# Block A: Fuel Gas

TRU
Open Press

Plumbing Apprenticeship Program Level 2 Series

# Block A: Fuel Gas

*BC Plumbing Apprenticeship - Level 2*

*SKILLED TRADES BC*

*BC PIPING ARTICULATION AND CURRICULUM SUBCOMMITTEE; ROD LIDSTONE; AUDREY CURRAN; AND PAUL SIMPSON*

TRU OPEN PRESS
KAMLOOPS

# Contents

# Block A: Fuel Gas Introduction

In the field, there are many similarities or overlaps with the work of plumbers and gas fitters. Many plumbing and heating contractors employ both plumbers and gas fitters as well as tradespeople with dual certifications.

Upon completion of a Plumbing Apprenticeship, a plumber can receive cross-program credit for a portion of the Gas fitter apprenticeship. As such, training in fuel gas has been incorporated into all levels of the Plumbing Apprenticeship.

Block A of the **Plumbing Apprenticeship Program Level 2 Series** focuses on the fundamentals of fuel gas systems, providing apprentices with a solid understanding of gas-fired appliances, regulations, and safety standards. This section gives apprentices the skills they need to safely work with fuel gas systems, make sure they follow industry rules, and properly install and maintain gas-fired equipment.

## Plumbing Apprenticeship Program Level 2 Series

The *Plumbing Apprenticeship Program Level 2 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: Fuel Gas Systems (https://a-fuelgas-bcplumbingapprl2.pressbooks.tru.ca/)

A-1: Gas Fired Appliances
A-2: Gas Codes Regulations and Standards
A-3: Gas Appliance and Building Air Requirements
A-4: Technical Instruments and Testers

### Block B: Heating and Cooling Systems (https://b-heating-bcplumbingapprl2.pressbooks.tru.ca/)

B-1: Types of Heating and Cooling Systems
B-2: Hydronic Heating and Cooling Generating Equipment
B-3: Hydronic Heat Transfer Units
B-4: Hydronic Heating Piping and Components

## Block C: Install Fixtures and Appliances (https://c-plumbfixappliance-bcplumbingapprl2.pressbooks.tru.ca/)

C-1: Plumbing Fixtures and Trim
C-2: Plumbing Appliances

## Block D: Drainage Systems (https://d-drainagesystems-bcplumbingapprl2.pressbooks.tru.ca/)

D-1: Sanitary Drain, Waste and Vent Systems
D-2: Planning and Installation of DWV Systems
D-3: Storm Drainage Systems
D-4: Test and Drainage Systems
D-5: Drainage System Maintenance and Repairs

### Plumbing Apprenticeship Program Overview and Upcoming Resources

- **Plumbing Apprenticeship Program Level 1 Series** is coming soon to TRU Open Press in 2025–2026!
- **Plumbing Apprenticeship Program Level 3 Series (https://collection.bccampus.ca/search/?q=%22pl3%22)** can be found in the BCCampus Open Collection (https://collection.bccampus.ca/).
- **Plumbing Apprenticeship Program Level 4 Series** (https://bccampus.ca/projects/archives/zed-cred-z-degrees/ztc-open-educational-resources-for-trades/) can be found in the BCCampus Open Collection. (https://collection.bccampus.ca/) (Block F: Commission and Service will be available soon.)

## Disclaimer

The materials in these Learning Guides are intended for use by students and instructional staff. They have been compiled from sources believed to be reliable and to represent the best current opinions on these subjects. These manuals are designed to serve as a starting point for good practices and may not cover all minimum legal standards. No warranty, guarantee, or representation is made by the BC Piping Trades Articulation Committee, the Skilled Trades BC authority, or the King's Printer of British Columbia regarding the accuracy or sufficiency of the information contained in these publications. These manuals aim to provide basic guidelines for piping trades practices. Therefore, do not assume that all necessary warnings and safety precautions are included, and additional measures may be required.

# Safety Advisory

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

# 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**

# Acknowledgments

The development of the *Piping Trades Learning Guides* was a collaborative effort driven by a commitment to excellence in trades education. These guides 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 leadership and guidance have been instrumental in shaping high-quality training resources. We extend our sincere gratitude for their contributions and ongoing stewardship in advancing the piping trades.


### 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.

## Resource Development Team 2024/2025

**Content Review, Revision, and Development:** BC Plumbing Articulation Curriculum Subcommittee and Rod Lidstone
**Final Content Review and Revisions:** Audrey Curran
**Project Lead (TRU Plumbing Trades):** Paul Simpson, Curriculum Subcommittee Chair
**Publishing Manager:** Dani Collins, MEd
**Copy Editing:** Kaitlyn Meyers, BA
**Production:** Jessica Obando Almache, BCS

- Co-op Students:
  - Greg Vilac
  - Riley Phillips
  - Vansh Sethi
  - Jesse Perkins

## Resources

Content adapted from:

- ©2019, Skilled Trades BC (Harmonized)

- Open School BC
- Trades Training BC

---

Skilled Trades BC website: www.skilledtrades.bc.ca (https://skilledtradesbc.ca)

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

Crown Publications, Queen's Printer
Web: www.crownpub.bc.ca
Email: crownpub@gov.bc.ca
Toll Free: 1 800 663-6105

---

The following companies and suppliers have kindly provided copyright permission for selected images throughout these Plumbing Apprenticeship resources:

- The American Society of Mechanical Engineers (ASME) (https://www.asme.org/)
- Canadian Standards Association (CSA Group Org) (https://www.csagroup.org/)
- Dwyer Instruments, Inc. (https://dwyer-inst.com/)
- Fireside Group Inc (https://www.thefiresidegroup.com/).
- Gas Fired Products (Spaceray) (https://spaceray.com/commercial-industrial-heaters/)
- Gosyln Environmental Systems (https://www.goslyn.ca/)
- HILTI North America (https://www.hilti.com/)
- IAPMO R&T (http://www.scc.ca/en/accreditation/product-process-and-service-certification/iapmo-research-and-testing-inc)
- International Code Council (ICC) Evaluation Service, LLC (https://icc-es.org/evaluation-report-program)
- International Association of Certified Home Inspectors® (InterNACHI) (https://www.nachi.org)
- International Organization for Standardization (https://www.iso.org/)
- Intertek Testing Services NA Inc. (https://www.intertek.com/appliances/energy-efficiency/)
- Kohler® (https://www.kohler.ca/en)
- LabTest Certification Inc. (https://labtestcert.com/)
- Maytag/Whirlpool (https://www.maytag.ca/en_ca.html)
- Modern Fireplace Ideas (https://modernfireplaceideas.com/)
- Natural Resources Canada, 2021 (ENERGY STAR) (https://natural-resources.canada.ca/energy-efficiency/energy-star)
- NIBCO, Inc. (http://www.nibco.com)
- PFS-TECO Corporation (https://www.pfsteco.com/)
- Province of British Columbia (Building and Safety Standards Branch (http://www.gov.bc.ca/buildingcodes))
- QAI Product Testing, Certification and Inspection Services (https://qai.org/) | Laboratories
- QPS Evaluation Services (https://www.qps.ca/)
- Rinnai Corporation (https://media.rinnai.us/)
- Rod Lidstone
    - Brass 1/4″ MIP x barbed hose adapters
    - 1/8″ NPT inlet pressure tap plug
    - Outlet pressure tap connected to clear plastic manometer tubing
    - Combination gas valve with three taper boss test ports

    - Bared reducer and barbed tee
    - Manometer being connected into pressure switch sensing line
    - 3mm silicone rubber tubing connected to static pressure tip
    - Pitot tube
    - P/T plub
    - 1/8″ NPT inlet pressure tap plug
    - Outlet pressure tap connected to clear plastic manometer tubing
    - Glass-stem thermometers
    - Dial stem thermometers
    - Flexible capillary dial thermometer
    - Dial thermometer partially insterted into thermowell
    - Folding digital pocket thermometer
    - Cutaway of RTD probe
    - 10 kΩ NTC thermistor
    - Type K exposed wire thermocouple
    - DMM with temperature setting
    - K type thermocouple connections
    - IR thermometer
    - Calibrating analogue dial thermometers
    - Calibrating DMM temperature readings
    - Pipe clamp thermocouples
- ServiceWhale (https://servicewhale.com/)
- SkilledTradesBC (https://skilledtradesbc.ca/)
- Standards Council of Canada (SCC) (https://scc-ccn.ca/)
- Underwriters Laboratories of Canada (https://canada.ul.com/)
- Xylem, Inc. (https://www.xylem.com/en-us/)

Any additional adapted versions of this content would require additional copyright permissions from the rights holders.

Creative Commons and site licensed images:

- Differential pressure gauge used for testing backflow prevention assemblies, by Richard V. Mawle, from BCcampus Cross Connection Control for Plumbing and Piping Trades (https://collection.bccampus.ca/textbooks/cross-connection-control-for-plumbing-and-piping-trades-plumber-apprenticeship-program-level-3-bccampus-93/); Plumber Apprenticeship Program Level 3 (CC BY-NC 4.0 (https://creativecommons.org/licenses/by-nc/4.0/) International)
- Fire tetrahedron (https://commons.wikimedia.org/wiki/File:Fire_tetrahedron.svg) (adapted) by Gustavb (https://en.wikipedia.org/wiki/User:Gustavb), via Wikimedia Commons, is in the public domain (https://en.wikipedia.org/wiki/en:public_domain).
- Patio Outdoor Free Stock (https://stocksnap.io/photo/patio-outdoor-ISWZOYDFU7) by Matt Bango, via StockSnap.io, is CC0 (https://creativecommons.org/publicdomain/zero/1.0/) licensed.

All symbol icons are from the Noun Project and are used under a CC BY license:

- Important by Larea from Noun Project (https://thenounproject.com/browse/icons/term/important/) (CC BY 3.0 (https://creativecommons.org/licenses/by/3.0/deed.en))
- Skull and Crossbones by Luis Prado from Noun Project (https://thenounproject.com/browse/icons/term/skull-and-crossbones/) (CC BY 3.0 (https://creativecommons.org/licenses/by/3.0/deed.en))
- Resources by popcornarts from Noun Project (https://thenounproject.com/browse/icons/term/resources/) (CC BY 3.0 (https://creativecommons.org/licenses/by/3.0/deed.en))
- Flammable by yogi rista from Noun Project (https://thenounproject.com/browse/icons/term/flammable/) (CC BY 3.0 (https://creativecommons.org/licenses/by/3.0/deed.en))
- Checkbox by ims.icon from Noun Project (https://thenounproject.com/browse/icons/term/checkbox/) (CC BY 3.0 (https://creativecommons.org/licenses/by/3.0/deed.en))
- Explosive Materials by Ervin Bolat from Noun Project (https://thenounproject.com/browse/icons/term/explosive-materials/) (CC BY 3.0 (https://creativecommons.org/licenses/by/3.0/deed.en))
- Work gloves by perilous graphic from Noun Project (https://thenounproject.com/browse/icons/term/work-gloves/) (CC BY 3.0 (https://creativecommons.org/licenses/by/3.0/deed.en))
- Danger by Alice Design from Noun Project (https://thenounproject.com/browse/icons/term/danger/) (CC BY 3.0 (https://creativecommons.org/licenses/by/3.0/deed.en))
- Electricity by Alice Design from Noun Project (https://thenounproject.com/browse/icons/term/electricity/) (CC BY 3.0 (https://creativecommons.org/licenses/by/3.0/deed.en))

*TRU Wolves (https://www.flickr.com/photos/thompsonrivers/52667199689/) (Thompson Rivers University/Flickr) CC BY-NC-SA 2.0 (https://creativecommons.org/licenses/by-nc-sa/2.0/)*

## Land Acknowledgement

Thompson Rivers University (TRU) campuses are situated on the ancestral lands of the Tk'emlúps te Secwépemc and the T'exelc within Secwepemcúl'ecw, the ancestral and unceded territory of the Secwépemc. The rich tapestry of this land also encompasses the territories of the St'át'imc, Nlaka'pamux, Tŝilhqot'in, Nuxalk, and Dakelh. Recognizing the deep histories and ongoing presence of these Indigenous peoples, we express gratitude for the wisdom held by this land. TRU is dedicated to fostering an inclusive and respectful environment, valuing education as a shared journey. TRU Open Press, inspired by collaborative learning on this land, upholds open principles and accessible education, nurturing respectful, reciprocal relationships through the shared exchange of knowledge across generations and communities.

If you are using a printed copy, you can scan the QR code with your digital device to go directly to the video: Introducing SkilledTradesBC (https://www.youtube.com/watch?v=OQgwdP0rNog)

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

*One or more interactive elements has been excluded from this version of the text. You can view them online here: https://a-fuelgas-bcplumbingapprl2.pressbooks.tru.ca/?p=21#oembed-1 (#oembed-1)*

## References


Skilled Trades BC. (2021). Book 1: Fuel gas systems, Heating and cooling Systems. Plumber apprenticeship program level 2 book 1 Harmonized. Crown Publications: King's Printer for British Columbia.

SkilledTradesBC. (2022, December 1). Introducing Skilled Trades BC. YouTube. https://www.youtube.com/watch?v=OQgwdP0rNog

Trades Training BC. (2021). A-1: Introduction to gas-fired appliances. In: *Plumber Apprenticeship Program: Level 2*. Industry Training Authority, BC.

# Accessibility

The web version of Block A: Fuel Gas (https://a-fuelgas-bcplumbingapprl2.pressbooks.tru.ca/) has been designed to meet Web Content Accessibility Guidelines 2.0 (https://www.w3.org/TR/WCAG20/), level AA. In addition, it follows all guidelines in Appendix A: Checklist for Accessibility (https://opentextbc.ca/accessibilitytoolkit/back-matter/appendix-checklist-for-accessibility-toolkit/) of the Accessibility Toolkit – 2nd Edition (https://opentextbc.ca/accessibilitytoolkit/).

Includes:

- **Easy navigation.** This resource has a linked table of contents and uses headings in each chapter to make navigation easy.
- **Accessible videos.** All videos in this resource have captions.
- **Accessible images.** All images in this resource that convey information have alternative text. Images that are decorative have empty alternative text.
- **Accessible links.** All links use descriptive link text.

## Accessibility Checklist

| Element | Requirements | Pass |
|---|---|---|
| **Headings** | Content is organized under headings and subheadings that are used sequentially. | Yes |
| **Images** | Images that convey information include alternative text descriptions. These descriptions are provided in the alt text field, in the surrounding text, or linked to as a long description. | Yes |
| **Images** | Images and text do not rely on colour to convey information. | Yes |
| **Images** | Images that are purely decorative or are already described in the surrounding text contain empty alternative text descriptions. (Descriptive text is unnecessary if the image doesn't convey contextual content information.) | Yes |
| **Tables** | Tables include row and/or column headers with the correct scope assigned. | Yes |
| **Tables** | Tables include a title or caption. | Yes |
| **Tables** | Tables do not have merged or split cells. | Yes |
| **Tables** | Tables have adequate cell padding. | Yes |
| **Links** | The link text describes the destination of the link. | Yes |
| **Links** | Links do not open new windows or tabs. If they do, a textual reference is included in the link text. | Yes |
| **Links** | Links to files include the file type in the link text. | Yes |
| **Video** | All videos include high-quality (i.e., not machine generated) captions of all speech content and relevant non-speech content. | Yes |
| **Video** | All videos with contextual visuals (graphs, charts, etc.) are described audibly in the video. | Yes |
| **H5P** | All H5P activities have been tested for accessibility by the H5P team and have passed their testing. | Yes |
| **H5P** | All H5P activities that include images, videos, and/or audio content meet the accessibility requirements for those media types. | Yes |
| **Font** | Font size is 12 point or higher for body text. | Yes |
| **Font** | Font size is 9 point for footnotes or endnotes. | Yes |
| **Font** | Font size can be zoomed to 200% in the webbook or eBook formats. | Yes |
| **Mobile Check** | Layout displays properly on smaller screen sizes and is mobile-friendly. | |

### Known Accessibility Issues and Areas for Improvement

- Images in H5P self-tests lack alt text, attributions, and licenses to avoid revealing answers.
- Some tables may use merged cells, but they have been structured to work properly with screen readers and there may be long descriptions included in each section if readers prefer to see the table data in a bulleted list.
- These videos do not have edited captions:
    - Introducing SkilledTradesBC (https://www.youtube.com/watch?v=OQgwdP0rNog) by Skilled Trades BC (2022)

Adapted from the Accessibility Toolkit – 2nd Edition (https://opentextbc.ca/accessibilitytoolkit/) by BCcampus, licensed under CC-BY (https://creativecommons.org/licenses/by/4.0/).

### Other Formats Available

In addition to the web version, this book is available in a number of file formats, including PDF, EPUB (for eReaders), and various editable files. The Digital PDF has passed the Adobe Accessibility Check.

## Are you having an issue accessing this resource?

If you have problems accessing this resource, or if you have an idea for how to make this resource more accessible, please contact us to let us know!

Please include the following information:

- The name of the resource
- The location of the problem by providing a web address or page description.
- A description of the problem
- The computer, software, browser, and any assistive technology you are using that can help us diagnose and solve your issue (e.g., Windows 10, Google Chrome (Version 65.0.3325.181), NVDA screen reader)

Contact OpenPress@tru.ca (mailto:OpenPress@tru.ca).

# A-2 GAS INSTALLATION CODE

## Plumber Apprenticeship Program – Level 2

**CSA B149.1:20**
National Standard of Canada

# Natural gas and propane installation code

REVISED MAY 2021

# A-2 Gas Installation Code Introduction

You must be able to recognize and access pertinent codes, regulations, and standards related to the gas equipment installations. This section will familiarize you with the most important codes and standards in the field.

*Learning Objectives*

After completing the chapters in this section, you will be able to:

- Identify codes, regulations, and standards for the gas industry.
- Explain the purpose of the different sections contained within the B149.1 Gas Installation Code.

*Terminology*

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

- **air supply:** (For combustion); The air required by a gas appliance to support proper combustion, which may need to come from outside depending on appliance type and building design. (Section A-2.2)
- **B149.1 code:** The Canadian standard that governs the installation of natural gas and propane appliances and equipment. It's a critical document for all gas-related work. (Section A-2.2)
- **combustible material:** Any material that can ignite and burn. The code contains specific clearance requirements to prevent fire hazards. (Section A-2.2)
- **gas pressure regulators:** A device used to control and maintain gas pressure at a safe, usable level for gas appliances. (Section A-2.2)
- **natural gas:** A fossil fuel primarily composed of methane, used as a common energy source in residential, commercial, and industrial applications. (Section A-2.2)
- **piping and tubing systems:** Approved assemblies of pipes, tubes, hoses, and fittings used to safely transport gas from the meter or tank to appliances. (Section A-2.2)
- **propane:** A hydrocarbon gas used as a fuel, often stored in tanks or cylinders, commonly used where natural gas service is unavailable. (Section A-2.2)
- **psi:** The pressure exerted by a force of one pound-force applied over an area of one square inch is defined as 1 psi (pound per square inch). In the International System of Units (SI), 1 psi is approximately equal to 6,895 pascals. PSI is a unit of pressure in both the US customary and imperial systems. It is also sometimes referred to as pound-force per square inch. (Section A-2.1)
- **psia:** The term "pound per square inch absolute" (psia) specifies that the pressure measurement is relative to a vacuum, as opposed to ambient atmospheric pressure. Note: pounds per square inch gauge is "psig"

whereas pounds per square inch absolute is “psia.” (Section A-2.1)

- **psig:** PSIG stands for “pounds per square inch gauge” and refers to the pressure measured by a gauge or other pressure measurement device. It indicates the difference between the pressure inside a pipe or tank and the atmospheric pressure (atm). Note: pounds per square inch gauge is “PSIG” whereas pounds per square inch absolute – PSIA. (Section A-2.1)
- **purge:** The process of removing air or other gases from piping systems before gas is introduced, critical for safe appliance operation. (Section A-2.2)

# A-2.1 Introduction to Gas Standards, Codes, Acts, and Regulations

Gas standards, codes, acts, and regulations are crucial for ensuring the safe and efficient operation of gas systems. They establish guidelines for the design, installation, maintenance, and inspection of gas appliances, pipelines, and equipment. By setting minimum safety requirements, these codes promote consistency and reliability across gas installations, enhancing public confidence and facilitating regulatory enforcement.

## Canadian Standards Association

The Canadian Standards Association (CSA) exists to develop standards. Among the 57 different areas of specialization are business management, safety, and performance standards, including those for electrical and electronic equipment, industrial equipment, boilers and pressure vessels, compressed gas handling appliances, environmental protection, and construction materials.

Most standards are voluntary, meaning there are no laws requiring their application. Despite that, adherence to standards is beneficial to companies because it shows products have been independently tested to meet certain standards. The CSA mark is a registered certification mark that can only be applied by someone who is licensed or otherwise authorized by the CSA to do so.

Laws and regulations in most municipalities, provinces, and states in North America require certain products to be tested to a specific standard or group of standards by a nationally recognized testing laboratory (NRTL). Currently, 40% of all the standards issued by CSA are referenced in Canadian legislation. CSA's sister company, CSA International, is a nationally recognized testing laboratory that manufacturers can choose, usually because the law of the jurisdiction requires it or the customer specifies it.

## CSA B149 Gas Code Series

The CSA B149 Gas Code Series provides important guidance on how to work as a gasfitter safely — from the handling and storage of natural gas and propane to the safe and effective installation of related appliances and equipment. The CSA B149 Gas Code Series is a Canadian Standards Association (CSA) publication. In 1958, the CSA published the first edition of the B149.1, Installation Code for Gas-Burning Appliances and Equipment. Following the publication of the 1966 edition, the decision was made to split the code into two parts: B149.1, dealing with the installation of appliances and equipment burning natural gas, and B149.2, dealing with the installation of appliances and equipment burning propane. As a first step, B149.2 was prepared and first published in 1969.

In 1974, the Canadian Gas Association (CGA) was accredited by the Standards Council of Canada as the standards development organization responsible for preparing standards for gas-burning appliances and equipment and took over responsibility for the B149 code at that time. Many new editions of the code have been published since that time (a typical code cycle is about every five years).

On June 30, 1997, the CSA Group acquired International Approval Services (IAS), which, until then, was a joint venture of the American Gas Association (AGA) and the Canadian Gas Association (CGA).

Under this agreement, CSA acquired the complete range of IAS standards administration, certification, and registration products and services for appliances and accessories fuelled by natural and liquefied petroleum gases. In 1998, the CSA B149 Installation Code Committee agreed to publish a natural gas and propane installation code that would amalgamate the first seven sections of CAN/CGA-B149.1 and CAN/CGA-B149.2 to become CAN/CSA-B149.1-00. This merger was in response to the trend among the authorities having jurisdiction (AHJ) in many provinces toward having combined licensing and training for both natural gas and propane.

The remaining sections, 8 to 14 of CAN/CGA-B149.2, then became CAN/CSA-B149.2-00, Propane Storage and Handling Code.

It is important to note that when a new edition of these codes is adopted by the enforcing jurisdiction (Technical Safety BC (TSBC)), it supersedes all previous editions.

## CSA B149.1: Natural Gas and Propane Installation Code

CSA B149.1 Natural Gas and Propane Installation Code targets Canadian gas and propane industry workers. This code is an extremely important reference for all gasfitters. It is intended to protect public health and safety for all building systems that use fuel gas. It addresses system design, installation, and inspection of such systems by providing minimum safeguards and corresponding safety requirements. It has been reviewed by regulatory authorities across Canada and has been adopted into law in every Canadian province and territory.

CSA B149.1 applies to the installation of:

- Appliances, equipment, components, and accessories where gas is used for fuel purposes
- Gas piping and tubing systems
- Vehicle-refuelling appliances and associated equipment
- Stationary gas engines and turbines

## CSA B149.2: Propane Storage and Handling Code

The CSA B149.2 Propane Storage & Handling Code reflects the latest advances in industry best practices and the most current safety requirements.

CSA B149.2 applies to the:

- Storage, handling, and transfer of propane
- Propane used as an engine fuel in other than highway vehicles
- Installation of containers and equipment used for propane in distribution locations and filling plants

## CSA B149.3: Code for the Field Approval of Fuel-Related Components on Appliances and Equipment

The CSA B149.3 Code for the Field Approval of Fuel-Related Components on Appliances and Equipment provides requirements for fuel-related components and accessories and their assembly on appliances and equipment using gas.

This document is used predominantly in the commercial and industrial gas industry for large volume equipment and appliances that use a programmable logic controller (PLC) or microprocessor-based controls used for flame safety. Many of these types of equipment may be designed beyond the scope of any existing standards, and the appliances or equipment may not already be certified. In these cases, the B149.3 would apply. This code pertains mostly within the scope of qualification of Class A Gasfitters in Canada.

# Technical Safety BC

Although CSA codes have been adopted as the standard for the design and installation of fuel gas systems across Canada, each province maintains regulation, licensing, and registration of gas in various ways.

Gas systems are usually installed under the regulatory authority in that province. In British Columbia, that authority is Technical Safety BC (https://www.technicalsafetybc.ca/) (formerly BC Safety Authority).

Technical Safety BC is an independent, self-funded organization that oversees the safe installation and operation of technical systems and equipment across the province. In addition to issuing permits, licences, and certificates of qualification, they work with the industry to reduce safety risks through inspections, assessment, education and outreach, enforcement, and research.

Technical Safety BC has been given powers to enforce and create public safety rules in the following areas:

- Natural gas and propane appliances and systems, including hydrogen
- Boilers, pressure vessels, and refrigeration systems
- Passenger ropeways, such as aerial trams and ski lifts
- Elevating devices, such as elevators and escalators
- Electrical equipment and systems
- Alternative safety approaches
- Amusement devices
- Railways

Technical Safety BC administers the Safety Standards Act and Railway Safety Act throughout British Columbia. Anyone who installs, operates, manufactures, maintains, or sells equipment in any of the technologies they regulate is within Technical Safety BC jurisdiction.

Although Technical Safety BC oversees the safe installation and operation of technical systems across the province, some exemptions do exist in certain municipalities. Ten municipalities are delegated portions of the Safety Standards Act to issue electrical and/or gas permits and perform inspections. Technical Safety BC typically does not issue permits or perform inspections for electrical or gas work and equipment in these areas (e.g., the City of Kelowna is permitted to issue gas installation permits within their jurisdiction).

For gas, the local governments (municipalities) can issue natural gas installation permits for:

- Fully detached dwellings serviced by a single meter at 2 **psig** (14 kPa) or less
- Any premise other than a fully detached dwelling if the gas meter pressure is 2 **psi** (14 kPa) or less and the total connected load is 409,600 BTU/hr (120 kW) or less

Technical Safety BC has jurisdiction over all other regulated gases, such as propane, methane, and hydrogen. Although these ten jurisdictions have oversight for electrical and/or gas, Technical Safety BC still oversees contractor licensing and certification of qualified individuals and provides oversight for all other technologies they regulate.

## Gas Installation Permits

There is sometimes misconceptions about who actually has the authority to apply for a gas installation permit. The process is different from applying for a plumbing installation permit, for example.

Gasfitting work in BC must be performed by certified gasfitters. Gas permits are allocated only to registered gas contractors (or, in some cases, a homeowner working under the regulations). Gas contractors are licensed to do work in BC if they are registered with TSBC, employ qualified individuals, and pay an annual licensing fee. Each contractor must also be able to supply a performance bond to do gasfitting work (minimum $10K bond, held in trust with TSBC). Bonding helps ensure that contractors are reputable and that they will complete their work to the regulations.

If a contractor is registered with TSBC to perform regulated gas work, then they must employ certified gasfitters to do the work.

A gas permit is required to perform any regulated gas work, including the installation, alteration, or replacement of any gas-fired appliance. Gas permits are also required if installing or altering the associated gas piping or appliance venting. Gas installation permits must be obtained before any work begins.

When constructing a new dwelling, a building permit is required prior to a gas or plumbing permit being issued. Plumbing permits are issued by the local municipal building department, whereas gas permits are typically issued by TSBC.

The permit process is generally the same for all types of projects, but more specific requirements may be required for some commercial construction and industrial projects.

## Review Process

During the review process, staff determine if the project is in compliance with the applicable codes and other local ordinances and statutes. The length of the review process depends on the type and complexity of the project.

## Permit Approval

When compliance with the code and other applicable statutes is determined, the permit application is approved. Once all final permit fees are paid, the permit is issued.

However, if the permit application is not approved or a review has failed, the permit application, as submitted, will

be denied. When a permit application is denied, corrections to the application shall be made and the application resubmitted for final approval.

### Non-Compliance Enforcement Process

An enforcement action typically begins with the safety officer. The safety officer may address a non-compliance by taking actions, such as suspending a permit, issuing a compliance order, or recommending that a safety manager impose a monetary penalty. The next step involves the Provincial Safety Manager, who may impose more significant sanctions, such as monetary penalties or suspending contractors' licences, or qualification certificates. Enforcement decisions by safety officers and safety managers are generally subject to review or appeal.

The Safety Standards Appeal Board is created under the Safety Standards Act. This appeal board can review certain TSBC decisions when clients request a review.

## Safety Standards Act (BC)

The Safety Standards Act sets out the general requirements for regulated work performed by contractors involved in the operation and installation of technical systems and equipment in BC. It also includes information on the legal requirements for permits and qualifications. The Safety Standards Act authorizes TSBC to take enforcement actions if they discover a non-compliance with the act or regulations.

Products and work regulated under the act include:

- Boilers and boiler systems
- Electrical systems and equipment
- Elevating devices and passenger conveyors
- Gas systems and equipment
- Pressure vessels, pressure piping, refrigeration systems, and equipment
- Amusement rides
- Ski lifts

### Gas Safety Regulation

The Gas Safety Regulation applies to everyone who installs, alters, maintains, or operates gas technologies in British Columbia.

All licensed contractors and gasfitters are required to keep up to date with changes in the act and regulations. In BC, there are a few distinct differences to the National CSA B149.1 code that pertain to gas installations in this province. These variations are contained at the end of the Gas Safety Regulation as an additional schedule. It is important to be familiar with these BC variances.

Contractors and gasfitters must have access to a current edition of the Canadian CSA Gas Code (https://www.csagroup.org/store/), BC Gas Safety Regulation (https://www.bclaws.gov.bc.ca/civix/document/id/

complete/statreg/15_103_2004) and BC Variations to the National Code (https://www2.gov.bc.ca/gov/content/industry/construction-industry/building-codes-standards/bc-codes/2024-bc-codes).

## Gas Safety Orders, Directives, and Information Bulletins

Safety orders are instruments issued to prevent or reduce the risk of personal injury or damage to property. Compliance is mandatory and enforceable by TSBC.

Directives are instruments that clarify or provide a new interpretation of a regulation or code. Compliance is mandatory.

Information bulletins provide helpful information and clarification on existing regulations or code that affect a particular technology.

## Self-Test A-2.1: Identify Gas codes, Regulations, and Standards

Complete Self-Test A-2.1 and check your answers.

If you are using a printed copy, please find Self-Test A-2.1 and Answer Key at the end of this section. If you prefer, you can scan the QR code with your digital device to go directly to the interactive Self-Test.

*An interactive H5P element has been excluded from this version of the text. You can view it online here: https://a-fuelgas-bcplumbingapprl2.pressbooks.tru.ca/?p=39#h5p-5 (https://a-fuelgas-bcplumbingapprl2.pressbooks.tru.ca/?p=39#h5p-5)*

# References


Canadian Commission on Building and Fire Codes. (2022, March 28). *National plumbing code of Canada: 2020*. National Research Council Canada. Government of Canada. https://doi.org/10.4224/2ehs-dp68

Canadian Standards Association (or CSA Group). (n.d.). https://www.csagroup.org/ and https://www.csagroup.org/store/

Office of Housing and Construction Standards. (2024, March 8). *BC codes 2024*. Province of British Columbia. https://www2.gov.bc.ca/gov/content/industry/construction-industry/building-codes-standards/bc-codes/2024-bc-codes

Safety Standards Act, SBC 2003, c 39, <https://canlii.ca/t/565hg (https://canlii.ca/t/565hg)> retrieved on 2024-04-25

Skilled Trades BC. (2021). Book 1: Fuel gas systems, Heating and cooling systems. *Plumber apprenticeship program level 2 book 1 (Harmonized)*. Crown Publications: King's Printer for British Columbia.

Standards Council of Canada – conseil canadien des normes. (n.d.). https://www.scc.ca/en/agl-csa

Technical Safety BC. (n.d.). https://www.technicalsafetybc.ca/

Trades Training BC. (2021). A-2: Use gas codes regulations and standards. In: *Plumber Apprenticeship Program: Level 2*. Industry Training Authority, BC.

# A-2.2 Interpret Sections of the B149.1 Gas Code

This chapter briefly explains what information is contained in the various sections of the gas installation code. For installers, the majority of requirements in Code Sections 1 through 8 of the **B149.1 code**, except for pressure controls and pipe sizing, are common to **natural gas** and **propane**.

## Section 1: Scope

The scope of the code is confined to the installation of typical appliances, equipment, components, and accessories that use gas for fuel purposes, and to the installation of piping and tubing systems extending from the termination of the utility installation (in the case of natural gas) or from the tank or cylinder (in the case of propane).

Where the term "gas" is used, the contents of the code are intended to apply equally to and include any of the following gases or mixtures of them: natural gas, manufactured gas, propane, and mixtures of propane and air.

Where the term "natural gas" is used, it is intended to apply only to natural gas (methane).

Where the term "propane" is used, the contents of the code are intended to apply specifically to and include any material that is composed predominantly of any of the following hydrocarbons or mixtures of them: propane, propylene, butanes (normal butane or isobutane), and butylenes.

In the B149 Gas Code, unless approved otherwise by the authority having jurisdiction, the word "shall" indicates a mandatory requirement; "should" indicates a recommendation or that which is advised but not mandatory; and "may" indicates an advisory or optional statement.

## Section 2: Reference Publications

The reference publications listed in Section 2 of the B149.1 code refer to codes or standards that govern equipment, components, methods, or materials cited in the code. Refer to Section 2 of the code for a complete list of reference publications. Installers must ensure they use the proper reference publication when interpreting and applying the B149 codes. Always check the title and year of any reference publication being used, since versions earlier or later than those listed may contain requirements that have not been approved by the code committees or authority having jurisdiction.

## Section 3: Definitions

Definitions, sometimes referred to as defined terms, appear throughout the code as bold-faced, italicized text. These terms should be clearly understood when applying or interpreting the code and should not be confused with definitions cited in other codes or standards, dictionaries, manufacturers' terminology, or trade slang. Therefore, industry and regulatory agencies should attempt to apply these definitions consistently in practice. When in doubt, consult the authority having jurisdiction for clarification.

## Section 4: General

Section 4 of the code explains the general application of the B149.1 Code. The general requirements set out criteria for the approval of appliances, accessories, components, equipment, and materials. Section 4 also outlines the responsibilities of the appliance installer and defines the skills and training they require. In addition, it provides general requirements applicable to all gas-burning appliance installations in areas such as suitability of use, electrical safety, clearances to **combustible material**, and accessibility.

Installation requirements for specific appliances are provided in Section 7 of the B149.1 code.

Section 4 clearly points out that the requirements of the B149 codes take precedence over those found in referenced standards or manufacturers' instructions, unless otherwise approved by the authority having jurisdiction. This serves to remind designers and installers to carefully review applicable code requirements in relation to specific installations, particularly where new or unfamiliar products are being considered.

Installers must ensure that they are fully familiar with the requirements of Section 4 and should use them as a checklist when planning or performing an installation.

## Section 5: Pressure Controls

Gas pressures in service supply mains and from storage tanks are generally higher than the safe operating pressures of connected appliances. For this reason, gas pressures must be controlled to fall within an appropriate range, depending on the operating characteristics of installed appliances. The requirements for pressure control in Section 5 of the code are intended to limit the range of gas pressure to ensure safe and reliable appliance operation.

Section 5 requirements also give practical consideration to the safe relief of gas pressure surges, the isolation of pressure control devices (like **gas pressure regulators**), using manual shut-off valves to permit servicing and replacement, and the installation of pressure controls in locations that are accessible and protect the devices from physical or chemical damage.

## Section 6: Piping and Tubing Systems, Gas Hose, and Fittings

Section 6 of the B149.1 code provides requirements for **piping and tubing systems**, hose, and fittings. These requirements represent conventional industry practice, and it should be noted that a large number of new technologies and systems are constantly entering the marketplace. For such proprietary products, manufacturers' certified installation instructions serve as additional requirements over those found in Section 6 of the code.

Section 6 deals primarily with gas piping and tubing, as well as hose, from the meter into all the appliances served, and between buildings. Gas piping from the main supply to the meter is normally the responsibility of the gas utility.

Piping and tubing systems, as well as hose, must incorporate approved materials that are properly sized, located, and protected. All piping outlets, drip pockets, and valves must be installed as required. The entire system must be properly pressure-tested and **purged**, then appropriately identified.

## Section 7: Installation of Specific Types of Appliances

Section 7 of the code provides requirements for the installation of specific types of appliances. Due to the large number and variety of gas appliances available, the requirements in Section 7 should be viewed as largely generic in nature and be limited to the general types of appliances commonly installed. More accurate information may be found by referring to the manufacturer's certified installation instructions for the appliance being installed.

Before proceeding with any installation, review the general requirements in Clause 4, which are applicable to the appliance being installed. As well, review Section 6 for relevant supply piping requirements and Section 8 for the appropriate venting requirements. By taking the time to correctly identify all the applicable requirements pertaining to the installation of an appliance, and installer will find it easier to properly plan any work. Following these suggestions will result in a more economical and efficient execution of their installations.

## Section 8: Venting Systems and Air Supply for Appliances

Section 8 of the B149.1 code provides requirements for venting systems and **air supply** for appliances. Careful consideration of these requirements is recommended prior to the specification and installation of appliances, since the methods of venting and air supply required by specific appliances may render them impractical in some situations.

Always consider venting and air supply requirements together because different requirements apply to natural draft and fan-assisted appliances as opposed to, for example, induced draft and direct vent appliances. When natural draft and fan-assisted appliances are being installed, it is necessary to determine the airtightness of the building envelope and consider any large-capacity air exhausting appliances operating in the building or enclosure in which the appliances are located.

Several other factors must also be considered relating to clearances to combustible materials, the suitability of vent and chimney types, and the termination of vents or chimneys. A well-planned and well-integrated venting system and air supply provides an economical installation, which ensures effective venting and proper appliance performance.

## Self-Test A-2.2: Identify Sections of the B149.1 Gas Code

Complete Self-Test A-2.2 and check your answers.

If you are using a printed copy, please find Self-Test A-2.2 and Answer Key at the end of this section. If you prefer, you can scan the QR code with your digital device to go directly to the interactive Self-Test.

*An interactive H5P element has been excluded from this version of the text. You can view it online here: https://a-fuelgas-bcplumbingapprl2.pressbooks.tru.ca/?p=41#h5p-6 (https://a-fuelgas-bcplumbingapprl2.pressbooks.tru.ca/?p=41#h5p-6)*

## References


Canadian Standards Association (or CSA Group). (n.d.). https://www.csagroup.org/ and https://www.csagroup.org/store/

Office of Housing and Construction Standards. (2024, March 8). *BC codes 2024*. Province of British Columbia. https://www2.gov.bc.ca/gov/content/industry/construction-industry/building-codes-standards/bc-codes/2024-bc-codes

Skilled Trades BC. (2021). Book 1: Fuel gas systems, Heating and cooling systems. *Plumber apprenticeship program level 2 book 1 (Harmonized)*. Crown Publications: King's Printer for British Columbia.

Trades Training BC. (2021). A-2: Use gas codes regulations and standards. In: *Plumber Apprenticeship Program: Level 2*. Industry Training Authority, BC.

# Self-Test A-2.1: Identify Gas Codes, Regulations, and Standards

Complete Self-Test A-2.1 and check your answers.

1. What year did the CSA publish the very first edition of the B149.1 Gas Code?
    a. 1942
    b. 1958
    c. 1969
    d. 2010

2. Which B149 code is specific to the storage and handling of propane?
    a. B149.1
    b. B149.2
    c. B149.3
    d. B149.4

3. Who is the independent, self-funded organization that oversees the safe installation and operation of technical systems and equipment (including gas systems) across the British Columbia?
    a. CSA
    b. CBC
    c. TSSA
    d. TSBC

4. At what point must you obtain a gas installation permit?
    a. Before any work begins
    b. After the rough-in is complete
    c. Before the first pressure test
    d. At final completion

5. Gas directives and safety orders are mandatory and enforceable by Technical Safety BC.
    a. True
    b. False

Answer Key: Self-Test A-2.1 is on the next page.

# Answer Key: Self-Test A-2.1

1. a. 1942
2. b. B149.2
3. d. TSBC
4. a. Before any work begins
5. a. True

# Self-Test A-2.2: Identify Sections of the B149.1 Gas Code

Complete Self-Test A-2.2 and check your answers.

1. In reference to the B149.1 gas code, the term “natural gas” is intended to apply to both natural gas (methane) and propane.
    a. True
    b. False

2. In reference to the B149.1 gas code, which term indicates that a requirement is mandatory?
    a. May
    b. Might
    c. Shall
    d. Should

3. In reference to the B149.1 gas code, which section contains information regarding reference publications that are cited in the code?
    a. Section 1
    b. Section 2
    c. Section 3
    d. Section 4

4. Defined terms appear throughout the code as bold-faced, italicized text.
    a. True
    b. False

5. When in doubt regarding a definition in the code, who should be consulted for clarification?
    a. The authority having jurisdiction
    b. An online search engine
    c. Popular opinion
    d. A buddy

6. Unless otherwise approved by the authority having jurisdiction, do the requirements of the B149 codes take precedence over those found in referenced standards or manufacturer’s instructions?
    a. Yes
    b. No

7. In reference to the B149.1 gas code, which section contains information regarding the appliance installer’s

responsibilities?

a. Section 2
b. Section 3
c. Section 4
d. Section 6

8. Gas service piping from the main supply (street main) to the meter is normally whose responsibility?

   a. Any certified gasfitter
   b. Homeowner
   c. Gas utility
   d. Builder

9. The manufacturer's certified installation instructions contain the most accurate installation information for the appliance being installed.

   a. True
   b. False

10. Which code section contains requirements for the installation of gas pressure regulators?

    a. Section 4
    b. Section 5
    c. Section 6
    d. Section 7

Answer Key: Self-Test A-2.2 is on the next page.

# Answer Key: Self-Test A-2.2

1. b. False
2. c. Shall
3. b. Section 2
4. a. True
5. a. The authority having jurisdiction
6. a. Yes
7. c. Section 4
8. c. Gas utility
9. a. True
10. b. Section 5

# 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.

# Version History

This page provides a record of changes made to this learning resource, Plumbing Apprenticeship Level 2, Block A (https://a-fuelgas-bcplumbingapprl2.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.

**Important Notice:** This book contains content used with permission from Skilled Trades BC, Trades Training BC, and various third-party contributors, with all third-party content identified and attributed throughout. To create your own version, you must obtain explicit permission from Skilled Trades BC and the respective third-party content owners.

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).

| Version | Date | Change | Details |
|---|---|---|---|
| 1.0 | September, 2025 | Plumbing Apprenticeship Level 2 Block A learning resource from STBC content converted to open and freely accessible digital platform and published at TRU. | |