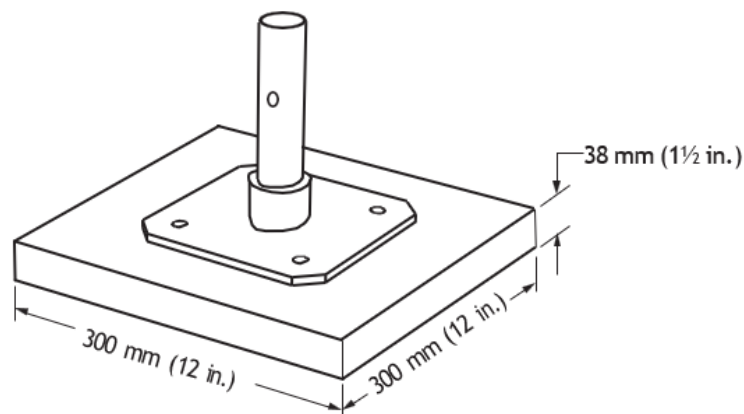


Figure 13 Base plate on mud sill
(Courtesy WorkSafeBC)

Frozen Ground

Do not place mudsills directly onto frozen ground. Dig out the frozen ground until a firm bearing layer is reached, or have an engineer approve the foundation conditions.

Platforms

Planks used for a work platform on a manufactured scaffold are often manufactured to match the steel scaffolding. The plank shown below hooks over the horizontal bars of the end frames, and usually has a minimum width of 508 mm (20 in.). Manufactured planks must be designed to meet workplace regulations.

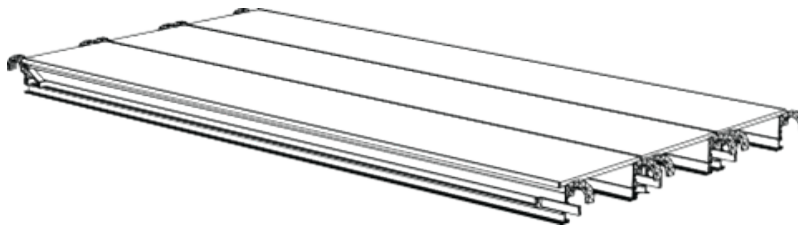


Figure 14 *Manufactured scaffold plank*
(Courtesy WorkSafeBC)

If lumber planks are used instead of manufactured ones, they must be fitted with cleats to prevent them from sliding off the steel frames. Lumber planks must extend beyond the supports by at least 150 mm (6 in.) but no more than 300 mm (12 in.).

Guardrails

Whenever the work platform is more than 3.0 m (10 ft) above the ground, guardrails are required on all open sides of the scaffold platform. The guardrail unit consists of a top rail, an intermediate rail, and a toe-board. The top rail is placed 1020–1120 mm (40–44 in.) above the platform, and the intermediate rail is set halfway between the top rail and the toe-boards. Guardrails can be erected at the top of steel scaffolding using manufactured guardrail posts and metal guardrails.

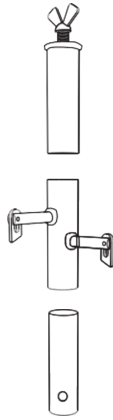


Figure 15 Guardrail post
Courtesy of WorkSafeBC



Figure 16 Metal guardrail
Courtesy of WorkSafeBC

When manufactured guardrail components are not available, an additional unit of scaffolding may be added to the top of the scaffold. Attach wooden guardrails to this added section. Guardrails must be installed at the ends of the platforms as well as along the sides.

Rolling Scaffolds

A rolling scaffold is a steel scaffold fitted with **casters** so that it can be moved easily. With casters, even a heavy unit two or three frames high can be moved easily. Rolling scaffolds must be used only on floors that are within three degrees of level and must be free of depressions and obstructions.

Casters must be installed on steel scaffolds so that they cannot fall out if one end of the scaffold is lifted. All casters must be bolted to the frame. Casters must be fitted with locking devices or brakes when workers are on the scaffold more than 3 m (10 ft) above floor level. Because the casters allow the basic unit to shift from corner to corner, a horizontal cross brace, called a **sway brace**, is installed to give the unit rigidity.

The most common violation by users of rolling scaffolds is failure to install locking pins to secure the wheels in place. The pins are required to hold the wheels in place. Accidents have occurred because one of the wheels fell out when the scaffold was rolled over a depression in the floor or ground. All vertical frames must also be equipped with locking pins at the top and bottom of the couplers.

The height of a rolling scaffold must not exceed three times its base dimension. Use outriggers to increase the base dimension and allow for a higher free-standing scaffold.

Moving Rolling Scaffolds

If the height of the platform exceeds $1 \frac{1}{2}$ times the minimum base dimension of a rolling scaffold, a worker on the work platform must not move the scaffold while remaining on it.

If the height of the platform exceeds two times the minimum base dimension of a rolling scaffold, a worker must not remain on the scaffold while it is being moved from below.

Always cover floor openings and use curb protection when using rolling scaffolds. Follow the manufacturer's instructions precisely when erecting manufactured scaffolds, to reduce the risk of accidents.

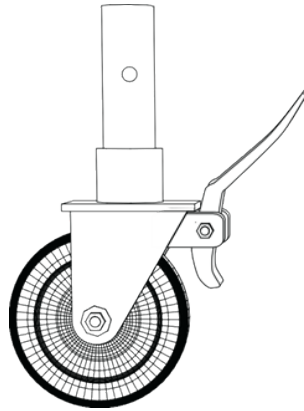


Figure 17 Caster wheel (BC Industry Training Authority, 2019). CC BY-NC-SA 4.0 (<https://creativecommons.org/licenses/by-nc-sa/4.0/>)

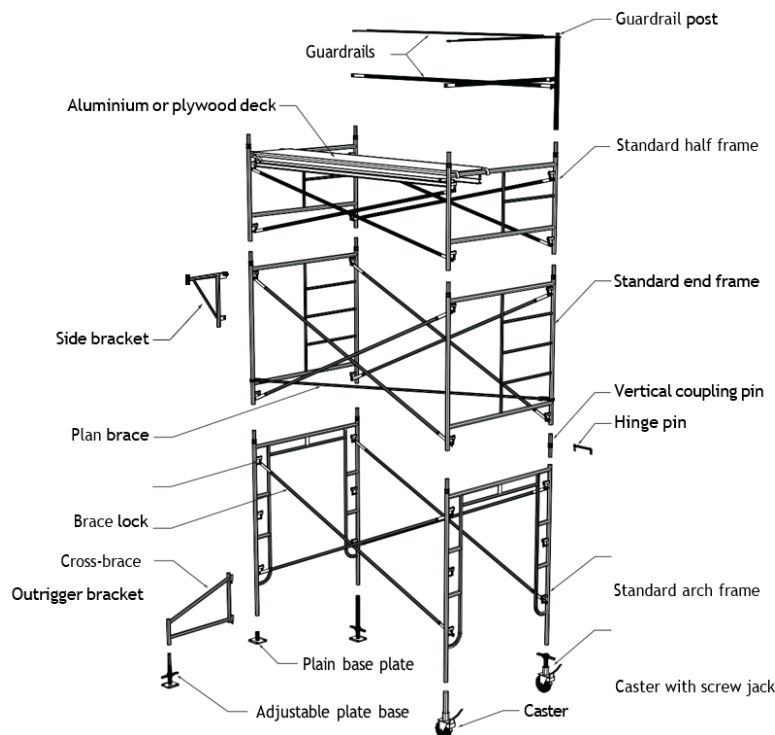


Figure 18 Rolling scaffold (Courtesy WorkSafeBC)

Powered Elevated Work Platforms

Power-elevated work platforms are useful because they provide mobility and access to different elevations. These types of lifts allow workers to reach elevated work areas and operate the equipment from the platform.

Scissor Lifts

A scissor lift is a type of elevated platform that can be used to access high work areas while supporting multiple workers and equipment. Most scissor lifts used in construction are mounted on rubber tires, either solid or **pneumatic**, which allow the lifts to be transported to worksites on trailers.

The largest advantage of scissor lifts is their ability to quickly move a load vertically. Linked, folding supports connected in a crisscross pattern provide vertical movement of the platform.

The upward motion is achieved by applying pressure to the outside of the lowest set of supports, lengthening the crossing pattern and propelling the work platform vertically. The platform may also have an extending platform bridge to allow closer access to some work areas.

The driving force of the scissor action is most often **hydraulic**, but it may also be pneumatic or mechanical (using a lead screw or rack-and-pinion system). Depending on the power system employed on the lift, it may require no power to enter “descent” mode, but rather a simple release of hydraulic or pneumatic pressure.



Figure 19 TL 2000 scissor lift (Edmolift AB/Wikimedia Commons CC BY-SA 3.0 (<http://creativecommons.org/licenses/by-sa/3.0/>))



Figure 20 Scissor lift (elevated work platform) (BC Industry Training Authority, 2019). CC BY-NC-SA 4.0 (<https://creativecommons.org/licenses/by-nc-sa/4.0/>)

This is the main reason that these methods of powering the lifts are preferred, as they allow a fail-safe method of returning the platform to the ground by release of a manual valve.

Boom Lifts

Boom lifts are often mounted on rubber pneumatic tires capable of operating on rough terrain.

Also known as **cherry pickers**, they are widely used for maintenance and construction applications, including extensive use in the pipe trades. As with all power-operated elevated work platforms, proper training in safe operating procedures is required for all employees who will operate this equipment.

You must perform safety checks and log critical information daily. Consult local workplace regulations for additional requirements.

The **bucket** is designed for a person to stand in and work from. Often the person in the bucket has a duplicate set of controls available at grade level, allowing them to position the platform. The lifting arms of some cherry pickers are capable of telescoping to adjust the reach of the device, usually with automatic safety controls to prevent tipping. Articulated boom lifts (a highly manoeuvrable design) are more appropriate than **stick booms** when operating in tight spaces or when it is necessary to clear nearby obstacles.



Figure 21 Articulating Boom Lift (Billy McCrorie/Wikimedia Commons) CC BY-SA 2.0
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Self-Test B-3.1: Ladders and Elevated Platforms

Complete Self-Test 3.1 and check your answers.

If you are using a printed copy, please find Self-Test A-3.1 and Answer Key in the Appendix at the end. If you prefer, you can scan the QR code with your digital device to go directly to the interactive Self-Test.



An interactive H5P element has been excluded from this version of the text. You can view it online here:
<https://b-handmeasuringtools-bcplumbingapprl1.pressbooks.tru.ca/?p=2851#h5p-32> (<https://b-handmeasuringtools-bcplumbingapprl1.pressbooks.tru.ca/?p=2851#h5p-32>)

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B-3.2 Use Ladders and Elevated Platforms

Portable Ladder Safety

Portable ladder safety requirements are governed by workplace regulations. In British Columbia, these requirements are outlined in WorkSafeBC's Occupational Health and Safety Regulation, Part 13: Ladders, scaffolds and temporary work platforms (<https://www.worksafebc.com/en/law-policy/occupational-health-safety/searchable-ohs-regulation/ohs-regulation/part-13-ladders-scaffolds-and-temporary-work-platforms>), available on the WorkSafeBC website.

The following rules apply to all portable ladders:

- Inspect all portable ladders before use.
- Do not use ladders with loose, broken, or missing rungs, split side rails, or other dangerous defects.
- Ensure that aluminum ladders have all members straight and properly aligned.
- Remove from use any aluminum ladder with bends, kinks, or other damage.
- Have damaged ladders repaired by an appropriate and reputable firm before putting them back into service.
- Do not use metal ladders or wire-reinforced wooden ladders near energized electrical equipment.
- Use only transparent protective coatings or preservatives on wooden ladders, so that possible defects remain visible during inspection.
- Never reach more than one arm's length beyond the side of the ladder.
- Do not carry heavy or bulky items while climbing up or down ladders.
- Always face the ladder when climbing up or down.
- Ensure that all ladders bear the appropriate Canadian Standards Association (CSA) label.

Carrying, Setting Up, and Using Ladders

Single and extension ladders have the same basic requirements for safe use:

- Rest the foot of the ladder on a firm, level base.
- Choose a ladder of sufficient length to project at least 1 m (3 ft) above the level of the **landing** to which it provides access.
- Do not stand on the top two **rungs** or **cleats**.
- See the illustration for Figure 1: It shows a side-elevation view of a ladder leaning against a building. If dimension A is 4 m (13 ft), then B should be approximately 1 m (3 ft), and C should extend approximately 1 m (3 ft) above the level of the landing.

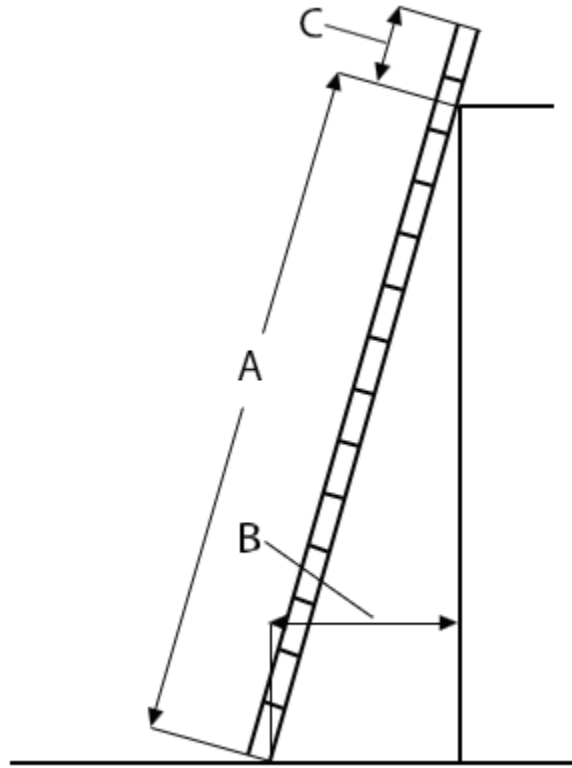


Figure 1 Correct ladder slope (BC Industry Training Authority, 2019). CC BY-NC-SA 4.0 (<https://creativecommons.org/licenses/by-nc-sa/4.0/>)

- Ladders must have **slip-resistant safety feet** or be secured to prevent slipping during use.

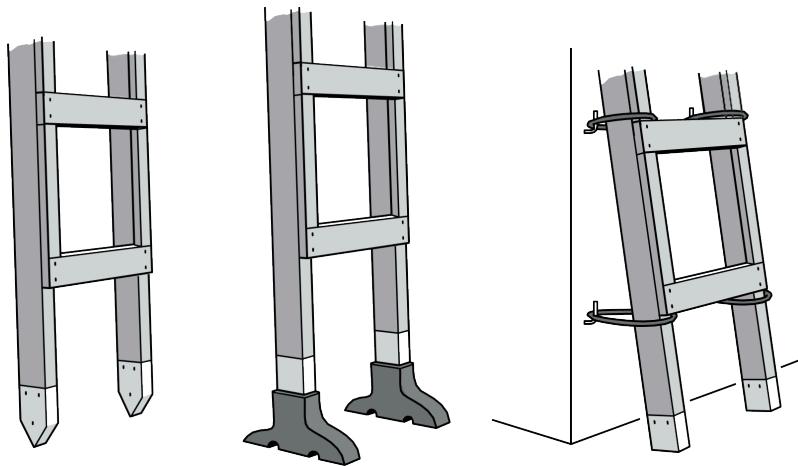


Figure 2 Securing the base of single or extension ladders (BC Industry Training Authority, 2019). CC BY-NC-SA 4.0 (<https://creativecommons.org/licenses/by-nc-sa/4.0/>)

Setting Up Single and Extension Ladders

It is important to use the correct methods for setting up ladders to avoid injury to the person or damage to the ladder. Check for overhead wires or other hazards before lifting the ladder.

Setting Up Alone

The following steps should be followed when setting up or taking down a ladder when you are alone.

1. Lay the ladder on the ground with the base resting against the wall and the top pointing away from the wall.
2. Starting at the top of the ladder, lift the end over your head and walk under the ladder toward the wall, moving your hands from rung to rung as you go (Figure 3).
3. If you find you are unable to raise the ladder enough, set it back down and get help.
4. Adjust the slope of the ladder so that the distance from the wall at the base is one-quarter of the height of the landing being accessed.
5. If necessary, secure both the top and bottom to prevent dislodgment.
6. Reverse this process to take down the ladder, and remember that you will be walking backwards, so check your path for obstacles before you start.
7. Lower the ladder slowly so that you keep it under control and prevent it from falling on you.

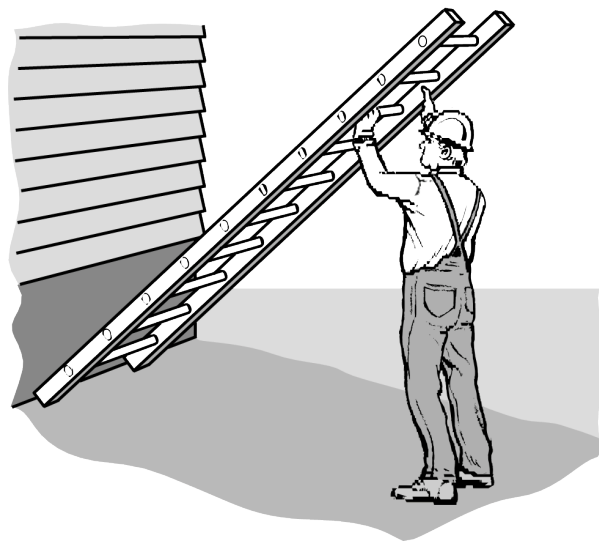


Figure 3 Setting up a ladder alone (BC Industry Training Authority, 2019). CC BY-NC-SA 4.0 (<https://creativecommons.org/licenses/by-nc-sa/4.0/>)

Setting Up with a Helper

The following steps should be followed when setting up or taking down a ladder with someone else's help:

1. Lay the ladder flat on the ground, with its feet at the point where they will be placed during use, and with its

length parallel to the surface against which it will be placed.

2. With the helper holding the base of the ladder in place, lift the top of the ladder over your head.
3. Walk down the length of the ladder, lifting as you go and moving your hands from rung to rung, while your helper bears some of the ladder's weight (Figure 4).
4. When the ladder is straight up, lower the top gently against the wall.
5. If necessary, secure both the top and bottom to prevent dislodgment.

Follow these steps in reverse to take down the ladder. Remember to check your path for obstacles because you will be walking backwards. Gravity will cause the ladder to fall if not controlled at all times.

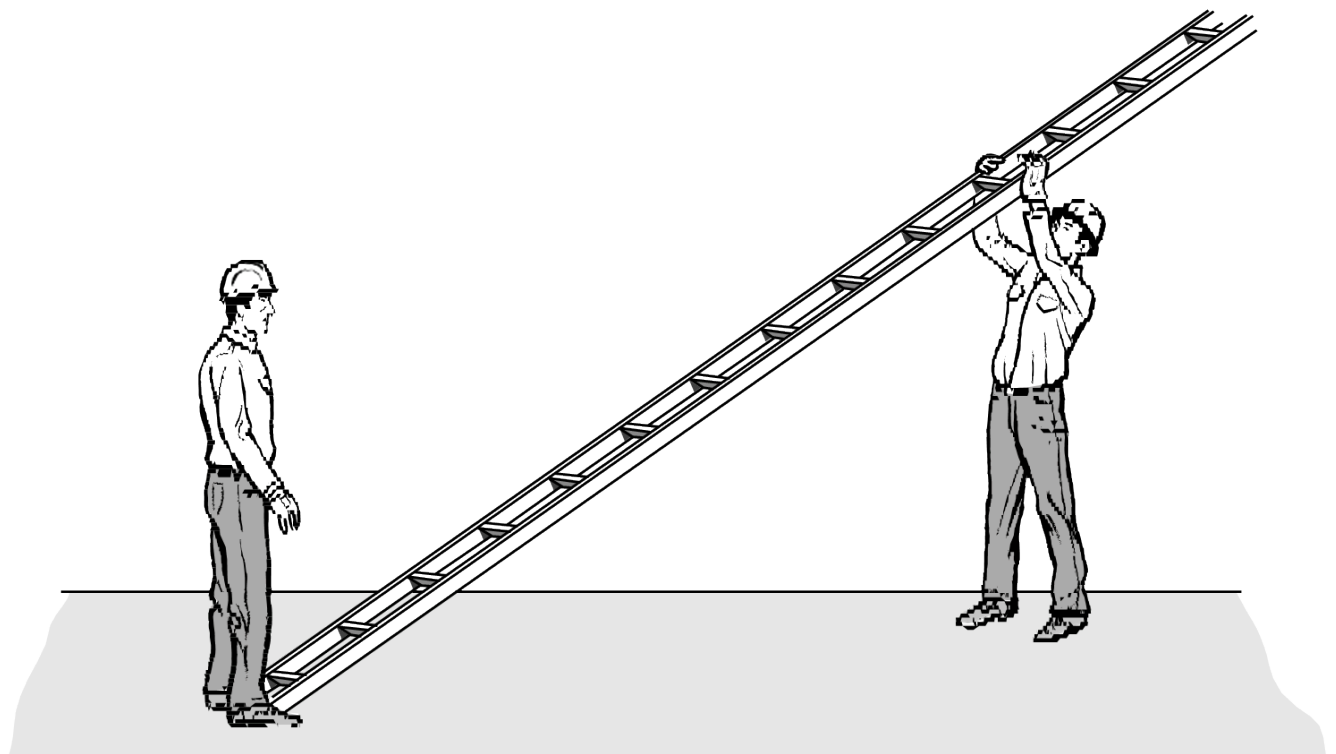


Figure 4 Setting up a ladder with a helper (BC Industry Training Authority, 2019). CC BY-NC-SA 4.0 (<https://creativecommons.org/licenses/by-nc-sa/4.0/>)

Ladder Maintenance and Storage

In addition to a routine inspection before use, proper maintenance and storage of a ladder will help ensure that it is safe to use. The following steps highlight important practices for maintaining ladders:

- Wipe the ladder clean to keep it free of oil, grease, or grime.
- Replace frayed or worn ropes on extension ladders.
- Treat wood ladders with a clear finish or penetrating preservative. NEVER paint a wood ladder because paint can hide damage.
- Clean and lubricate pulleys on an extension ladder.
- Store ladders away from heat, moisture, weathering, and sunlight. Ultraviolet (UV) rays damage fibreglass, and heat and moisture can cause wood ladders to rot.

- Properly store ladders on a rack; do not store materials on ladders.

General Requirements for Scaffolds

The following specifications apply to all scaffolds:

- Scaffolds shall be erected, maintained, and dismantled under the direct personal supervision of an experienced, competent worker.
- Use a spirit level to set standards and ledgers accurately in both horizontal and vertical alignment at each lift.
- All wood planks shall be unpainted and regularly inspected for defects.
- Place the inner row of standards as close as possible to the wall. If they are more than one plank width from the wall, install an inside guardrail and midrail. The work platform must be fully planked.
- Standards shall be spaced no more than 2.1 m (7 ft) apart for heavy work and 3 m (10 ft) apart for light work.

Erecting Welded Frame Scaffolds

Scaffolds should be erected by two or more people. The following instructions are provided as a general guideline; always follow the manufacturer's or supplier's specifications. These steps describe the assembly of a scaffold that is one frame high. Additional frames should be added after Step 5 and before installing the guardrail system. Before erecting a scaffold, ensure you are familiar with OHS Regulation Part 11: Fall Protection (<https://www.worksafebc.com/en/law-policy/occupational-health-safety/searchable-ohs-regulation/ohs-regulation/part-11-fall-protection>) and applicable Workers' Compensation Board (WCB) requirements available on the WorkSafeBC website.

1. Select and prepare the ground area. Select the equipment you need and place it near your work area. Place suitable **sills** and make sure there are no holes under the sills. Put the adjustable **base plates** onto the sills to match your approximate scaffold dimensions, but don't secure them to the sills yet. Adjust the base plate jack nuts so they are approximately level, starting with the jack nut at the highest level and setting it relatively low—about 7.5–15 cm (3–6 in.) from the top of the sill.

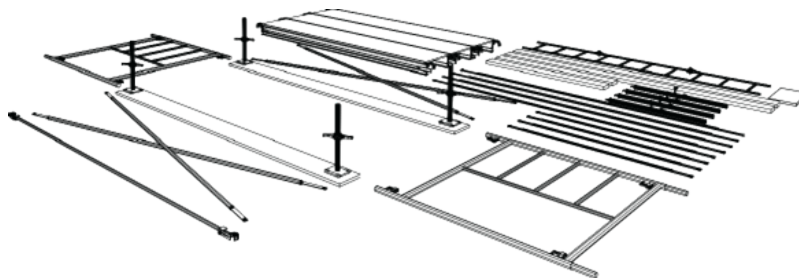


Figure 5 Lay out components
(Courtesy of WorkSafeBC)

If you are erecting a rolling scaffold, you will not install sills or base plates because you will be working on a hard, level surface. In this case, you can start by installing the four wheels onto the first two frames.

2. Place the first frame onto the base plates, then connect a **cross brace** to the frame. Allow the frame to lean slightly forward and rest on the sill while you prepare to install the next frame.

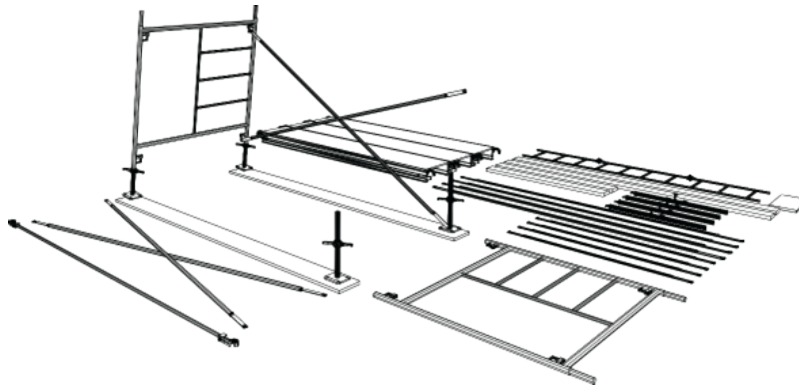


Figure 6 First frame installation
(Courtesy of WorkSafeBC)

3. Install the second frame onto the base plates and secure the previously connected cross brace to the second frame.

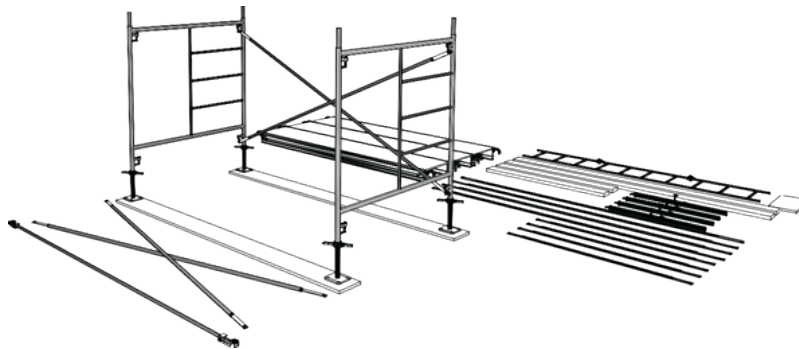


Figure 7 Second frame installation
(Courtesy of WorkSafeBC)

4. Install the second cross brace to both frames, then level the scaffold using the jack screws. If possible, always bring the highest corner down. Install the **plan brace (gooser bar)** to keep the scaffold square. Fasten the base plates to the sills.

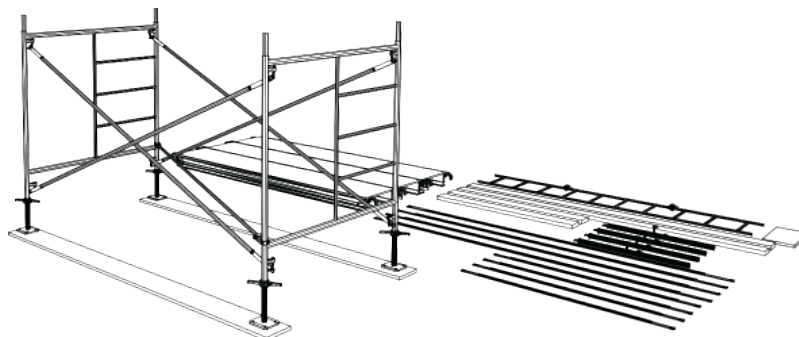


Figure 8 Complete basic unit
(Courtesy of WorkSafeBC)

5. Install the decking, which may be metal or wood planks, or aluminum and plywood decking units.

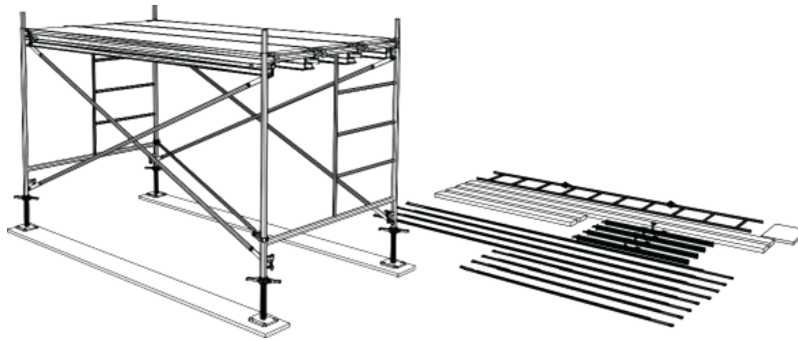


Figure 9 Install decking
(Courtesy of WorkSafeBC)

6. Select the appropriate guardrail system. If your system is purpose-made for frame scaffolds, install the four posts into the vertical coupling pins on top of the frames. Make sure all coupling pins have two locking pins or spring clips to prevent separation.

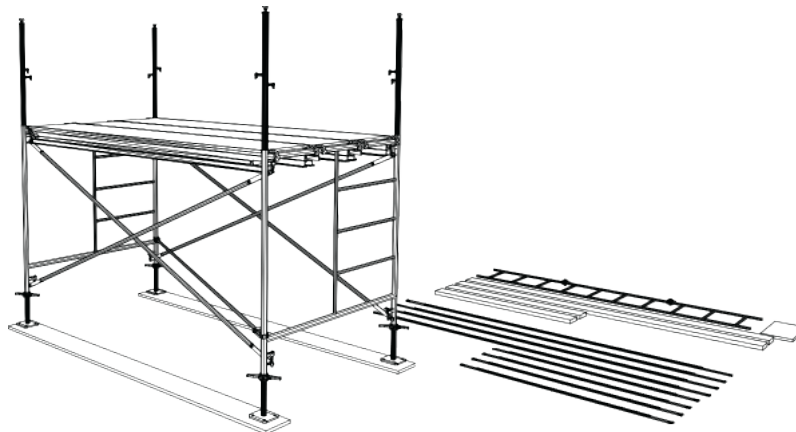


Figure 10 Install guardrail posts
(Courtesy of WorkSafeBC)

7. Attach the guardrails and midrails to the posts on all exposed sides.

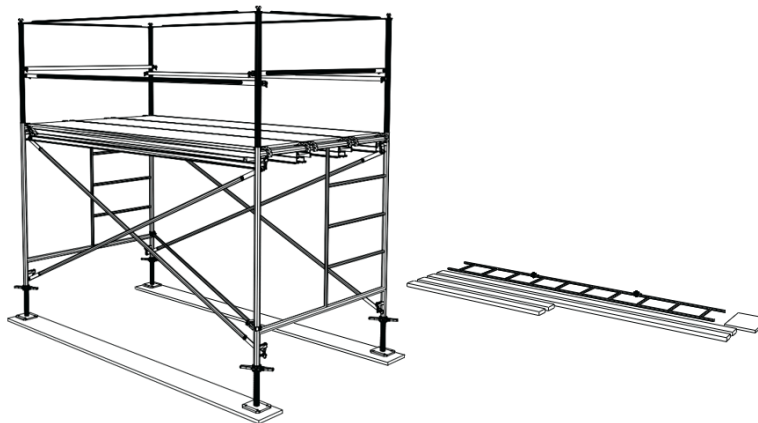


Figure 11 Install guardrails
(Courtesy of WorkSafeBC)

8. Install toe-boards as required.

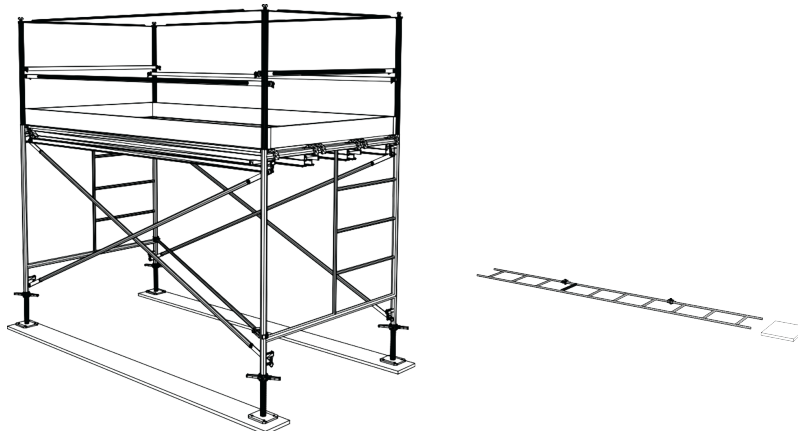


Figure 12 Install toe-boards
(Courtesy of WorkSafeBC)



Self-Test B-3.2: Use Ladders and Elevated Platforms

Complete Self-Test 3.2 and check your answers.

If you are using a printed copy, please find Self-Test A-3.2 and Answer Key in the Appendix at the end. If you prefer, you can scan the QR code with your digital device to go directly to the interactive Self-Test.





An interactive H5P element has been excluded from this version of the text. You can view it online here:
<https://b-handmeasuringtools-bcplumbingapprl1.pressbooks.tru.ca/?p=2853#h5p-7> (<https://b-handmeasuringtools-bcplumbingapprl1.pressbooks.tru.ca/?p=2853#h5p-7>)

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- **Figures 5-12** are courtesy of WorkSafeBC and are used with permission.

Self-Test B-3.1: Describe Ladders and Elevated Platforms

Complete Self-Test B-3.1 and check your answers.

1. Which organization publishes the Occupational Health and Safety regulations related to ladders and scaffolds in British Columbia?
 - a. Canadian Standards Association (CSA)
 - b. American National Standards Institute (ANSI)
 - c. WorkSafeBC
 - d. National Building Code
2. Which of the following is NOT one of the three basic types of ladders?
 - a. Step ladder
 - b. Extension ladder
 - c. Single (straight) ladder
 - d. Platform ladder
3. A Grade 1 ladder is designed primarily for:
 - a. Household use
 - b. Construction or industrial use
 - c. Office use
 - d. Recreational use
4. A step ladder is described as self-supporting. What does this mean?
 - a. It must be secured to a wall before use
 - b. It can stand on its own without leaning against a structure
 - c. It can only be used indoors
 - d. It must be used with scaffolding
5. When using a step ladder, which safety practice must always be followed?
 - a. Stand on the top step to gain extra height
 - b. Lock the spreaders before climbing
 - c. Lean the ladder against a wall
 - d. Use the shelf near the top as a step
6. Manufactured single ladders usually have:
 - a. Cleats
 - b. Platforms
 - c. Rungs
 - d. Spreaders
7. On a job-built ladder, the climbing steps are called:

- a. Spreaders
- b. Cleats
- c. Guardrails
- d. Platforms

8. For safe ladder setup, the distance between the ladder base and the wall should be approximately:

- a. One tenth of the ladder height
- b. One quarter of the ladder height
- c. One half of the ladder height
- d. The same as the ladder height

9. A worker must access a platform that is 4 m high. Approximately how far should the ladder base be from the wall?

- a. 0.5 m
- b. 1 m
- c. 2 m
- d. 4 m

10. In an extension ladder, the overlap section refers to:

- a. The part where ladder feet touch the ground
- b. The section where ladder parts slide over each other
- c. The rung spacing on the ladder
- d. The guardrail attachment point

11. A temporary structure used to provide a working platform at height is called a:

- a. Cleat
- b. Scaffold
- c. Spreader
- d. Guardrail

12. Who is responsible for ensuring scaffolds used by workers are safe and able to withstand loads?

- a. The worker using the scaffold
- b. The manufacturer
- c. The employer
- d. The safety inspector

13. Before using a scaffold, a responsible worker must:

- a. Inspect the scaffold
- b. Paint the scaffold
- c. Remove guardrails
- d. Install additional planks

14. A scaffold is being erected on soft ground. What should be used to spread the load and provide support?

- a. Toe-boards
- b. Mudsills
- c. Cleats
- d. Coupler pins

15. The term out-of-plumb refers to a structure that is:

- a. Not level horizontally
- b. Not perfectly vertical
- c. Not supported properly
- d. Too tall for its base

16. Guardrails must be installed when a scaffold work platform is more than:

- a. 1 m above ground
- b. 2 m above ground
- c. 3 m above ground
- d. 5 m above ground

17. The purpose of toe-boards on scaffolds is to:

- a. Support the scaffold frame
- b. Prevent tools or materials from falling off the platform
- c. Secure the scaffold to the building
- d. Connect scaffold braces

18. What is the main function of a scissor lift?

- a. To move workers horizontally
- b. To raise workers vertically using folding supports
- c. To stabilize scaffolding
- d. To secure ladders

19. Casters on a rolling scaffold allow the scaffold to:

- a. Increase height
- b. Move easily across a surface
- c. Attach to a building
- d. Support heavier loads

20. The platform where a worker stands on a boom lift is called the:

- a. Guardrail
- b. Bucket
- c. Cleat
- d. Coupler

Answer Key: Self-Test B-3.1 is on the next page.

Answer Key: Self-Test B-3.1

1. c. WorkSafeBC
2. d. Platform ladder
3. b. Construction or industrial use
4. b. It can stand on its own without leaning against a structure
5. b. Lock the spreaders before climbing
6. c. Rungs
7. b. Cleats
8. b. One quarter of the ladder height
9. b. 1 m
10. b. The section where ladder parts slide over each other
11. b. Scaffold
12. c. The employer
13. a. Inspect the scaffold
14. b. Mudsills
15. b. Not perfectly vertical
16. c. 3 m (10 ft.)
17. b. Prevent tools or materials from falling off the platform
18. b. To raise workers vertically using folding supports
19. b. Move easily across a surface
20. b. Bucket

Self-Test B-3.2: Use Ladders and Elevated Platforms

Complete Self-Test B-3.2 and check your answers.

1. The type of finish for a wooden ladder is:
 - a. Oil-based paint
 - b. Latex paint
 - c. Solid colour stain
 - d. Clear finish
2. Which of the following ladders is freestanding?
 - a. Extension
 - b. Step
 - c. Single
 - d. Fixed
3. A full body harness attached to a lifeline must be used when working on a scaffold higher than
 - a. 2.1 m (7 ft.)
 - b. 2.4 m (8 ft.)
 - c. 3 m (10 ft.)
 - d. 4.9 m (16 ft.)
4. The correct slope for single or extension ladders is:
 - a. 1 up the slope of the ladder to 4 horizontal
 - b. 2 up the slope of the ladder to 4 horizontal
 - c. 3 up the slope of the ladder to 1 horizontal
 - d. 4 up the slope of the ladder to 1 horizontal
5. Minimum size for the side rail of a 3 m (10 ft.) job-built single ladder is
 - a. 38–38 mm (2–2 in.)
 - b. 38–64 mm (2–3 in.)
 - c. 38–89 mm (2–4 in.)
 - d. 38–140 mm (2–6 in.)
6. The minimum distance that a single or extension ladder is required to project above the level to which it gives access, is
 - a. 500 mm (20 in.)
 - b. 600 mm (2 ft)
 - c. 900 mm (3 ft)
 - d. 1200 mm (4 ft)
7. What is the minimum width of a wooden scaffold plank?
 - a. 140 mm (5½ in.)
 - b. 184 mm (7¼ in.)
 - c. 235 mm (9¼ in.)
 - d. 286 mm (11½ in.)

8. What is the minimum height of a guardrail?
- a. 600 mm (24 in.)
 - b. 750 mm (30 in.)
 - c. 900 mm (36 in.)
 - d. 1020 mm (40 in.)
9. At what maximum height does a scaffold require a guardrail?
- a. 1200 mm (4 ft)
 - b. 2100 mm (7 ft)
 - c. 2400 mm (8 ft)
 - d. 3000 mm (10 ft)
10. Bolts or pins must be placed through the end frames and coupler pins when the scaffold is higher than one unit.
- a. True
 - b. False
11. Casters for steel scaffolds must have:
- a. Rubber tires
 - b. Ball bearings
 - c. Leveling screws
 - d. Brakes
12. What is the maximum height of a rolling scaffold?
- a. 2 times its minimum base dimension
 - b. 2½ times its minimum base dimension
 - c. 3 times its minimum base dimension
 - d. 3½ times its minimum base dimension
13. Steel scaffolds fitted with casters also require:
- a. Sway braces
 - b. Screw jacks
 - c. Base plates
 - d. Mud sills

Answer Key: Self-Test B-3.2 is on the next page.

Answer Key: Self-Test B-3.2

1. d. Clear finish
2. b. Step
3. c. 3 m (10 ft.)
4. d. 4 up the slope of the ladder to 1 horizontal
5. c. 38 × 89 mm (2 × 4 in.)
6. c. 900 mm (3 ft.)
7. c. 235 mm (9-1/4 in.)
8. d. 1020 mm (40 in.)
9. d. 3000 mm (10 ft.)
10. a. True
11. d. Brakes
12. c. Three times its minimum base dimension
13. a. Sway braces

Version History

This page provides a record of changes made to this learning resource, Plumbing Apprenticeship Level 1, Block B (<https://b-handmeasuringtools-bcplumbingapprl1.pressbooks.tru.ca/>). Each update increases the version number by 0.1. The most recent version is reflected in the exported files for this resource.

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Version	Date	Change	Details
1.0	May 2026	Plumbing Apprenticeship Level 1 Block B learning resource from STBC content converted to open and freely accessible digital platform and published at TRU.	

Plumbing Apprenticeship & Trade Resources in BC

A successful career in plumbing requires a strong foundation of skills, knowledge, and workplace safety awareness. Below are key resources to support plumbing apprentices in BC, including educational pathways, trade certifications, workplace safety guidelines, and mental health and wellness support.

Plumbing Apprenticeship & Certification Resources

- **SkilledTradesBC – Plumbing Apprenticeship** (<https://skilledtradesbc.ca/plumber>) – Overview of plumbing training, certification requirements, and apprenticeship pathways in British Columbia.
- **Red Seal Program – Plumber** (<https://www.red-seal.ca/eng/trades/plumbers/overview.shtml>) – National certification program with exam prep guides and trade mobility information.
- **BC Building Codes & Standards** (<https://www.bccodes.ca/>) – Official building and plumbing codes for British Columbia.

Workplace Safety & Regulations

- **WorkSafeBC** (<https://www.worksafebc.com/en>) – Essential safety resources for plumbers, including:
 - Health & Safety – WorkSafeBC (<https://www.worksafebc.com/en/health-safety>)
 - Report Unsafe Working Conditions (<https://www.worksafebc.com/en/contact-us/departments-and-services/health-safety-prevention>)
 - Report a Workplace Injury or Disease (<https://www.worksafebc.com/en/claims/report-workplace-injury-illness>)
 - Submit a Notice of Project Form (<https://www.worksafebc.com/en/for-employers/just-for-you/submit-notice-project>)
 - Get Health and Safety Resources (Videos, Posters, Publications, and More) (<https://www.worksafebc.com/en/resources-health-safety>)
 - Search the OHS Regulations (and Related Materials) (<https://www.worksafebc.com/en/law-policy/occupational-health-safety/searchable-ohs-regulation>)
 - Conduct an Incident Investigation (<https://www.worksafebc.com/en/health-safety/create-manage/incident-investigations/conducting-employer-investigation>)
- **CCOHS: OHS Answers Fact Sheets – Plumber** (https://www.ccohs.ca/oshanswers/occup_workplace/plumber.html) – Safety guidelines and best practices for plumbers in various work environments.

Financial Supports

- **Financial Support (SkilledTradesBC)** (<https://skilledtradesbc.ca/financial-support>) – Information about grants, tax credits, Canada apprentice loans, employment insurance, and the Indigenous Skills and Employment Training

(ISET) program.

- **StudentAidBC** (<https://studentaidbc.ca/>) – Complete post-secondary education through student loans, grants, and scholarships. There is also programs that help with loan repayment.
- **WorkBC (Government of BC)** (<https://www.workbc.ca/find-loans-and-grants/students-and-adult-learners/services-apprentices-and-employers>) – Services for apprentices and employers.

Mental Health & Wellness Support

- **HealthLink BC – Mental Health and Substance Use** (<https://www.healthlinkbc.ca/mental-health-and-substance-use>) – HealthLink BC resources for mental health and wellness support.
- **Here2Talk** (<https://here2talk.ca/>) – Free and confidential counseling services available to all post-secondary students registered at a BC school.
- **Help Starts Here** (<https://helpstartshere.gov.bc.ca/>) – A database with over 2,500 listings of services related to mental health and substance use supports.
- **Hope for Wellness Helpline** (<https://www.hopeforwellness.ca/>) – 24/7 online chat and phone line with experienced and culturally competent counselors available to all Indigenous people in Canada.
 - First Nations Health Authority Mental Health Supports Info Sheet [PDF] (<https://www.fnha.ca/Documents/FNHA-mental-health-and-wellness-supports-for-indigenous-people.pdf>) by First Nations health Authority – List of culturally safe services for Indigenous people.
- **HeretoHelp – BC** (<https://www.heretohelp.bc.ca/>) – Mental health resources, including videos, articles, and support services in BC.
- **BC Construction Industry Rehabilitation Plan** (<https://www.constructionrehabplan.com/>) – Mental health and substance use services for CLRA and BCBT members and their families.
- **Virtual Mental Health Supports (Government of BC)** (<https://www2.gov.bc.ca/gov/content/health/managing-your-health/mental-health-substance-use/virtual-mental-health-supports>) – Virtual services are available for British Columbians who are experiencing anxiety, depression, or other mental health challenges.

Crisis Support

- **Interior Crisis Line Network** – Call 1-888-353-2273 (tel:+1-888-353-2273) for 24/7 emotional support, crisis intervention, and community resource information.
- **Talk Suicide Chat Service** (<https://talksuicide.ca/>) – An alternative if calling is difficult; available for crisis intervention.
- **310Mental Health Support** – Call 250-310-6789 (tel:+1-250-310-6789) for emotional support, information, and resources specific to mental health.
- **1-800-SUICIDE** – Call 1-800-784-2433 (tel:+1-800-784-2433) if you are experiencing feelings of distress or despair, including thoughts of suicide.
- **Opioid Treatment Access Line** – Call 1-833-804-8111 (tel:+1-833-804-8111) between 9 am and 4 pm to connect with a doctor, nurse, or healthcare worker who can prescribe opioid treatment medication that same day.
- **KUU-US Crisis Response Service** – Call 1-800-588-8717 (tel:+1-800-588-8717) for culturally-aware crisis support for Indigenous peoples in BC.
- **Alcohol and Drug Information and Referral Service** – Call 1-800-663-1441 (tel:+1-800-663-1441) to find resources and support.



Emergency Services — For life-threatening situations, call 911 or visit your nearest emergency department.