Block D: Piping and Components

TRU Open Press

Plumbing Apprenticeship Program Level 1 Series

Block D: Piping and Components

BC Plumbing Apprenticeship, Level 1

SKILLEDTRADESBC

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Block D: Piping and Components of the Plumbing Apprenticeship Program Level 1 Series features Skilled Trades BC industry-authority content focused on the core installation skills that form the foundation of plumbing systems. This block emphasizes the practical knowledge and techniques apprentices use to assemble, connect, and integrate piping systems accurately and safely within residential, commercial, and institutional settings.

In Block D, apprentices learn how to install pipe and tubing, valves, and fittings, as well as how to safely and effectively penetrate building structures. These competencies support proper system function, durability, and compliance with codes and specifications, while reinforcing precision, planning, and coordination with other trades on the job site.

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-bcplumbingapprl1.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-bcplumbingapprl1.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/).
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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 D: Piping and Components* (https://d-pipingcomponents-bcplumbingapprl1.pressbooks.tru.ca/) is adapted from the Piping Trades Apprenticeship Program from SkilledTradesBC (2019 Harmonized).

The original materials were produced in collaboration with industry partners and aligned with the Industry Training Authority (ITA)/SkilledTradesBC harmonized program outlines for Plumbing, Steamfitting/Pipefitting, and Sprinkler Fitting. These works were released under a Creative Commons Attribution 4.0 International (CC-BY-NC-SA (https://creativecommons.org/licenses/by-nc-sa/4.0/)) licence, except where otherwise noted.

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This adapted version has been reformatted and integrated into the current Thompson Rivers University/TRU Open Press open educational resource in collaboration with the BC Piping Articulation and Curriculum Subcommittee and SkilledTradesBC, in support of open, accessible, and up-to-date apprenticeship training.

The Open Press

The Open Press combines TRU's open platforms and expertise in learning design and open resource development to support the creation and reuse of open educational resources, while encouraging open scholarship and research.

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Resources

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

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- Piping Trades Apprenticeship Program – Perform Safety Related Functions – Level 1 Harmonized (2019) (Binder) (ISBN: 978-0-7726-7362-6; product no. 7960000260) Crown Publications Online Catalogue – Piping Trades Apprenticeship Program – Perform Safety Related Functions – Level 1 Harmonized (2019) (Binder) (https://www.crownpub.bc.ca/Product/Details/7960000260_S)
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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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Camosun College. (n.d.). *Line E – Electrical Fundamentals Competency*. BCcampus. https://collection.bccampus.ca/textbook/Nf7jVbAg/

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 D: Piping and Components

ablative

Resisting heat transfer by using the heat of the exposing fire to erode the material. The material, by sacrificing itself, protects the unexposed side from rapid temperature rise until it is spent. A typical example is a silicon-based firestop material. (Section D-4.2 (#chapter-d-4-2-describe-acceptable-methods-of-structure-penetration))

ABS double wye

A plastic DWV fitting that connects four pipes using two angled (typically 45°) branches for smoother flow and reduced blockages. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

acid core

A type of solder with an acidic flux inside that helps clean metal surfaces during soldering. (Section D-1.6 (#chapter-d-1-6-section-6))

acrylonitrile-butadiene-styrene (ABS)

A strong, lightweight plastic used to make pipes and fittings, especially for drainage, waste, and vent systems. (Section D-1.2 (#chapter-d-1-2-describe-the-methods-of-manufacture-of-piping-and-tubing))

active fire protection

Systems that respond to fire through movement or activation, such as sprinklers or alarms. (Section D-4.2 (#chapter-d-4-2-describe-acceptable-methods-of-structure-penetration))

actuator

A device that moves a valve open or closed, either by hand or using power such as air, electricity, or hydraulic pressure. (Section D-2.2 (#chapter-d-2-2-install-valve))

adapters fittings

(sometimes called *transition fittings*)**;** A fitting used to connect pipes with different connection types. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

air barrier

A system that prevents air leakage through building assemblies. (Section D-4.2 (#chapter-d-4-2-describe-acceptable-methods-of-structure-penetration))

air inlet valve

A valve that allows air to enter a system to prevent vacuum or pressure problems. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

air valve

A valve used to control the flow of air. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

air vent

A device that removes trapped air from a piping system. (Section D-1.4 (#chapter-d-1-3-section-4))

angle body globe valve

A globe valve valve design where the inlet and outlet are at a right angle; allows fluid to change direction only once as it flows through, and can also function as both a valve and a piping elbow. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

annealed

Heated and cooled metal to make it softer and easier to shape. (Section D-1.6 (#chapter-d-1-6-section-6))

annealed temper

A soft and flexible type of copper tubing made by heating the metal and then slowly cooling it. (Section D-1.2 (#chapter-d-1-2-describe-the-methods-of-manufacture-of-piping-and-tubing))

annular space

The gap between a pipe and the sleeve or opening it passes through. (Section D-4.1 (#chapter-d-4-1-describe-factors-affecting-penetrations-in-structures))

anode

A metal through which current flows. (In an electrochemical reaction, the anode is the metal that corrodes.) (Section D-1.4 (#chapter-d-1-3-section-4))

apartment tee

A DWV fitting used in multi-unit buildings to connect a branch line to a vertical stack, designed to help control flow and reduce blockages. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

armour conduit

A protective tube or covering placed around piping or tubing to shield it from damage, such as impacts, abrasion, or punctures. (Section D-1.6)

as-installed piping geometry

The final position and layout of pipes after they have been installed. (Section D-1.6 (#chapter-d-1-6-section-6))

austenitic grades

A type of stainless steel that contains chromium and nickel, making it strong and very resistant to rust and corrosion. (Section D-1.1 (#chapter-d-1-1-describe-piping-and-tubing-materials))

authorities having jurisdiction (AHJ)

Organizations or officials (such as inspectors) who enforce codes and regulations and approve whether work meets required standards. (Section D-1.1 (#chapter-d-1-1-describe-piping-and-tubing-materials))

backfill

Material, such as soil or gravel, placed back into an excavation around a pipe or structure to provide support and restore the ground surface. (Section D-4.1)

backflow preventer valve

A valve designed to stop contaminated water from flowing backward into a clean water supply. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

backpressure

The pressure exerted on the downstream side of a valve seat. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

backwater valve

A check valve designed for use in a sanitary drainage system. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

ball valve

A quarter-turn valve with a ball-shaped closing element held between two seats. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

bead

A raised line or ring of melted material formed along a joint during welding or fusion, showing that the materials have joined properly. (Section D-1.6)

beam clamp

A device used to attach piping or supports to a steel beam without drilling, by gripping the beam securely. (Section D-1.3 (#chapter-d-1-3-describe-the-methods-of-pipe-and-tubing-support))

bell and spigot (lead and oakum) joint

A pipe connection where the plain end (spigot) is inserted into the enlarged end (bell), then sealed with oakum and molten lead to create a watertight joint. (Section D-3.1)

bell crank lever

A mechanical device that helps change the direction of movement and balance loads. (Section D-1.3 (#chapter-d-1-3-describe-the-methods-of-pipe-and-tubing-support))

bellows

A sealing device that prevents line media from leaking between the stem and the body. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

bellows seal bonnet

A valve bonnet that uses a flexible bellows to prevent leakage around the valve stem. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

bend

A pipe fitting used to change direction, often used instead of the term elbow in DWV systems. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

bidirectional valve

A valve that moves or operates in two usually opposite directions. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

billet (or tube round)

A solid piece of metal that is heated and shaped into pipe or tubing. (Section D-1.2 (#chapter-d-1-2-describe-the-methods-of-manufacture-of-piping-and-tubing))

blind pipe flange

A solid flange used to close off the end of a pipe or opening. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

block-out

An opening intentionally formed in concrete or other structural components during construction to allow space for pipes, ducts, or other services to be installed later. (Section D-4.1 (#chapter-d-4-1-describe-factors-affecting-penetrations-in-structures))

bolted bonnet

A valve bonnet that is attached to the valve body using bolts, allowing easy access for maintenance. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

bond beam

A reinforced horizontal element in a masonry wall that strengthens and ties the wall together. (Section D-4.1 (#chapter-d-4-1-describe-factors-affecting-penetrations-in-structures))

bore

The inside space of a pipe where fluid flows. (Section D-1.5 (#chapter-d-1-5-describe-the-inspection-of-pipes-and-tube-before-installation))

Boston fitting

A DWV fitting that combines a wye and a 1/8 bend in one piece, allowing a smooth change in direction and connection of pipes. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

branch (lateral)

The pipe that connects off the main run of a fitting. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

brazed fitting

A fitting joined by heating and melting a filler metal to create a strong, high-temperature joint. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

brazing

Joining metal using heat and a filler metal at high temperatures. (Section D-1.6 (#chapter-d-1-6-section-6))

brinelling

Damage to a metal surface caused by too much pressure, leaving dents or marks. (Section D-1.6 (#chapter-d-1-6-section-6))

bullhead tee

A tee fitting where flow enters through the branch and splits in opposite directions through the run, often causing turbulence and pressure loss. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

buoyancy

The upward force that pushes objects up when they are in water. (Section D-1.4 (#chapter-d-1-3-section-4))

bushing

A fitting used to reduce the size of a pipe opening, usually with threaded ends. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

butt fusion

A method of joining plastic pipes by heating the ends and pressing them together to form one solid piece. (Section D-1.6 (#chapter-d-1-6-section-6))

butterfly valve

A quarter-turn valve that has a circular disk as its closing element. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

bypass valve

A small-bore valve fitted in parallel to a larger main valve. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

cable-brace attachment

A support system that uses tensioned cables to hold piping in place and resist movement, especially during seismic activity. (Section D-1.3 (#chapter-d-1-3-describe-the-methods-of-pipe-and-tubing-support))

caddy clip

A fastening device used to secure pipe sleeves to formwork or structural surfaces. (Section D-4.1 (#chapter-d-4-1-describe-factors-affecting-penetrations-in-structures))

cams

When a disk moves into the seat in a slightly angled or rolling motion, rather than straight in. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

canning

The process of installing pipe sleeves in formwork before concrete is poured. (Section D-4.1 (#chapter-d-4-1-describe-factors-affecting-penetrations-in-structures))

cap

A fitting used to close the end of a pipe with internal threads. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

capillary action

The movement of liquid solder into the small gap between a pipe and fitting; caused by attraction between the metal surfaces and the solder. (Section D-1.6 (#chapter-d-1-6-section-6))

carburizing flame

A type of torch flame with extra fuel that adds carbon to the metal surface and produces a softer, lower-temperature flame. (Section D-1.6)

cast brass

A metal material used to make fittings, with a rougher surface and lower flexibility than copper. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

cast iron threaded drainage fitting (Durham fitting)

A threaded cast iron fitting used in drainage systems that can be taken apart and reused. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

cathode

A metal from which current flows. (Section D-1.4 (#chapter-d-1-3-section-4))

cathodic protection

A method used to control the corrosion of a metal surface by ensuring that the metal is the cathode in an electrochemical process. Normally, this process requires attaching or connecting the metal to a less-noble metal. (Section D-1.4, Table 5 (#chapter-d-1-3-section-4))

caulking gun

A tool used to apply sealants into joints or openings. (Section D-4.2 (#chapter-d-4-2-describe-acceptable-methods-of-structure-penetration))

cavitation

The formation of air bubbles in a liquid that can damage pipes. (Section D-1.5 (#chapter-d-1-5-describe-the-inspection-of-pipes-and-tube-before-installation))

ceiling collars

A firestop collar specifically designed and tested for use in ceiling penetrations, often to meet additional temperature-rise (FT rating) requirements. (Section D-4.2)

centre-to-centre

The distance from the middle of one fitting to the middle of another. (Section D-1.6 (#chapter-d-1-6-section-6))

centre-to-face

The distance from the centre of a fitting to the end (face) of the pipe or fitting. (Section D-1.6 (#chapter-d-1-6-section-6))

centreline

An imaginary line that runs through the centre of a pipe or fitting. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

centrifugal casting process

A method of making pipe by pouring molten metal into a spinning mould so the material spreads evenly along the inside surface. (Section D-1.2 (#chapter-d-1-2-describe-the-methods-of-manufacture-of-piping-and-tubing))

cerami-fibre (ceramic fibre)

A high-temperature insulation made from fine fibres, used to resist extreme heat and help prevent the spread of fire. (Section D-4.2 (#chapter-d-4-2-describe-acceptable-methods-of-structure-penetration))

chamfering

Cutting or smoothing the edge of a pipe at an angle to remove sharp edges and help it fit into a connection. (Section D-1.6 (#chapter-d-1-6-section-6))

check valve (non-return valve)

A valve designed to allow fluid to flow in one direction only and prevent reverse flow. The valve closes to prevent backflow. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

chlorinated polyethylene (CPE)

A type of plastic material used for seals and linings that resists chemicals such as chlorine and bleach solutions. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

chlorinated polyvinyl chlorine (CPVC)

A type of plastic pipe that can handle higher temperatures than regular PVC and is used in hot and cold-water systems. (Section D-1.6 (#chapter-d-1-6-section-6))

cleanout

An access point in a pipe system used to remove blockages. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

clevis hanger

A type of pipe support that uses a U-shaped metal bracket and pin to hold and suspend a pipe from above. (Section D-1.3 (#chapter-d-1-3-describe-the-methods-of-pipe-and-tubing-support))

close nipple

A very short threaded pipe with threads running nearly the entire length, used to connect two fittings closely together. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

closure

A device or assembly for closing an opening through a fire separation or an exterior wall, such as a door, shutter, wired glass, or glass block. Includes all components such as hardware, closing devices, frames, and anchors. (Section D-4.2 (#chapter-d-4-2-describe-acceptable-methods-of-structure-penetration))

closure (fire-rated)

A device such as a door or shutter used to close an opening in a fire separation. (Section D-4.2 (#chapter-d-4-2-describe-acceptable-methods-of-structure-penetration))

coefficient of friction

A measure of how easily one surface slides over another. (Section D-1.3 (#chapter-d-1-3-describe-the-methods-of-pipe-and-tubing-support))

cold spring

A slight bending of pipe during installation to reduce stress during use. (Section D-1.6 (#chapter-d-1-6-section-6))

cold-worked

Metal that has been shaped or strengthened without using heat, usually by bending or pressing it. (Section D-1.6 (#chapter-d-1-6-section-6))

combination valve

A valve that combines two functions, such as shutting off flow and relieving pressure, in one unit. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

companion flange

A flange used to connect a pipe to equipment or another flanged component, often matching the bolt pattern of the mating flange. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

compartmentalization

The division of a building into sections to limit fire spread. (Section D-4.2 (#chapter-d-4-2-describe-acceptable-methods-of-structure-penetration))

composite sheets and boards

Rigid panels made of layered materials, consisting of sheets sandwiched around an intumescent material, used to seal large openings and maintain fire resistance around penetrations. (Section D-4.2 (#chapter-d-4-2-describe-acceptable-methods-of-structure-penetration))

compression bending

A method of bending pipe where force is applied to push the pipe into shape using a die. (Section D-1.6 (#chapter-d-1-6-section-6))

compression-type fitting

A fitting that uses a nut and compression ring (ferrule) to squeeze and seal a pipe without the need for heat or threading. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

concrete formwork

Temporary structures used to shape and support concrete until it hardens. (Section D-4.1 (#chapter-d-4-1-describe-factors-affecting-penetrations-in-structures))

constant spring support

A pipe support that uses a spring mechanism to provide the same supporting force even as the pipe moves. (Section D-1.3 (#chapter-d-1-3-describe-the-methods-of-pipe-and-tubing-support))

control valve

A valve that regulates the flow or pressure of a fluid; control valves normally respond to signals generated by independent devices such as flow meters, temperature gauges, etc.; control valves are normally fitted with actuators and positioners. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

core drilling (coring)

A method of drilling circular holes in concrete using a specialized drill. (Section D-4.1 (#chapter-d-4-1-describe-factors-affecting-penetrations-in-structures))

corporation valve

A valve installed on a water main that allows a service line to be connected or shut off, often designed for underground use. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

corrosion

The gradual breakdown of metal caused by chemical reactions, such as rust. (Section D-1.4 (#chapter-d-1-3-section-4))

corrugated Stainless-Steel Tubing (CSST)

A flexible metal pipe used to carry natural gas or propane, designed with ridges so it can bend easily during installation. (Section D-1.6 (#chapter-d-1-6-section-6))

coupling

A fitting used to connect two pieces of pipe or tubing together in a straight line. (Section D-1.6)

crimp ring

A metal ring that is compressed around PEX tubing to hold it tightly onto a fitting and create a watertight seal. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

cross-connection

A connection between clean water and contaminated water that can allow pollution to enter the system. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

cross-linking

A chemical process that joins plastic molecules together to make the material stronger. (Section D-1.2 (#chapter-d-1-2-describe-the-methods-of-manufacture-of-piping-and-tubing))

crossover method

A way of tightening bolts in a crisscross pattern to ensure even pressure and a proper seal. (Section D-1.6 (#chapter-d-1-6-section-6))

cryogenic valve

A valve designed for use at temperatures below −40°C (−40°F). (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

cupola furnace

A type of furnace used to melt metal, especially iron, by heating it with coke and air to produce molten metal for casting. (Section D-1.2 (#chapter-d-1-2-describe-the-methods-of-manufacture-of-piping-and-tubing))

curb stop

A valve located near the property line that is used to shut off the water supply to a building from the main. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

dashpots

Devices that slow down the movement of a valve disk using fluid resistance to reduce shock, noise, and wear. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

dauber

A small applicator tool with a brush or sponge tip used to apply primer or solvent cement to pipes and fittings. (Section D-3.2)

deburring

The process of removing rough edges from a cut pipe. (Section D-1.5 (#chapter-d-1-5-describe-the-inspection-of-pipes-and-tube-before-installation))

defect

A flaw or damage that makes a product less safe or effective. (Section D-1.5 (#chapter-d-1-5-describe-the-inspection-of-pipes-and-tube-before-installation))

diaphragm valve

A valve that uses a flexible rubber-like part to control the flow and keep the fluid separate from the valve parts; a bidirectional valve operated by applying an external force to a flexible element, or diaphragm (typically an elastomer). (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

dielectric

A substance with a small amount of electrical conductivity. (Section D-1.4 (#chapter-d-1-3-section-4))

dielectric (cathodic) protection

A method used to reduce corrosion by separating different metals and controlling electrical current so the pipe is protected from rusting. (Section D-1.4 (#chapter-d-1-3-section-4))

direct acting pressure relief valve

A pressure relief valve that opens directly when system pressure exceeds a set level, usually using a spring. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

disbondment

The separation of a protective coating from a pipe's surface; accelerated when cathodic protection systems are operated with excessively polarized negative potentials, especially in systems operating at high temperatures. (Section D-1.4 (#chapter-d-1-3-section-4))

dissimilar metals

Different metals that can react with each other and cause corrosion when in contact. (Section D-4.1 (#chapter-d-4-1-describe-factors-affecting-penetrations-in-structures))

dissolved gases

Oxygen and carbon dioxide can be readily dissolved by water. These gases are aggressive instigators of corrosion. (Section D-1.4 (#chapter-d-1-3-section-4))

dissolved solids

These are substances that will dissolve in water. The principal ones are the carbonates and sulphates of calcium and magnesium, which are scale-forming when heated. There are other dissolved solids, which are non-scale forming. In practice, any salts forming scale within the boiler should be chemically altered so that they produce suspended solids, or sludge, rather than scale. (Section D-1.4 (#chapter-d-1-3-section-4))

diverter valve

A valve that can change the direction of the flow of a medium to two or more different directions. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

DN (diameter nominal)

A standard way of naming pipe size using metric units (millimetres) instead of inches. (Section D-1.1 (#chapter-d-1-1-describe-piping-and-tubing-materials))

double block and bleed valve

A valve configuration in which positive shut-off is achieved at both the inlet and outlet sides, with a pressure bleed off between the two. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

double flange type butterfly valve

A butterfly valve with flanges on both sides that bolt directly to pipe flanges for a secure connection. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

double roll-back bead

A raised ring of melted material on both sides of the joint. (Section D-1.6)

double submerged arc welded (DSAW)

A pipe welding method where both the inside and outside seams are welded under a protective layer. (Section D-1.2 (#chapter-d-1-2-describe-the-methods-of-manufacture-of-piping-and-tubing))

double wye

A fitting that connects four pipes with angled branches. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

double-disk wafer-type check valve (split disk or dual plate check valve)

A check valve with two spring-loaded plates that open with flow and close quickly to prevent reverse flow and reduce water hammer. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

draft stop

A material intended to stop air movement and fire spread. (Section D-4.2 (#chapter-d-4-2-describe-acceptable-methods-of-structure-penetration))

draw bending

A method of bending pipe by pulling it around a form to create a smooth, controlled bend. (Section D-1.6 (#chapter-d-1-6-section-6))

drawn temper

A hard and strong type of copper tubing made by pulling the metal through a die without heating it. (Section D-1.2 (#chapter-d-1-2-describe-the-methods-of-manufacture-of-piping-and-tubing))

ductility

The ability of a metal to bend or stretch without breaking. (Section D-1.6 (#chapter-d-1-6-section-6))

duriron pipe

A type of cast iron pipe that is specially made to resist strong acids and corrosive liquids, often used in chemical and industrial systems. (Section D-1.1 (#chapter-d-1-1-describe-piping-and-tubing-materials))

DWV (drainage, waste, and vent)

Pipes and fittings used to remove wastewater and allow air to flow in plumbing systems so drains work properly. (Section D-1.1 (#chapter-d-1-1-describe-piping-and-tubing-materials))

DWV cross (double sanitary tee)

A fitting used in drainage systems to connect four pipes at 90-degree angles, allowing flow in multiple directions. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

DWV fittings

Fittings used to carry drainage, waste, and vent fluids by gravity. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

elastomer

Any material, such as natural or synthetic rubber, that is able to resume its original shape when a deforming force is removed. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

elastomeric

A material that is flexible and rubber-like, able to stretch and return to its original shape. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

elastomeric gaskets

Flexible rubber-like seals used between pipe connections to prevent leaks. (Section D-1.6 (#chapter-d-1-6-section-6))

elbow

A fitting used to change the direction of a pipe. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

electric resistance weld (ERW)

A method of making pipe by heating and welding the edges of steel together using electricity. (Section D-1.2 (#chapter-d-1-2-describe-the-methods-of-manufacture-of-piping-and-tubing))

electrical tester pen

A small handheld tool that detects if electrical voltage is present in a wire or device without touching exposed metal parts. (Section D-1.4 (#chapter-d-1-3-section-4))

electrochemical corrosion

Corrosion caused by an electrical reaction between metals and their environment. (Section D-1.4 (#chapter-d-1-3-section-4))

electrochemical process

A chemical reaction that involves electricity. (Section D-1.4 (#chapter-d-1-3-section-4))

electrochemical reaction

A reaction either caused or accompanied by the passage of an electric current and involving the transfer of electrons between two substances. (Section D-1.4 (#chapter-d-1-3-section-4))

electrode

An electrical conductor used to make contact with a part of a circuit. In an electrochemical cell, the electrode is referred to as either an anode or a cathode. Each electrode can be either the anode or the cathode depending on the current direction. (Section D-1.4 (#chapter-d-1-3-section-4))

electrolytic action

A reaction between different metals that can cause corrosion when they touch. (Section D-1.3 (#chapter-d-1-3-describe-the-methods-of-pipe-and-tubing-support))

elongation properties

Ability of the metal to stretch without breaking. (Section D-1.6 (#chapter-d-1-6-section-6))

endothermic

A reaction that absorbs heat energy. (Section D-4.2 (#chapter-d-4-2-describe-acceptable-methods-of-structure-penetration))

EPDM (ethylene propylene diene monomer)

A type of rubber used for seals and gaskets that resists heat, water, and weather. (Section D-1.6 (#chapter-d-1-6-section-6))

erection (field installation)

The process of assembling and installing piping systems on-site at the job location. (Section D-1.6 (#chapter-d-1-6-section-6))

erosion

The wearing away of material caused by fluid movement. (Section D-1.5 (#chapter-d-1-5-describe-the-inspection-of-pipes-and-tube-before-installation))

ethylene propylene diene monomer (EPDM)

A type of synthetic rubber used for seals and gaskets that resists heat, water, and many chemicals, but is not suitable for oils or fuels. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

eutectic

A mixture having the lowest liquefaction point possible with a tin/lead mix. Alloys are eutectic when the solidus and liquidus are the same. (Section D-1.6 (#chapter-d-1-6-section-6))

exothermic

A reaction that releases heat energy. (Section D-4.2 (#chapter-d-4-2-describe-acceptable-methods-of-structure-penetration))

expansion

When a pipe gets bigger because of heat. (Section D-1.4 (#chapter-d-1-3-section-4))

expansion anchors (quick-bolts)

Fasteners that expand inside a hole to hold objects securely in place. (Section D-1.3 (#chapter-d-1-3-describe-the-methods-of-pipe-and-tubing-support))

extracted tee joints

A method of joining pipes where a collar is formed from the pipe itself to create a branch connection, which is then brazed for strength. (Section D-1.6)

extrusion

A process where heated material is pushed through a shaped opening to form pipe. (Section D-1.2 (#chapter-d-1-2-describe-the-methods-of-manufacture-of-piping-and-tubing))

face (flange)

The flat surface of a flange where it meets another flange or gasket to form a seal. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

female iron pipe (FIP)

A threaded pipe connection with internal threads that receives a male threaded pipe or fitting. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

ferritic grades

A type of stainless steel that resists corrosion and is magnetic, but cannot be hardened by heat. (Section D-1.1 (#chapter-d-1-1-describe-piping-and-tubing-materials))

ferrule

A small metal ring that fits around a pipe or tube to help create a tight seal and hold the connection securely when tightened. (Section D-1.6)

fibre insulation

Insulation made of fibrous materials such as mineral wool, glass fibre, or ceramic fibre, used to resist heat and help prevent the spread of fire. (Section D-4.2 (#chapter-d-4-2-describe-acceptable-methods-of-structure-penetration))

filler metal

A metal added to a joint to help join two pieces together. (Section D-1.6 (#chapter-d-1-6-section-6))

fillet

A visible ring of filler metal around the joint. (Section D-1.6)

fire damper

A device that automatically closes to prevent fire spread through ducts. (Section D-4.2 (#chapter-d-4-2-describe-acceptable-methods-of-structure-penetration))

fire load

The amount of combustible material present in a space. (Section D-4.2 (#chapter-d-4-2-describe-acceptable-methods-of-structure-penetration))

fire rating

The length of time that a building component or assembly can resist the spread of fire while maintaining its structural integrity, usually measured in minutes or hours. (Section D-4.1 (#chapter-d-4-1-describe-factors-affecting-penetrations-in-structures))

fire separation

A construction assembly designed to resist the spread of fire. (Section D-4.1 (#chapter-d-4-1-describe-factors-affecting-penetrations-in-structures))

fire-block

A material installed to prevent the spread of fire through concealed spaces. (Section D-4.1 (#chapter-d-4-1-describe-factors-affecting-penetrations-in-structures))

fire-rated assembly

A construction system designed to resist fire for a specified period of time. (Section D-4.1 (#chapter-d-4-1-describe-factors-affecting-penetrations-in-structures))

fire-resistant foam

A foam material designed to resist fire and provide a fire rating when used to seal gaps or joints. (Section D-4.2 (#chapter-d-4-2-describe-acceptable-methods-of-structure-penetration))

fire-resistant pillows

Soft, fire-resistant bags or cushions packed into openings around pipes or cables to help prevent the spread of fire and smoke. (Section D-4.2 (#chapter-d-4-2-describe-acceptable-methods-of-structure-penetration))

fire-stop foam

A fire-resistant foam that expands to fill openings around pipes or cables, helping to seal the space and prevent the spread of fire and smoke. (Section D-4.2 (#chapter-d-4-2-describe-acceptable-methods-of-structure-penetration))

firestop

A sealing system used to prevent fire and smoke from passing through penetrations. (Section D-4.1 (#chapter-d-4-1-describe-factors-affecting-penetrations-in-structures))

firestop collar

A device placed around a pipe at a wall or floor penetration that expands when exposed to heat to seal the opening and prevent the spread of fire and smoke. (Section D-4.2)

firestop mortar

A fire-resistant compound mixed with water and applied to seal large openings around pipes or cables, helping prevent the spread of fire and smoke. (Section D-4.2 (#chapter-d-4-2-describe-acceptable-methods-of-structure-penetration))

firestop putty

A soft, mouldable firestop material used to seal openings around pipes, cables, or boxes, helping prevent the spread of fire and smoke. (Section D-4.2 (#chapter-d-4-2-describe-acceptable-methods-of-structure-penetration))

firewall

A fire-resistant wall that separates buildings or sections of a building. (Section D-4.1 (#chapter-d-4-1-describe-factors-affecting-penetrations-in-structures))

fit-ups

The process of aligning and positioning pipes or parts correctly before joining them together. (Section D-1.6 (#chapter-d-1-6-section-6))

fitting allowance (takeoff)

The amount of pipe length lost inside a fitting when making a connection. (Section D-1.6 (#chapter-d-1-6-section-6))

flanged

A type of connection where pipes are joined using flat edges (flanges) that are bolted together. (Section D-1.6 (#chapter-d-1-6-section-6))

flanged fitting

A threaded cast iron fitting used in drainage systems that can be taken apart and reused. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

flare fitting

A fitting that seals by pressing a flared (widened) pipe end against a matching surface to create a tight connection. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

flare nuts

Nuts used with flare fittings that tighten onto the fitting to press the flared pipe end and create a tight seal. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

flashing

A material installed to prevent water penetration at roof or wall openings. (Section D-4.1 (#chapter-d-4-1-describe-factors-affecting-penetrations-in-structures))

flashing cap

A protective cover placed over a pipe penetration on a roof, used with flashing to prevent water from entering around the pipe. (Section D-4.1 (#chapter-d-4-1-describe-factors-affecting-penetrations-in-structures))

flexible penetration seals

A seal that closes a pipe sleeve opening while allowing pipe movement and absorbing misalignment, maintaining a watertight, airtight, or fire-resistant seal. (Section D-4.1 (#chapter-d-4-1-describe-factors-affecting-penetrations-in-structures))

float-control valve

A valve that automatically controls the level of liquid in a tank using a float. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

flotation

When a pipe rises or lifts out of the ground due to water pressure. (Section D-1.4 (#chapter-d-1-3-section-4))

fluorocarbon rubber (FKM or FPM) (Viton)

A type of synthetic rubber used for seals and gaskets that resists high temperatures, oils, and many chemicals, but may not perform well with certain strong bases. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

flux

A material used during welding to protect the metal from air and impurities. (Section D-1.2; (#chapter-d-1-2-describe-the-methods-of-manufacture-of-piping-and-tubing) Section D-1.6 (#chapter-d-1-6-section-6))

freeze protection

Methods used to stop pipes from freezing and bursting. (Section D-1.4 (#chapter-d-1-3-section-4))

friction loss

The reduction of pressure in a pipe due to resistance as fluid flows. (Section D-1.5 (#chapter-d-1-5-describe-the-inspection-of-pipes-and-tube-before-installation))

full port ball valve

A ball valve with an opening the same size as the pipe, allowing full flow with little or no restriction. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

full-face gasket

A gasket that covers the entire face of a flange, including the bolt holes, to provide a complete seal between two flanged surfaces. (Section D-3.2 (#chapter-d-3-2-section-2))

fusible link

A heat-sensitive component that melts to activate a fire damper. (Section D-4.2 (#chapter-d-4-2-describe-acceptable-methods-of-structure-penetration))

fusion welding

A method of joining materials by heating them until they melt and fuse together as one piece. (Section D-1.6 (#chapter-d-1-6-section-6))

fusion welding (continuous weld)

A process of joining metal by heating it until it melts and fuses together, often forming a continuous seam along the pipe. (Section D-1.2 (#chapter-d-1-2-describe-the-methods-of-manufacture-of-piping-and-tubing))

galling

A severe form of metal wear caused when sliding surfaces make contact, tearing areas of the metal surface. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

galvanic corrosion

Damage that occurs when different metals touch and react in the presence of moisture. (Section D-1.3 (#chapter-d-1-3-describe-the-methods-of-pipe-and-tubing-support))

galvanic series

A list that indicates the relative stability of different metals and alloys in seawater, based on the measurement of corrosion potentials. (Section D-1.4 (#chapter-d-1-3-section-4))

gasket

(Sometimes referred to as a *compression type fitting* or *connection*); A flat sealing material placed between two surfaces to prevent leaks when they are joined together. (Section D-3.2 (#chapter-d-3-2-section-2))

gasket union

A union that uses a washer to create a seal. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

gate valve

A valve used to fully open or fully close flow by raising or lowering a flat gate inside the pipe. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

gear clamp

A metal band clamp with a screw mechanism that tightens around a pipe or hose to hold it securely in place. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

geotextile

A protective fabric used to cover pipes and prevent damage during installation. (Section D-1.4 (#chapter-d-1-3-section-4))

glass-fibre

A type of mineral-fibre insulation made from fine glass fibres, used to resist heat and help prevent the spread of fire. (Section D-4.2 (#chapter-d-4-2-describe-acceptable-methods-of-structure-penetration))

globe valve

A valve used to control or regulate flow by moving a disk against a seat inside the valve. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

glue-glycerin solution

A mixture used as a lubricant to help gaskets or pipe joints slide into place and form a proper seal during assembly. (Section D-3.2)

glued-laminated beam

(Also called *glulam* and *paralam*); An engineered wood beam made by bonding together layers of lumber with adhesive to create a strong, stable structural member. (Section D-4.1 (#chapter-d-4-1-describe-factors-affecting-penetrations-in-structures))

Go/No-go gauge

A tool used to check if a crimp connection is properly sized by confirming whether it passes or fails specific measurement limits. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

graphite thread compound

A type of thread sealant that contains graphite to provide lubrication and sealing for threaded connections, especially in high-temperature applications. (Section D-3.2 (#chapter-d-3-2-section-2))

grommet

A protective insert used to prevent damage to pipes passing through metal or other materials. (Section D-4.1 (#chapter-d-4-1-describe-factors-affecting-penetrations-in-structures))

grooved-end piping

A pipe connection method where a groove is formed near the pipe end so a clamp and gasket can be used to join pipes without heat. (Section D-1.6 (#chapter-d-1-6-section-6))

grooving

The process of cutting or forming a groove near the end of a pipe so it can be joined using a grooved coupling or fitting. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

ground union (ground joint union)

A type of union that forms a tight seal using smooth, tapered metal surfaces, allowing pipes to be connected and disconnected without a gasket. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

gypsum board

gypsum board: A panel made of gypsum plaster pressed between layers of paper, commonly used for walls and ceilings and providing fire resistance. (Section D-4.2 (#chapter-d-4-2-describe-acceptable-methods-of-structure-penetration))

H grades (austenitic stainless steel)

Stainless steel with higher carbon content that helps maintain strength at high temperatures; contain a minimum of 0.04% and a maximum of 0.10% carbon; primarily used when the material will be used at extreme temperatures. (Section D-1.1 (#chapter-d-1-1-describe-piping-and-tubing-materials))

hard soldering (brazing)

Brazing at temperatures **above** 450°C (840°F). (Section D-1.6 (#chapter-d-1-6-section-6))

hard-drawn tube

Copper tubing that has not been heat-treated, making it stronger and more rigid but harder to bend. (Section D-1.6 (#chapter-d-1-6-section-6))

heat trace

An electrical cable used to keep pipes warm and prevent freezing. (Section D-1.4 (#chapter-d-1-3-section-4))

heating irons (heaters)

Tools used to heat pipe and fittings so they can be joined together by melting and fusing the material. (Section D-1.6)

high-build single-coat application

A coating that can be applied in one thick layer to provide full protection, instead of needing several thinner coats. (Section D-1.4 (#chapter-d-1-3-section-4))

high-density polyethylene pipe (HDPE)

A strong, flexible plastic pipe used for water, gas, and other piping systems. (Section D-1.6 (#chapter-d-1-6-section-6))

Hilti firestop collars

A proprietary firestop collar made by Hilti, designed to be installed around combustible pipes at wall or floor penetrations, containing intumescent material that expands in a fire to seal the opening. (Section D-4.2)

hinge pin

A metal pin that allows a valve disk or part to pivot or swing open and closed. (Section D-2.2 (#chapter-d-2-2-install-valve))

hose

Portable and flexible pipe made from flexible material such as natural rubber, synthetic rubbers, plastics and composites with metal reinforcing. (Section D-1.1 (#chapter-d-1-1-describe-piping-and-tubing-materials))

hub end (socket or bell end)

The end of a fitting that receives another pipe or fitting. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

hub-to-spigot piping

A pipe system where one end (spigot) fits into a wider end (hub) of another pipe or fitting. (Section D-1.6 (#chapter-d-1-6-section-6))

hydraulic shock arrestor

A device that protects pipes from sudden pressure changes, such as water hammer. (Section D-1.3 (#chapter-d-1-3-describe-the-methods-of-pipe-and-tubing-support))

hydro-pneumatic testing

A method of testing pipes using both water and air pressure to check for leaks. (Section D-1.6 (#chapter-d-1-6-section-6))

I-joist

(Also called I-beam); A lightweight engineered wood beam shaped like the letter “I,” commonly used in floors and roofs. (Section D-4.1 (#chapter-d-4-1-describe-factors-affecting-penetrations-in-structures))

ID

inner diameter

injection-moulded CPVC thermoplastic fittings

Fittings made by injecting molten CPVC plastic into a mould to form durable shapes used in piping systems, especially for hot and cold water applications. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

insert fitting

A fitting used to join *polyethylene (PE)* tubing by inserting into the tubing and securing it with clamps or compression rings to create a tight seal. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

insert sleeve

A small tube, made out of plastic or metal, placed inside a pipe to support it and help maintain its shape when making a connection. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

insulation

Material used to keep heat in or out of a pipe. (Section D-1.4 (#chapter-d-1-3-section-4))

interference fit

A tight connection where a pipe is pressed into a fitting so the surfaces bond together, often using solvent cement that softens the material and allows it to fuse. (Section D-1.1 (#chapter-d-1-1-describe-piping-and-tubing-materials))

intumescent material

A material that swells when heated to block fire and smoke. (Section D-4.2)

inverted flare

A type of flare fitting where the flared end of the pipe is folded inward, providing a strong, leak-resistant connection commonly used in automotive and refrigeration systems. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

IPS (iron pipe size)

Used to identify standard dimensions of a carbon steel pipe which is often referred to as “iron pipe.” (Section D-1.1 (#chapter-d-1-1-describe-piping-and-tubing-materials))

JIC flare

A type of flare fitting with a 37-degree angle, commonly used in hydraulic systems. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

joint

The place where two pipes or fittings are connected. (Section D-1.6 (#chapter-d-1-6-section-6))

jointing (joining)

The process of connecting pipes or fittings together to form a complete piping system. (Section D-1.6 (#chapter-d-1-6-section-6))

knife valve

A type of gate valve with a sharp-edged blade designed to cut through thick or solid-containing fluids to stop flow. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

L grades (austenitic stainless steel)

Stainless steel with low carbon content that helps prevent corrosion, especially after welding; the letter L after a stainless steel type indicates low carbon (as in 304L). The carbon is kept to 0.03% or under to avoid carbide precipitation. (Section D-1.1 (#chapter-d-1-1-describe-piping-and-tubing-materials))

lantern ring

A metal ring in a valve that provides for uniform distribution of stem packing pressure over the packing. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

lap joint pipe flange

A flange used with a stub end that can rotate, making it easier to align bolt holes during installation. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

lead-based compound

A thread sealant that contains lead, formerly used to seal pipe connections but now restricted or banned in many applications due to health and safety concerns. (Section D-3.2 (#chapter-d-3-2-section-2))

lead-free solder

Solder that does not contain lead and is safe for drinking water systems. (Section D-1.6 (#chapter-d-1-6-section-6))

lift-check valve

A check valve where the disk lifts up to allow flow and drops back down to prevent reverse flow. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

linear movement valves

Valves where the internal parts move in a straight line to open or close the flow. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

lip-seal bonnet

A valve bonnet that seals tightly using metal-to-metal contact and pressure from the system. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

liquid thread compound

A liquid sealant applied to threaded connections to prevent leaks and help seal and protect the joint. (Section D-3.2 (#chapter-d-3-2-section-2))

liquidus

The temperature at which 100% of the alloy is in a fluid, non-crystalline form. The liquidus temperature is the minimum temperature at which soldering or brazing will take place. (Section D-1.6 (#chapter-d-1-6-section-6))

load-bearing structural member

A structural element designed to hold up the load above it, such as a second storey or roof. Cutting, drilling, or removing this support will weaken the structure. (Section D-4.1 (#chapter-d-4-1-describe-factors-affecting-penetrations-in-structures))

long nipple

A longer length of threaded pipe used to connect fittings that are spaced farther apart. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

long radius (long sweep)

A fitting with a gradual curve that allows smoother flow and reduces pressure loss. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

lubricated gas cock

A type of plug valve used in gas systems that requires lubricant to reduce friction and maintain a tight seal. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

makeup-type joints

Pipe connections that require the pipe to be inserted into a fitting, which affects the overall length of the pipe. (Section D-1.6 (#chapter-d-1-6-section-6))

male iron pipe (MIP)

A threaded pipe connection with external threads that screws into a female threaded fitting. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

malleability

The ability of a metal to be shaped or bent without breaking. (Section D-1.6 (#chapter-d-1-6-section-6))

malleable iron fittings

A strong, flexible fitting that resists cracking and is often used in gas piping. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

mandrel

A tool placed inside a pipe during manufacturing to shape and size it. (Section D-1.2 (#chapter-d-1-2-describe-the-methods-of-manufacture-of-piping-and-tubing))

martensitic grades

A type of stainless steel that is strong and can be hardened by heat, often used where strength and wear resistance are important. (Section D-1.1 (#chapter-d-1-1-describe-piping-and-tubing-materials))

material takeoff lists

A list of materials needed for a job. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

materials list

A list of materials needed to complete a job, used to communicate with suppliers or plan work on site. (Section D-3.3 (#chapter-d-3-3-select-fittings))

materials takeoff (materials takeoff list)

(Sometimes referred to as a *quantity survey* or *quantity cost sheet*); A detailed list of materials and quantities required for a job, often used for estimating costs and planning. (Section D-3.3 (#chapter-d-3-3-select-fittings))

mechanical joint (MJ) coupling

A pipe coupling that uses bolts, a gland, and an elastomeric gasket to compress and seal the connection without welding or threading. (Section D-3.1)

mechanical joint (zip coupling)

A pipe connection that uses a clamp and gasket tightened with bolts or screws to create a seal. (Section D-1.6 (#chapter-d-1-6-section-6))

mechanical joint fittings

A fitting that connects pipes using bolts, gaskets, or clamps to create a tight seal without welding or threading. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

membrane-penetration firestop

A firestop system used when a pipe or other item passes through only one side (membrane) of a wall or floor assembly, designed to seal the opening and prevent the spread of fire and smoke. (Section D-4.2)

metal decking

Corrugated steel panels used as a structural base for floors or roofs, often supporting concrete or roofing materials and providing strength and stability to the structure. (Section D-4.1 (#chapter-d-4-1-describe-factors-affecting-penetrations-in-structures))

metal gaskets

Gaskets made of metal that are used in high-pressure or high-temperature systems to create a strong, durable seal. (Section D-3.2)

metal roof or floor truss

A structural framework made of steel members designed to support loads in roofs or floors, typically engineered for strength, stability, and efficient load distribution. (Section D-4.1 (#chapter-d-4-1-describe-factors-affecting-penetrations-in-structures))

microbiologically influenced corrosion (MIC)

Corrosion caused or sped up by bacteria. (Section D-1.4 (#chapter-d-1-3-section-4))

mineral wool

A fire-resistant insulation made from rock or slag fibres, commonly used to fill openings and help prevent the spread of fire and heat. (Section D-4.2 (#chapter-d-4-2-describe-acceptable-methods-of-structure-penetration))

mineral-fibre

A type of insulation made from fine fibres of rock, slag, or glass, used to resist heat and help prevent the spread of fire. (Section D-4.2 (#chapter-d-4-2-describe-acceptable-methods-of-structure-penetration))

MJ clamp (mechanical joint clamp)

A clamp used with mechanical joint fittings to compress a gasket and secure the pipe connection, creating a tight seal. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

moment critical zone

A section of a structural beam where stress is highest and drilling is restricted. (Section D-4.1 (#chapter-d-4-1-describe-factors-affecting-penetrations-in-structures))

Monel steel

A corrosion-resistant metal alloy made mainly of nickel and copper, commonly used in harsh environments such as marine or chemical systems. (Section D-3.2 (#chapter-d-3-2-section-2))

NB (nominal bore)

Another name for nominal pipe size that refers to the approximate inside diameter of a pipe. (Section D-1.1 (#chapter-d-1-1-describe-piping-and-tubing-materials))

nitrile (acrylonitrile-butadiene copolymer, NBR) (buna-n)

A type of synthetic rubber used for seals and gaskets that resists oil and petroleum products and has good abrasion resistance, but is not suitable for strong acids or oxidizing chemicals. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

no-stop coupling

A coupling without an internal stop that allows pipe to slide through. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

noble

Possessing outstanding qualities. (Section D-1.4 (#chapter-d-1-3-section-4))

noise (in piping systems)

Unwanted sound made by water or air moving through pipes, often caused by high flow, pressure changes, or rough pipe surfaces. (Section D-1.5 (#chapter-d-1-5-describe-the-inspection-of-pipes-and-tube-before-installation))

non-load-bearing structural member

A support that is installed as a partition to divide space in a structure and does not support the weight above it. Cutting, drilling or removing this support will not weaken the structure. (Section D-4.1 (#chapter-d-4-1-describe-factors-affecting-penetrations-in-structures))

non-makeup type joints

Pipe connections where the pipe ends meet directly and do not change the overall length. (Section D-1.6 (#chapter-d-1-6-section-6))

NPS (nominal pipe size)

This is the approximate inside diameter. (Section D-1.1 (#chapter-d-1-1-describe-piping-and-tubing-materials))

NPT (national pipe thread)

The standard developed in North America for tapered threads is ANSI/ASME standard B1.20.1; may be referred to as MPT (male pipe thread) for external threads, and FPT (female pipe thread) for internal threads. (**Note that FPT and MPT are not authorized designations according to the ANSI standard.**) (Section D-1.1 (#chapter-d-1-1-describe-piping-and-tubing-materials))

o-rings

Round rubber seals placed between pipe parts to prevent leaks. (Section D-1.6 (#chapter-d-1-6-section-6))

OD

outer diameter

offset multiplier (1.414)

A number used to calculate pipe length when pipes change direction at an angle, such as 45 degrees. (Section D-1.6 (#chapter-d-1-6-section-6))

oriented strand board (OSB)

A structural panel made from compressed wood strands bonded with adhesive, commonly used for sheathing in walls, floors, and roofs. (Section D-4.2 (#chapter-d-4-2-describe-acceptable-methods-of-structure-penetration))

out-of-round

When a pipe is no longer perfectly circular in shape. (Section D-1.5 (#chapter-d-1-5-describe-the-inspection-of-pipes-and-tube-before-installation))

outside screw and yoke (OSY) valve

A valve with a stem that moves up and down outside the valve body, making it easy to see if the valve is open or closed. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

oxidation

A chemical reaction where a material (often metal) reacts with oxygen, often causing rust or surface buildup. (Section D-1.6 (#chapter-d-1-6-section-6))

oxygen barrier

A layer in some piping (such as PEX) that prevents oxygen from passing through the pipe wall and entering the system, helping to reduce corrosion. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

oxygen corrosion

Corrosion caused by oxygen reacting with metal. (Section D-1.4 (#chapter-d-1-3-section-4))

packing

A sealing material made of flexible (pliable) materials that provides a dynamic seal between a moving part and a stationary part, such as around a valve stem to prevent leaks. Common types include graphite packing. (Section D-3.2 (#chapter-d-3-2-section-2))

party wall

A shared wall between two adjoining buildings or units that acts as a fire separation and may also provide sound insulation. (Section D-4.1 (#chapter-d-4-1-describe-factors-affecting-penetrations-in-structures))

PEX (cross-linked polyethylene)

A flexible plastic pipe made stronger by a chemical bonding process. (Section D-1.2 (#chapter-d-1-2-describe-the-methods-of-manufacture-of-piping-and-tubing))

PEX crimp fitting

A fitting used with PEX tubing that is secured using a crimp ring to form a tight, leak-resistant connection. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

PEX fitting

A fitting used to connect PEX (cross-linked polyethylene) tubing, typically secured with a crimp ring, clamp, or expansion method to create a watertight seal. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

PEX-A (peroxide [Engel] method)

A type of PEX tubing made using the peroxide (Engel) method, known for being flexible and able to be repaired with heat. (Section D-1.2 (#chapter-d-1-2-describe-the-methods-of-manufacture-of-piping-and-tubing))

PEX-B (silane method)

A type of PEX tubing made using the silane (moisture cure) method, known for its strength and resistance to pressure. (Section D-1.2 (#chapter-d-1-2-describe-the-methods-of-manufacture-of-piping-and-tubing))

PEX-C (electron beam method)

A type of PEX tubing made using an electron beam process, known for being more rigid and less evenly cross-linked than other types. (Section D-1.2 (#chapter-d-1-2-describe-the-methods-of-manufacture-of-piping-and-tubing))

PEX/AL/PEX (cross-linked polyethylene/aluminum/cross-linked polyethylene)

A multilayer pipe made of PEX with a thin aluminum layer in the middle, providing added strength, shape retention, and resistance to oxygen entering the system. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

pH

This is a measurement of the acidity or alkalinity of a substance. You may need to adjust the pH level of water in a hydronic heating system by adding an acid to stabilize a condition that is too alkaline or by adding a base (alkali) if the solution is too acidic. Hot water boiler manufacturers normally suggest a solution that is very mildly alkaline

(pH of approximately 7.8) rather than neutral (pH of 7) to prevent corrosion caused by acidic water. (Section D-1.4 (#chapter-d-1-3-section-4))

pilot operated pressure relief valve

A pressure relief valve that uses a smaller control valve (pilot) to control when the main valve opens. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

pinch valve

A valve that controls flow by squeezing a flexible tube to stop or allow fluid to pass. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

pinhole leak

A very small hole in a pipe that can cause leaks. (Section D-1.4 (#chapter-d-1-3-section-4))

pipe

Pipe is generally specified by a nominal inside diameter with a constant outside diameter (OD) and a schedule rating that defines its thickness. Pipe is generally manufactured to one of several international and national industrial standards. In general, “pipe” is the more common term in most of the world, whereas “tube” is more widely used in the United States. (Section D-1.1 (#chapter-d-1-1-describe-piping-and-tubing-materials))

pipe anchors

Devices used to hold pipes firmly in place and prevent movement. (Section D-1.3 (#chapter-d-1-3-describe-the-methods-of-pipe-and-tubing-support))

pipe chase

A framed or enclosed space within a building used to conceal and protect pipes as they run vertically or horizontally through the structure. (Section D-4.1 (#chapter-d-4-1-describe-factors-affecting-penetrations-in-structures))

pipe facer (trimmer)

A tool used to cut and smooth the ends of a pipe so they are flat, clean, and ready to be joined. (Section D-1.6)

pipe nipple

A short length of pipe with threads on one or both ends used to connect fittings or extend piping. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

pipe or thread engagements

The length of pipe or threads that fit inside a fitting when making a connection. (Section D-1.6 (#chapter-d-1-6-section-6))

pipe sleeve

A protective tube that allows a pipe to pass through a structure safely; also refers to protective pipe or tubing that surrounds a pipe carrying the fluid to be used. (Section D-4.1 (#chapter-d-4-1-describe-factors-affecting-penetrations-in-structures))

Pipetite sleeve boots

Flexible, pre-manufactured seals designed to fit around pipes passing through walls or floors, providing a watertight and durable seal without the need for additional sealants or fasteners. (Section D-4.1 (#chapter-d-4-1-describe-factors-affecting-penetrations-in-structures))

piping geometry

The shape, direction, and layout of a piping system. (Section D-1.6 (#chapter-d-1-6-section-6))

plain-ended piping

Pipe with straight, smooth ends that require joining methods such as welding or fusion. (Section D-1.6 (#chapter-d-1-6-section-6))

plastic clips and grommets

plastic range (melting [pasty] range)

The temperature range between the solidus and liquidus, where some portion of the alloy is solid, but the majority is liquid; also called the melting (pasty) range; may be of importance when selecting a filler metal; indicates the width of the working range for the filler metal and the speed with which the filler metal will become fully solid after brazing; filler metals with narrow ranges, with or without silver, solidify more quickly and therefore require careful application of heat. (Section D-1.6 (#chapter-d-1-6-section-6))

plug

A fitting with external threads used to seal the end of a pipe. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

plug valve

A quarter-turn valve that uses a solid plug with a hole through it to start or stop flow by rotating the plug inside the valve body. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

plumber's putty

A soft, moldable sealing compound used to create watertight seals around fixtures such as sinks and drains. (Section D-3.2 (#chapter-d-3-2-section-2))

plumbing trap (P-trap)

A curved section of pipe that holds a small amount of water to prevent sewer gases from entering a building. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

polybutylene (PB) plastic pipe

A flexible plastic pipe once used for water supply systems, known for being easy to install but no longer commonly used due to failure issues over time. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

polyethylene (PE)

A type of plastic commonly used to make pipes. (Section D-1.2 (#chapter-d-1-2-describe-the-methods-of-manufacture-of-piping-and-tubing))

polyvinyl chloride (PVC)

A strong plastic material used to make pipes for water and drainage systems. (Section D-1.2 (#chapter-d-1-2-describe-the-methods-of-manufacture-of-piping-and-tubing))

polyvinyl chloride (PVC) Schedule 80 fittings

Strong plastic fittings with thicker walls than standard PVC, designed to handle higher pressure in piping systems. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

positioner

A device used to ensure that the valve is at the correct position of opening as the control signal indicates. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

post indicator valve

A valve connected to an above-ground indicator that shows whether an underground valve is open or closed, often used in fire protection systems. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

post-tension slab

A concrete slab reinforced with tensioned steel cables to increase strength and reduce cracking. (Section D-4.1 (#chapter-d-4-1-describe-factors-affecting-penetrations-in-structures))

post-tensioned

Concrete that has steel cables inside it to make it stronger. (Section D-1.3 (#chapter-d-1-3-describe-the-methods-of-pipe-and-tubing-support))

potable water

Water safe for human consumption. (Section D-1.1 (#chapter-d-1-1-describe-piping-and-tubing-materials))

powder shot pins

Metal pins driven into hard materials using a powder-actuated tool, often used for quick fastening into concrete or steel. (Section D-1.3 (#chapter-d-1-3-describe-the-methods-of-pipe-and-tubing-support))

power-actuated or power-driven fasteners

Fasteners that are driven into materials like concrete or steel using a tool powered by explosive charges or compressed force. (Section D-1.3 (#chapter-d-1-3-describe-the-methods-of-pipe-and-tubing-support))

press-connect (press-fit)

A method of joining pipes using a special fitting and tool that presses the connection together to form a tight seal. (Section D-1.6 (#chapter-d-1-6-section-6))

pressure fittings

Fittings designed to carry fluids under pressure. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

pressure relief valve (PRV)

A safety valve that opens to release pressure when it gets too high, protecting the system from damage. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

pressure-seal bonnet

A valve bonnet that uses system pressure to create a tight metal-to-metal seal, making it suitable for high-pressure and high-temperature applications. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

print-line

The line of markings printed on a pipe that identifies its size, type, approvals, etc. (Section D-1.1 (#chapter-d-1-1-describe-piping-and-tubing-materials))

ProPEX propex (formerly quick and easy)

A PEX connection system that uses expansion fittings and rings to create a tight seal as the tubing shrinks back to its original size. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

PTFE (poly-tetra-fluoro-ethylene)

A smooth plastic material that reduces friction and allows parts to slide easily. (Section D-1.3 (#chapter-d-1-3-describe-the-methods-of-pipe-and-tubing-support))

purge gas

A gas (usually nitrogen) used to remove air from inside pipes during brazing to prevent oxidation. (Section D-1.6)

push-connect

A type of pipe connection that uses a gasket and grab ring to create a seal when the pipe is pushed into the fitting, without the need for heat or tools. (Section D-1.6 (#chapter-d-1-6-section-6))

push-fitting system

A connection system that allows pipes or tubing to be joined by pushing them into a fitting, where internal seals and gripping rings create a secure, leak-resistant connection without tools. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

push-on joint

A pipe connection where the spigot end is pushed into a bell with a rubber gasket to create a watertight seal without threading or welding. (Section D-3.1)

PVC Schedule 40 fittings

Standard plastic fittings with moderate wall thickness, commonly used for drainage, waste, vent, and some low-pressure piping systems. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

pyrometer

A tool used to measure high temperatures, especially on heating surfaces. (Section D-1.6 (#chapter-d-1-6-section-6))

quarter-turn valve

A valve in which the handle and stem move from fully closed to fully open in one-quarter of a 360° turn (90°). (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

quick-connect fitting

A fitting that allows pipes or tubing to be connected and disconnected quickly without the use of tools. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

radius

The curved part of a fitting that determines how sharply it changes direction. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

raised face flange

A type of flange with a slightly raised sealing surface that helps concentrate pressure on the gasket to create a better seal. (Section D-3.2)

ram bending

A method of bending pipe using a pushing force (ram) to shape the pipe. (Section D-1.6 (#chapter-d-1-6-section-6))

reaming

The process of smoothing the inside edge of a pipe after cutting. (Section D-1.5 (#chapter-d-1-5-describe-the-inspection-of-pipes-and-tube-before-installation))

rebar (reinforcing bar)

Steel bars embedded in concrete to provide strength and support. (Section D-4.1 (#chapter-d-4-1-describe-factors-affecting-penetrations-in-structures))

rectifier

An electrical device that changes alternating current (AC) into direct current (DC). This current is then impressed on an underground metallic piping system to protect it against corrosion. (Section D-1.4 (#chapter-d-1-3-section-4))

reduced port ball valve

A ball valve with a smaller opening than the pipe, which reduces flow and increases pressure loss. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

reducer or increaser

An MJ cast iron fitting that changes a pipe size. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

reducing elbows

An elbow that changes both the direction and size of a pipe. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

reducing fitting

A fitting used to connect pipes of different sizes. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

resilient seat

A valve disk or seat that is soft-seated rather than a metal-to-metal hard seat. An example is a Teflon seat. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

retrofit or surface-mounted collars

A firestop collar installed around a pipe after it has been placed through a wall or floor, typically attached to the surface of the structure. (Section D-4.2)

return bend

A fitting that changes direction by 180 degrees. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

ring gasket

A circular gasket that fits within the flange faces to create a seal, often used where higher pressure or more precise sealing is required. (Section D-3.2)

rising stem inside screw valve

A valve where the stem moves up and down inside the valve body as it turns, showing whether the valve is open or closed. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

rising stem outside screw valve

A valve with threads located outside the valve body, where the stem moves up and down as the valve is opened or closed, making it easy to see the valve position. (Section D-2.1)

rod hanger

A threaded metal support used to hang pipes from a structure; other common names: hang-up anchors, Sammy super screws, vertigo anchors, hanger mates, and titan anchors. (Section D-1.3 (#chapter-d-1-3-describe-the-methods-of-pipe-and-tubing-support))

roll bending

A method of bending pipe by passing it through rollers to create a curved shape. (Section D-1.6 (#chapter-d-1-6-section-6))

roll groove joining

A method of forming a groove on the outside of a pipe using a rolling tool so it can be connected with a clamp and gasket. (Section D-1.6 (#chapter-d-1-6-section-6))

rolled and welded (pyramid roll method)

A method of making pipe by rolling a flat steel plate into a round shape using three rollers, then welding the seam to form a cylinder. (Section D-1.2 (#chapter-d-1-2-describe-the-methods-of-manufacture-of-piping-and-tubing))

rosin core

A type of solder with a mild flux inside that helps clean metal without causing corrosion. (Section D-1.6 (#chapter-d-1-6-section-6))

rotary movement valves

Valves where the internal parts rotate (turn) to open or close the flow. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

rotary piercing

A method of making pipe by rotating a heated solid metal piece and pushing it over a tool to form a hollow tube. (Section D-1.2 (#chapter-d-1-2-describe-the-methods-of-manufacture-of-piping-and-tubing))

rotating shoe type valve

A type of three-port valve that uses a rotating internal part to direct or mix flow between ports. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

run

The straight-through portion of a fitting. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

sacrificial anode

A metallic anode intended to be dissolved to protect other metal components. (Section D-1.4 (#chapter-d-1-3-section-4))

saddle fusion

A method of joining a branch pipe to a main pipe by heating and fusing them together. (Section D-1.6 (#chapter-d-1-6-section-6))

SAE flare

A type of flare fitting with a 45-degree angle, commonly used in automotive and refrigeration systems. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

san (sanitary) tees

A fitting used in drainage systems to connect pipes at a 90-degree angle, designed with a curved shape to guide flow smoothly. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

sanitary cross (double sanitary tee)

A fitting used in drainage systems to connect four pipes at 90-degree angles, designed to guide flow smoothly and reduce blockages. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

schedule numbers

Numbers used to show the wall thickness of a pipe, which affects how strong it is and how much pressure it can handle. (Section D-1.1 (#chapter-d-1-1-describe-piping-and-tubing-materials))

scissor beam clamp

A temporary clamp that grips onto a steel beam using a scissor-like action to create a secure attachment point for lifting or supporting equipment. (Section D-1.3 (#chapter-d-1-3-describe-the-methods-of-pipe-and-tubing-support))

screwed union ring bonnet

A valve bonnet held in place by a threaded ring, allowing easier removal for maintenance. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

screwed-in bonnet

A valve bonnet that is threaded directly into the valve body to create a tight seal. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

scum-forming substances

The use of water softeners, iron filters, UV-sterilization, and other water treatment devices may be necessary in order to correct any conditions that are undesirable for the water's intended use. Mineral impurities that foam or scum: usually soda in the form of a carbonate, chloride or sulphate. (Section D-1.4 (#chapter-d-1-3-section-4))

SDR (standard dimension ratio)

A number that compares a pipe's outside diameter to its wall thickness to show how strong it is and how much pressure it can handle. (Section D-1.1 (#chapter-d-1-1-describe-piping-and-tubing-materials))

SDR number

SDR number is determined by dividing the outside diameter of the tube or pipe by its minimum wall thickness. (Section D-1.1 (#chapter-d-1-1-describe-piping-and-tubing-materials))

sealant

A material used to fill gaps and create a watertight or airtight seal between surfaces. (Section D-3.2 (#chapter-d-3-2-section-2))

seamless (SMLS) steel pipe

A type of steel pipe made from a solid piece of metal with no welded seams, making it strong and able to handle high pressure. (Section D-1.1 (#chapter-d-1-1-describe-piping-and-tubing-materials))

seat ring

A part of a valve that provides a smooth surface for the valve disk to seal against, helping to stop the flow and prevent leaks. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

seismic activity

Movement of the ground caused by an earthquake. (Section D-1.3 (#chapter-d-1-3-describe-the-methods-of-pipe-and-tubing-support))

seismic braces

Supports used to prevent pipes from moving during earthquakes or vibrations. (Section D-1.3 (#chapter-d-1-3-describe-the-methods-of-pipe-and-tubing-support))

seismic restraint

A system used to keep pipes and equipment secure during an earthquake. (Section D-1.3 (#chapter-d-1-3-describe-the-methods-of-pipe-and-tubing-support))

service check valve

A valve that allows components (such as gauges or expansion tanks) to be removed or serviced without draining the entire system. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

shim

A thin piece of material (such as paper, plastic, or metal) used to fill a gap or adjust the fit between parts. (Section D-1.6)

short radius

A fitting with a tighter curve that changes direction quickly but may cause more flow resistance. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

shoulder (short) nipple

A short pipe with a small unthreaded section (shoulder) between the threaded ends, allowing better wrench grip during installation. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

side inlet fitting

A fitting with an additional opening on the side that allows another pipe to connect to the main fitting. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

side inlet tee

A fitting with an extra connection on the side. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

silent flow check valve

A check valve designed to close smoothly and quietly, reducing or preventing water hammer. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

silicone caulking

A flexible sealant and adhesive compound used to fill gaps and create a watertight seal around fixtures, joints, and surfaces, often containing mildew-resistant chemicals. (Section D-3.2 (#chapter-d-3-2-section-2))

skelp

A strip of steel that is formed into pipe during manufacturing. (Section D-1.2 (#chapter-d-1-2-describe-the-methods-of-manufacture-of-piping-and-tubing))

sleeve seal

A sealing device used to close the gap between a pipe and a pipe sleeve. (Section D-4.1 (#chapter-d-4-1-describe-factors-affecting-penetrations-in-structures))

sleeve type gasket

A gasket that fits around a pipe inside a joint to help seal the connection and prevent leaks. (Section D-3.2)

slide plates

Flat surfaces that support equipment while allowing it to move easily. (Section D-1.3 (#chapter-d-1-3-describe-the-methods-of-pipe-and-tubing-support))

sliding-stem valve

A valve where the stem moves in and out in a straight line without threads, often operated by a lever or actuator. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

slip-on joint

A type of pipe connection where one pipe slides into or over another and is sealed with a gasket or O-ring. (Section D-1.6 (#chapter-d-1-6-section-6))

slip-on pipe flange

A flange that slides over the pipe and is then welded in place to secure it. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

socket fused

A method of joining plastic pipe where a heated fitting (socket) is used to connect the pipe. (Section D-1.6 (#chapter-d-1-6-section-6))

socket weld pipe flange

A flange with a recessed socket that the pipe fits into before being welded, providing a strong and aligned connection. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

socket welded fitting

A fitting with a recessed socket that a pipe is inserted into and then welded around the joint to create a strong, leak-proof connection. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

soft soldering

Soldering at temperatures below 450°C (840°F). (Section D-1.6 (#chapter-d-1-6-section-6))

soldered fitting (sweat)

A fitting joined by heating and melting solder to seal and connect the pipe. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

soldering

Joining metal using a lower-temperature filler metal. (Section D-1.6 (#chapter-d-1-6-section-6))

solid wedge gate valves

A type of gate valve that uses a single, solid wedge-shaped gate to close tightly against the valve seats and stop flow. (Section D-2.2 (#chapter-d-2-2-install-valve))

solidus

The temperature at which 100% of the alloy is in a solid, crystalline form but starts to melt when additional heat is applied; soldering begins upon reaching the solidus. (Section D-1.6 (#chapter-d-1-6-section-6))

solvent cement

A chemical adhesive used to join plastic pipes by softening and fusing the surfaces together to form a permanent bond. (Section D-3.2)

solvent cementing (solvent welding)

A method of joining plastic pipes by using a chemical that softens the surfaces so they fuse together as one piece. (Section D-1.6 (#chapter-d-1-6-section-6))

sound transmission

The movement of sound through building materials or structures. (Section D-4.1 (#chapter-d-4-1-describe-factors-affecting-penetrations-in-structures))

spigot end

The end of a pipe or fitting that fits into a hub end. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

spindle

A rod inside a valve that connects the handle to the internal parts and turns or moves to open or close the valve. (Section D-2.2 (#chapter-d-2-2-install-valve))

spiral-weld pipe

A type of steel pipe made by rolling a strip of steel into a spiral shape and welding the seam along its length. (Section D-1.2 (#chapter-d-1-2-describe-the-methods-of-manufacture-of-piping-and-tubing))

spring relief valve (pop safety valve)

A pressure relief valve that uses a spring to hold it closed and “pops” open quickly when pressure gets too high, releasing fluid to protect the system. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

spring support

A support that allows pipes to move up and down while still holding their weight. (Section D-1.3 (#chapter-d-1-3-describe-the-methods-of-pipe-and-tubing-support))

spring sway brace

A support that controls pipe movement while allowing limited motion using a spring, helping the pipe return to its original position. (Section D-1.3 (#chapter-d-1-3-describe-the-methods-of-pipe-and-tubing-support))

standard

A body of rules or principles established and agreed upon as valid and fundamental in a certain field or industry. (Section D-1.1 (#chapter-d-1-1-describe-piping-and-tubing-materials))

standard port ball valve

A ball valve with an opening slightly smaller than the pipe, resulting in some reduction in flow. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

standard turn

A common fitting bend used to change direction, typically referring to a standard radius elbow. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

stop and drain valve (stop and waste valve)

A valve that shuts off water flow and allows the system to drain, either automatically or through a drain opening. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

straight grades (austenitic stainless steel)

Stainless steel with a maximum of 0.08% carbon that provides good corrosion resistance and strength. (Section D-1.1 (#chapter-d-1-1-describe-piping-and-tubing-materials))

straight tees

A fitting that connects three pipes at a 90-degree angle, typically used in pressure piping systems. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

strap iron (plumber's tape or metal hanger strap)

A thin strip of metal used to support and secure pipes. (Section D-1.3 (#chapter-d-1-3-describe-the-methods-of-pipe-and-tubing-support))

stray current

The portion of a current that flows over a path other than the intended path. There are two types of stray current: direct current (DC) and alternating current (AC). Stray currents found in the ground and in water promote corrosion of piping and metal components. (Section D-1.4 (#chapter-d-1-3-section-4))

street elbow

An elbow with male threads on one end and female threads on the other. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

stretch bending

A method of bending pipe by pulling it while applying force to shape it. (Section D-1.6 (#chapter-d-1-6-section-6))

striker plates

Metal plates installed over or near pipes or tubing in walls to protect them from being punctured by nails or screws. (Section D-1.6 (#chapter-d-1-6-section-6))

structural component

A part of a building that supports loads or contributes to the strength and stability of the structure, such as beams, columns, walls, floors, and foundations. (Section D-4.1 (#chapter-d-4-1-describe-factors-affecting-penetrations-in-structures))

structural integrity

The ability of a building or structure to remain strong, stable, and safe under loads without failure or damage. (Section D-4.1 (#chapter-d-4-1-describe-factors-affecting-penetrations-in-structures))

stuffing box

An enclosure containing packing to prevent leakage around a moving machine part. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

submerged arc welded (SAW)

A welding method where the weld is protected by a layer of material during the process. (Section D-1.2 (#chapter-d-1-2-describe-the-methods-of-manufacture-of-piping-and-tubing))

suspended solids

These are substances that exist in water as suspended particles. They are usually mineral or organic in origin. These substances are not generally a problem as they can be filtered out. (Section D-1.4 (#chapter-d-1-3-section-4))

swage

A tool, die, or stamp for bending and shaping wrought iron, etc., by hammering or pressure (Canadian Oxford Dictionary, 2004) (Section D-1.6)

sway brace

A support that prevents pipes from moving side to side. (Section D-1.3 (#chapter-d-1-3-describe-the-methods-of-pipe-and-tubing-support))

swing-check valve

A check valve with a hinged disk that swings open with forward flow and closes to prevent reverse flow. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

tapped

A process where threads are cut into a hole so a pipe or fitting can be screwed into it. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

tapped side inlet

A side opening on a fitting that has internal threads to allow connection to another pipe or fitting. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

tapt (tapped) opening

A threaded opening in a fitting used to connect to another pipe. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

tapt side outlet

A side opening on a fitting that is internally threaded to allow connection to another pipe or fitting. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

tee wye

A fitting that combines a tee and a wye, with a longer-radius curve to direct flow more smoothly than a standard sanitary tee. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

teflon gaskets

Gaskets made from PTFE (Teflon) that resist heat and chemicals and provide a low-friction sealing surface. (Section D-3.2 (#chapter-d-3-2-section-2))

teflon polytetrafluoroethylene (PTFE)

A type of plastic used in valves and seals that resists heat and chemicals and provides a low-friction surface that does not require lubrication. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

teflon thread compound

A type of thread sealant that contains PTFE (Teflon) to help seal threaded connections, reduce friction, and prevent leaks. (Section D-3.2 (#chapter-d-3-2-section-2))

teleposts (telescopic)

Adjustable steel support posts used to temporarily support structures such as formwork or beams during construction, allowing height to be changed as needed. (Section D-4.1 (#chapter-d-4-1-describe-factors-affecting-penetrations-in-structures))

temper

The hardness and strength of metal, based on how it is heated and cooled. (Section D-1.2 (#chapter-d-1-2-describe-the-methods-of-manufacture-of-piping-and-tubing))

temperature and pressure relief valve (TPRV/T&P)

A safety valve that releases water if temperature or pressure becomes too high, commonly used on water heaters. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

Tempilstik

A temperature-indicating stick that melts at a specific heat level to show if a surface has reached the correct temperature. (Section D-1.6)

tendon (post-tension)

A steel cable used in post-tension concrete to apply compressive force. (Section D-4.1 (#chapter-d-4-1-describe-factors-affecting-penetrations-in-structures))

tensile load applications

Situations where a fastener or support must hold forces that are pulling or stretching it apart. (Section D-1.3 (#chapter-d-1-3-describe-the-methods-of-pipe-and-tubing-support))

tensile strength

The ability of a material to resist being pulled apart. (Section D-1.6 (#chapter-d-1-6-section-6))

thermal expansion

The increase in size of a material when it is heated. (Section D-1.3 (#chapter-d-1-3-describe-the-methods-of-pipe-and-tubing-support))

thermal expansion relief valve

A valve that releases excess pressure caused by water expanding as it is heated, helping to protect the plumbing system from damage. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

thermo-set

A plastic capable of becoming permanently rigid when heated or cured. It cannot be reheated and re-melted. Fibreglass pipe is an example of a thermo-set plastic pipe. (Section D-1.1 (#chapter-d-1-1-describe-piping-and-tubing-materials))

thermoplastic

A plastic capable of softening or fusing when heated and which hardens once cooled. Can be reheated and melted. Polyethylene and polyvinyl chloride (PVC) are examples of a thermoplastic. (Section D-1.1 (#chapter-d-1-1-describe-piping-and-tubing-materials))

thermosetting resins

Plastics that become permanently hard when heated and cannot be melted or reshaped again. (Section D-1.1 (#chapter-d-1-1-describe-piping-and-tubing-materials))

thermostatic mixing valve

A valve that mixes hot and cold water to maintain a safe and steady outlet temperature. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

thread compound (pipe dope)

A paste applied to threaded pipe connections to seal gaps, prevent leaks, and make assembly easier. (Section D-3.2 (#chapter-d-3-2-section-2))

thread engagement

The length of pipe threads that connect inside a fitting. (Section D-1.6 (#chapter-d-1-6-section-6))

threaded fitting

A fitting with internal or external threads that is screwed onto a pipe to form a connection. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

threaded pipe flange

A flange with internal threads that screws onto a pipe, eliminating the need for welding. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

three-port diverting valve

A valve with one inlet and two outlets that directs flow from one path to another. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

three-port mixing valve

A valve with two inlets and one outlet that combines flows, such as hot and cold water, into one stream. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

three-port valve

A valve with three openings (ports) that can be used to mix or divert flow depending on the piping setup. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

throat

The inside curved portion of a fitting where flow changes direction. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

through-penetration firestops

A firestop system installed where a penetrating item passes entirely through a fire-rated assembly, maintaining the assembly's fire-resistance rating. (Section D-4.2)

tilting-disk swing-check valve

A type of swing-check valve with a disk that tilts to open and close, allowing faster response and improved flow compared to standard swing-check valves. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

timing flanges

The process of aligning flange bolt holes so they match correctly before tightening. (Section D-1.6 (#chapter-d-1-6-section-6))

toilet fill valve

A valve in a toilet tank that controls the flow of water to refill the tank after flushing. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

torque wrench

A tool used to tighten bolts or nuts to a specific amount of force to ensure a proper and secure connection. (Section D-1.6 (#chapter-d-1-6-section-6))

trench

A long, narrow hole dug in the ground to install pipes. (Section D-1.4 (#chapter-d-1-3-section-4))

trunnion

A valve component such a pin or pivot on which something can be rotated, such in a trunnion ball valve, which has additional mechanical anchoring of the ball at the top and the bottom, suitable for larger and higher pressure valves. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

tube

Most often specified by the outside diameter (OD) and wall thickness, but may be specified by any two of OD, inside diameter (ID), and wall thickness. Although standards exist for tube, it's often made to custom sizes and a broad range of diameters and tolerances. (Section D-1.1 (#chapter-d-1-1-describe-piping-and-tubing-materials))

Tyton® joint

A type of push-on pipe joint that uses a rubber gasket inside a bell to create a watertight seal when the spigot end is inserted. (Section D-3.2 (#chapter-d-3-2-section-2))

U&O process

A method of making large steel pipe by pressing a flat steel plate into a “U” shape and then into an “O” shape before welding it into a cylinder. (Section D-1.2 (#chapter-d-1-2-describe-the-methods-of-manufacture-of-piping-and-tubing))

ultraviolet (UV) rays

Invisible rays from the sun that can damage materials over time. (Section D-1.5 (#chapter-d-1-5-describe-the-inspection-of-pipes-and-tube-before-installation))

union

A fitting that allows pipes or equipment to be easily connected and disconnected without cutting or rotating the pipe. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

upright wye

A wye fitting installed in a vertical position to connect horizontal piping into a vertical stack with smooth flow. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

V-port ball valve

A ball valve with a V-shaped opening that allows more precise control of flow. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

vacuum relief valve

A valve that allows air into a system to prevent vacuum conditions that could damage equipment. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

valve actuator

A device used to open, close, or control a valve, such as manual handles and electrical, hydraulic, and pneumatic actuators. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

valve chatter

The noise created when the water flow causes loose valve components to rattle or chatter in rapid succession. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

valve packing

A sealing material, usually graphite, used to seal around a valve stem to prevent leakage of system fluids. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

valve stem

The part of a valve that connects the handle or actuator to the internal closing part (such as a disk or gate) and moves to open or close the valve. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

variable spring support

A pipe support that uses a spring to carry the load, where the supporting force changes slightly as the pipe moves. (Section D-1.3 (#chapter-d-1-3-describe-the-methods-of-pipe-and-tubing-support))

vegetable fibre gaskets

Gaskets made from plant-based fibres that are compressed to form a seal, commonly used in low-pressure applications. (Section D-3.2)

vibration isolator

A device used to reduce the transfer of vibration and noise between components. (Section D-4.1 (#chapter-d-4-1-describe-factors-affecting-penetrations-in-structures))

Vic-press

A patented press-connect piping system, manufactured by the Victaulic Co., that uses special fittings and a pressing tool to create a secure, leak-resistant connection without welding or threading. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

Victaulic's Zero-Flex coupling

A rigid grooved coupling designed to join pipes with no movement at the joint, providing strong support and maintaining alignment. (Section D-3.1)

volatile organic compounds (VOCs)

Chemicals that easily turn into gases and can be harmful to people and the environment. They are often found in paints, coatings, and solvents. (Section D-1.4 (#chapter-d-1-3-section-4))

wafer lug type butterfly valve

A butterfly valve with threaded or unthreaded lugs that allow it to be bolted between flanges and support one side of the piping when the other side is removed. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

wafer-type butterfly valve

A butterfly valve designed to fit between two pipe flanges, usually without the need for separate gaskets, for quick and compact installation. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

wall cladding

A layer of material added to the outside or inside of a wall to protect it and improve its appearance (such as siding, drywall, or panels). (Section D-1.6 (#chapter-d-1-6-section-6))

water hammer (hydraulic shock)

A pressure surge or high-pressure shockwave that occurs when water in motion is forced to stop or change direction suddenly. It produces a distinct banging or hammering sound, caused by the shockwave traveling back through the pipe. This effect can damage pipes, joints, and appliances. (Section D-1.3 (#chapter-d-1-3-describe-the-methods-of-pipe-and-tubing-support))

water pressure reducing valve

A valve that lowers incoming water pressure to a safe level for a plumbing system. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

water table

The level below ground where the soil is fully saturated with water. (Section D-1.4 (#chapter-d-1-3-section-4))

waterstop

A material used to prevent water from passing through joints in concrete. (Section D-4.1 (#chapter-d-4-1-describe-factors-affecting-penetrations-in-structures))

wax gaskets

Soft wax rings used to seal toilet connections to prevent leaks and sewer gases from escaping. (Section D-3.2 (#chapter-d-3-2-section-2))

weld-neck pipe flange

A flange with a long neck that is welded to the pipe, providing strong support and smooth flow. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

welded fittings

A fitting that is permanently joined to a pipe by melting and fusing the metal together to create a strong, leak-proof connection. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

wingback elbow (lug ear elbow; drop-ear elbow; drop elbow)

An elbow with mounting tabs used to secure piping to a surface. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

wire drawing

The visual effect of erosion of a valve seat or disk. Wire drawing occurs when a valve is not closed perfectly tight. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

wrought copper (streamline fitting)

A smooth, flexible copper fitting made by shaping metal rather than casting, commonly used in pressure piping systems. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

wrought copper solder pressure female adapter

A copper fitting used to connect soldered copper pipe to a female threaded connection in pressure systems. (Section D-3.1 (#chapter-ch-3-install-fittings-3-1))

wyes

Y-shaped pipe fittings that allow flow to split or join at an angle. (Section D-1.6 (#chapter-d-1-6-section-6))

Y-body globe valve

A globe valve design with the seat and stem set at an angle (about 45°), which reduces pressure drop and is suited for high-pressure or demanding service. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

Z-body globe valve

The simplest globe valve design, with a symmetrical shape that makes it easy to manufacture, install, and repair, and is commonly used for water applications; the fluid changes direction twice as it flows through the valve, creating more resistance and pressure loss. (Section D-2.1 (#chapter-d-2-1-describe-basic-valve-types))

Version History

This page provides a record of changes made to this learning resource, Plumbing Apprenticeship Level 1, Block D (https://d-pipingcomponents-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 (#back-matter-tru-open-education-resource-error-form).

Table 1: Version History Table

Version	Date	Change	Details

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.