



PORTABLE LADDER SAFETY

1 Introduction

Accidents involving ladders are common in the workplace because this tool is often abused and/or used improperly. The following section is intended to provide some guidelines and requirements for the safe use of ladders.

2 Scope

This safe work procedure relates to portable and fixed ladders, including stepladders, straight ladders, extension ladders and fixed ladders.

3 Applicable Legislation

The requirements for the safe use of ladders are covered in Part XVI of the Occupational Health & Safety Regulations under regulations Sections 252 to 256.

4 Ladder Standards

Portable ladder design, construction, and use must conform to the requirements of one or more of the following internationally accepted standards:

- Canadian Standards Association CSA standard CAN3-Z11-M81, “Portable Ladders,” or
- American National Standards – ANSI A14.1-1990 – “Safety Requirements for Portable Wood ladders,” or
- American National Standards – ANSI A14.2-1994 – “Safety Requirements for Portable Metal ladders,” or
- Any other standards acceptable to Saskatchewan Labour, Occupational Health & Safety

5 Portable Ladders

Portable ladders are available in several models, the most common of which are stepladders, single ladders, and extension ladders, which are the main types discussed in this procedure. Ladders are made out of three main types of materials (e.g. aluminium, wood or fibreglass). Each model and/or type of material has certain advantages and disadvantages. Selection of the correct ladder for the type of work activity is important to ladder safety.



PORTABLE LADDER SAFETY

5.1 Single Ladders

Single ladders consist of two side rails and evenly spaced rungs. They do not have any moving parts, are non-self-supporting and are not adjustable in length. They are limited to a single section. Their size is defined by the overall length of the side rail, excluding any foot or end caps. Their rung width is at least 300 mm (12 in) for ladders up to 3 m (10ft) in length. Rung width will increase 1 mm for each additional 100 mm of length (0.125 in/ft). The maximum length of single ladders must not exceed:

- Type 1 – Heavy duty – 9 m (30 ft)
- Type 2 – Medium duty – 7.3 m (26 ft)
- Type 3 – Light duty – 5 m (16 ft)

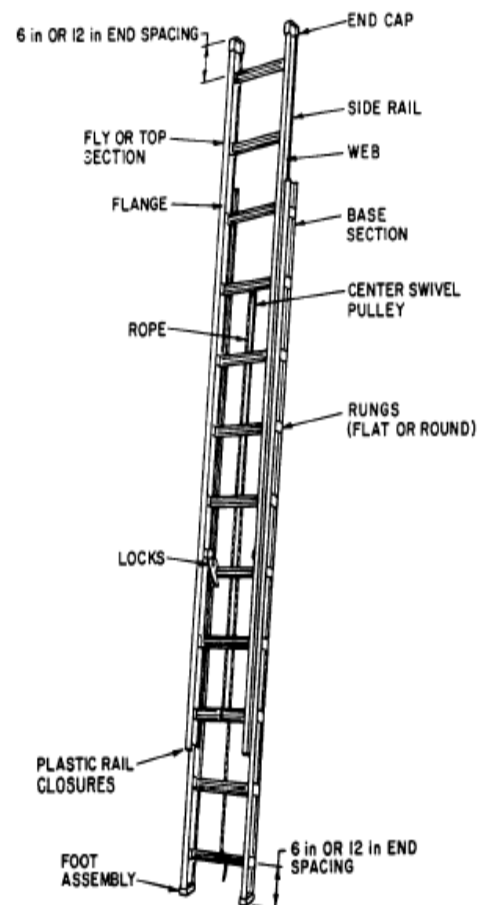
5.2 Extension Ladders

Extension ladders are non-self-supporting portable ladders that are adjustable in length.

They consist of two or more sections travelling in guides or brackets and arranged so as to permit adjustment.

Their size is defined by the sum of the lengths of the side rail of each section, excluding any foot or end caps. However, because extension ladders must maintain a minimum amount of overlap between sections, their effective use length is reduced from their size (e.g. when properly extended, a “20 foot extension ladder” is only 17 feet long).

The rung width of the fly (top) section of any extension ladder must be at least 300 mm (12 in). Rung widths of the other sections will be larger, and vary; depending on the number of sections of the ladder, but in all cases must comply with the applicable standard to which the ladder is certified.





PORTABLE LADDER SAFETY

Table 1. Maximum Length of Extension Ladders
(Wooden and Metal Ladders):

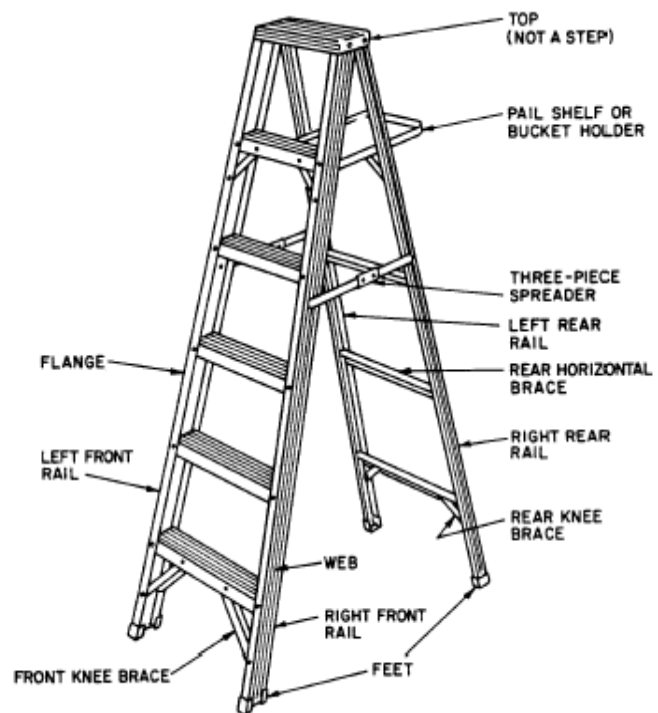
Grade of Ladder	Number of Sections	Maximum Length of Ladder	
		Metres	Feet
Heavy Duty – Type I	2	18	60
	3	22	72
Heavy Duty – Type II	2	15	48
	3	18	60
Light Duty – Type III	2	9.5	32

5.3 Stepladders

A stepladder is a self-supporting portable ladder, non adjustable in length, with flat steps and a hinged back.

The length (size) of a stepladder is determined by the length of the front side rail, including the top cap and foot.

The slope of stepladders is designed so that when the ladder is properly opened and secured, the angle of inclination of the front section is not more than 75°.



5.4 Ladder Materials

As mentioned, ladders are made out of three main types of materials (e.g. wood, aluminium, or fibreglass).

5.4.1 Wood

Advantages

- Are non-conductors of electricity, when dry;
- Best natural insulator against heat;
- Durable and strong



PORTABLE LADDER SAFETY

Disadvantages

- Age very fast, and are very susceptible to drying and splitting with age or exposure to weather;
- Need a clear, protective finish (e.g. varnish) to preserve the wood and extend the useful life;
- The protective varnish finish would be redone annually to ensure protection of the wood;
- Some manufacturers use an oil finish to preserve the wood, unfortunately this oil preservation material will conduct electricity

5.4.2 Aluminium

Advantages

- Strong and durable material, which withstands routine use without damaging;
- Will not crack when subjected to a sever impact;
- Do not require a protective coating

Disadvantages

- Conduct electricity and therefore should never be used around electrical equipment;
- Conduct heat very rapidly;
- Can be bent/damaged and still be used, eventually failing without warning

5.4.3 Fibreglass

Advantages

- Are non-conductors of electricity, when dry;
- Even though some fibreglass ladders are aluminium, there is no metal connecting the rungs, and therefore are still considered to be a non-conductor of electricity;
- Generally comparable to wood in characteristics and performance;
- Does not dry out and split when exposed to sunlight or stored near heat source, but surface colours may fade;
- Dense material and does not conduct heat very well;
- Does not require a protective finish

Disadvantages

- Generally heavier or equal weight than aluminium or wooden models (i.e. no significant weight advantages);
- Tends to chip and crack under severe impact;



PORTABLE LADDER SAFETY

- Although not subject to deterioration from sunlight, the surface of the fibreglass may fray or peel thin fibres with age;
- Not a malleable material and behaves similar to wood when overloaded;
- Does not bend when overloaded, but will rather crack and fail suddenly

5.5 Ratings and Types

Manufactured ladders are rated to the duty or service to which they will be put and the working load under which they will be used in a standard inclined position. The following table provides the different grades of ladders and loads they are rated for:

Table 2. In-Line Load Ratings & Duty Type
(Wooden and Metal Ladders)

Duty Rating & Type	Working Load (pounds)
Extra Heavy Duty – Type IA	300
Heavy Duty – Type I	250
Medium Duty – Type II	225
Light Duty – Type III	200

6 Electrical Work

- Metal ladders (e.g. aluminium) should NEVER be used for electrical work, or in close proximity to overhead power lines and/or electrical circuits;
- Wooden ladders with metal reinforcing rods shall NOT be used for electrical work, due to the danger of inadvertent electrical contact;
- Wooden ladders or fibreglass ladders are acceptable for using near or during electrical work, however they must be completely dry;
- Wooden ladders that are damp or wet can conduct electricity and should NOT be used when working on, with or around electrical equipment or electrical power sources

7 Ladder Inspections

- Ladders should be inspected before each use for loose or damaged rungs, steps, rails or braces and to detect other obvious signs of damage or deterioration. If they can be moved by hand, they are too loose;
- Check the ladder rungs to be sure that they are free of any slippery material;



PORTABLE LADDER SAFETY

- Ensure that stepladder spreaders are sturdy, tight and can be properly locked in place;
- Check all ladder hardware, nuts, bolts, spreaders, etc. for tightness and good repair with particular attention to locking mechanisms;
- Check pulleys on extension ladders for good condition and proper lubrication. If pulleys are damaged, they should be replaced;
- Check ropes on extension ladders and replace any frayed or worn ropes;
- Check for damaged or excessive wear on the non-slip feet;
- Check ladders for twisted or distorted rails. Do not attempt to straighten, or allow to remain in use, any bent or bowed metal ladder;
- In wooden ladders, check for rot, decay, or warped rails;
- Check for missing identification and/or warning labels;
- Where damage to or deterioration of any ladder is encountered, a qualified person must determine whether or not the ladder can still be used;
- Ladders cannot be safely repaired. If the damage is significant enough to affect the safety of the unit, the ladder must be immediately removed from service, destroyed, and replaced as soon as possible;
- Ladders should also be thoroughly examined/inspected once every three (3) months and a record of those inspections should be kept on file for future reference

8 Ladder Maintenance

- The feet of ladders, especially straight or extension ladders, should be equipped with slip-resistant surfaces;
- Untreated wooden ladders should be stored in dry areas to prevent moisture or water absorption;
- Wooden ladders must not be painted, since this may hide serious defects that may develop. A wood preservative or clear finish coating (e.g. varnish) should be used to protect the ladder;
- Avoid painting the rungs/steps with anything, even clear coatings, unless a non-slip material has been added to prevent slipping;
- Ladders constructed from fibreglass should be cleaned and sprayed lightly with a clear or pigmented lacquer or paste wax once every three (3) months to reduce deterioration (weathering);
- When transported on a vehicle, ladders should be properly supported and secured using proper “tie down” straps. Avoid using rubber “bungy cords” unless the travel distance is short;



PORTABLE LADDER SAFETY

9 Proper Ladder Use

9.1 General

- Place the ladder on a solid, firm, flat surface. The feet of straight, extension or stepladders should always be level. A board may be necessary to ensure that it's level or to prevent it from sinking into soft ground;
- **NEVER** place a ladder against an unstable surface;
- Keep the area around the base of the ladder uncluttered;
- Unless a ladder is designed for the additional weight, only one (1) person should be on a ladder at any one time;
- Do **NOT** overload any ladder;
- Obtain assistance when handling a heavy or long ladder; always make sure that a ladder is not placed in front of a door that opens toward the ladder unless the door is locked, blocked, or guarded;
- Never deliberately allow a ladder to fall to the ground, or drop one from height; too much damage may result;
- Before using a ladder always check your shoe soles and ladder rungs (or steps) to ensure that they are free of any slippery material (grease, oil, paint, snow, ice, etc.);
- Do not climb/use a wet ladder;
- Do not use straight ladders or stepladders in a horizontal position as a platform or scaffold, they are not designed for it;
- Go up and down a ladder facing the ladder, taking only one (1) step at a time. Hold onto either the side rails or rungs with both hands when climbing up or down a ladder.;
- **NEVER** climb a ladder "one-handed" while carrying something in the other hand. Carry tools in a tool belt and use a hand line to raise or lower large objects, parts, tools, etc;
- When working on ladders keep your body centered between the rails of the ladder and **NEVER** over-reach to the side or attempt to reach too high as you may lose your balance;
- **NEVER** use makeshift items such as a chair, barrel, or box, etc., as a substitute ladder;
- **NEVER** position a ladder on top of a table, box, chair, or other potentially unstable surface;
- **NEVER** place a ladder against an eaves trough, windowpane or sash. Fasten a board (do not use nails) across the top of the ladder to give a bearing surface at each side of the window;
- **NEVER** use any type of ladder during strong winds or storms except in emergencies, and then only; when they are securely "tied-off";



PORTABLE LADDER SAFETY

- Carry ladders in a horizontal position, with the feet to the rear and the top of the ladder to the front and slightly higher than the back. Where the ladder is long, use two people to carry it, one at either end;
- **NEVER** place any ladder (straight or stepladder) on tables, boxes, or other item that is not designed to take such weight or loading;
- Do not leave an erected ladder unattended, unauthorized people may attempt to use it;
- **NEVER** attempt to “walk,” “hop,” or laterally move a straight ladder or extension ladder while standing on it;
- If you need to work with both hands, lock one leg around a rung (provided the ladder has been tied off);

9.2 Stepladders

- When using a stepladder, make sure that it is fully open and that its spreader bar is securely locked;
- **NEVER** stand on the top two (2) steps of stepladders;
- **NEVER** stand on the top step or platform of a stepladder;
- **NEVER** stand on the “paint shelf” or bucket holder of a stepladder;
- Make sure that the stepladder is placed on a firm and level footing to ensure that it doesn’t slip;
- If you need to reach a height in excess of twenty (20) feet, use a straight ladder or an extension ladder;
- When using a stepladder for access to high places, always have a second worker support the stepladder or “tie-off” the stepladder to prevent it from slipping;
- Do not place a stepladder close to, or against pipes containing acids, chemicals, sprinkler systems;
- **NEVER** attempt to “walk” or move a stepladder while standing on it;
- **NEVER** use a stepladder while leaning it against a wall or other vertical surface; use a straight ladder or extension ladder instead.



PORTABLE LADDER SAFETY

9.3 Straight/Extension Ladders

- When erecting straight or extension ladders, check for overhead hazards, including power lines;
- Both railings of the top section of a straight or extension ladder must be resting on a firm support;
- When using an extension ladder, the sections must overlap by at least 1 m (39") for ladders up to 11 m (36 ft) in length; 1.2 m (4ft) for ladders between 11 m (36 ft) and up to 15 m (48 ft); 1.5 m (5ft) for ladders between 15 m (48ft) and up to 22 m (72 ft);
- With straight or extension ladders, use the "4 to 1" rule to determine the necessary length and placement. This simply means that the ladder should be placed (1) foot away from the base of the object for every four (4) feet in height to the place where the top of the ladder rests;
- Make sure that the locking device is fully secured on extension ladder before using;
- When a ladder is used to climb onto a platform or roof make certain that it extends at least three (3) feet (90 cm) above the platform or roof edge contact point, to provide for support to the worker when getting off/on the ladder;
- When using a ladder for access to high places, always securely "tie-off" the ladder to prevent it from slipping;
- When working with power equipment from a ladder, regardless of the height, make sure it is firmly secured or "tied-off" at the top;
- **NEVER** attempt to "walk" or move a straight or extension ladder sideways while standing on it;
- **NEVER** slide down the side rails of ladders;
- For long ladders, get assistance when raising or lowering them. It basically requires at least two people to do it safely (see below);
- Ensure that two workers are present when a ladder is being secured or released;
- Do not stand higher than the fourth rung from the top on straight or extension ladders;
- The sections of extension ladders are to be used together as a unit and are not to be taken apart and used individually as single ladders.

9.4 Specialty/Multi-purpose Ladders

These are ladders that are designed to allow use in several different configurations, as well as being able to fold for storage. Because of their design, regular inspection of their locking mechanisms is critical. It is essential that the manufacturer's instructions are read and followed before using.



PORTABLE LADDER SAFETY

9.5 Raising a Long Ladder

Raising a long extension ladder requires a minimum of two people, following a standard procedure. Raising very long and heavy ladders may require additional people.

First, lay the ladder on the ground at a right angle to the wall or object to be climbed. The fly section should be against the ground (i.e. the ladder face down). The foot end of the ladder should be situated near the point where it will be located away from the wall or object to be climbed (i.e. proper 4:1 distance away).

One person should brace the foot end of the ladder to prevent movement.

Next, the second person will lift the top end and walk underneath the ladder, raising it while moving forward to the other person.

An alternate method is to turn the ladder on its edge and walk underneath the side rail, raising it while moving forward towards the other person.

Once the ladder is in a vertical position, and braced by both people, the extension (fly) section should be raised using the rope provided. Once the ladder has been extended to the required length, the ladder should be slowly lowered against the surface to be climbed.

The ladder should then be secured (tied) in place at the bottom (if applicable). If only to be secured (tied) at the top, one worker shall steady the ladder while the other climbs and ties off the ladder.



PORTABLE LADDER SAFETY

10 Which Ladder to Choose

Selecting the correct size and type of ladder is essential to safety when working off the ground level. The following table will assist in selection.

Table 3. Ladder Selection Guide

Ladder Types							
Extension Ladders				Stepladders			
Maximum height you need to reach		Size of extension ladder required		Maximum height you need to reach		Size of stepladder required	
Metres (approx)	Feet	Metres (approx.)	Feet	Metres (approx.)	Feet	Metres (approx.)	Feet
2.7	9	4.8	16	1.8	6	0.6	2
4	13	6	20	2.1	7	1.2	4
5.2	17	7.3	24	2.4	5	1.5	5
6.4	21	8.5	28	2.7	9	1.8	6
7.6	25	9.8	32	3.0	10	2.1	7
8.5	28	11	36	3.4	11	2.4	8
9.5	31	12.2	40	4	13	3.0	10

Another “rule of thumb” to use to help you select the correct ladder length is:

For extension ladders:

- Up to 25 feet in height, choose a ladder length seven (7) feet longer
- Over 25 feet in height, choose a ladder eight (8) feet longer

For stepladders:

- Choose a ladder three (3) feet less than the height you wish to reach



PORTABLE LADDER SAFETY

11 Fall Protection

A person may work from a portable ladder without fall protection, **provided that:**

- The work is a “light duty” task of short duration at each location; and
- The worker’s centre of gravity (body mass) is maintained between the ladder side rails; and
- The worker will generally have one hand available to hold on to the ladder or other support; and
- The ladder is not positioned near an edge or floor opening that would significantly increase the potential fall distance.

12 Warning Labels

Newly manufactured ladders are properly labelled to meet the requirements of the respective code/standard that applies to the ladder. These labels are usually found on the side rails or under the steps of a stepladder. These labels are **NOT** to be removed. Older ladders maybe no longer have the appropriate labels, but the same requirements apply. Where possible, if labels become worn or damaged, they should be replaced. Following are some sample labels that may be encountered.





PORTABLE LADDER SAFETY

CAUTION

KEEP BODY CENTERED BETWEEN SIDE-RAILS. DO NOT OVER-REACH.

DO NOT STAND ABOVE THIS STEP

LOCK SPREADERS

SET ALL FOUR FEET ON FIRM LEVEL SURFACE.

WEAR SLIP-RESISTANT SHOES

READ ADDITIONAL INSTRUCTIONS ON LADDER

DANGER

FAILURE TO READ AND FOLLOW INSTRUCTIONS ON THIS LADDER MAY RESULT IN INJURIES OR DEATH.

DANGER

ELECTROCUTION HAZARD

THIS LADDER CONDUCTS ELECTRICITY

CAUTION

SET UP LADDER PROPERLY TO REDUCE SLIP AND OVERLOAD HAZARDS. FOLLOW THESE INSTRUCTIONS.

SECURE LOCKS

75° (approx.)

- 1 PLACE TOES AGAINST BOTTOM OF LADDER SIDERAILS.
- 2 STAND ERECT
- 3 EXTEND ARMS STRAIGHT OUT
- 4 PALMS OF HANDS SHOULD TOUCH TOP OF RUNG AT SHOULDER LEVEL

1. DO NOT OVER-REACH. KEEP BODY CENTERED BETWEEN SIDERAILS

2. EXTEND LADDER ONE TO THREE FEET ABOVE ROOF FOR ACCESS

3. READ ADDITIONAL INSTRUCTIONS ON LADDER



PORTABLE LADDER SAFETY

13 Common Causes of Ladder Accidents

- Over-reaching from ladders, rather than moving them
- Standing ladders on boxes, etc., to gain additional height
- Too much haste in climbing or descending
- Climbing one-handed while carrying something in the other hand
- Standing at the very top of a short ladder, rather than getting one long enough for the job
- Hanging tools from ladder rungs, or leaving tools on the top of the stepladder
- Throwing tools to a fellow worker on a ladder
- Placing the ladder at an improper angle
- Using metal ladders in locations where contact with electric wires is possible
- Using worn or damaged ladders
- Failure to secure (tie) the ladder in place