

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-bcplumbingapprl1.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-bcplumbingapprl1.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.
- **Plumbing Apprenticeship Program Level 3 Series** (<https://collection.bccampus.ca/search/?q=%22pl3%22>) can be found in the BCCampus Open Collection (<https://collection.bccampus.ca/>).
- **Plumbing Apprenticeship Program Level 4 Series** (<https://bccampus.ca/projects/archives/zed-cred-z-degrees/ztc-open-educational-resources-for-trades/>) can be found in the BCCampus Open Collection. (<https://collection.bccampus.ca/>) (Block F: Commission and Service will be available soon.)

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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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Resources

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- 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.



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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>
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- 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.

Glossary - Block B: Tools and Equipment

“endless” hand chain

A continuous loop of chain used to operate a chain hoist. Pulling the chain in one direction raises the load, while pulling it in the opposite direction lowers it. (Section B-4.2 (#chapter-b-4-2-describe-hoisting-lifting-and-rigging-equipment))

abrasive cut-off wheel

A circular cutting wheel made of abrasive material that grinds through metal or other hard materials instead of cutting with teeth. It is commonly used on power saws or grinders to cut metal. (Section B-2.1 (#chapter-b-2-1-describe-portable-power-tools-used-in-the-pipe-trades))

abrasive disk blade

A circular cutting disk made from abrasive material that grinds through metal or other hard materials instead of cutting with teeth. It is commonly used on chop saws or grinders to cut metal. (Section B-2.1 (#chapter-b-2-1-describe-portable-power-tools-used-in-the-pipe-trades))

absolute limit of approach

The minimum safe distance that equipment must stay away from live electrical power lines. (Section B-4.5 (#chapter-b-4-5-use-hoisting-lifting-and-rigging-equipment))

acetone

A straw-coloured, stable liquid that is flammable, volatile and strong smelling, placed inside acetylene cylinders; safely absorbs and stores acetylene gas under pressure. (Section B-5.1 (#chapter-b-5-1-describe-oxy-acetylene-equipment))

acetylene

A fuel gas made from carbon and hydrogen that burns very hot when mixed with oxygen and is commonly used for welding, brazing, and cutting metal. (Section B-5.1 (#chapter-b-5-1-describe-oxy-acetylene-equipment))

acetylide

A highly unstable and explosive compound that can form when acetylene gas reacts with certain metals, particularly copper or copper alloys. Because acetylides can detonate from shock or heat, materials such as copper and red brass are not used in acetylene equipment. (Section B-5.1 (#chapter-b-5-1-describe-oxy-acetylene-equipment))

adjustable base jack

A scaffold base support with a threaded stem that can be adjusted up or down to level the scaffold and distribute weight evenly on the ground. (Section B-3.1 (#chapter-b-3-1-describe-ladders-and-elevated-platforms))

adjustable or sliding choker hook

A type of choker hook that can move along a sling and be positioned where needed. It allows the sling to wrap around a load and tighten to form a choker hitch, helping hold the load securely during lifting. (Section B-4.2 (#chapter-b-4-2-describe-hoisting-lifting-and-rigging-equipment))

agamassan

A type of special porous, fire-resistant material used to help keep equipment safe from heat and flames (e.g., asbestos, charcoal or diatomaceous earth); saturated with acetone. (Section B-5.1 (#chapter-b-5-1-describe-oxy-acetylene-equipment))

air-impact wrench

A power tool that uses compressed air to quickly tighten or loosen nuts and bolts by delivering strong turning force in short bursts. (Section B-2.1 (#chapter-b-2-1-describe-portable-power-tools-used-in-the-pipe-trades))

air-line respirators

A type of respirator that supplies clean air through a hose from a safe external source, protecting the user from harmful fumes or low-oxygen environments. (Section B-6.1 (#chapter-b-6-1-describe-safety-requirements-and-precautions-for-arc-welding))

all-hardened

A type of saw blade that has been heat-treated so that the entire blade is hardened. This makes the blade very strong and resistant to wear, but also more brittle and less flexible than blades that are hardened only at the teeth. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

alloy

A homogeneous metal composed of two or more elements. (Section B-5.2 (#chapter-b-5-2-describe-cutting-brazing-and-soldering-techniques))

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 (#chapter-b-3-1-describe-ladders-and-elevated-platforms))

alternating current (AC)

An electric current that changes direction back and forth many times per second. It is commonly used in homes and buildings. (Section B-6.3 (#chapter-b-6-3-describe-the-arc-welding-process-and-equipment))

amperes (A)

The unit used to measure electric current, or how much electricity is flowing through a circuit. (Section B-6.3 (#chapter-b-6-3-describe-the-arc-welding-process-and-equipment))

angle drill

A power drill designed with the chuck set at a right angle to the motor so holes can be drilled in tight or hard-to-reach spaces; known by names like *Hole-Hawg*. (Section B-2.1 (#chapter-b-2-1-describe-portable-power-tools-used-in-the-pipe-trades))

angle grinder

A portable power tool that uses a rotating grinding wheel or disk to grind, cut, smooth, or polish metal and other materials. (Section B-2.1 (#chapter-b-2-1-describe-portable-power-tools-used-in-the-pipe-trades))

angle grinders

Power tools with a rotating disk set at a right angle to the motor, used for cutting, grinding, and shaping metal and other materials. (Section B-6.3 (#chapter-b-6-3-describe-the-arc-welding-process-and-equipment))

angle pipe welding vise

A tool used to hold a pipe branch at a right angle to another pipe while it is being fitted or welded. (Section 1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

annealed

A condition where metal has been softened by exposure to high heat. When wire rope becomes annealed, it loses strength and hardness, making it unsafe for lifting or rigging operations. (Section B-4.5 (#chapter-b-4-5-use-hoisting-lifting-and-rigging-equipment))

anode

The part of an electrical device or circuit where electric current enters. In plumbing and electrical systems, an anode is often a metal (like in a water heater) that is designed to corrode first to protect other parts from rust and damage. (Section C-2.2)

arc

A curved line that is part of a circle. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

arc flash

A painful eye injury caused by exposure to the intense light and radiation from a welding arc. (Section B-6.1 (#chapter-b-6-1-describe-safety-requirements-and-precautions-for-arc-welding))

arc length

The distance between the welding electrode and the metal being welded. (Section B-6.4 (#chapter-b-6-4-use-arc-welding-equipment))

arc voltage

The voltage present in a welding circuit after the arc is struck and the current is flowing. (Section B-6.3 (#chapter-b-6-3-describe-the-arc-welding-process-and-equipment))

arc-joint pliers

adjustable pliers used to grip, hold, or turn objects. The jaws can be moved to different positions using a curved slot (arc joint), allowing the tool to open wider or narrower depending on the size of the object being held. They are commonly used for gripping pipes, nuts, and other parts in plumbing or mechanical work. Many trades people refer to these as Channellock pliers. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

Archimedes' principle

A scientific rule that explains why objects float or sink in liquids. It states that an object in a liquid is pushed upward by a force equal to the weight of the liquid it displaces. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

auger bit

A drill bit with a spiral shape and a pointed tip used for drilling deep, clean holes in wood. (Section B-2.1 (#chapter-b-2-1-describe-portable-power-tools-used-in-the-pipe-trades))

automatic levels

(also known as self-levelling levels); a surveying instrument that automatically adjusts itself to create a level line of sight. It contains an internal compensator that keeps the telescope level even if the instrument is slightly out of position. (Section B-1.3 (#chapter-b-1-3-use-levelling-equipment))

auxiliary hoist

An additional hoisting mechanism on a crane that operates independently from the main hoist. It is used to lift lighter loads, provide faster lifting speeds, or assist with positioning materials during lifting operations. (Section B-4.3 (#chapter-b-4-3-describe-lifting-and-hoisting-communication))

azimuth adjustment

A feature on an optical instrument that allows the telescope or sight to rotate horizontally. It is used to align the instrument with a specific direction or reference point when taking measurements, measuring angles or establishing layout lines. (Section B-1.3 (#chapter-b-1-3-use-levelling-equipment))

backfire

A small explosion that occurs when the flame briefly burns back into the torch tip during cutting or welding. (Section B-5.1 (#chapter-b-5-1-describe-oxy-acetylene-equipment))

backsight

A level reading taken on a point with a known elevation, such as a benchmark or turning point. It is used to calculate the height of the instrument before measuring other points. (Section B-1.3 (#chapter-b-1-3-use-levelling-equipment))

backsight (BS)

A level reading taken on a point with a known elevation, such as a benchmark or turning point. It is used to calculate the height of the instrument before measuring other points. (Section B-1.3 (#chapter-b-1-3-use-levelling-equipment))

balance (tool balance)

How the weight of a tool is distributed, which affects how comfortable and controlled it feels in the hand. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

ball-peen hammer

A hammer with a flat striking face on one side and a rounded ball-shaped end (peen) on the other; commonly used in metalworking for shaping metal, setting rivets, and striking tools such as chisels or punches. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

base plates

Flat metal plates placed under scaffold legs to spread the weight and help keep the scaffold stable. (Section B-3.2 (#chapter-b-3-2-use-ladders-and-elevated-platforms))

basin wrench

A special wrench with a long handle used to tighten or loosen nuts in hard-to-reach places, such as under sinks. (Section 1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

bead weld

A single-pass weld used to build up or repair the surface of metal. (Section B-6.2 (#chapter-b-6-2-identify-types-of-welds-positions-joints-and-symbols))

beehive spring

A coiled spring retainer used on some pneumatic hammers to hold the chisel or tool bit securely in place during operation. (Section B-2.1 (#chapter-b-2-1-describe-portable-power-tools-used-in-the-pipe-trades))

benchmark

A permanent reference point with a known elevation used in surveying and leveling. It provides a fixed starting point for measuring the height of other points. (Section B-1.3 (#chapter-b-1-3-use-levelling-equipment))

bevel

A slanted or angled edge cut into a material, often used to prepare surfaces for cutting, joining, or welding. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

bight

A curved section or loop formed in a rope without crossing the rope over itself. It is often used when tying knots or attaching the rope to another object. (Section B-4.4 (#chapter-b-4-4-select-slings-and-tie-knots-bends-and-hitches))

bird caging

A type of damage where the strands of a wire rope spread apart and form a cage-like shape. (Section B-4.5 (#chapter-b-4-5-use-hoisting-lifting-and-rigging-equipment))

block

A collection of sheaves that provide a mechanical advantage in a lift. Often found at the hook. (Section B-4.6 (#chapter-b-4-6-rig-load-for-cranes))

block-and-tackle

A lifting system made of two or more pulleys (called blocks) with a rope or cable threaded between them. It allows a heavy load to be lifted using less force by spreading the weight across multiple rope sections. (Section B-4.2 (#chapter-b-4-2-describe-hoisting-lifting-and-rigging-equipment))

bogeys (end-trucks)

Wheeled assemblies located at each end of an overhead travelling crane bridge that allow the crane to move along the runway beams or rails. (Section B-4.2 (#chapter-b-4-2-describe-hoisting-lifting-and-rigging-equipment))

boom (crane)

The primary arm of a crane. Acts as a lever and positions the block and hook to be directly over the load. (Section B-4.3 (#chapter-b-4-3-describe-lifting-and-hoisting-communication); Section B-4.6 (#chapter-b-4-6-rig-load-for-cranes))

boom cylinder

The hydraulic control of a boom. (Section B-4.6 (#chapter-b-4-6-rig-load-for-cranes))

boom lifts

A type of elevated work platform that uses a long, extendable arm to lift a worker in a bucket to high or hard-to-reach areas. The arm can move up, down, and sideways to position the worker safely. (Section B-3.1 (#chapter-b-3-1-describe-ladders-and-elevated-platforms))

boom radius

Also referred to as operating radius, this horizontal distance from centre of rotation to the hook, is a function of boom angle and length. This concept is crucial to understanding safe crane capacity. (Section B-4.6 (#chapter-b-4-6-rig-load-for-cranes))

boom trucks

A truck equipped with a hydraulic crane mounted on its chassis and a telescoping or articulating boom used to lift, move, and position heavy loads at construction or work sites. (Section B-4.2 (#chapter-b-4-2-describe-hoisting-lifting-and-rigging-equipment))

bosun's chair

A seat or platform suspended by ropes that allows a worker to sit safely while working at height, such as when performing maintenance or installation tasks. (Section B-4.4 (#chapter-b-4-4-select-slings-and-tie-knots-bends-and-hitches))

Bourdon pressure gauge

A device used to measure the pressure of a gas or liquid in a system. It uses a curved metal tube that straightens slightly when pressure increases, moving a needle on a dial to show the pressure reading. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

bowline knot

A knot used to create a fixed loop at the end of a rope that will not tighten or slip under load. It is commonly used in rigging and rescue situations because it is strong and easy to untie after use. (Section B-4.4 (#chapter-b-4-4-select-slings-and-tie-knots-bends-and-hitches))

bowline on a bight

A variation of the bowline knot that forms two secure loops in the middle of a rope without using the rope's end. It is

often used for lifting or supporting a person or load. (Section B-4.4 (#chapter-b-4-4-select-slings-and-tie-knots-bends-and-hitches))

bridle hitch

A rigging method that uses two or more sling legs attached to a single lifting hook to lift a load from multiple points, helping distribute the weight and keep the load balanced during lifting. (Section B-4.2 (#chapter-b-4-2-describe-hoisting-lifting-and-rigging-equipment))

bucket

The small platform or enclosed work area at the end of a boom lift where a worker stands while performing tasks at height. (Section B-3.1 (#chapter-b-3-1-describe-ladders-and-elevated-platforms))

builder's level

a surveying instrument used in construction to measure height differences and ensure surfaces or structures are level. It usually includes a telescope and leveling screws that allow the user to establish a straight, level reference line across a distance. (Section B-1.3 (#chapter-b-1-3-use-levelling-equipment))

burr

A rough edge or small metal fragment left on a material after cutting, drilling, or machining. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

butt joint

A joint that joins two pieces of metal in the same plane, typically by welding along their adjoining edges. (Section B-6.2 (#chapter-b-6-2-identify-types-of-welds-positions-joints-and-symbols))

C-clamps

A clamp shaped like the letter “C” that is used to hold pieces of material tightly together or to hold something to a table while working. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

cable clips

A metal fastener used to secure the end of a wire rope back onto itself to form a loop. It consists of a U-bolt, saddle, and nuts that clamp the rope together. (Section B-4.2 (#chapter-b-4-2-describe-hoisting-lifting-and-rigging-equipment))

cam-out

When a screwdriver slips out of the screw head while turning it. This can damage the screw head and make the screw harder to tighten or remove. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

capillary action

The way a liquid (like melted solder) is pulled into small spaces between two surfaces without being pushed. (Section B-5.1 (#chapter-b-5-1-describe-oxy-acetylene-equipment))

carbide-tipped blade

A saw blade with small tips made of carbide, a very hard metal, attached to each tooth. The carbide tips help

the blade stay sharp longer and cut hard materials more easily. (Section B-2.1 (#chapter-b-2-1-describe-portable-power-tools-used-in-the-pipe-trades))

carbide-tipped drill bits

Drill bits with tips made of carbide, a very hard material that helps the bit stay sharp and drill through tough materials like masonry or hardened metal. (Section B-2.1 (#chapter-b-2-1-describe-portable-power-tools-used-in-the-pipe-trades))

carbon steel blade

A saw blade made from carbon steel that is strong and flexible, often used for cutting wood or soft metals. (Section B-2.1 (#chapter-b-2-1-describe-portable-power-tools-used-in-the-pipe-trades))

carburizing flame

A flame with excess acetylene that adds carbon to the metal and produces a cooler, softer flame used for brazing and working with certain metals. (Section B-5.3 (#chapter-b-5-3-use-oxy-acetylene-equipment))

carpenter's level

A measuring tool used to check whether a surface is level (horizontal) or plumb (vertical). It contains small tubes filled with liquid and an air bubble that moves to the center when the surface is straight. Carpenter's levels are commonly used in construction and carpentry. (Section B-1.3 (#chapter-b-1-3-use-levelling-equipment))

cartridge-type respirator

A respirator that uses replaceable cartridges to filter harmful gases or particles from the air, typically used for short-term exposure or emergency escape. (Section B-6.1 (#chapter-b-6-1-describe-safety-requirements-and-precautions-for-arc-welding))

casters

Small wheels attached to equipment so it can roll or move easily. (Section B-3.1 (#chapter-b-3-1-describe-ladders-and-elevated-platforms))

centre head

An attachment used with a combination square that helps find the exact centre of round objects, such as pipes or rods. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

centre of gravity

The point in an object where its weight is balanced. (Section B-4.1 (#chapter-b-4-1-describe-the-principles-of-lifting-and-hoisting))

centre point

The exact middle point of a circle or round object. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

centre punch

A pointed tool used to make a small dent in metal so a drill bit will start in the correct place. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

chain hoists (also known as chain falls or endless chains)

A lifting device that uses a chain and gears to raise or lower heavy loads. It is usually operated by pulling a hand chain, which turns gears that lift the load using a second chain attached to the hook. (Section B-4.2 (#chapter-b-4-2-describe-hoisting-lifting-and-rigging-equipment))

chain tongs

A tool that uses a chain wrapped around a pipe to grip and turn the pipe when tightening or loosening it. (Section 1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

chain wrenches

A wrench that uses a metal chain to wrap around and grip a pipe so it can be turned. (Section 1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

chalk line

A marking tool that uses a chalk-covered string to create long, straight lines on surfaces such as wood, metal, or concrete. The string is stretched tight and snapped against the surface to leave a straight chalk mark. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

chalk-line plumb bob

The weighted end of a chalk line tool that helps keep the string tight and straight. It allows workers to snap a straight chalk line on a surface for marking and layout. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

chamfer

A beveled edge that removes the sharp corner of a material, usually to make assembly easier or safer. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

chamfering

The process of **cutting or filing the sharp edge of a pipe or material at an angle** to make it smoother and easier to join. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

cherry picker

A type of boom lift with an extendable arm that raises a small platform so a worker can safely reach high work areas. (Section B-3.1 (#chapter-b-3-1-describe-ladders-and-elevated-platforms))

chipping hammer

A tool used in welding to chip and remove slag from a weld after the metal has cooled; usually has a pointed tip and a chisel edge to reach tight areas around the weld. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

chisel combination blade

A combination saw blade with chisel-shaped teeth that cut wood cleanly and efficiently when ripping or crosscutting. (Section B-2.1 (#chapter-b-2-1-describe-portable-power-tools-used-in-the-pipe-trades))

choker hitch

A method of attaching a sling to a load by passing one end of the sling around the load and then hooking it back onto itself. This creates a tightening grip that helps hold the load securely during lifting. (Section B-4.2 (#chapter-b-4-2-describe-hoisting-lifting-and-rigging-equipment))

cleats

Flat wooden strips used as steps on some job-built ladders. (Section B-3.1 (#chapter-b-3-1-describe-ladders-and-elevated-platforms))

clove hitch

A knot used to quickly attach a rope to a post, pole, or pipe. It is easy to tie and untie but can slip if the load changes or becomes loose. (Section B-4.4 (#chapter-b-4-4-select-slings-and-tie-knots-bends-and-hitches))

clutch drive screwdriver

A tool used to tighten or loosen screws that have a clutch-shaped slot in the head. The screwdriver tip fits the special slot so the screw can be turned without slipping. These screws are often used in equipment and machinery. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

coarse adjustment dial

(job selector dial); A control on a welding machine used to set the main current level for a specific welding task. (Section B-6.3 (#chapter-b-6-3-describe-the-arc-welding-process-and-equipment))

combination square (or combination set)

A measuring tool used to check right angles (90°) and measure distances. It has a ruler and an adjustable head. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

combination wrench

A wrench that has an open end on one side and a box end on the other, both the same size. (Section 1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

combustion

The chemical process of burning that occurs when a fuel reacts with oxygen and releases heat and light. (Section B-5.1 (#chapter-b-5-1-describe-oxy-acetylene-equipment))

come-alongs (pullers)

A hand-operated device that uses a ratchet and lever to pull, lift, or tighten heavy loads. It works by tightening a chain or wire rope in small steps, allowing workers to move or position equipment safely. (Section B-4.2 (#chapter-b-4-2-describe-hoisting-lifting-and-rigging-equipment))

compensator

A mechanism inside an automatic level that automatically keeps the instrument's line of sight level. It adjusts the internal optics so accurate readings can be taken even if the instrument is slightly tilted. (Section B-1.3 (#chapter-b-1-3-use-levelling-equipment))

compound gauge

a pressure gauge that can measure both positive pressure and vacuum in the same instrument. It shows pressure above and below atmospheric pressure on the same dial. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

compound leverage pipe wrench

A pipe wrench designed with extra leverage to help apply greater turning force with less effort. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

compression hand bender

A handheld tool used to bend metal tubing by applying steady pressure around a curved form so the tubing bends without kinking or flattening. (Section B-2.1 (#chapter-b-2-1-describe-portable-power-tools-used-in-the-pipe-trades))

connectors

(quick couplers); Devices or fittings used to join two pieces of equipment, pipe, hose, or electrical components so they can work together properly. (Section B-2.1 (#chapter-b-2-1-describe-portable-power-tools-used-in-the-pipe-trades))

convex

A curved outward shape. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

coring machines (core drills)

Power tools used to cut large, round holes in materials such as concrete, brick, or stone using a hollow drill bit. (Section B-2.1 (#chapter-b-2-1-describe-portable-power-tools-used-in-the-pipe-trades))

corner joint

A joint that joins two pieces of metal at right angles at their ends, forming an L shape. (Section B-6.2 (#chapter-b-6-2-identify-types-of-welds-positions-joints-and-symbols))

corrosion

The gradual damage or weakening of metal caused by chemical reactions with the environment, such as exposure to moisture, air, or chemicals. In wire rope and rigging equipment, corrosion often appears as rust and can reduce the strength and safety of the metal. (Section B-4.5 (#chapter-b-4-5-use-hoisting-lifting-and-rigging-equipment))

countersink bit

A drill bit used to widen the top of a hole so the head of a screw can sit flush with or below the surface of the material. (Section B-2.1 (#chapter-b-2-1-describe-portable-power-tools-used-in-the-pipe-trades))

counterweight

A supplementary ballast added to the weight of a crane to provide additional stability in a lift. (Section B-4.6 (#chapter-b-4-6-rig-load-for-cranes))

coupler 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 (#chapter-b-3-1-describe-ladders-and-elevated-platforms))

cracking

Breaks or splits that form in a weld or metal because of stress. (Section B-6.4 (#chapter-b-6-4-use-arc-welding-equipment))

crane

A machine used to lift and move heavy loads using a hook, cable, and boom. (Section B-4.1 (#chapter-b-4-1-describe-the-principles-of-lifting-and-hoisting), Section B-4.2 (#chapter-b-4-2-describe-hoisting-lifting-and-rigging-equipment))

cribbing

Material used for dunnage or blocking under a load to allow for the attachment and removal of rigging. (Section B-4.6 (#chapter-b-4-6-rig-load-for-cranes))

crimping

A method of joining pipe or tubing by squeezing a metal ring or fitting tightly around it with a special tool. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

critical point

The pressure or temperature at which acetylene becomes unstable and can break down suddenly, possibly causing an explosion. (Section B-5.1 (#chapter-b-5-1-describe-oxy-acetylene-equipment))

cross brace

A diagonal support that connects scaffold frames and helps keep the structure stable and rigid. (Section B-3.2 (#chapter-b-3-2-use-ladders-and-elevated-platforms))

crossbow loading

A dangerous rigging condition where a load is applied to the sides of a shackle instead of to the pin and curved body. This can weaken the shackle and may cause it to bend or fail during lifting. (Section B-4.2 (#chapter-b-4-2-describe-hoisting-lifting-and-rigging-equipment))

crosscut blade

A saw blade designed to cut wood across the grain. The teeth are shaped to make smooth and clean cuts. (Section B-2.1 (#chapter-b-2-1-describe-portable-power-tools-used-in-the-pipe-trades))

crosscut saw

A hand saw used to cut across the grain of wood. It has special teeth designed to slice through wood fibres. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

crosshairs

Thin horizontal and vertical lines inside the telescope of a surveying instrument. They intersect at the center and are used to aim precisely at a target or measuring rod when taking readings. (Section B-1.3 (#chapter-b-1-3-use-levelling-equipment))

current

The flow of electricity through a circuit, measured in amperes (A). (Section B-6.3 (#chapter-b-6-3-describe-the-arc-welding-process-and-equipment))

cutting faces

The flat or angled surface of a tool that does the cutting. It is the part of the tool that comes into contact with the material and removes small pieces as the tool is used. Cutting faces are found on tools such as chisels, drill bits, and cutting blades. (Section B-1.2 (#chapter-b-1-2-use-hand-tools))

cycle

One complete change in an alternating current where the voltage goes from zero to maximum in one direction, back to zero, and then to maximum in the opposite direction. (Section B-6.3 (#chapter-b-6-3-describe-the-arc-welding-process-and-equipment))

datum

A fixed reference point or level used as a starting point for measuring heights or depths. (Section B-1.3 (#chapter-b-1-3-use-levelling-equipment))

DCEN (direct current electrode negative)

A welding setup where the electrode is connected to the negative side of the power source, causing more heat to be concentrated in the workpiece. (Section B-6.3 (#chapter-b-6-3-describe-the-arc-welding-process-and-equipment))

DCEP (direct current electrode positive)

A welding setup where the electrode is connected to the positive side of the power source, causing more heat to be concentrated in the electrode. (Section B-6.3 (#chapter-b-6-3-describe-the-arc-welding-process-and-equipment))

dead-blow hammer

A hammer designed to reduce rebound when striking a surface. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

deburring

The process of removing burrs or rough edges from metal, plastic, or other materials after cutting or drilling. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

demolition

The process of breaking down or removing structures. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

demolition hammer (jack hammer; chipping gun)

A heavy-duty power tool used to break, chip, or remove concrete, masonry, or other hard materials. (Section B-2.1 (#chapter-b-2-1-describe-portable-power-tools-used-in-the-pipe-trades))

dense-structure fine-grain wheel

A grinding wheel made with small abrasive grains packed closely together to produce smoother and more precise grinding. (Section B-2.1 (#chapter-b-2-1-describe-portable-power-tools-used-in-the-pipe-trades))

diagonal or side-cutting pliers

Tools used for cutting wire and small metal pins. The cutting edges are set at an angle near the pivot, which allows the user to cut close to a surface or in tight spaces. These pliers are commonly used in electrical and mechanical work. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

dies

Cutting tools used to create threads on the outside of a pipe or rod so it can be connected to fittings. (Section B-2.4 (#chapter-b-2-4-use-stationary-power-tools))

digital multimeter (DMM)

An electronic tool used to measure electrical values such as voltage, current, and resistance. It shows the readings on a digital screen and is commonly used to test electrical circuits and equipment. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

digital multimeters

An electronic tool used to measure electrical values such as voltage, current, and resistance. It shows the readings on a digital screen and is commonly used to test electrical circuits and equipment. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

dimensional faults

Problems with a weld where the size or shape is different from what the design requires. (Section B-6.4 (#chapter-b-6-4-use-arc-welding-equipment))

direct current (DC)

An electric current that flows in one direction only, from the negative to the positive side of a circuit. It is commonly produced by batteries and some welding machines. (Section B-6.3 (#chapter-b-6-3-describe-the-arc-welding-process-and-equipment))

distortion

A change in the shape of metal caused by heating and cooling during welding. (Section B-6.4 (#chapter-b-6-4-use-arc-welding-equipment))

divider

A tool with two sharp points used to draw circles or measure distances on metal or other materials. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

dog everything

A safety instruction used in lifting and hoisting operations that means to secure or lock all controls and equipment so that no movement can occur. It ensures the load and machinery remain safely in place before workers approach or handle the load. (Section B-4.3 ([http://4.3](#)))

dog-legged

A condition where a rope, wire rope, or metal strand becomes bent sharply out of its normal straight alignment, creating an uneven angle that can cause extra wear or weakness in the material. (Section B-4.5 (#chapter-b-4-5-use-hoisting-lifting-and-rigging-equipment))

double basket hitch

A lifting method that uses two basket hitches placed under a load to support it at two separate points. This arrangement helps distribute the weight evenly and keeps the load stable during lifting. (Section B-4.2 (#chapter-b-4-2-describe-hoisting-lifting-and-rigging-equipment))

double joints

Connections where two welds are made on both sides of the same joint to make it stronger and more secure. This helps the metal pieces hold together better and handle more stress. (Section B-6.2 (#chapter-b-6-2-identify-types-of-welds-positions-joints-and-symbols))

double saddle (fist grip) clip

A type of cable clip that has two saddles instead of a U-bolt. It grips both sides of the wire rope evenly and is often used for stronger or more secure wire rope connections. (Section B-4.2 (#chapter-b-4-2-describe-hoisting-lifting-and-rigging-equipment))

drain auger (snake)

A flexible tool used to clear blockages in pipes and drains. It is pushed into the pipe and rotated to break up or pull out the material causing the clog. (Section B-2.1 (#chapter-b-2-1-describe-portable-power-tools-used-in-the-pipe-trades))

draw filing

a finishing technique where a file is held sideways across the workpiece and pulled or pushed along the surface. This method removes small amounts of material and helps create a smooth, flat finish on metal surfaces. It is commonly used to improve surface quality after rough filing. (Section B-1.2 (#chapter-b-1-2-use-hand-tools))

drill press

A stationary machine that holds and drives a drill bit vertically into a workpiece to make accurate holes. (Section B-2.3 (#chapter-b-2-3-describe-stationary-power-tools-used-in-the-pipe-trades))

drop head threader

A pipe-threading tool with a head that can open or “drop” to quickly release the pipe after threads have been cut. (Section B-2.1 (#chapter-b-2-1-describe-portable-power-tools-used-in-the-pipe-trades))

drop stops

Safety devices installed on lifting equipment, such as trolleys or hoists, that prevent the load or trolley from accidentally falling or running off the end of a beam or track. (Section B-4.2 (#chapter-b-4-2-describe-hoisting-lifting-and-rigging-equipment))

drop-forged steel

Steel that is shaped using heavy pressure and heat to make it stronger. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

drum machine

A drain-cleaning machine that stores a long flexible cable inside a rotating drum. The cable is fed into a pipe to break up or remove blockages in drains and sewer lines. (Section B-2.1 (#chapter-b-2-1-describe-portable-power-tools-used-in-the-pipe-trades))

dry fit (or dry seal)

When pipe parts are assembled together without using sealant, glue, or thread compound. It is usually done to check that the pieces fit properly before the final installation. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

dual-control machines

A welding machine that has two controls—one for adjusting the main current level and another for making fine adjustments to voltage or arc characteristics. (Section B-6.3 (#chapter-b-6-3-describe-the-arc-welding-process-and-equipment))

dummy (4-pin) level

A dummy level is a basic surveying tool used to measure height differences and check if surfaces are level. It has a short telescope mounted on a base that can be adjusted using screws. (Section B-1.3 (#chapter-b-1-3-use-levelling-equipment))

dunnage

Pieces of wood, metal, or other material placed under or between loads to support them, keep them off the ground, and prevent shifting or damage during storage or transport. (Section B-4.5 (#chapter-b-4-5-use-hoisting-lifting-and-rigging-equipment))

edge or flange joints

connections where the edges of two metal pieces are bent (flanged) and then welded together. This type of joint is often used for thin metal and helps create a neat, sealed edge. (Section B-6.2 (#chapter-b-6-2-identify-types-of-welds-positions-joints-and-symbols))

effort (input force)

The force a person applies to move or lift an object. (Section B-4.1 (#chapter-b-4-1-describe-the-principles-of-lifting-and-hoisting))

electrode

A metal rod used in welding that carries electric current and melts to provide filler metal for the weld. (Section B-6.3 (#chapter-b-6-3-describe-the-arc-welding-process-and-equipment))

electrode angle

The direction or tilt of the electrode when it is held during welding. (Section B-6.4 (#chapter-b-6-4-use-arc-welding-equipment))

electrode holder (stinger)

A handheld device used in welding to hold the electrode and safely carry electric current to it during welding. (Section B-6.3 (#chapter-b-6-3-describe-the-arc-welding-process-and-equipment))

electrode ovens

A heated storage unit used to keep welding electrodes dry and at the correct temperature to prevent moisture from affecting weld quality. (Section B-6.3 (#chapter-b-6-3-describe-the-arc-welding-process-and-equipment))

electrode stubs

The short leftover pieces of welding electrodes that remain after most of the electrode has been used. (Section B-6.3 (#chapter-b-6-3-describe-the-arc-welding-process-and-equipment))

electronic level

A digital measuring tool used to determine whether a surface is level or to measure angles and slopes; uses electronic sensors to detect the position and displays the reading on a digital screen for greater accuracy. (Section B-1.3 (#chapter-b-1-3-use-levelling-equipment))

elevation

The height of a point compared to a chosen reference level such as sea level. (Section B-1.3 (#chapter-b-1-3-use-levelling-equipment))

embrittlement

A condition where metal becomes hard and brittle, making it more likely to crack or break. (Section B-6.3 (#chapter-b-6-3-describe-the-arc-welding-process-and-equipment))

end

(working end) The free end of a rope used to tie knots, bends, or hitches. It is the part of the rope that is manipulated during rope tying. (Section B-4.4 (#chapter-b-4-4-select-slings-and-tie-knots-bends-and-hitches))

end pattern pipe wrench

A pipe wrench with jaws angled at about 45 degrees, allowing it to be used in tight spaces. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

endless slings (also known as grommet slings)

A type of sling made as a continuous loop of rope, wire rope, or webbing with no fixed ends. Endless slings can be wrapped around loads in different ways for lifting and are often used because they distribute weight evenly and are flexible to position. (Section B-4.2 (#chapter-b-4-2-describe-hoisting-lifting-and-rigging-equipment))

equalizer bar

A lifting bar that helps spread the weight of a load evenly between multiple slings or lifting lines. (Section B-4.2 (#chapter-b-4-2-describe-hoisting-lifting-and-rigging-equipment))

eutectic alloy

A special type of metal mixture that melts and hardens at one exact temperature instead of over a range. (Section B-5.1 (#chapter-b-5-1-describe-oxy-acetylene-equipment))

explosive limits

The range of concentrations of a flammable gas or vapour in air within which combustion or explosion can occur if an ignition source is present. Below the lower explosive limit (LEL) the mixture is too lean to ignite, and above the upper explosive limit (UEL) it is too rich to burn. (Section B-5.1 (#chapter-b-5-1-describe-oxy-acetylene-equipment))

exposed ratchet drop head threader

A pipe-threading tool used to cut threads on the outside of pipes; it has a ratcheting handle for use in tight spaces, and the drop head holds the cutting dies that form the threads. The exposed design allows the cutting head to be easily seen and adjusted during use. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

extracted-tee drill

A special drill used to cut an opening in a pipe so a branch connection can be added without removing the pipe. (Section B-2.1 (#chapter-b-2-1-describe-portable-power-tools-used-in-the-pipe-trades))

eyebolt

A bolt with a looped head used as a strong attachment point for lifting loads. (Section B-4.2 (#chapter-b-4-2-describe-hoisting-lifting-and-rigging-equipment))

fastener

A device used to hold materials together, such as a nail, bolt, or screw. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

fatigue fractures

Breaks in wire rope wires caused by repeated bending, vibration, or stress over time. These breaks usually appear as clean, square-ended wire breaks and often occur near fittings or areas where the rope bends frequently. (Section B-4.5 (#chapter-b-4-5-use-hoisting-lifting-and-rigging-equipment))

feed

The amount of pressure you apply to push a cutting tool into the material while drilling or grinding. (Section B-2.4 (#chapter-b-2-4-use-stationary-power-tools))

ferrous metals

Metals that contain iron and usually produce sparks when cut or ground, such as steel and cast iron. (Section B-2.1 (#chapter-b-2-1-describe-portable-power-tools-used-in-the-pipe-trades))

filler metal

Metal that is added during welding to help join two pieces together and form a strong weld. (Section B-6.3 (#chapter-b-6-3-describe-the-arc-welding-process-and-equipment))

fillers

Pieces of material used to fill gaps between parts so everything fits tightly and securely. (Section B-3.1 (#chapter-b-3-1-describe-ladders-and-elevated-platforms))

fillet weld

A weld used to join two pieces of metal at right angles, forming a triangular cross-section. (Section B-6.2 (#chapter-b-6-2-identify-types-of-welds-positions-joints-and-symbols))

fire standpipe

A fixed piping system in a building that supplies water for firefighting, allowing hoses to be connected on different floors. (Section B-2.4 (#chapter-b-2-4-use-stationary-power-tools))

flaring

The process of spreading the end of a pipe or tube outward so it can connect securely to a fitting. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

flashback arrestors

A safety device that stops flames from travelling backward through oxy-fuel equipment during a flashback. (Section B-5.1 (#chapter-b-5-1-describe-oxy-acetylene-equipment))

flashback explosion

A dangerous condition where the flame travels back through the torch and hoses toward the regulator, possibly causing an explosion. (Section B-5.1 (#chapter-b-5-1-describe-oxy-acetylene-equipment))

flutes (grooves)

The long channels cut into tools such as drill bits or taps. They help remove chips of material while cutting and allow cutting fluid to reach the cutting edge. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

flux

A coating on a welding electrode that helps protect the molten metal from air and keeps the arc stable during welding. (Section B-6.3 (#chapter-b-6-3-describe-the-arc-welding-process-and-equipment))

foresight reading

A measurement taken with a level instrument on a point whose elevation is being determined. It is usually the

last reading taken before the instrument is moved. (Section B-2.1 (#chapter-b-2-1-describe-portable-power-tools-used-in-the-pipe-trades))

formwork

Temporary structures used to shape concrete while it hardens. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

framing square (or carpenter's square)

An L-shaped measuring tool used to check right angles (90°) and lay out lines on materials such as wood, metal, or pipe. It has two straight arms set at a right angle and is commonly used for measuring, marking, and squaring workpieces. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

fusion

A method used to join thermoplastic pipes by heating the pipe ends until they soften and pressing them together to form a strong joint. (Section B-2.1 (#chapter-b-2-1-describe-portable-power-tools-used-in-the-pipe-trades))

gain (tubing gain)

The small amount of extra length that appears when tubing or pipe is bent because the outside of the bend stretches slightly. (Section B-1.3 (#chapter-b-1-3-use-levelling-equipment))

gantry

A fabricated structural bridge-like crane operating on tracks or wheels at or near ground level. (Section B-4.6 (#chapter-b-4-6-rig-load-for-cranes))

gantry crane

A type of crane that has a horizontal beam supported by two legs that move on wheels or rails. A hoist travels along the beam to lift and move heavy loads in workshops, warehouses, or construction sites. (Section B-4.2 (#chapter-b-4-2-describe-hoisting-lifting-and-rigging-equipment))

gasket

A seal placed between two surfaces to prevent leaks. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

gauge stems (sockets)

The threaded connectors on a pressure gauge that attach the gauge to a pipe, valve, or fitting. They allow the gauge to be securely connected so it can measure the pressure inside the system. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

geared pipe threader

A pipe-threading tool that uses gears to help turn the cutting dies around the pipe. The gears provide extra mechanical advantage, making it easier to cut threads on larger pipes with less effort. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

GO/NO-GO gauge

A measuring tool used to quickly check if a part is the correct size. One end (the “go” side) should fit into or onto the part if it is the right size, while the other end (the “no-go” side) should not fit. If the “go” side fits and the “no-go” side does not, the part is within the correct limits. (Section B-1.2 (#chapter-b-1-2-use-hand-tools))

grade (grinding wheel)

The measure of how strongly the abrasive grains are held together in a grinding wheel. (Section B-2.1 (#chapter-b-2-1-describe-portable-power-tools-used-in-the-pipe-trades))

grain density

The amount of abrasive grains packed into a grinding wheel. A wheel with high grain density has more grains close together, while a wheel with low grain density has fewer grains with more space between them. (Section B-2.1 (#chapter-b-2-1-describe-portable-power-tools-used-in-the-pipe-trades))

grinders

Power tools used to shape, smooth, or remove material from metal surfaces, often using a rotating abrasive wheel or disk. (Section B-6.3 (#chapter-b-6-3-describe-the-arc-welding-process-and-equipment))

grinding wheel (or disk)

A round wheel made of abrasive material used to grind, shape, smooth, or sharpen metal and other materials. (Section B-2.1 (#chapter-b-2-1-describe-portable-power-tools-used-in-the-pipe-trades))

groove weld

A weld that fills the gap between two pieces of metal, typically used in butt joints. (Section B-6.2 (#chapter-b-6-2-identify-types-of-welds-positions-joints-and-symbols))

groover

A tool or machine used to form a groove around the end of a pipe so that mechanical couplings or fittings can be attached securely. (Section B-2.3 (#chapter-b-2-3-describe-stationary-power-tools-used-in-the-pipe-trades))

ground clamp (ground connection)

A device used to attach the welding circuit to the workpiece or work surface, completing the electrical circuit and allowing current to flow safely. (Section B-6.3 (#chapter-b-6-3-describe-the-arc-welding-process-and-equipment))

grounded

Connected safely to the earth so that electrical current can flow away and reduce the risk of electric shock. (Section B-6.1 (#chapter-b-6-1-describe-safety-requirements-and-precautions-for-arc-welding))

guardrail

A protective rail along an edge that helps prevent people from falling. (Section B-3.1 (#chapter-b-3-1-describe-ladders-and-elevated-platforms))

gullet

The curved space between two saw teeth that collects and clears chips or sawdust while cutting. (Section B-2.1 (#chapter-b-2-1-describe-portable-power-tools-used-in-the-pipe-trades))

gullet (saw tooth)

The curved space between two saw teeth that collects and clears chips or sawdust while cutting. (Section B-2.1 (#chapter-b-2-1-describe-portable-power-tools-used-in-the-pipe-trades))

hammer drill (rotary hammer, roto-hammer)

A power drill that combines rotating motion with a hammering action to drill into hard materials like concrete or masonry. (Section B-2.1 (#chapter-b-2-1-describe-portable-power-tools-used-in-the-pipe-trades))

hand level

A straight tool used to check whether a surface is level (horizontal) or plumb (vertical). It usually contains glass tubes with bubbles that show when something is straight. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

hardsurfacing (hardfacing)

A process of adding a layer of weld material to the surface of a metal to rebuild worn areas or to increase resistance to wear and damage. (Section B-6.2 (#chapter-b-6-2-identify-types-of-welds-positions-joints-and-symbols))

headache ball

A crane hook generally without a block. (Section B-4.6 (#chapter-b-4-6-rig-load-for-cranes))

heat-treated

A process in which metal is heated and then cooled in a controlled way to make it stronger, harder, or more durable. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

heel

The back edge of a saw tooth that slopes downward after the cutting tip. (Section B-2.1 (#chapter-b-2-1-describe-portable-power-tools-used-in-the-pipe-trades))

heel (saw tooth)

The back edge of a saw tooth that slopes downward after the cutting tip. (Section B-2.1 (#chapter-b-2-1-describe-portable-power-tools-used-in-the-pipe-trades))

height of instrument (HI)

The height of the level instrument's line of sight above a known point or elevation. It is used to calculate the height of other points. (Section B-1.3 (#chapter-b-1-3-use-levelling-equipment))

hex key (Allen key) wrench

An L-shaped metal tool used to turn screws or bolts that have a hexagon-shaped hole. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

hexagonal wrench

A tool used to tighten or loosen pipes or fittings that have **six flat sides (a hexagonal shape)**. The wrench fits around the flats of the pipe fitting so it can grip firmly and turn the pipe without slipping. It is commonly used when working with hex-shaped pipe fittings and valves. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

hickory

A very strong hardwood commonly used to make tool handles. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

high stranding or unlaying (unwinding)

A condition where the strands of a wire rope begin to loosen, separate, or unwind from their normal twisted position. This can weaken the rope and may indicate damage or improper handling, requiring inspection or replacement. (Section B-4.5 (#chapter-b-4-5-use-hoisting-lifting-and-rigging-equipment))

high-speed steel blade

A saw blade made from a special steel that stays strong and sharp even at high cutting speeds and temperatures. (Section B-2.1 (#chapter-b-2-1-describe-portable-power-tools-used-in-the-pipe-trades))

hoist line

Wire rope that controls the main block or jib block or hook. (Section B-4.6 (#chapter-b-4-6-rig-load-for-cranes))

hoisting device

Equipment used to lift or lower loads, such as a crane or hoist. (Section B-4.1 (#chapter-b-4-1-describe-the-principles-of-lifting-and-hoisting))

holding action

The force that keeps a fastener securely in place after it is driven into a material. It occurs when the surrounding material compresses around the fastener and presses tightly against it. (Section B-2.1 (#chapter-b-2-2-use-portable-power-tools))

hole saw

A circular cutting tool with teeth on the edge used with a drill to cut large round holes in materials such as wood, plastic, or metal. The center drill bit helps guide the saw while cutting. (Section B-2.1 (#chapter-b-2-1-describe-portable-power-tools-used-in-the-pipe-trades))

hook

The forward-leaning edge of a saw tooth that helps pull the blade into the material during cutting. (Section B-2.1 (#chapter-b-2-1-describe-portable-power-tools-used-in-the-pipe-trades))

hook (lifting)

A curved metal device used to connect lifting equipment to a load. (Section B-4.2 (#chapter-b-4-2-describe-hoisting-lifting-and-rigging-equipment))

hook-tooth blade

A band saw blade with teeth that lean forward to cut quickly and remove material efficiently. (Section B-2.1 (#chapter-b-2-1-describe-portable-power-tools-used-in-the-pipe-trades))

hot cracking

Cracks that form in the weld metal while it is still very hot and starting to cool. (Section B-6.4 (#chapter-b-6-4-use-arc-welding-equipment))

hot tapping

A method used to cut into a pipe while it is still in service and under pressure, allowing a new connection to be added without shutting off the flow inside the pipe. (Section B-2.1 (#chapter-b-2-1-describe-portable-power-tools-used-in-the-pipe-trades))

hot-work permit

A formal safety document that gives permission to perform work that produces heat, sparks, or flames (such as welding or cutting) and confirms that proper precautions are in place to prevent fire or injury. (Section B-5.3 (#chapter-b-5-3-use-oxy-acetylene-equipment))

hydraulic

A system that uses liquid pressure to move or lift objects or equipment. (Section B-3.1 (#chapter-b-3-1-describe-ladders-and-elevated-platforms))

hydrometer

A measuring tool used to check the density of a liquid. It floats in the liquid, and the level where it sits shows the liquid's density or concentration. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

ice plugs

A temporary blockage of ice formed inside a pipe when the water in the pipe is frozen. The ice stops the flow of water so repairs or changes can be made without shutting off the entire system. (Section B-2.1 (#chapter-b-2-1-describe-portable-power-tools-used-in-the-pipe-trades))

incomplete penetration

A welding problem where the weld metal does not fully reach or join the bottom of the joint. (Section B-6.4 (#chapter-b-6-4-use-arc-welding-equipment))

inconel

A type of strong metal alloy made mainly from nickel that resists heat and corrosion, often used in high-temperature or harsh environments. (Section B-6.3 (#chapter-b-6-3-describe-the-arc-welding-process-and-equipment))

indentation

A small dent or mark made in a surface. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

inert gas

A gas that does not react chemically and is used to prevent unwanted reactions such as oxidation or explosions. (Section B-6.1 (#chapter-b-6-1-describe-safety-requirements-and-precautions-for-arc-welding))

interference fit (wedging effect)

Occurs when two parts are pressed together so tightly that they stay in place without fasteners. The tight fit creates friction that holds the parts securely together. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

intermediate foresight (IFS)

A level reading taken on a point between the starting point and the next turning point. It is used to find the elevation of points that are not used to move the instrument. (Section B-1.3 (#chapter-b-1-3-use-levelling-equipment))

intermediate sight (IS)

A level reading taken on a point between the starting point and the final point. It helps measure the height or elevation of different points along the way. (Section B-1.3 (#chapter-b-1-3-use-levelling-equipment))

internal wrench

A tool used to grip and turn parts from inside a pipe or fitting. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

jam-proof ratchet threader

A pipe-threading tool that cuts threads on the outside of a pipe. It uses a ratcheting handle so the pipe can be threaded in tight spaces, and the jam-proof design helps prevent the tool from sticking while cutting threads. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

jib

Secondary arm of a crane. Used to extend boom for specific lifts. (Section B-4.6 (#chapter-b-4-6-rig-load-for-cranes))

jib crane

A type of crane that has a horizontal arm (called a jib or boom) attached to a vertical support. The arm can rotate, allowing loads to be lifted and moved within a circular area. (Section B-4.2 (#chapter-b-4-2-describe-hoisting-lifting-and-rigging-equipment))

kerf

The width of material removed by a cutting tool such as a saw blade. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades); Section B-2.2 (#chapter-b-2-2-use-portable-power-tools))

kinks

A sharp bend in a wire rope that damages the rope and weakens it. (Section B-4.5 (#chapter-b-4-5-use-hoisting-lifting-and-rigging-equipment))

lack of fusion

A welding defect where melted metal does not properly join to the metal beside it. (Section B-6.4 (#chapter-b-6-4-use-arc-welding-equipment))

ladder-jack scaffold

A temporary work platform supported by brackets attached to ladders. (Section B-3.1 (#chapter-b-3-1-describe-ladders-and-elevated-platforms))

landing

A platform or surface at the top or bottom of a ladder where a person safely steps onto the ladder or off the ladder, rather than standing on the top of the ladder itself. (Section B-3.2 (#chapter-b-3-2-use-ladders-and-elevated-platforms))

lap joint

A joint that joins two pieces of metal by overlapping one piece over the other and welding along the edges of the overlap. (Section B-6.2 (#chapter-b-6-2-identify-types-of-welds-positions-joints-and-symbols))

LASER

Light Amplification by Simulated Emission of Radiation: A mixture of helium and neon gases is used to emit a very narrow beam of light that does not grow larger as it moves away from the source. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

laser level

A tool that projects a straight beam of light to create a level or vertical reference line. It helps workers align pipes, walls, or other structures accurately. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

lashing

An arrangement of wire rope and securing hardware such as U-bolt clips, meant to secure two or more objects together. Often used to temporarily secure a load, prior to a hoist. (Section B-4.6 (#chapter-b-4-6-rig-load-for-cranes))

layout lines

Lines drawn on material to guide cutting, drilling, or shaping operations. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

lead angle

the angle at which a cutting edge meets the material being cut. It helps guide the tool into the material and affects how smoothly the tool cuts and removes material. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

level, or level (levelling rod)

level: Perfectly horizontal or flat, from side to side; or

level (or levelling rod): A long measuring rod used with an optical or laser level to measure height differences and determine elevations on a job site. The rod has marked scales that allow workers to read measurements from a distance.. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

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 (#chapter-b-3-1-describe-ladders-and-elevated-platforms))

levels

A tool used to check whether a surface or object is perfectly horizontal (level) or vertical (plumb). It helps ensure that structures, pipes, or equipment are installed straight and properly aligned. (Section B-1.3 (#chapter-b-1-3-use-levelling-equipment))

leverage

Using a long tool or handle to multiply force. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

lift plan

A written or discussed plan that explains how a load will be safely lifted and moved. It includes details such as the weight of the load, the equipment being used, the lifting path, possible hazards, and how workers will communicate during the lift. (Section B-4.1 (#chapter-b-4-1-describe-the-principles-of-lifting-and-hoisting))

lifting point

The place on a load where the lifting equipment is attached. (Section B-4.1 (#chapter-b-4-1-describe-the-principles-of-lifting-and-hoisting))

line level

A small level that hangs on a string line to check if the line is level. It is used for rough measurements such as setting fence posts or checking building lines. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

line of sight

A clear, direct view of the load and work area without obstructions. (Section B-4.3 (#chapter-b-4-3-describe-lifting-and-hoisting-communication))

linesman pliers

Strong pliers used for gripping, twisting, bending, and cutting wire. They have short jaws with flat gripping surfaces and sharp cutting edges near the pivot. These pliers are commonly used by electricians when working with electrical wires and cables. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

liquidus

The temperature at which 100% of the alloy is in a fluid, non-crystalline form. (Section B-5.2 (#chapter-b-5-2-describe-cutting-brazing-and-soldering-techniques))

load

The object or material being lifted or moved. (Section B-4.1 (#chapter-b-4-1-describe-the-principles-of-lifting-and-hoisting))

load chart

Manufacturer's literature describing a crane's lift capacity under all possible configurations. (Section B-4.6 (#chapter-b-4-6-rig-load-for-cranes))

load integrity

The condition in which a lifted load remains secure, stable, and properly contained so that individual items do not shift, separate, or fall during lifting, moving, or positioning operations. (Section B-4.1 (#chapter-b-4-1-describe-the-principles-of-lifting-and-hoisting))

locking pliers

(Often referred to as vice-grips); adjustable pliers that can clamp tightly onto an object and stay locked in place until released. A screw on the handle adjusts the jaw opening, and a locking mechanism holds the pliers closed. They are commonly used to grip, clamp, or hold parts securely during mechanical or repair work. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

lockout

A safety procedure that ensures equipment is completely shut off and cannot be turned on during maintenance or repair. (Section B-6.1 (#chapter-b-6-1-describe-safety-requirements-and-precautions-for-arc-welding))

machine vise

A vise used on machines such as drill presses to hold a workpiece firmly while it is being drilled or cut. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

machined surface

A surface that has been precisely shaped or smoothed by a machine. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

main line

The primary lifting cable or hook on a crane used for most lifting operations. (Section B-4.3 (#chapter-b-4-3-describe-lifting-and-hoisting-communication))

manifold

A device that connects several gas cylinders together so they can supply gas through one main line. it helps provide a steady flow of gas when more than one cylinder is needed. (Section B-5.1 (#chapter-b-5-1-describe-oxy-acetylene-equipment))

manometer

A device used to measure the pressure of a gas or liquid. It often uses a tube filled with liquid, such as water or mercury, and the difference in liquid levels shows the pressure. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

Manual forklifts (also called pallet trucks or pallet jacks)

A hand-operated device used to lift and move loads placed on pallets. It uses a hydraulic mechanism and small wheels to raise the pallet slightly off the floor so it can be pushed or pulled across smooth surfaces. (Section B-4.2 (#chapter-b-4-2-describe-hoisting-lifting-and-rigging-equipment))

MAPP gas (methylacetylene-propadiene)

A stabilized fuel gas mixture used in oxy-fuel cutting, heating, and brazing. It produces a high-temperature flame, though slightly lower than acetylene, and is valued for its stability, safety in storage, and suitability for metalworking applications. (Section B-5.1 (#chapter-b-5-1-describe-oxy-acetylene-equipment))

masonry blade

A circular saw blade designed to cut hard materials such as brick, concrete, and stone. (Section B-2.1 (#chapter-b-2-1-describe-portable-power-tools-used-in-the-pipe-trades))

master link

A large metal link used to connect multiple slings or chains to a lifting hook. (Section B-4.2 ([http://4.2](#)))

maximum rate of removal (the draw limit)

The highest amount of gas you can safely take out of a cylinder in a short time. Taking out more than this can make the cylinder unsafe as liquid acetone will be drawn from the cylinder. (Section B-5.1 (#chapter-b-5-1-describe-oxy-acetylene-equipment))

mechanical advantage (MA)

How much a machine increases the force you put into it to make work easier. (Section B-4.1 (#chapter-b-4-1-describe-the-principles-of-lifting-and-hoisting))

mechanical bending

A process that uses a machine or tool to permanently bend pipe or tubing into a desired shape without cutting it. (Section B-2.3 (#chapter-b-2-3-describe-stationary-power-tools-used-in-the-pipe-trades))

metal-cutting circular blade

A circular saw blade designed to cut metal using strong materials and specially shaped teeth. (Section B-2.1 (#chapter-b-2-1-describe-portable-power-tools-used-in-the-pipe-trades))

mitre

A joint made between two pieces of wood or other material at an angle of 90°, such that the line of junction bisects this angle. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

monel

A metal alloy made mainly from nickel and copper that is strong and highly resistant to corrosion, especially in marine environments. (Section B-6.3 (#chapter-b-6-3-describe-the-arc-welding-process-and-equipment))

movable pulley

A pulley that moves with the load and helps reduce the effort needed to lift it. (Section B-4.1 (#chapter-b-4-1-describe-the-principles-of-lifting-and-hoisting))

mudsill

A strong board placed on the ground to spread the weight of a scaffold and keep it from sinking. (Section B-3.1 (#chapter-b-3-1-describe-ladders-and-elevated-platforms))

nail claw

(also called cat's paw); A short metal bar with a claw-shaped end used to pull nails out of wood. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

National Pipe Thread (NPT)

A standard type of pipe thread used in North America - ANSI/ASME standard B1.20.1. The threads are slightly tapered so they seal tightly when pipes are screwed together; sometimes still referred to as American Standard Pipe Thread (ASPT). (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

natural gas

A combustible fossil fuel composed primarily of methane that is used as a fuel for heating, cutting, and other industrial processes. In oxy-fuel operations, natural gas can be used as a fuel gas with oxygen to produce a flame for heating or cutting metal, although its flame temperature is lower than that of acetylene. (Section B-5.1 (#chapter-b-5-1-describe-oxy-acetylene-equipment))

needle-nose pliers

Pliers with long, narrow jaws that taper to a point. They are used to grip, bend, and hold small objects or wires, especially in tight or hard-to-reach spaces. These pliers are commonly used in electrical work, crafts, and small mechanical repairs. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

neutral flame

A flame with the right mix of oxygen and fuel so it burns clean and does not damage the metal. (Section B-5.1 (#chapter-b-5-1-describe-oxy-acetylene-equipment))

nipple

A short piece of pipe, usually threaded on both ends, used to connect two fittings or sections of pipe. (Section B-2.4 (#chapter-b-2-4-use-stationary-power-tools))

nipple chuck

A special chuck used on a threading machine to hold short pieces of pipe (nipples) securely while they are being threaded. (Section B-2.3 (#chapter-b-2-3-describe-stationary-power-tools-used-in-the-pipe-trades))

Nominal Pipe Size (NPS)

A standard system used to identify the size of pipes. The number refers to the approximate inside diameter of the pipe, even though the actual measurements may vary depending on the pipe wall thickness. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

offset pattern pipe wrench

A pipe wrench designed with jaws parallel to the handle so it can reach tight or awkward spaces. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

offset screwdriver

a tool used to tighten or loosen screws that have a star-shaped pattern with six points in the head. The shape helps the screwdriver grip the screw firmly, reducing slipping and allowing more turning force. Torx screwdrivers are commonly used in electronics, automotive work, and machinery. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

oiler

A device used to apply cutting oil to pipe threads or cutting tools to reduce heat, improve cutting performance, and help produce smooth, accurate threads. (Section B-2.3 (#chapter-b-2-3-describe-stationary-power-tools-used-in-the-pipe-trades))

open side vise

A vise designed to hold long pieces of pipe from one side while work is done on them. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

open-circuit voltage

The voltage in a welding circuit when the machine is on, but the arc has not yet been started. (Section B-6.3 (#chapter-b-6-3-describe-the-arc-welding-process-and-equipment))

open-structure coarse-grain wheel

A grinding wheel with large abrasive grains spaced farther apart to remove material quickly. (Section B-2.1 (#chapter-b-2-1-describe-portable-power-tools-used-in-the-pipe-trades))

optical level

A surveying instrument that uses a telescope and leveling system to measure height differences and establish level lines over a distance. It is commonly used in construction and site layout work. (Section B-1.3 (#chapter-b-1-3-use-levelling-equipment))

optical level (builder's level or dumpy level)

Also known as 4-pin level; a surveying instrument with a telescope used to measure height differences and establish level reference points over long distances on construction sites. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

out-of-plumb

Not perfectly vertical or straight up and down. (Section B-3.1 (#chapter-b-3-1-describe-ladders-and-elevated-platforms))

out-of-round

A condition where a grinding wheel is not perfectly circular, causing vibration during use. (Section B-2.4 (#chapter-b-2-4-use-stationary-power-tools))

outrigger

A support member that projects beyond the natural outline of a crane to provide additional support to prevent toppling. (Section B-4.6 (#chapter-b-4-6-rig-load-for-cranes))

Overhead travelling cranes (also called bridge or gantry cranes)

A crane that moves along overhead beams or rails and uses a hoist to lift and move heavy loads across a workspace. (Section-B-4.2 (#chapter-b-4-2-describe-hoisting-lifting-and-rigging-equipment))

overlap

Extra weld metal that spills over the edge of a weld without properly joining to the base metal. (Section B-6.4 (#chapter-b-6-4-use-arc-welding-equipment))

overlapped

The part where two sections of a ladder slide over each other to make the ladder longer and stronger. (Section B-3.1 (#chapter-b-3-1-describe-ladders-and-elevated-platforms))

oxidizing effect

The ability of oxygen to make materials burn faster and hotter by helping combustion happen more easily. (Section B-5.1 (#chapter-b-5-1-describe-oxy-acetylene-equipment))

oxidizing flame

A flame with too much oxygen that can cause metal to burn or become brittle. (Section B-5.2 (#chapter-b-5-2-describe-cutting-brazing-and-soldering-techniques))

oxy-acetylene

A system that uses a mixture of oxygen and acetylene gas to produce a high-temperature flame for cutting, welding, or heating metal. (Section B-5.3 (#chapter-b-5-3-use-oxy-acetylene-equipment))

oxyacetylene

A mixture of oxygen and acetylene gases used in metalworking to produce a very high-temperature flame for welding, cutting, brazing, and heating metals. The oxyacetylene flame can reach temperatures of about 3300 °C (6000 °F), making it one of the hottest fuel-gas flames used in the pipe trades. (Section B-5.1 (#chapter-b-5-1-describe-oxy-acetylene-equipment))

oxygen cylinder valve

A valve on top of an oxygen tank that opens and closes to control how much oxygen comes out. It keeps the gas safely inside the tank until you are ready to use it. (Section B-5.1 (#chapter-b-5-1-describe-oxy-acetylene-equipment))

parallel

When two lines or surfaces run in the same direction and stay the same distance apart, so they never meet. (Section B-2.1 (#chapter-b-2-1-describe-portable-power-tools-used-in-the-pipe-trades))

parallel (with the grain)

When two lines or surfaces run in the same direction and stay the same distance apart, so they never meet or cross. (Section B-2.1 (#chapter-b-2-1-describe-portable-power-tools-used-in-the-pipe-trades))

peen

The rounded end of a hammer head opposite the striking face. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

peening

Damage that occurs when wire rope repeatedly strikes or rubs against a hard surface, causing the wires or strands to flatten, distort, and become brittle over time. (Section B-4.5 (#chapter-b-4-5-use-hoisting-lifting-and-rigging-equipment))

pencil grinders (die grinders)

Small, high-speed grinders used for detailed work, such as removing burrs, shaping metal, or working in tight spaces. (Section B-6.3 (#chapter-b-6-3-describe-the-arc-welding-process-and-equipment))

pendant

Also called stay, a supporting line that maintains a constant distance between two points of attachment, such as a counterweight and a gantry or mast. (Section B-4.6 (#chapter-b-4-6-rig-load-for-cranes))

penetration

The depth that the weld melts into the base metal. (Section B-6.3 (#chapter-b-6-3-describe-the-arc-welding-process-and-equipment))

percussive force

A strong striking or hammering force produced by a tool that repeatedly hits a surface to break, chip, or penetrate material. (Section B-2.2 (#chapter-b-2-2-use-portable-power-tools))

perpendicular

When two lines or surfaces meet at a right angle of 90 degrees. (Section B-2.1 (#chapter-b-2-1-describe-portable-power-tools-used-in-the-pipe-trades))

perpendicular (against the grain)

When two lines or surfaces meet at a right angle (90°). One line goes straight up or across from the other. (Section B-2.1 (#chapter-b-2-1-describe-portable-power-tools-used-in-the-pipe-trades))

PEX

Cross-linked Polyethylene (PEX) is a type of flexible plastic pipe used for plumbing and heating systems. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

pick-and-carry

A lifting operation in which a crane or lifting machine raises a load and then moves it horizontally to another

location while the load remains suspended, usually carried low to the ground for safety. (Section B-4.1 (#chapter-b-4-1-describe-the-principles-of-lifting-and-hoisting))

pipe dies

Cutting tools used to create threads on the outside of a pipe. These threads allow pipes and fittings to be screwed together to form a tight connection. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

pipe freeze kits

A tool used to temporarily freeze the water inside a pipe so repairs can be made without shutting off the entire water system. The frozen water forms a plug that stops the flow while work is done. (Section B-2.1 (#chapter-b-2-1-describe-portable-power-tools-used-in-the-pipe-trades))

pipe saddle drill

A mechanical fitting that attaches to a pipe to create a branch outlet connection. (Section B-2.1 (#chapter-b-2-1-describe-portable-power-tools-used-in-the-pipe-trades))

pipe sleeve

A protective pipe or opening that allows another pipe to pass through walls or structures. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

pipe taps and tapping

Pipe taps are cutting tools used to create internal threads inside a pipe or fitting. Tapping is the process of using a pipe tap to cut these threads so another threaded pipe or fitting can be screwed into it. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

pipe thread

A **spiral ridge** cut into the end of a pipe so it can screw into another pipe or fitting. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

pipe vises

A tool used to hold a pipe steady while it is cut, threaded, or worked on. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

pipe wrench

A wrench with sharp teeth designed to grip and turn round pipes. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

pitch

The distance between the teeth on a saw blade. It helps determine how fast and how smoothly the saw cuts. (Section B-2.1 (#chapter-b-2-1-describe-portable-power-tools-used-in-the-pipe-trades))

pitch (saw teeth)

The distance between the teeth on a saw blade. (Section B-2.1 (#chapter-b-2-1-describe-portable-power-tools-used-in-the-pipe-trades))

pitch (thread pitch)

The distance between corresponding points on adjacent threads, often measured as threads per inch (imperial) or millimetres (metric). (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

plan brace (gooser 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 (#chapter-b-3-2-use-ladders-and-elevated-platforms))

plastic (pasty) range

The temperature range where a metal is partly solid and partly liquid, making it soft and easy to shape. (Section B-5.1 (#chapter-b-5-1-describe-oxy-acetylene-equipment))

plastic nut basin wrench

A basin wrench designed specifically for tightening or loosening plastic nuts under sinks. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

plastic range

(Also called the *pasty range*); the temperature range between the solidus and liquidus of an alloy; some portion of the alloy is solid, but the majority is liquid. This is due to the alloy's components solidifying at different temperatures. (Section B-5.2 (#chapter-b-5-2-describe-cutting-brazing-and-soldering-techniques))

plug and slot weld

A weld used to join overlapping pieces of metal by filling holes or slots in one piece to fuse it to another. (Section B-6.2 (#chapter-b-6-2-identify-types-of-welds-positions-joints-and-symbols))

plumb

Perfectly **vertical or straight up and down**, like the direction gravity pulls. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

plumb bob

A pointed weight attached to a string that is used to find a perfectly vertical (plumb) line. When the weight hangs freely, the string shows a straight up-and-down direction. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

pneumatic

A system that uses air pressure to move or lift things. (Section B-3.1 (#chapter-b-3-1-describe-ladders-and-elevated-platforms))

polarity

The direction of electrical flow in a welding circuit, which affects how heat is distributed between the electrode and the workpiece. (Section B-6.3 (#chapter-b-6-3-describe-the-arc-welding-process-and-equipment))

polyolefins

A group of plastics made from simple chemical compounds called olefins. Common examples include polypropylene (PP) and polyethylene (PE). These plastics are lightweight, strong, and resistant to chemicals, so they are often used to make pipes, fittings, and other plumbing materials. (Section B-2.1 (#chapter-b-2-1-describe-portable-power-tools-used-in-the-pipe-trades))

porosity

Small holes or bubbles in a weld caused by trapped gas. (Section B-6.4 (#chapter-b-6-4-use-arc-welding-equipment))

portable

A tool or piece of equipment that is easy to carry and move from one place to another so it can be used in different locations. Portable tools are often cordless and may use a rechargeable battery. (Section B-2.1 (#chapter-b-2-1-describe-portable-power-tools-used-in-the-pipe-trades))

portable band saw

A handheld power saw that uses a continuous loop blade to cut metal, pipe, or other materials. (Section B-2.1 (#chapter-b-2-1-describe-portable-power-tools-used-in-the-pipe-trades))

portable power drive

A powered tool used to turn pipe-threading heads and cut threads on pipe quickly. (Section B-2.1 (#chapter-b-2-1-describe-portable-power-tools-used-in-the-pipe-trades))

position welding

Welding performed in the flat position where the weld is parallel to the ground. (Section B-6.2 (#chapter-b-6-2-identify-types-of-welds-positions-joints-and-symbols))

powder-actuated fastener

A hardened steel nail or pin that is driven into materials such as concrete or steel using a powder-actuated tool powered by a small explosive charge. (Section B-2.2 (#chapter-b-2-2-use-portable-power-tools))

powder-actuated tools

(Often called a Hilti gun or Ramset gun after their manufacturing companies); A power tool (like a nail gun) that uses a small explosive charge (similar to a firearm cartridge) to drive fasteners such as nails or pins into hard materials like concrete or steel; process is known as direct fastening or explosive fastening. (Section B-2.1 (#chapter-b-2-1-describe-portable-power-tools-used-in-the-pipe-trades))

power cut-off saw (chop saw)

A power tool that uses a rotating abrasive wheel or blade to cut metal, pipe, or other materials. (Section B-2.1 (#chapter-b-2-1-describe-portable-power-tools-used-in-the-pipe-trades))

power drives

A stationary machine that rotates pipe so tools can be used to cut, ream, thread, or groove the pipe more easily. (Section B-2.3 (#chapter-b-2-3-describe-stationary-power-tools-used-in-the-pipe-trades))

prick punch

A very sharp punch used to mark precise points on metal before drilling. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

propane gas

A flammable hydrocarbon fuel gas (C_3H_8) stored as a liquid in pressurized cylinders and widely used for heating and cutting operations. In oxy-fuel processes, propane is mixed with oxygen to produce a clean, controlled flame suitable for metal cutting and preheating, though its flame temperature is lower than that of oxyacetylene. (Section B-5.1 (#chapter-b-5-1-describe-oxy-acetylene-equipment))

protractor head

An attachment used with a combination square that helps measure and mark angles. It is marked in degrees so workers can lay out accurate angles. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

pry bar

(also called the crowbar or long bar); A long, strong metal bar used to lift, pry apart, or move heavy materials. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

prying

Using leverage with a tool to separate or lift materials apart. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

pulley

A wheel with a rope or cable that helps lift or move heavy loads. (Section B-4.1 (#chapter-b-4-1-describe-the-principles-of-lifting-and-hoisting))

pulsation dampeners (snubbers)

Small devices attached to pressure gauges to reduce rapid pressure fluctuations. They help protect the gauge from damage and allow the pressure reading to remain steady and easier to read. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

purging

The process of removing air or hazardous gases from a space by replacing them with another gas or liquid. (Section B-6.1 (#chapter-b-6-1-describe-safety-requirements-and-precautions-for-arc-welding))

quick-change spring

A type of tool retainer used on pneumatic hammers that allows the operator to quickly install or remove a chisel or tool bit by pushing the spring aside. (Section B-2.2 (#chapter-b-2-2-use-portable-power-tools))

raker (tooth set)

A pattern of band-saw teeth where one tooth bends left, the next bends right, and the next stays straight to help clear chips while cutting. (Section B-2.1 (#chapter-b-2-1-describe-portable-power-tools-used-in-the-pipe-trades))

ram bending

A pipe-bending method where a hydraulic ram pushes the pipe against a forming die to create a bend. (Section B-2.3 (#chapter-b-2-3-describe-stationary-power-tools-used-in-the-pipe-trades))

rapidgrip wrench

A wrench with a spring-loaded jaw that allows quick gripping and ratcheting with one hand. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

raprench (rap-wrench)

A type of pipe wrench with a flat hammering surface used to loosen stuck pipes or fittings. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

ratchet torque wrenches

A tool used to tighten nuts or bolts to a specific amount of turning force (torque); works with a ratcheting handle so the user can tighten a fastener without removing the tool after each turn. When the correct torque is reached, the wrench usually clicks or releases to prevent over-tightening. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

reamer

A precision tool used to enlarge, smooth, or finish an existing hole or pipe end to an accurate diameter. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

reaming

The process of smoothing and slightly enlarging the inside of a hole or pipe to remove rough edges and improve fit. (Section B-2.4 (#chapter-b-2-4-use-stationary-power-tools))

reciprocating saw

(Also known simply as a *recip saw* or *Sawzall*); a power saw with a blade that moves back and forth quickly to cut through wood, metal, or plastic. (Section B-2.1 (#chapter-b-2-1-describe-portable-power-tools-used-in-the-pipe-trades))

reef knot

(or square knot); A simple knot used to tie two ends of a rope together. It is commonly used for securing bundles or light loads but should not be used for heavy lifting or critical rigging because it can slip under strain. (Section B-4.4 (#chapter-b-4-4-select-slides-and-tie-knots-bends-and-hitches))

reeving

The process of threading a rope or cable through pulleys or lifting equipment. (Section B-4.5 (#chapter-b-4-5-use-hoisting-lifting-and-rigging-equipment))

refractive index

A measurement that describes how much light bends when it passes through a substance, such as a liquid or glass. It is used to help determine the concentration or composition of a liquid. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

refractometer

A handheld measuring tool used to check the concentration of liquids, such as antifreeze, by measuring how light bends (refracts) when it passes through the liquid. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

refractometers

A handheld measuring tool used to check the concentration of liquids, such as antifreeze, by measuring how light bends (refracts) when it passes through the liquid. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

regular teeth

A band-saw tooth pattern with evenly spaced teeth designed for smooth cutting. (Section B-2.1 (#chapter-b-2-1-describe-portable-power-tools-used-in-the-pipe-trades))

regulator

A device that controls the pressure of gas flowing from a cylinder to ensure safe and consistent operation. (Section B-5.3 (#chapter-b-5-3-use-oxy-acetylene-equipment))

reinforcement

Extra weld metal deposited above the surface of the base metal to strengthen the weld. (Section B-6.2 (#chapter-b-6-2-identify-types-of-welds-positions-joints-and-symbols))

residual stress

Stress that remains inside metal after it has been heated and cooled. (Section B-6.4 (#chapter-b-6-4-use-arc-welding-equipment))

resistance (load force)

The force that must be overcome to move or lift a load. (Section B-4.1 (#chapter-b-4-1-describe-the-principles-of-lifting-and-hoisting))

respirator

A protective device worn over the nose and mouth to filter harmful fumes, gases, or particles from the air. (Section B-6.1 (#chapter-b-6-1-describe-safety-requirements-and-precautions-for-arc-welding))

retainer

A device used on tools such as pneumatic hammers to hold a tool bit, chisel, or attachment securely in place during operation. (Section B-2.3 (#chapter-b-2-3-describe-stationary-power-tools-used-in-the-pipe-trades))

reverse flow check valve (RFCV)

A device that prevents gases from flowing backward into hoses or cylinders, helping to reduce the risk of fire or explosion. (Section B-5.3 (#chapter-b-5-3-use-oxy-acetylene-equipment))

reverse flow check valves (RFCV)

A safety device installed in oxy-fuel equipment that allows gas to flow in only one direction and prevents gases from flowing backward into hoses or cylinders. (Section B-5.1 (#chapter-b-5-1-describe-oxy-acetylene-equipment))

rigging

The equipment and methods used to attach and lift loads safely with cranes or hoists. (Section B-4.1 (#chapter-b-4-1-describe-the-principles-of-lifting-and-hoisting))

rip blade

A saw blade designed to cut wood along the grain. (Section B-2.1 (#chapter-b-2-1-describe-portable-power-tools-used-in-the-pipe-trades))

rip blades

A saw blade designed to cut wood along the grain. The teeth are shaped to remove wood quickly and make long, straight cuts. (Section B-2.1 (#chapter-b-2-1-describe-portable-power-tools-used-in-the-pipe-trades))

ripsaw

A hand saw used to cut **along the grain of wood**. Its teeth are shaped to remove wood fibres as it cuts. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

rivet

A metal pin used to permanently fasten materials together. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

roll groover

A machine that uses rollers to press a groove into the end of a pipe so it can be connected with mechanical couplings. (Section B-2.4 (#chapter-b-2-4-use-stationary-power-tools))

roll grooving

A process used to form a groove around the outside of a pipe by pressing it between rolling wheels. The groove allows special couplings to be attached so pipes can be joined together without threading or welding. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

rolling hitch

A knot used to attach a rope to another rope, pole, or object so it grips tightly when pulled lengthwise. It is commonly used to take strain off a loaded rope or to secure a line that may be under tension. (Section B-4.4 (#chapter-b-4-4-select-slings-and-tie-knots-bends-and-hitches))

root face (or landing)

The flat surface at the edge of a joint that remains uncut to support the weld and control penetration. (Section B-6.2 (#chapter-b-6-2-identify-types-of-welds-positions-joints-and-symbols))

root opening

The gap between two pieces of metal at the joint, which allows weld metal to penetrate and fuse the pieces together. (Section B-6.2 (#chapter-b-6-2-identify-types-of-welds-positions-joints-and-symbols))

root radius

The curved surface at the base of a joint preparation (such as a U-groove) that helps control weld penetration and allows smoother flow of weld metal. (Section B-6.2 (#chapter-b-6-2-identify-types-of-welds-positions-joints-and-symbols))

rope lay

The length along the rope in which one strand makes a complete revolution around the rope. (Section B-4.5 (#chapter-b-4-5-use-hoisting-lifting-and-rigging-equipment))

rosebud (torch tip)

A multi-port torch tip used with an oxy-fuel torch to produce a large, soft flame for heating or preheating metal. It distributes the flame through several small openings, allowing heat to be spread evenly over a wider area than a standard welding or cutting tip. (Section B-5.1 (#chapter-b-5-1-describe-oxy-acetylene-equipment))

rotary draw bending

A pipe-bending method where the pipe is clamped to a rotating die and pulled around it to form a smooth, accurate bend. (Section B-2.3 (#chapter-b-2-3-describe-stationary-power-tools-used-in-the-pipe-trades))

round stock

A solid piece of metal shaped like a cylinder (round bar) that is used to make parts or components. It is often measured, cut, or machined in metalworking and pipe trades. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

rungs

The round bars on a ladder that you step on when climbing. (Section B-3.1 (#chapter-b-3-1-describe-ladders-and-elevated-platforms))

sabre saw (jigsaw)

A handheld power saw with a narrow blade that moves up and down to cut curves or shapes in wood, metal, or plastic. (Section B-2.1 (#chapter-b-2-1-describe-portable-power-tools-used-in-the-pipe-trades))

saddle (pertaining to hook)

The curved bottom part of a lifting hook where the load should sit. The saddle is the strongest part of the hook and is designed to safely support the weight. (Section B-4.2 (#chapter-b-4-2-describe-hoisting-lifting-and-rigging-equipment))

safe working load

safe working load (SWL) – The maximum weight that lifting equipment can safely lift without breaking or failing. (Section B-4.2 (#chapter-b-4-2-describe-hoisting-lifting-and-rigging-equipment))

safety catches

A spring-loaded latch attached to a hook that closes the opening of the hook to prevent a sling, rope, or chain from accidentally slipping off during lifting. (Section B-4.2 (#chapter-b-4-2-describe-hoisting-lifting-and-rigging-equipment))

safety collar

A U-shaped metal collar used on pneumatic hammers with a spring retainer to help keep the tool bit securely in place and prevent it from becoming loose during operation. (Section B-2.1 (#chapter-b-2-1-describe-portable-power-tools-used-in-the-pipe-trades))

safety factor

A margin of safety used to ensure equipment can handle more than the expected load. (Section B-4.1 (#chapter-b-4-1-describe-the-principles-of-lifting-and-hoisting))

scaffold

A temporary structure that allows workers to safely reach high work areas. (Section B-3.1 (#chapter-b-3-1-describe-ladders-and-elevated-platforms))

scissor lift

A machine that raises workers straight up using folding supports that move like scissors. (Section B-3.1 (#chapter-b-3-1-describe-ladders-and-elevated-platforms))

scribe / scribing

To scratch a thin line on metal using a sharp tool so that it can be cut, drilled, or shaped accurately. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

scriber (or awl)

A sharp, pointed tool used to scratch or mark precise lines on metal or other hard materials before cutting, drilling, or machining. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

scrubbing

Wear and damage that occur when a wire rope rubs repeatedly against another surface or against itself. This rubbing can cause the wires and strands to shift out of place and wear down over time. (Section B-4.5 (#chapter-b-4-5-use-hoisting-lifting-and-rigging-equipment))

sectional drain cleaning machines

A drain-cleaning machine that uses several short sections of cable connected together to clear blockages in pipes. Each section is added as needed, allowing the cable to reach farther into the drain. (Section B-2.1 (#chapter-b-2-1-describe-portable-power-tools-used-in-the-pipe-trades))

self-contained breathing apparatus (SCBA)

A type of respirator that supplies clean air from a tank carried by the user. (Section B-6.1 (#chapter-b-6-1-describe-safety-requirements-and-precautions-for-arc-welding))

self-feeding multi-spur bit

A drill bit designed for wood that pulls itself into the material and cuts quickly with several sharp cutting edges. (Section B-2.1 (#chapter-b-2-1-describe-portable-power-tools-used-in-the-pipe-trades))

self-fluxing

A property of some metals or filler materials that allows them to clean and protect the joint without needing a separate flux, helping the molten metal flow properly during brazing or soldering. (Section B-5.2 (#chapter-b-5-2-describe-cutting-brazing-and-soldering-techniques))

self-supporting

Able to stand on its own without leaning against another structure. (Section B-3.1 (#chapter-b-3-1-describe-ladders-and-elevated-platforms))

semi-high-speed steel blade

A saw blade made from steel that is harder than carbon steel and can handle faster cutting speeds. (Section B-2.1 (#chapter-b-2-1-describe-portable-power-tools-used-in-the-pipe-trades))

serrated jaws

Jaws with small teeth or ridges that help grip an object so it does not slip. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

shackle

A U-shaped metal connector with a removable pin used to attach slings, ropes, or chains to a load or lifting device during rigging and hoisting operations. (Section B-4.2 (#chapter-b-4-2-describe-hoisting-lifting-and-rigging-equipment))

shank (shaft)

the long, straight part of a tool that connects the working end (such as a blade or tip) to the handle. It helps transfer force from the handle to the cutting or working part of the tool. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

sheave

A grooved shell or pulley used to redirect force upon a hoist line. (Section B-4.6 (#chapter-b-4-6-rig-load-for-cranes))

sheet bend

A knot used to join two ropes together, especially when the ropes are different sizes or materials. It forms a secure connection that is commonly used in rigging and rope work. (Section B-4.4 (#chapter-b-4-4-select-slings-and-tie-knots-bends-and-hitches))

shielded metal arc welding (SMAW)

(Also commonly called *stick welding* or *electric arc welding*); A welding process that uses an electric arc between a coated electrode and the metal to join materials. (Section B-6.1 (#chapter-b-6-1-describe-safety-requirements-and-precautions-for-arc-welding))

shots (sightings)

The readings taken through a level instrument when looking at a leveling rod to measure height or elevation. (Section B-1.3 (#chapter-b-1-3-use-levelling-equipment))

side grinder

A handheld power tool that uses a rotating grinding wheel or disk mounted on the side of the motor to grind, cut, or smooth metal and other materials. It is commonly used for metal work and pipe preparation. (Section B-2.1 (#chapter-b-2-1-describe-portable-power-tools-used-in-the-pipe-trades))

side-loading

A dangerous condition in which a portion of a crane hoist acts horizontally; force on a boom other than a true vertical lift that the boom is designed for. (Section B-4.6 (#chapter-b-4-6-rig-load-for-cranes))

signal person

A trained worker who gives hand signals or radio instructions to a crane operator during lifting operations. (Section B-4.1 (#chapter-b-4-1-describe-the-principles-of-lifting-and-hoisting))

sills

Flat pieces of wood or other material placed under scaffold supports to spread the load and provide a stable base on the ground. (Section B-3.2 (#chapter-b-3-2-use-ladders-and-elevated-platforms))

simple machines

Basic devices, such as levers, pulleys, and inclined planes, that make work easier by changing the size or direction of a force. (Section B-4.1 (#chapter-b-4-1-describe-the-principles-of-lifting-and-hoisting))

sine wave

A smooth, wave-shaped pattern that shows how alternating current (AC) rises and falls over time as it changes direction. (Section B-6.3 (#chapter-b-6-3-describe-the-arc-welding-process-and-equipment))

single basket hitches

A lifting method where a sling is passed under or through a load and both ends of the sling are attached to the lifting hook, forming a “basket” that supports the load from underneath. (Section B-4.2 (#chapter-b-4-2-describe-hoisting-lifting-and-rigging-equipment))

single joints

A joint that is welded from one side only, where the weld is applied to one side of the materials being joined. (Section B-6.2 (#chapter-b-6-2-identify-types-of-welds-positions-joints-and-symbols))

single-phase AC

A type of alternating current that uses one electrical wave and is commonly used in homes and small buildings. (Section B-6.3 (#chapter-b-6-3-describe-the-arc-welding-process-and-equipment))

sink machines

A portable drain-cleaning machine used to remove clogs in sinks, floor drains, and small pipes. It rotates a flexible

cable (snake) inside the pipe to break up or pull out blockages. (Section B-2.1 (#chapter-b-2-1-describe-portable-power-tools-used-in-the-pipe-trades))

sintered

A process where powdered metal or ceramic particles are heated until they fuse together without fully melting. The result is a solid but slightly porous material that can be used to filter gases or absorb heat, such as in flashback arrestors in oxy-fuel equipment. (Section B-5.1 (#chapter-b-5-1-describe-oxy-acetylene-equipment))

skip-tooth blade

A band-saw blade with widely spaced teeth that helps clear sawdust and is useful for cutting softer materials. (Section B-2.1 (#chapter-b-2-1-describe-portable-power-tools-used-in-the-pipe-trades))

slag

A hard residue left on a weld after metal is melted and fused together. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

slag inclusion

Pieces of solid material (slag) that become trapped inside the weld. (Section B-6.4 (#chapter-b-6-4-use-arc-welding-equipment))

sling

A strong strap, rope, or chain used to lift heavy objects. (Section B-4.1 (#chapter-b-4-1-describe-the-principles-of-lifting-and-hoisting))

slip-proof loop

A loop tied in a rope that will not tighten or slide when weight or tension is applied. It helps keep loads secure during lifting or pulling. (Section B-4.4 (#chapter-b-4-4-select-slings-and-tie-knots-bends-and-hitches))

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 (#chapter-b-3-2-use-ladders-and-elevated-platforms))

slug wrench (or striking wrench)

A short, heavy wrench designed to tighten or loosen large nuts and bolts. It has a thick handle end that can be hit with a hammer to apply extra force when turning stubborn or tightly fastened parts. It is commonly used in heavy construction and industrial work. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

snap-spin

A quick turning motion of a hand wheel used to tighten or loosen chuck jaws on a pipe or tool. (Section B-2.4 (#chapter-b-2-4-use-stationary-power-tools))

snatch block

A pulley with a side plate that opens so a rope or cable can be placed over the wheel without threading the entire

line through it. Snatch blocks are commonly used to change the direction of a pull or to increase lifting or pulling power. (Section B-4.2 (#chapter-b-4-2-describe-hoisting-lifting-and-rigging-equipment))

snub line

A rope or line attached to a load to help control its movement and prevent it from swinging while it is being lifted or moved by a crane. (Section B-4.1 (#chapter-b-4-1-describe-the-principles-of-lifting-and-hoisting))

soapstone

A soft, chalk-like material used to **mark lines on metal or other surfaces**, especially in welding or metalworking. The marks are easy to see and can be wiped off after the work is finished. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

socket wrench

A wrench that uses removable sockets to fit over nuts or bolts and turn them. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

softeners

Protective padding placed between a sling and the sharp edges or corners of a load. Softeners help prevent damage to the sling and reduce wear or cutting while lifting. (Section B-4.2 (#chapter-b-4-2-describe-hoisting-lifting-and-rigging-equipment))

solidus

The temperature at which 100% of the alloy is in a solid, crystalline form. (Section B-5.2 (#chapter-b-5-2-describe-cutting-brazing-and-soldering-techniques))

sorting hooks

(shake-out hook): A long, narrow hook used in rigging to pick up or separate steel plates, beams, or other stacked materials. Its thin shape allows it to slide between tightly stacked pieces so they can be lifted safely. (Section B-4.2 (#chapter-b-4-2-describe-hoisting-lifting-and-rigging-equipment))

spade bit

A flat drill bit with a pointed tip used to drill larger holes in wood. (Section B-2.1 (#chapter-b-2-1-describe-portable-power-tools-used-in-the-pipe-trades))

spalled concrete

Concrete that has chipped, cracked, or broken away from the surface, often due to impact, weathering, or stress. (Section B-2.2 (#chapter-b-2-2-use-portable-power-tools))

spark guard

A protective shield mounted near a grinding wheel that helps deflect sparks, dust, and debris away from the operator during grinding. (Section B-2.3 (#chapter-b-2-3-describe-stationary-power-tools-used-in-the-pipe-trades))

speed

How fast a machine or tool rotates, usually measured in revolutions per minute (RPM). (Section B-2.4 (#chapter-b-2-4-use-stationary-power-tools))

speed governor

A device that controls the maximum speed of a machine or motor to keep it running at a safe and steady rate. (Section B-2.1 (#chapter-b-2-1-describe-portable-power-tools-used-in-the-pipe-trades))

speed of travel

How fast the welder moves the electrode along the metal while welding. (Section B-6.4 (#chapter-b-6-4-use-arc-welding-equipment))

spiralling (pipe cutting)

A cutting problem that occurs when a pipe cutter does not stay in a straight line around the pipe. Instead of following the same groove, the cutter wheel gradually moves along the pipe in a spiral pattern, resulting in an uneven or angled cut that is not square to the pipe; sometimes referred to as a barber's pole. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

spirit level

A tool used to check if something is level or plumb. It has a small bubble inside a liquid-filled tube. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

spirit vial

A small, sealed tube filled with liquid and an air bubble. It helps show when a tool or instrument is level. (Section B-1.3 (#chapter-b-1-3-use-levelling-equipment))

spreader bar

A bar used to keep lifting slings apart and evenly distribute the load. (Section B-4.2 ([http://4.2](#)))

spreader bars (beams)

A strong bar used during lifting to keep slings apart and help balance the weight of a load. (Section B-4.2 (#chapter-b-4-2-describe-hoisting-lifting-and-rigging-equipment))

spreaders

Bars on a step ladder that hold the legs apart so the ladder stays stable. (Section B-3.1 (#chapter-b-3-1-describe-ladders-and-elevated-platforms))

spud wrench

(also called *monkey wrench*); A wrench used in construction that has a pointed end to help align holes and a wrench end to tighten bolts. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

square cut

A cut made at a 90-degree angle to the length of a pipe or material. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

square head (or set square)

The adjustable head of a combination square that is used to check or mark 90° (square) and 45° angles. It often includes a small spirit level and a scribe for marking lines. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

square tee joint

A tee joint in which the edges of the materials are not beveled or prepared, allowing the pieces to meet at a right angle without additional edge preparation. (Section B-6.2 (#chapter-b-6-2-identify-types-of-welds-positions-joints-and-symbols))

stable load

A load that remains balanced and does not shift or tip when lifted. (Section B-4.1 (#chapter-b-4-1-describe-the-principles-of-lifting-and-hoisting))

stadia lines

Two short horizontal lines located above and below the main crosshair inside the telescope of a surveying instrument. They are used to estimate distance by comparing the spacing between the lines with markings on a measuring rod. (Section B-1.3 (#chapter-b-1-3-use-levelling-equipment))

standard combination blade

A saw blade that can be used for both ripping and crosscutting. It is made to handle general cutting jobs. (Section B-2.1 (#chapter-b-2-1-describe-portable-power-tools-used-in-the-pipe-trades))

standing part

The long, main portion of a rope that is not actively used to tie the knot. It carries most of the load when the rope is under tension. (Section B-4.4 (#chapter-b-4-4-select-slings-and-tie-knots-bends-and-hitches))

station (STA)

A specific point or location along a line where measurements or readings are taken. (Section B-1.3 (#chapter-b-1-3-use-levelling-equipment))

steam-tracing tubing

Steam tracing: A method of using steam pipes to keep other pipes warm so fluids do not freeze.

Steam-tracing tubing: Small tubing that carries steam along a pipe to keep the pipe and its contents warm, helping prevent liquids from cooling, thickening, or freezing. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

steel rule

A straight measuring tool made of steel that is used to measure short distances and draw straight lines. It usually has markings in millimetres and inches for accurate measurements. (Section B-1.1 ([http://1.1](#)))

stick boom

A type of boom lift with a straight, telescoping arm that extends outward and upward to reach high work areas.

It moves in a direct line rather than bending at joints like an articulated boom. (Section B-3.1 (#chapter-b-3-1-describe-ladders-and-elevated-platforms))

stillson pattern pipe wrench

A classic pipe wrench design invented by Daniel Stillson that uses adjustable serrated jaws to grip pipes. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

straight grinders

A type of grinder where the grinding wheel is in line with the motor shaft, used for precise work and hard-to-reach areas. (Section B-6.3)

straight pattern pipe wrench

A common pipe wrench design with straight jaws used for gripping and turning pipes. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

strap wrench

A wrench that uses a rubber or fabric strap to grip and turn round objects without damaging them. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

striker

A tool used to safely ignite a welding torch by producing a spark. (Section B-5.3 (#chapter-b-5-3-use-oxy-acetylene-equipment))

structural discontinuities

Flaws or breaks in a weld that weaken the metal. (Section B-6.4 (#chapter-b-6-4-use-arc-welding-equipment))

stubbies (stubby screwdrivers)

Short screwdrivers with a compact handle and shaft. They are designed for tightening or loosening screws in tight or confined spaces where a regular-length screwdriver would not fit. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

studs

Short rods or fasteners, often threaded on both ends, used to join or secure parts together. (Section B-2.4 (#chapter-b-2-4-use-stationary-power-tools))

superstructure

The supporting framework or structure above the base of lifting equipment that holds and supports hoists, cranes, or other lifting devices during operation. (Section B-4.2 (#chapter-b-4-2-describe-hoisting-lifting-and-rigging-equipment))

swaging

A process used to change the shape or size of a pipe or tube end, usually to make it fit inside another pipe. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

sway brace

A support bar that helps keep a scaffold stable and prevents it from wobbling. (Section B-3.1 (#chapter-b-3-1-describe-ladders-and-elevated-platforms))

swing

The hazard area associated with the radius of the crane's carrier and counterweights; this should be a flagged-off area during crane operation and considered a no-go zone. (Section B-4.6 (#chapter-b-4-6-rig-load-for-cranes))

swivels

A rotating connector used in lifting and rigging that allows a hook, chain, or sling to turn freely. This helps prevent twisting of the lifting equipment while a load is being lifted or moved. (Section B-4.2 (#chapter-b-4-2-describe-hoisting-lifting-and-rigging-equipment))

tack weld

A short weld used to hold parts in place during fit-up before final welding. (Section B-6.2 (#chapter-b-6-2-identify-types-of-welds-positions-joints-and-symbols))

tag lines

A rope attached to a suspended load that workers hold to guide and steady the load, helping control its direction and rotation during lifting or positioning. (Section B-4.1 (#chapter-b-4-1-describe-the-principles-of-lifting-and-hoisting))

tagline

Guy-wires used to control crane loads from unwanted rotation or swinging, allowing ground workers to control the load from a safe distance. (Section B-4.6 (#chapter-b-4-6-rig-load-for-cranes))

tang (file tang)

The narrow-pointed section at the end of a file that fits into the handle. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

tangent chart

A printed chart on some pipe layout tools that helps workers find angles and measurements when laying out cuts or fittings on pipe. It uses tangent values to calculate distances needed for accurate pipe layouts. (Section B-1.1 (<http://1.1>))

tapered thread

A thread that gradually decreases in diameter along its length to create a tighter seal as it is tightened. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

telescope (surveying)

In a surveying instrument, the telescope is the tube used to look at a distant target or measuring rod to determine height or alignment. (Section B-1.3 (#chapter-b-1-3-use-levelling-equipment))

temper (metal)

The hardness and strength created in metal by heat treatment. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

tempered steel

Steel that has been heat-treated to increase hardness and durability. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

theodolite level

A precision surveying instrument used to measure horizontal and vertical angles. It uses a rotating telescope mounted on a base and is commonly used in construction, engineering, and land surveying to establish accurate positions and alignments. (Section B-1.3 (#chapter-b-1-3-use-levelling-equipment))

thermoplastic pipe

A type of plastic pipe that softens when heated and hardens again when cooled. (Section B-2.1 (#chapter-b-2-1-describe-portable-power-tools-used-in-the-pipe-trades))

thimble

A metal fitting placed inside the eye (loop) of a wire rope or fibre rope to protect it from wear and crushing. The thimble helps the rope keep its shape and prevents damage when the rope is attached to hooks, shackles, or other rigging hardware. (Section B-4.4 (#chapter-b-4-4-select-slings-and-tie-knots-bends-and-hitches))

thread

A spiral ridge formed on a bolt, screw, or pipe used for fastening or sealing. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

thread gauge (or screw pitch gauge)

A measuring tool used to identify the size and spacing of threads on bolts, screws, or pipes. It helps determine the thread pitch so the correct fastener or fitting can be used. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

threader

A tool used to cut threads onto the outside of a pipe or rod so that fittings or other threaded parts can be screwed onto it. Threaders are commonly used in plumbing and pipe installation. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

three-jawed chuck

A clamping device on a drill that uses three jaws to hold a drill bit or other tool securely in place while it spins. The jaws tighten or loosen together to keep the bit centered. (Section B-2.1 (#chapter-b-2-1-describe-portable-power-tools-used-in-the-pipe-trades))

three-phase AC

A type of alternating current that uses three electrical waves working together to provide a steady and powerful

supply of electricity, often used in industrial settings. (Section B-6.3 (#chapter-b-6-3-describe-the-arc-welding-process-and-equipment))

thumbscrews (levelling screws)

Thumbscrews are adjustable screws used to level or position an instrument by turning them with your fingers. (Section B-1.3 (#chapter-b-1-3-use-levelling-equipment))

tilting level

(also known as split-bubble levels or engineer's levels); a surveying instrument used to measure height differences and establish level lines. It has a telescope that can be slightly tilted to center the bubble in the level vial for accurate readings. (Section B-1.3 (#chapter-b-1-3-use-levelling-equipment))

timber hitch

A knot used to secure a rope around logs, poles, or other long objects for lifting or dragging. The knot tightens when tension is applied and loosens easily when the load is removed. (Section B-4.4 (#chapter-b-4-4-select-slings-and-tie-knots-bends-and-hitches))

tirfor jacks

A hand-operated lifting or pulling device that uses a wire rope and gripping jaws to move heavy loads. By operating a lever, the device pulls the rope through the mechanism to lift, lower, or pull materials with controlled force. (Section B-4.2 (#chapter-b-4-2-describe-hoisting-lifting-and-rigging-equipment))

toe-boards

A small board along the edge of a platform that prevents tools or materials from falling off. (Section B-3.1 (#chapter-b-3-1-describe-ladders-and-elevated-platforms))

tolerances

The small amount a measurement can vary from the exact value and still be acceptable. (Section B-3.1 (#chapter-b-3-1-describe-ladders-and-elevated-platforms))

tool rest

An adjustable support on a grinder that holds the workpiece steady while grinding so the operator can control the tool safely and accurately. (Section B-2.3 (#chapter-b-2-3-describe-stationary-power-tools-used-in-the-pipe-trades))

top screw chain vise

A portable pipe vise with three legs and a chain used to hold pipes firmly at a job site. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

top screw stand chain vise

A portable pipe vise mounted on a stand with legs that support long pieces of pipe during work. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

top-running

A type of overhead travelling crane where the crane bridge runs on rails mounted on top of runway beams, allowing it to carry heavier loads. (Section B-4.2 (#chapter-b-4-2-describe-hoisting-lifting-and-rigging-equipment))

torpedo level

A torpedo level is a small, narrow level used to check whether a surface or pipe is level or plumb in tight spaces. (Section B-1.3 (#chapter-b-1-3-use-levelling-equipment))

torque

A twisting force applied to a fastener or tool. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

Torx head screwdrivers

A tool used to tighten or loosen screws that have a star-shaped pattern with six points in the head. The shape helps the screwdriver grip the screw firmly, reducing slipping and allowing more turning force. Torx screwdrivers are commonly used in electronics, automotive work, and machinery. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

toxic fumes

Harmful gases or airborne particles produced during welding that can cause illness or injury when inhaled. (Section B-6.1 (#chapter-b-6-1-describe-safety-requirements-and-precautions-for-arc-welding))

trammel points

Adjustable points attached to a bar or ruler that are used to draw very large circles or arcs. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

transit level

A surveying instrument used to measure horizontal and vertical angles and to establish level lines in construction and layout work. It has a telescope that can rotate both horizontally and vertically for accurate measurements. (Section B-1.3 (#chapter-b-1-3-use-levelling-equipment))

tri-stand chain vise

A portable pipe vise with three legs and a chain used to hold pipes firmly at a job site. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

tri-stand yoke vise

A portable vise with three legs and metal jaws used to clamp and hold pipes while they are being worked on. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

trucker's knot

A knot system used to tighten a rope when securing loads. It creates a mechanical advantage that allows the rope to be pulled very tight, making it useful for tying down equipment or materials. (Section B-4.4 (#chapter-b-4-4-select-slings-and-tie-knots-bends-and-hitches))

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 (#chapter-b-3-1-describe-ladders-and-elevated-platforms))

tubing

Thin-walled pipe used to transport fluids or gases. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

tubing benders

Tools used to bend metal tubing or pipe into smooth curves without flattening or damaging the tube. They help create accurate angles and shapes when installing plumbing, heating, or mechanical tubing. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

tubing nut wrench

(flare nut); A special wrench used to tighten or loosen nuts on tubing connections. It fits around most sides of the nut, which helps prevent slipping and reduces damage to the corners of the nut. It is commonly used on fuel lines, brake lines, and plumbing tubing. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

tubing spring bender

A tightly wound metal spring that slides over or inside soft tubing to help it bend without kinking or flattening. It supports the tubing while it is being bent so the curve stays smooth and the tube keeps its round shape. (Section B-1.2 (#chapter-b-1-2-use-hand-tools))

tuggers

A powered winch, usually electric or hydraulic, that pulls or lifts heavy loads using a drum and cable or rope. Tuggers are commonly used to move pipes, equipment, or materials into position. (Section B-4.2 (#chapter-b-4-2-describe-hoisting-lifting-and-rigging-equipment))

turnbuckles

A metal device used to adjust the tension or length of ropes, cables, or slings. It has a threaded body with two threaded ends that can be tightened or loosened by rotating the central frame. (Section B-4.5 (#chapter-b-4-5-use-hoisting-lifting-and-rigging-equipment))

turning point

A temporary reference point used when moving a level instrument to a new position. A reading is taken on this point before and after the instrument is moved so measurements stay accurate. (Section B-1.3 (#chapter-b-1-3-use-levelling-equipment))

twist drills (drill bits)

Common drill bits with spiral grooves that remove material as the bit drills into wood, metal, or plastic. (Section B-2.1 (#chapter-b-2-1-describe-portable-power-tools-used-in-the-pipe-trades))

under-running

A type of overhead travelling crane where the crane bridge is suspended from the underside of runway beams, typically used for lighter loads. (Section B-4.2 (#chapter-b-4-2-describe-hoisting-lifting-and-rigging-equipment))

undercut

A groove or dip along the edge of a weld that makes the joint weaker. (Section B-6.4 (#chapter-b-6-4-use-arc-welding-equipment))

unstable load

A load that shifts, tilts, or moves unexpectedly when lifted. (Section B-4.1 (#chapter-b-4-1-describe-the-principles-of-lifting-and-hoisting))

variable speed

A feature on a power tool that allows the operator to control how fast the tool runs. The speed can be increased or decreased depending on the task being performed. (Section B-2.1 (#chapter-b-2-1-describe-portable-power-tools-used-in-the-pipe-trades))

ventilation

The movement of fresh air through a space to remove harmful fumes, gases, or heat. (Section B-6.1 (#chapter-b-6-1-describe-safety-requirements-and-precautions-for-arc-welding))

vertical pipe wrench

A pipe wrench designed for use on vertical pipes or in tight spaces where a long handle cannot be used. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

vise

A mechanical tool used to securely hold a workpiece during cutting, drilling, or assembly operations. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

voltage

The electrical pressure that pushes current through a circuit, measured in volts (V). (Section B-6.3 (#chapter-b-6-3-describe-the-arc-welding-process-and-equipment))

volts (V)

The unit used to measure voltage, or the electrical pressure that pushes current through a circuit. (Section B-6.3 (#chapter-b-6-3-describe-the-arc-welding-process-and-equipment))

water jetter

A drain-cleaning machine that uses a high-pressure stream of water to break up and wash away grease, debris, and other blockages inside pipes. (Section B-2.1 (#chapter-b-2-1-describe-portable-power-tools-used-in-the-pipe-trades))

water pump pliers

adjustable pliers used to grip and turn pipes, fittings, and other round objects. The jaws can be moved to different

positions to fit different sizes, and the teeth help hold the object tightly without slipping. They are commonly used in plumbing and mechanical work. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

wavy set

A band-saw tooth pattern where small groups of teeth are bent slightly in alternating directions to make smooth cuts in thin materials. (Section B-2.1 (#chapter-b-2-1-describe-portable-power-tools-used-in-the-pipe-trades))

weld deposit

The metal that is melted and added during welding, forming the final weld as it cools and hardens. (Section B-6.3 (#chapter-b-6-3-describe-the-arc-welding-process-and-equipment))

weld joint

The point or area where two or more pieces of metal are joined together by welding. (Section B-6.2 (#chapter-b-6-2-identify-types-of-welds-positions-joints-and-symbols))

welding position

The orientation of the weld and workpiece during welding, such as flat, horizontal, vertical, or overhead. (Section B-6.2 (#chapter-b-6-2-identify-types-of-welds-positions-joints-and-symbols))

whip line

A secondary hoist line on a crane that is typically lighter and faster than the main hoist line. It is used for lifting smaller loads or for quicker lifting operations. (Section B-4.3 (#chapter-b-4-3-describe-lifting-and-hoisting-communication))

whipline (auxiliary hoist)

A secondary hoist line from the main, usually lighter and faster. (Section B-4.6 (#chapter-b-4-6-rig-load-for-cranes))

whipping

A method of tightly wrapping twine or wire around the end of a rope to prevent it from fraying or unraveling. (Section B-4.4 (#chapter-b-4-4-select-slings-and-tie-knots-bends-and-hitches))

winch

A mechanical device used to pull or lift loads using a rotating drum and cable. (Section B-4.2 (#chapter-b-4-2-describe-hoisting-lifting-and-rigging-equipment))

wonder bar

A small flat metal prying tool with claws on both ends used for light prying and nail removal. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

wood vises

A vise designed to hold pieces of wood securely while cutting, shaping, or sanding. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

working load limit (WLL)

(or *rated capacity*); The maximum weight a piece of lifting equipment can safely carry. (Section B-4.1 (#chapter-b-4-1-describe-the-principles-of-lifting-and-hoisting))

workpiece

The material or object being worked on, such as metal, pipe, or wood. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

wrap-around

A flexible measuring tool, often made of paper, plastic, or metal, that is wrapped around a pipe to mark a straight and even cutting line all the way around it. It helps ensure the pipe is cut square (perfectly straight) across its diameter. (Section B-1.2 (#chapter-b-1-2-use-hand-tools))

wrecking bar

(also called a gooseneck); A heavy metal bar used for prying materials apart and pulling nails during construction or demolition. (Section B-1.1 (#chapter-b-1-1-describe-hand-tools-used-in-the-pipe-trades))

zero datum

The starting reference level from which all elevations or depths are measured. It is considered the “zero” point for height measurements. (Section B-1.3 (#chapter-b-1-3-use-levelling-equipment))

zip disks (cut-off disks)

A thin abrasive cutting disk used with a grinder to cut metal or other hard materials. It cuts quickly along the edge of the disk and should not be used for grinding on the side. (Section B-2.2 (#chapter-b-2-2-use-portable-power-tools))

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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If you identify an error in this resource, please report it using the TRU Open Education Resource Error Form.

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.