

## **CHAPTER 21**

### **Codes, Standards, and Regulations**

#### **Learning Objectives**

Upon completion of this chapter, students will be able to:

1. Navigate the Canadian regulatory framework for gas installations
2. Apply CSA B149.1 Natural Gas and Propane Installation Code requirements
3. Implement CSA B149.2 Propane Storage and Handling Code provisions
4. Understand vehicle propane system requirements under CSA B149.5
5. Integrate National Building Code requirements with gas codes
6. Apply Canadian Electrical Code requirements for gas installations
7. Reference other relevant standards appropriately
8. Complete permit and inspection requirements properly
9. Understand liability and insurance requirements for gas contractors
10. Maintain current knowledge of codes and regulations

#### **21.1 Canadian Regulatory Framework**

Canada's gas safety regulatory system involves multiple levels of government and enforcement authorities.

##### **Overview of Regulatory Structure**

The Canadian regulatory framework operates through federal, provincial, and municipal jurisdictions with specific responsibilities at each level.

##### **Hierarchy of Regulations**

###### **Federal Level:**

- Sets national standards through CSA
- Regulates interprovincial pipelines
- Transportation of Dangerous Goods (TDG)
- National Building Code (model)
- National Energy Board oversight

###### **Provincial Level:**

- Adopts and enforces codes
- Licensing and certification
- Safety authorities (TSSA, etc.)
- Provincial amendments
- Inspection programs

### **Municipal Level:**

- Permit issuance
- Local bylaws
- Additional requirements
- Zoning restrictions
- Business licensing

### **Legal Authority:**

<b>Level</b>	<b>Authority Source</b>
Federal	Constitution Act, various acts
Provincial	Provincial legislation
Municipal	Provincial delegation
Safety Authorities	Provincial designation

### **Federal Regulations**

Federal involvement focuses on standards development and interprovincial matters.

### **Standards Development**

#### **Canadian Standards Association (CSA):**

- Develops national standards
- Technical committees
- Public review process
- Consensus-based
- Regular updates

### **Key Federal Acts:**

<b>Act</b>	<b>Application</b>
Canada Labour Code	Federal workplaces
Transportation of Dangerous Goods Act	Cylinder transport
National Energy Board Act	Interprovincial pipelines
Hazardous Products Act	Equipment approval

### **Federal Standards:**

- CSA B149 series
- CSA B51 (Boilers)
- CSA B52 (Mechanical Refrigeration)
- CSA Z662 (Oil and Gas Pipeline)

- CAN/ULC standards

### **Transport Canada:**

- DOT cylinder specifications
- Transportation requirements
- Driver certification
- Vehicle requirements
- Documentation

### **Natural Resources Canada:**

- Energy efficiency standards
- EnerGuide ratings
- Equipment testing
- Rebate programs
- Research initiatives

### **Provincial Regulations by Province**

Each province has unique regulatory structures and requirements.

### **Ontario**

### **Technical Standards and Safety Authority (TSSA):**

#### **Responsibilities:**

- Code adoption and enforcement
- Licensing and certification
- Inspections
- Incident investigation
- Public safety

#### **Regulations:**

<b>Regulation</b>	<b>Coverage</b>
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O. Reg 212/01 Gaseous Fuels	
O. Reg 215/01 Fuel Oil	
O. Reg 220/01 Boilers and Pressure Vessels	
O. Reg 209/01 Operating Engineers	

#### **Licensing Requirements:**

- G3: Appliances up to 400,000 BTU/hr

- G2: Any size appliance
- G1: All work including industrial
- GP: Propane specific
- OBT: Oil burner technician

## **British Columbia**

### **BC Safety Authority (Technical Safety BC):**

#### **Structure:**

- Independent authority
- Provincial mandate
- Fee-based services
- Industry oversight
- Public safety focus

#### **Gas Safety Regulation:**

- Based on CSA B149.1
- Provincial amendments
- Permit requirements
- Contractor licensing
- Installation standards

#### **Certification Levels:**

<b>Class</b>	<b>Scope</b>
Class B	Residential/commercial
Class A	All gas work
Class B Fitter	Under supervision
Class A Fitter	Installation/maintenance

## **Alberta**

### **Alberta Municipal Affairs:**

#### **Safety Codes Act:**

- Comprehensive safety legislation
- Permits and inspections
- Certification requirements
- Discipline process
- Appeals mechanism

**ABSA (Pressure Equipment):**

- Boiler and pressure vessel
- Power engineers
- Pressure welders
- Quality programs
- Design registration

**Certification:**

- Gasfitter Level 1 (Apprentice)
- Gasfitter Level 2 (Journeyman)
- Sheet Metal Worker
- Refrigeration Mechanic

**Quebec****Régie du bâtiment du Québec (RBQ):****Unique Aspects:**

- French language requirements
- Quebec Construction Code
- Different trade structure
- Licence requirements
- Competency cards

**Gas Licensing:****License Work Authorized**

TAG-1 Residential gas

TAG-2 Commercial gas

TAG-3 Industrial gas

15.4 Gas contractor

**Other Requirements:**

- CCQ membership
- French proficiency
- Quebec-specific training
- Insurance requirements
- Business registration

**Atlantic Provinces**

**Nova Scotia:**

- Labour and Advanced Education
- Gas Fitter Class 1, 2, 3
- Mandatory certification
- Red Seal recognition

**New Brunswick:**

- Public Safety Division
- Plumbing Installation and Inspection Act
- Combined plumbing/gas
- Certification levels

**Prince Edward Island:**

- Office of the Fire Marshal
- Limited gas work
- Propane focus
- Small market

**Newfoundland and Labrador:**

- Service NL
- Government Services
- Similar to Nova Scotia
- Remote challenges

**Prairie Provinces****Manitoba:**

- Office of the Fire Commissioner
- Manitoba Hydro involvement
- Certification requirements
- Inspection programs

**Saskatchewan:**

- TSASK (Technical Safety Authority)
- Gas Licensing Act
- Similar to Alberta
- Agricultural exemptions

**Territories**

**Common Characteristics:**

- Smaller markets
- Limited authorities
- Federal involvement
- Unique challenges
- Adapted requirements

**Regulatory Adaptations:**

- Remote locations
- Extreme weather
- Limited resources
- Cultural considerations
- Federal partnerships

**Municipal Bylaws**

Municipalities add local requirements beyond provincial regulations.

**Typical Municipal Requirements****Permit Requirements:**

- Building permits
- Gas permits
- Plumbing permits
- Electrical permits
- Business licenses

**Additional Restrictions:**

Area	Common Restrictions
Zoning	Equipment locations
Noise	Operating hours
Aesthetics	Screening requirements
Heritage	Special districts
Environmental	Emission limits

**Fees and Charges:**

- Permit fees
- Inspection fees
- Re-inspection charges
- Plan review fees

- Development charges

## **Local Variations**

### **Major Cities:**

#### **Toronto:**

- Additional inspections
- Certified installer program
- High-rise requirements
- District heating rules

#### **Vancouver:**

- Seismic requirements
- Energy efficiency
- Green building standards
- Rainwater protection

#### **Calgary:**

- Separate gas permits
- Quality Management Plan
- Safety Codes Officers
- Electronic permitting

#### **Montreal:**

- French documentation
- RBQ coordination
- Borough variations
- Historic preservation

## **Enforcement Authorities**

Various authorities enforce gas safety regulations.

## **TSSA and Provincial Equivalents**

### **Technical Standards and Safety Authority (Ontario):**

#### **Structure:**

- Not-for-profit corporation
- Delegated authority



- Self-funded
- Industry boards
- Public accountability

### **Programs:**

<b>Program</b>	<b>Coverage</b>
Fuels Safety	Natural gas, propane, fuel oil
Boilers/Pressure Vessels	BPV equipment
Operating Engineers	Power engineers
Elevating Devices	Elevators, escalators
Amusement Devices	Rides, inflatables

### **Enforcement Tools:**

- Licensing suspension/revocation
- Orders and directives
- Prosecution
- Administrative penalties
- Public notification

### **Provincial Safety Authorities**

### **Technical Safety BC:**

#### **Services:**

- Permits and licensing
- Inspections
- Incident investigations
- Education programs
- Standards development

#### **Enforcement:**

- Compliance orders
- Monetary penalties
- License actions
- Prosecution
- Equipment orders

### **TSASK (Saskatchewan):**

#### **Unique Features:**

- Crown corporation
- Industry governance
- Quality programs
- Risk-based inspection
- Technology adoption

## **AER (Alberta Energy Regulator):**

### **Scope:**

- Oil and gas facilities
- Pipeline safety
- Well sites
- Processing plants
- Environmental protection

### **Inspection Programs**

#### **Risk-Based Inspection:**

#### **Categories:**

#### **Risk Level Inspection Frequency**

High	Annual or more
Medium	Every 2-3 years
Low	Every 3-5 years
Periodic	Random selection

#### **Inspection Types:**

- Initial installation
- Periodic safety
- Incident follow-up
- Complaint-based
- Audit inspections

#### **Inspector Powers:**

- Enter premises
- Examine equipment
- Request documentation
- Issue orders
- Stop work
- Seize evidence

## **Compliance and Enforcement**

### **Progressive Enforcement:**

1. Education and warning
2. Compliance order
3. Administrative penalty
4. License action
5. Prosecution
6. Public notification

### **Penalties:**

<b>Violation</b>	<b>Typical Penalty</b>
No permit	\$200-1,000
Unlicensed work	\$500-5,000
Safety violation	\$1,000-10,000
Repeat offense	Double penalties
Corporate	Up to \$500,000

### **Due Process:**

- Notice of violation
- Opportunity to respond
- Appeal rights
- Hearing process
- Review procedures
- Court appeals

## **21.2 CSA B149.1 - Natural Gas and Propane Installation Code**

The primary code governing gas installations in Canada.

### **Scope and Application**

Understanding where and how the code applies.

### **Code Coverage**

#### **Included:**

- Natural gas installations
- Propane installations
- Piping systems
- Appliances

- Venting systems
- Controls and safety devices

### **Excluded:**

- Pipelines (CSA Z662)
- Portable camping equipment
- Manufacturing processes
- Refineries
- Marine installations
- Aircraft systems

### **Application:**

#### **System Component Code Section**

Piping	Section 5
Appliances	Section 7
Venting	Section 8
Air supply	Section 9
Exhaust	Section 10

### **Adoption Process**

#### **Provincial Adoption:**

- Review by authorities
- Stakeholder consultation
- Provincial amendments
- Regulatory approval
- Implementation date
- Transition period

#### **Amendments:**

- Local conditions
- Provincial laws
- Unique hazards
- Industry practices
- Safety improvements

### **Key Definitions**

Critical terms for code interpretation.

### **Essential Definitions**

**Appliance:**

"A device to convert gas to energy and includes all components, controls, wiring, and piping required as part of the device."

**Authority Having Jurisdiction (AHJ):**

"The governmental body responsible for the enforcement of any part of this Code or the official or agency designated by that body."

**Categories of Appliances:**

Category	Description
I	Non-condensing, negative draft
II	Non-condensing, non-positive
III	Non-condensing, positive pressure
IV	Condensing, positive pressure

**Approved:**

"Approved by the authority having jurisdiction."

**BTU (British Thermal Unit):**

"The amount of heat required to raise the temperature of 1 pound of water 1°F."

**Important Terms****Combustion Air:**

"Air required for complete combustion of gas."

**Dilution Air:**

"Air that enters a draft hood or draft regulator and mixes with flue gases."

**Excess Air:**

"Air supplied beyond that required for complete combustion."

**Readily Accessible:**

"Having access without requiring the removal of any panel, door, or similar obstruction and without the use of portable ladders, chairs, etc."

## **Safety Shut-Off Valve:**

"A valve that automatically shuts off the gas supply to the main burner and pilot burner, if applicable."

## **General Requirements**

Overarching principles governing all installations.

## **Fundamental Requirements**

### **Workmanship:**

- Industry-accepted practices
- Manufacturer instructions
- Neat and professional
- Proper materials
- Correct tools

### **Materials and Equipment:**

- Approved/certified products
- Suitable for application
- New or reconditioned
- Properly rated
- Compatible materials

### **Protection:**

<b>Requirement</b>	<b>Application</b>
Mechanical	Physical damage prevention
Corrosion	Suitable materials/coatings
Electrical	Bonding and grounding
Environmental	Weather protection

### **Clearances:**

- Manufacturer specifications
- Code minimums
- Heat protection
- Service access
- Combustion air

## **Installation Requirements by Section**

Detailed requirements for system components.

## **Section 5: Piping and Tubing**

### **Material Requirements:**

#### **Acceptable Materials:**

<b>Material</b>	<b>Application</b>
Steel pipe	All locations
Copper tube	Specific conditions
CSST	With restrictions
PE pipe	Underground only
Stainless steel	Special applications

### **Sizing Requirements:**

- Use code tables
- Longest run method
- Pressure drop limits
- Specific gravity correction
- Future load consideration

### **Installation:**

- Proper support spacing
- Protection from damage
- Corrosion prevention
- Electrical isolation
- Expansion provisions

## **Section 6: Meters and Service Regulators**

### **Meter Installation:**

- Accessible location
- Support requirements
- Clearances
- Protection
- Venting

### **Regulator Requirements:**

- Proper sizing
- Vent termination

- Relief protection
- Access
- Identification

## **Section 7: Appliance Installation**

### **General Installation:**

1. Manufacturer instructions
2. Clearances to combustibles
3. Level and secure
4. Proper connections
5. Controls accessible
6. Safety devices functional

### **Specific Requirements:**

<b>Appliance Type</b>	<b>Key Requirements</b>
Furnaces	Return air, filters, access
Water heaters	T&P valve, drain, access
Boilers	ASME rated, relief valve
Ranges	Anti-tip, ventilation
Dryers	Exhaust, make-up air

## **Section 8: Venting**

### **Venting Principles:**

- Natural draft
- Mechanical draft
- Direct vent
- Condensing systems
- Power venting

### **Venting Tables:**

- Table 8.2: Type B Gas Vent
- Table 8.3: Masonry Chimney
- Table 8.4: Single Wall
- Table 8.5: Connectors
- Table 8.6: Exterior Masonry

### **Common Requirements:**

- Minimum height



- Maximum length
- Clearances
- Termination
- Support

## **Testing and Purging Requirements**

Ensuring system integrity and safety.

### **Pressure Testing**

#### **Test Requirements:**

<b>System Pressure</b>	<b>Test Pressure</b>	<b>Duration</b>
≤0.5 psig	1.5× operating (min 3 psig)	10 min
>0.5 psig	1.5× operating (min 10 psig)	10 min
>125 psig	1.25× operating	24 hours

#### **Test Procedure:**

1. Isolate equipment
2. Install test gauge
3. Pressurize system
4. Monitor pressure
5. Check all joints
6. Document results

#### **Acceptable Test Media:**

- Air
- Nitrogen
- Carbon dioxide
- Inert gas
- NEVER oxygen

### **Purging Requirements**

#### **Purging Procedures:**

#### **Into Service:**

1. Verify test complete
2. Connect at meter
3. Purge air from system
4. Light pilots

5. Check operation
6. Leak check

**Out of Service:**

1. Close gas supply
2. Disconnect at meter
3. Purge gas out
4. Cap all openings
5. Tag system

**Safety Requirements:**

- Outdoor discharge
- No ignition sources
- Controlled release
- Proper ventilation
- Monitoring

**Using Code Tables**

Proper use of sizing and venting tables.

**Pipe Sizing Tables****Table 5.1 - Natural Gas:****How to Use:**

1. Determine total load
2. Measure longest run
3. Find pressure drop
4. Select pipe size
5. Verify velocity

**Corrections:**

- Specific gravity
- Temperature
- Altitude
- Fittings

Example:

- Load: 200,000 BTU/hr = 200 CFH
- Length: 100 feet

- Pressure: 7" W.C.
- Size from table: 1" pipe

## **Venting Tables**

### **Table 8.2 Application:**

1. Identify appliance category
2. Find BTU input
3. Determine vent height
4. Check lateral length
5. Select vent size

### **Multiple Appliances:**

- Common venting rules
- Combined capacity
- Connector sizing
- Maximum/minimum
- Special cases

## **Updates and Amendments**

Keeping current with code changes.

### **Update Cycle**

#### **CSA Process:**

- 5-year review cycle
- Technical committee
- Public review
- Comment resolution
- Publication

### **Major Updates:**

<b>Edition</b>	<b>Key Changes</b>
2015	CSST bonding, venting updates
2018	Condensing appliances, controls
2020	Electronic submissions, new materials
2025	Hydrogen provisions, efficiency

### **Provincial Amendments**

**Common Amendments:**

- Seismic requirements (BC)
- French language (QC)
- Local materials
- Regional practices
- Climate adaptations

**Tracking Changes:**

- Code committee bulletins
- Provincial updates
- Industry notices
- Training programs
- Online resources

**Interpretations:**

- Request process
- Official interpretations
- Precedent value
- Documentation
- Appeals

**21.3 CSA B149.2 - Propane Storage and Handling Code**

Specific requirements for propane systems.

**Scope and Application**

Coverage of propane-specific requirements.

**Code Coverage****Included Systems:**

- Storage containers
- Piping systems
- Vaporizers
- Dispensing
- Vehicle fuel systems
- Cylinder filling

**Excluded Systems:**

- Highway vehicles (B149.5)

- Refineries
- Chemical plants
- Pipeline systems
- Marine vessels

### **Relationship to B149.1:**

- B149.2 for storage/handling
- B149.1 for installation
- Both may apply
- Specific overrides general
- Coordination required

### **Container Requirements**

Specifications for propane storage vessels.

### **Container Types**

#### **DOT/TC Cylinders:**

<b>Size</b>	<b>Specification</b>
≤45 kg	TC-4BA, 4BM, 4BW
>45 kg	TC-4BA240, 4BAM
Automotive	TC-5P, 5PX
Forklift	TC-4BA, 4BM

#### **ASME Tanks:**

- Design pressure: 250 psig
- Safety factor: 4:1
- Material: Carbon steel
- Code stamp required
- Data plate mandatory

### **Container Markings**

#### **Required Information:**

- Manufacturer name
- Serial number
- Water capacity
- Service pressure
- Manufacture date
- Tare weight

- Certification marks

### **Inspection Requirements:**

#### **Container Type Requalification**

TC cylinders	5 or 10 years
ASME tanks	Not required
Vehicle tanks	Per jurisdiction
Dispensers	Annual

### **Installation Requirements**

Proper installation of propane systems.

### **Above-Ground Tanks**

#### **Foundation Requirements:**

- Level and stable
- Non-combustible
- Adequate bearing
- Drainage provided
- Anchoring if required

#### **Support Types:**

<b>Tank Size</b>	<b>Support Method</b>
<500 USWG	Concrete blocks
500-2000 USWG	Concrete saddles
>2000 USWG	Engineered foundation

#### **Protection:**

- Vehicle impact
- Corrosion protection
- Security
- Weather protection
- Identification

### **Underground Tanks**

#### **Installation Requirements:**

1. Excavation depth

2. Bedding material
3. Coating inspection
4. Anchoring
5. Backfill procedures
6. Cathodic protection

### **Special Requirements:**

- Corrosion protection mandatory
- Regular testing
- Access provisions
- Ventilation
- Leak detection

### **Setback Distances**

Critical safety distances for propane containers.

### **Distance Requirements**

#### **From Buildings:**

<b>Container Size</b>	<b>Distance to Building</b>
<125 USWG	10 feet
125-250 USWG	10 feet
251-500 USWG	10 feet
501-2000 USWG	25 feet
2001-30,000 USWG	50 feet

#### **From Property Lines:**

- Minimum 10 feet
- Increases with size
- Local variations
- Measured from container
- Consider relief valve

### **Reductions Allowed:**

<b>Method</b>	<b>Reduction</b>
Fire wall	50%
Underground	Eliminates
Special design Engineering	

### **From Ignition Sources:**

- Air intakes: 10 feet
- Appliances: 10 feet
- Electrical: 10 feet
- Open flames: 10 feet
- Smoking areas: 25 feet

### **Multiple Containers:**

- Between containers: 3 feet minimum
- Grouped installations
- Manifolding allowed
- Common protection
- Access requirements

### **Marking and Identification**

Proper identification ensures safety.

#### **Container Marking**

##### **Required Markings:**

- "PROPANE"
- "FLAMMABLE"
- "NO SMOKING"
- Owner identification
- Emergency contact

##### **Sign Specifications:**

###### **Location    Sign Size**

Single tank 12" × 12"

Tank farm 24" × 24"

Dispensing 18" × 24"

##### **Colors:**

- Background: White
- Letters: Red
- Borders: Red
- Reflective preferred

#### **Piping Identification**



**Color Coding:**

- Yellow: Gas piping
- Red: Emergency shutoff
- Green: Venting
- Labels every 20 feet

**Valve Marking:**

- Function labels
- Direction arrows
- Normal position
- Emergency instructions
- Lock provisions

**Filling Procedures**

Safe procedures for container filling.

**Cylinder Filling****Pre-Fill Inspection:**

1. Check qualification date
2. Visual inspection
3. Valve condition
4. Tare weight verification
5. Previous content

**Filling Process:**

1. Weigh cylinder
2. Calculate fill limit
3. Connect properly
4. Fill slowly
5. Monitor weight
6. Stop at 80%

**Maximum Fill:****Temperature Maximum % by Volume**

-40°F	85%
0°F	82%
40°F	80%
70°F	76%

**Temperature Maximum % by Volume**

100°F            72%

**Tank Filling****Delivery Procedures:**

1. Check tank data
2. Verify percentage
3. Connect ground
4. Connect hose
5. Open valves slowly
6. Monitor gauge
7. Stop at limit

**Safety Requirements:**

- Truck positioned properly
- Wheels chocked
- Engine off (if required)
- No ignition sources
- Attendant present
- Emergency equipment

**Documentation:**

- Delivery ticket
- Amount delivered
- Beginning/ending percentage
- Safety checks
- Customer signature

**21.4 CSA B149.5 - Installation Code for Propane Fuel Systems and Tanks on Highway Vehicles**

Requirements for vehicle-mounted propane systems.

**Vehicle Installations**

Specific requirements for propane in vehicles.

**System Components****Required Components:**

<b>Component</b>	<b>Function</b>
Container	Fuel storage
Valves	Flow control
Regulators	Pressure reduction
Fuel lock	Safety shutoff
Piping	Fuel delivery
Carburetor/Injectors	Fuel metering

### **Container Requirements:**

- TC-5P specification
- Properly mounted
- Protected location
- Pressure relief
- Shut-off valve
- Gauge optional

### **Installation Requirements**

#### **Mounting:**

- Brackets rated 8g
- No drilling container
- Protected from damage
- Accessible valves
- Proper orientation

#### **Piping:**

- Steel tubing
- Proper support
- Protected routing
- Flexible connections
- No cabin penetration

### **Mobile Applications**

Special considerations for mobile equipment.

### **RV Systems**

#### **Requirements:**

- ASME or DOT containers
- Exterior mounting

- Proper ventilation
- Leak detection
- Separate regulators

### **Appliance Installation:**

#### **Appliance    Special Requirements**

Furnace        Sealed combustion

Water heater Exterior access

Refrigerator Dual fuel capability

Range         Shut-off accessible

### **Food Trucks**

#### **Commercial Requirements:**

- Commercial equipment
- Ventilation systems
- Fire suppression
- Emergency shutoffs
- Regular inspections

#### **Safety Systems:**

- Gas detection
- Automatic shutoffs
- Ventilation interlocks
- Emergency stops
- Signage

### **Forklift Systems**

#### **Installation:**

- Quick-connect cylinders
- Liquid withdrawal
- Vaporizer/regulator
- Fuel lock-off
- Pressure relief

#### **Cylinder Handling:**

- Storage requirements
- Exchange procedures
- Inspection requirements

- Training mandatory
- Documentation

## **Safety Requirements**

Critical safety provisions for vehicle systems.

## **Crash Protection**

### **Design Requirements:**

- 8g acceleration
- 4g lateral
- 2g vertical
- No leakage
- Maintained integrity

### **Protection Methods:**

- Structural cages
- Energy absorption
- Secure mounting
- Impact shields
- Break-away fittings

## **Ventilation Requirements**

### **Natural Ventilation:**

- Two openings minimum
- High and low
- 1 sq in per 1000 BTU
- Direct to exterior
- No restrictions

### **Mechanical Ventilation:**

- Continuous operation
- Fail-safe design
- Interlocked systems
- Alarm provisions
- Regular testing

## **Emergency Provisions**

### **Required Features:**

- Emergency shut-off
- Accessible location
- Clear marking
- Remote capability
- System isolation

### **Signage:**

- "PROPANE" visible
- Emergency instructions
- Shut-off locations
- No smoking
- Contact information

## **21.5 National Building Code of Canada**

Integration of building code requirements with gas installations.

### **Relationship to Gas Codes**

How building and gas codes interact.

### **Hierarchy and Precedence**

#### **Code Application:**

<b>Aspect</b>	<b>Governing Code</b>
Gas piping	B149.1
Venting design	Both
Combustion air	Building Code
Structural	Building Code
Clearances	Most restrictive

#### **Coordination Required:**

- Plan review
- Permit coordination
- Inspection scheduling
- Conflict resolution
- Professional consultation

### **Referenced Standards**

#### **NBC References:**

- CSA B149.1
- CSA B149.2
- CSA B365 (Solid Fuel)
- NFPA standards
- ULC standards

#### **Application:**

- Mandatory where referenced
- Version specified
- Amendments included
- Updates tracked
- Training required

#### **Combustion Air Requirements**

Building code provisions for combustion air.

#### **Natural Air Supply**

##### **Requirements:**

- Infiltration assessment
- Building tightness
- Exhaust systems
- Pressure effects
- Adequate supply

##### **Calculations:**

##### **Building Type Air Changes/Hour**

Old/leaky	0.5-1.0
Average	0.3-0.5
Tight	0.1-0.3
Very tight	<0.1

#### **Mechanical Air Supply**

##### **Design Requirements:**

1. Sized for all appliances
2. Interlocked operation
3. Proven before ignition
4. Failure protection
5. Maintenance access

## **Methods:**

- Direct supply
- Indirect supply
- Engineered systems
- Combination systems
- Make-up air units

## **Opening Sizes**

### **Natural Ventilation:**

#### **Interior Spaces:**

- 1 sq in per 1,000 BTU/hr
- Two openings
- 12" vertical separation
- Within 12" of ceiling/floor

#### **Exterior Openings:**

- 1 sq in per 4,000 BTU/hr
- Two openings preferred
- Protection required
- Screening allowed
- Clear of obstructions

#### **Ducted Systems:**

- Same as openings
- Smooth interior
- Minimal turns
- Proper termination
- Backdraft prevention

## **Venting Requirements**

Building code venting provisions.

## **General Principles**

### **Venting Categories:**

	<b>Category</b>	<b>Pressure</b>	<b>Temperature</b>	<b>Material</b>
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I		Negative	High	B-vent
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II		Negative	High	B-vent
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Category	Pressure	Temperature	Material
III	Positive	High	Stainless
IV	Positive	Low	Plastic

### Design Requirements:

- Proper sizing
- Materials suitable
- Clearances maintained
- Support provided
- Access included

### Chimney Requirements

#### Masonry Chimneys:

- Lined required
- Size appropriate
- Height adequate
- Cleanout provided
- Cap installed

#### Factory-Built:

- Listed system
- Proper class
- Installation per manufacturer
- Clearances maintained
- Support adequate

### Termination Requirements

#### Minimum Heights:

Roof Type	Height Above
Flat	2 feet
Sloped	2 feet at ridge
Within 10 ft horizontal	2 feet higher

#### Clearances from Openings:

- Windows: 4 feet
- Doors: 4 feet
- Gravity air: 4 feet
- Mechanical air: 10 feet

- Property line: 3 feet

## **Clearances to Combustibles**

Building code requirements for heat-producing equipment.

### **Standard Clearances**

#### **Default Requirements:**

<b>Component</b>	<b>Clearance</b>
Furnace plenum	1 inch
Supply duct (first 3 ft)	1 inch
Single wall vent	18 inches
B-vent	1 inch
Equipment sides	6 inches

#### **Reduction Methods:**

##### **Acceptable Methods:**

<b>Protection</b>	<b>Reduction Factor</b>
Sheet metal with air gap	67%
Ceramic board	50%
Metal with insulation	33%
Wire mesh and air	50%

#### **Zero Clearance:**

- Listed equipment only
- Manufacturer specifications
- Proper installation
- No modifications
- Regular inspection

## **Floor Protection**

#### **Requirements:**

- Non-combustible
- Extends beyond equipment
- Thermal resistance
- Structural support
- Permanent installation

## **Specifications:**

### **Equipment    Extension Required**

Solid fuel     18" front, 8" sides

Gas fireplace Per manufacturer

Water heater Not required typical

## **21.6 Canadian Electrical Code (CEC)**

Electrical requirements for gas installations.

## **Electrical Requirements for Gas Appliances**

Integration of electrical and gas systems.

## **Basic Requirements**

## **Power Supply:**

### **Voltage    Application**

120V     Most residential

240V     Large equipment

24V       Control circuits

Millivolt Thermocouples

## **Circuit Requirements:**

- Dedicated circuits recommended
- Proper ampacity
- GFCI where required
- Disconnect means
- Emergency stops

## **Wiring Methods**

## **Acceptable Methods:**

- NMD cable (Romex)
- AC cable (BX)
- Conduit systems
- TECK cable
- Approved connectors

## **Control Wiring:**

- Class 2 circuits
- Thermostat cable
- Proper support
- Separation from power
- Protection required

## **Grounding and Bonding**

Critical for safety and equipment protection.

### **Equipment Grounding**

#### **Requirements:**

- All equipment grounded
- Continuous path
- Proper size conductor
- Approved methods
- Testing required

#### **Grounding Methods:**

<b>Method</b>	<b>Application</b>
Equipment bond	Standard
Ground wire	Required
Metallic conduit	Acceptable
Ground rod	Supplementary

### **Gas Piping Bonding**

#### **When Required:**

- Always for CSST
- Metal piping systems
- Lightning protection
- Electrical contact
- Code requirement

#### **Bonding Methods:**

1. Bonding jumper
2. #6 AWG minimum
3. Accessible location
4. Listed clamps
5. To electrical ground

## **CSST Bonding Requirements**

Special requirements for corrugated stainless steel tubing.

### **Mandatory Bonding**

#### **Requirements:**

- Direct bonding required
- #6 AWG copper minimum
- Single point
- Accessible location
- Black CSST included

#### **Installation:**

1. Locate near entry
2. Install approved clamp
3. Route conductor
4. Connect to panel ground
5. Verify continuity

#### **Documentation:**

- Location of bond
- Conductor size
- Test results
- Date installed
- Installer information

### **Lightning Protection**

#### **Additional Requirements:**

- Part of lightning system
- Engineered design
- Multiple points possible
- Surge protection
- Regular testing

#### **Inspection:**

- Visual inspection
- Continuity test
- Resistance measurement
- Documentation

- Annual recommended

## **Wiring Methods**

Proper wiring ensures safety and reliability.

### **Permanent Wiring**

#### **Installation Requirements:**

- Approved materials
- Proper support
- Protection from damage
- Correct terminations
- Accessible boxes

#### **Junction Boxes:**

- Accessible location
- Proper size
- Secured mounting
- Covered
- Identified circuits

### **Flexible Connections**

#### **When Permitted:**

- Vibration isolation
- Minor movement
- Listed connectors
- Length restrictions
- Proper support

#### **Types:**

<b>Type</b>	<b>Application</b>
Flexible conduit	General use
Liquidtight	Wet locations
Appliance cord	Specific appliances
MC cable	Commercial

### **Control Circuits**

#### **Class 2 Circuits:**

- 24V typical
- Limited power
- Separate from power
- Different cable OK
- Less stringent rules

#### **Installation:**

- Proper cable type
- Support required
- Protection needed
- Separation maintained
- Polarity observed

### **21.7 Other Relevant Standards**

Additional standards affecting gas installations.

#### **NFPA Standards (Reference)**

National Fire Protection Association standards referenced in Canada.

#### **Commonly Referenced**

##### **NFPA 54:**

- National Fuel Gas Code (US)
- Similar to B149.1
- Reference for interpretations
- Training resource
- Not directly applicable

##### **NFPA 58:**

- Liquefied Petroleum Gas Code
- Similar to B149.2
- Storage and handling
- Reference material
- US applications

##### **NFPA 31:**

- Oil burning equipment
- Dual fuel systems
- Tank requirements
- Reference standard

- Coordination needed

## **NFPA Applications**

### **When Used:**

- International projects
- US equipment
- Reference material
- Training resources
- Best practices

### **Limitations:**

- Not law in Canada
- Different measurements
- Different terminology
- Requires interpretation
- Provincial precedence

## **ANSI Standards**

American National Standards Institute standards.

## **Equipment Standards**

### **ANSI Z21 Series:**

<b>Standard</b>	<b>Coverage</b>
Z21.1	Ranges
Z21.10.1	Water heaters
Z21.10.3	Volume water heaters
Z21.13	Low-pressure boilers
Z21.47	Central furnaces

### **Application:**

- Equipment certification
- Performance standards
- Test methods
- Safety requirements
- Efficiency ratings

### **ANSI Z223.1:**



- National Fuel Gas Code
- Companion to NFPA 54
- US installation standard
- Reference only
- Not Canadian law

## **UL/ULC Standards**

Underwriters Laboratories standards for equipment safety.

## **ULC Standards (Canadian)**

### **Common Standards:**

<b>Standard</b>	<b>Application</b>
CAN/ULC-S635	Steel underground tanks
CAN/ULC-S636	CSST
CAN/ULC-S639	Mobile homes
CAN/ULC-S668	Liners

### **Certification Marks:**

- ULC mark
- cUL mark
- Intertek (cETL)
- CSA mark
- Dual listings

## **UL Standards (US)**

### **Equipment Standards:**

- UL 795 (Furnaces)
- UL 730 (Oil burners)
- UL 2034 (CO alarms)
- Reference only
- Certification basis

### **Testing Requirements:**

- Performance tests
- Safety tests
- Efficiency verification
- Quality control
- Ongoing verification

## **Manufacturer Standards**

Equipment-specific requirements.

## **Installation Instructions**

### **Legal Status:**

- Part of approval
- Must be followed
- Override code minimums
- Specific requirements
- Warranty conditions

### **Content Requirements:**

- Clear instructions
- Diagrams/illustrations
- Specifications
- Warnings
- Maintenance requirements

## **Technical Bulletins**

### **Types:**

- Product updates
- Safety notices
- Installation changes
- Recall notices
- Technical tips

### **Application:**

- Retroactive sometimes
- Training updates
- File documentation
- Customer notification
- Compliance required

## **Warranty Requirements**

### **Typical Conditions:**

- Professional installation
- Regular maintenance

- Genuine parts
- Authorized service
- Documentation

#### **Documentation:**

- Installation certificate
- Start-up report
- Maintenance records
- Service invoices
- Part receipts

### **21.8 Permit and Inspection Requirements**

Regulatory compliance through proper permitting.

#### **When Permits are Required**

Understanding permit triggers.

#### **Always Required**

#### **New Installations:**

- New appliances
- New piping systems
- New venting
- Service connections
- System extensions

#### **Replacements:**

- Furnace replacement
- Water heater replacement
- Boiler replacement
- Major components
- System upgrades

#### **Alterations:**

<b>Type</b>	<b>Permit Required</b>
Piping changes	Yes
Venting modifications	Yes
Appliance relocation	Yes
BTU increase	Yes

<b>Type</b>	<b>Permit Required</b>
Fuel conversion	Yes

## **Sometimes Required**

### **Repairs:**

- Like-for-like often exempt
- Component replacement varies
- Emergency repairs retroactive
- Maintenance exempt
- Check locally

### **Maintenance:**

- Generally exempt
- Cleaning exempt
- Adjustments exempt
- Filter changes exempt
- Annual service exempt

### **Never Required:**

- Portable equipment
- Temporary heating
- Emergency shut-off
- Leak repairs (emergency)
- Investigations

## **Application Process**

Steps for obtaining permits.

## **Application Requirements**

### **Information Needed:**

1. Owner information
2. Location address
3. Contractor details
4. Equipment specifications
5. Gas load calculations
6. Plot plan sometimes

### **Documentation:**

<b>Document</b>	<b>When Required</b>
Plot plan	Tanks, new service
Specifications	Commercial
Engineer drawings	Complex systems
Load calculations	Always
Manufacturer data	New equipment

## **Application Methods**

### **Paper Applications:**

- Traditional method
- Original signatures
- Physical submission
- Manual processing
- Longer timelines

### **Electronic Applications:**

- Online portals
- Digital documents
- Electronic payment
- Faster processing
- Status tracking

### **Fees:**

<b>Work Type</b>	<b>Typical Fee Range</b>
Residential furnace	\$75-150
Water heater	\$50-100
Commercial system	\$200-1000
Plan review	\$100-500
Re-inspection	\$50-100

### **Timeline:**

- Same day: Emergency
- 1-2 days: Residential
- 3-5 days: Commercial
- 1-2 weeks: Complex
- Varies by jurisdiction

## **Inspection Procedures**

Understanding the inspection process.

## **Scheduling Inspections**

### **Notice Requirements:**

- 24-48 hours typical
- Morning of sometimes
- Specific time windows
- Access requirements
- Contact information

### **Types of Inspections:**

Type	Purpose
Rough-in	Piping before cover
Final	Complete installation
Partial	Phases of work
Re-inspection	Failed items

### **Preparation:**

1. Work complete
2. Area accessible
3. Power available
4. Gas available
5. Documentation ready

## **Rough-in Inspections**

Initial system verification.

## **Scope of Inspection**

### **Piping System:**

- Materials approved
- Sizing correct
- Support adequate
- Protection installed
- Valves accessible

### **Pressure Test:**

- Witnessed test

- Proper pressure
- Duration met
- No leaks
- Gauge calibrated

#### **Pre-Cover Items:**

- Sleeving installed
- Fire stops
- Clearances verified
- Bonding complete
- Venting rough-in

#### **Documentation Required:**

- Permit posted
- Test results
- Product approvals
- Plans if required
- Changes noted

#### **Common Deficiencies:**

<b>Issue</b>	<b>Frequency</b>
Inadequate support	20%
Wrong materials	10%
Sizing errors	15%
No test	5%
Missing sleeving	25%

#### **Final Inspections**

Complete system verification.

#### **Inspection Scope**

#### **Complete Review:**

1. Equipment installation
2. Venting complete
3. Gas connections
4. Electrical connections
5. Safety controls
6. Operation test

### **Operational Tests:**

- Normal operation
- Safety shutdowns
- Combustion test
- Draft verification
- Control function

### **Documentation Review:**

- Manufacturer instructions
- Start-up sheets
- Test results
- Warranty registration
- User instructions

### **Final Approval:**

- Green tag/sticker
- Certificate issued
- File closed
- Occupancy permitted
- Insurance notified

### **Dealing with Failed Inspections**

Managing inspection failures professionally.

### **Common Failures**

#### **Top Reasons:**

<b>Reason</b>	<b>Percentage</b>
Venting issues	25%
Clearance violations	20%
Missing/wrong materials	15%
Documentation lacking	10%
Safety deficiencies	15%
Other	15%

### **Response Process:**

1. Understand deficiencies
2. Clarify if needed
3. Document requirements



4. Schedule corrections
5. Complete repairs
6. Request re-inspection

**Documentation:**

- Deficiency list
- Correction actions
- Parts/materials used
- Time spent
- Additional costs
- Communication record

**Appeals Process****When to Appeal:**

- Code interpretation disputes
- Unreasonable requirements
- Alternative methods
- Equivalencies
- Errors

**Process:**

1. Informal discussion
2. Supervisor review
3. Formal appeal
4. Hearing scheduled
5. Decision rendered
6. Further appeals possible

**Best Practices:**

- Stay professional
- Document everything
- Know code well
- Have references ready
- Consider alternatives
- Maintain relationships

**Record Retention**

Maintaining proper documentation.

**Required Records**

### **Permanent Records:**

- Permits
- Inspection reports
- Incident reports
- Major repairs
- System drawings

### **Time-Limited Records:**

<b>Record Type</b>	<b>Retention Period</b>
Service records	7 years
Invoices	7 years
Test results	5 years
Training	Current + 5
Warranties	Duration + 1

### **Storage Methods:**

- Physical files
- Digital scans
- Cloud storage
- Redundant backups
- Organized system

### **Access Requirements:**

- Quick retrieval
- Organized filing
- Search capability
- Security maintained
- Privacy protected

## **21.9 Liability and Insurance**

Protecting businesses and technicians from liability.

### **Professional Liability**

Understanding legal responsibilities.

### **Duty of Care**

### **Legal Obligations:**

- Reasonable skill
- Industry standards
- Code compliance
- Manufacturer instructions
- Safety priorities

### **Standard of Care:**

- Reasonable technician standard
- Current knowledge
- Proper tools
- Appropriate methods
- Documentation

### **Liability Sources:**

<b>Source</b>	<b>Example</b>
Negligence	Improper installation
Code violations	Non-compliance
Warranty	Defective work
Contract	Breach of terms
Tort	Property damage

### **Risk Management**

#### **Mitigation Strategies:**

1. Proper training
2. Current certification
3. Code compliance
4. Documentation
5. Insurance coverage
6. Quality control

#### **Documentation Protection:**

- Detailed records
- Photos
- Test results
- Customer signatures
- Recommendations
- Follow-up

#### **Limitation Methods:**

- Clear contracts
- Warranty terms
- Exclusions stated
- Insurance requirements
- Indemnification clauses

## **Gas Contractor Licensing**

Business licensing requirements.

## **Contractor License Types**

### **Classifications:**

<b>Type</b>	<b>Scope of Work</b>
G1 Contractor	All gas work
G2 Contractor	Residential/commercial
G3 Contractor	Limited scope
Master License	Business operation

### **Requirements:**

- Technical qualification
- Business registration
- Insurance coverage
- Bonding
- Fees paid

### **Maintenance:**

- Annual renewal
- Continuing education
- Insurance updates
- Fee payment
- Compliance record

## **Business Requirements**

### **Registration:**

- Provincial registration
- Municipal license
- Tax accounts
- WSIB coverage
- Trade associations

**Compliance:**

- Code adherence
- Permit compliance
- Inspection cooperation
- Record keeping
- Reporting requirements

**Insurance Requirements**

Adequate coverage protects all parties.

**Required Coverage****General Liability:**

- \$2 million minimum typical
- Per occurrence
- Aggregate limits
- Products/completed operations
- Property damage

**Professional Liability:**

- Errors and omissions
- Design coverage
- Code compliance
- Professional services
- Defense costs

**Vehicle Insurance:**

- Commercial auto
- Tools and equipment
- Liability coverage
- Comprehensive
- Business use

**Additional Coverage****Optional Protections:**

Coverage	Purpose
Umbrella	Additional limits
Cyber	Data protection

<b>Coverage</b>	<b>Purpose</b>
Employment	HR issues
Business interruption	Lost income
Equipment	Tool coverage

### **Bonding:**

- Surety bonds
- Performance bonds
- License bonds
- Contract bonds
- Warranty bonds

### **Workers Compensation:**

- Provincial requirements
- Coverage amounts
- Classifications
- Experience rating
- Claims management

### **Record Keeping for Liability Protection**

Documentation provides legal protection.

### **Essential Records**

#### **Installation Records:**

- Permits
- Inspections
- Test results
- Photos
- Specifications
- Changes

#### **Service Records:**

- Work orders
- Service reports
- Test results
- Parts used
- Recommendations
- Follow-up

**Customer Records:**

- Contracts
- Correspondence
- Complaints
- Resolutions
- Payments
- Warranties

**Best Practices****Documentation Standards:**

- Complete information
- Legible entries
- Dated/signed
- Witnessed when appropriate
- Filed systematically

**Digital Systems:**

- Backup regularly
- Security measures
- Access control
- Audit trails
- Cloud storage

**Retention Policies:**

- Follow regulations
- Consistent application
- Destruction schedules
- Privacy compliance
- Access procedures

**21.10 Staying Current**

Continuous learning ensures compliance and competence.

**Code Updates**

Tracking and implementing changes.

**Update Sources****Official Channels:**

- CSA notifications
- Provincial bulletins
- Safety authority updates
- Industry associations
- Training providers

### **Update Frequency:**

<b>Code</b>	<b>Cycle</b>
CSA B149.1	5 years
CSA B149.2	5 years
National Building Code	5 years
CEC	3 years
Provincial amendments	Varies

### **Implementation:**

- Transition periods
- Grandfathering
- Training requirements
- Documentation updates
- Customer communication

### **Change Management**

#### **Tracking Changes:**

- Subscription services
- Email alerts
- Industry publications
- Association updates
- Peer networks

#### **Implementation Steps:**

1. Identify changes
2. Assess impact
3. Training needs
4. Update procedures
5. Communicate changes
6. Monitor compliance

### **Continuing Education**

Maintaining and expanding knowledge.



## **Required Training**

### **Mandatory Requirements:**

- License renewal courses
- Safety training
- Code updates
- Manufacturer training
- Regulatory requirements

### **Frequency:**

<b>Province</b>	<b>Hours/Period</b>
Ontario	Not specified
Alberta	Blue Seal optional
BC	Varies by class
Quebec	16 hours/2 years

### **Optional Development**

#### **Advanced Training:**

- Specialized equipment
- New technologies
- Business skills
- Safety certifications
- Management training

#### **Delivery Methods:**

- Classroom
- Online
- Hybrid
- Manufacturer facilities
- Trade shows

### **Industry Publications**

Staying informed through media.

#### **Trade Magazines**

#### **Canadian Publications:**

- HPAC Magazine

- Mechanical Business
- Plumbing & HVAC
- Canadian Contractor
- HRAI publications

#### **Content:**

- Technical articles
- Code interpretations
- Product reviews
- Industry news
- Best practices

#### **Online Resources**

##### **Websites:**

- CSA Group
- Provincial authorities
- Manufacturer sites
- Industry associations
- Forums/groups

##### **Digital Tools:**

- Code apps
- Reference guides
- Calculators
- Training videos
- Webinars

#### **Professional Associations**

Industry involvement provides many benefits.

##### **National Associations**

##### **HRAI (Heating, Refrigeration and Air Conditioning Institute):**

- National representation
- Training programs
- Advocacy
- Resources
- Networking

##### **CIPH (Canadian Institute of Plumbing & Heating):**

- Industry voice
- Education
- Standards involvement
- Trade promotion
- Member services

## **Provincial Associations**

### **Benefits:**

<b>Benefit</b>	<b>Value</b>
Training	Discounted/exclusive
Advocacy	Industry representation
Networking	Business opportunities
Resources	Technical support
Insurance	Group rates

### **Involvement:**

- Membership levels
- Committee participation
- Event attendance
- Certification programs
- Leadership opportunities

## **TSSA Bulletins and Directives**

Official safety communications.

### **Types of Communications**

#### **Bulletins:**

- Safety notices
- Code clarifications
- Incident learnings
- Best practices
- Regulatory changes

#### **Directives:**

- Mandatory actions
- Compliance requirements
- Deadlines
- Enforcement notices

- Emergency orders

**Directors Orders:**

- Immediate compliance
- Safety critical
- Legal requirement
- Enforcement action
- Appeals possible

**Response Requirements****Action Steps:**

1. Read thoroughly
2. Assess impact
3. Plan compliance
4. Implement changes
5. Document actions
6. Confirm compliance

**Documentation:**

- Receipt acknowledgment
- Implementation records
- Training completed
- Customer notifications
- Compliance confirmation

**Information Sharing:**

- Staff briefings
- Customer notices
- Supplier coordination
- Peer communication
- Industry involvement

**Chapter Review****Summary**

This chapter covered the comprehensive regulatory framework governing gas installations in Canada:

**Regulatory Framework:**

- Multiple levels of government involved
- Provincial variations significant
- Municipal requirements additional
- Enforcement authorities designated
- Compliance mandatory

### **Primary Codes:**

- CSA B149.1 for installations
- CSA B149.2 for propane storage
- CSA B149.5 for vehicles
- National Building Code integration
- Canadian Electrical Code requirements

### **Standards Integration:**

- Multiple standards apply
- Manufacturer requirements override minimums
- Most restrictive applies
- Coordination essential
- Updates regular

### **Compliance Requirements:**

- Permits required for most work
- Inspections verify compliance
- Documentation protects parties
- Insurance essential
- Liability significant

### **Professional Development:**

- Continuous learning required
- Code updates regular
- Industry involvement beneficial
- Documentation critical
- Safety paramount

### **Key Regulatory Principles:**

1. Safety is the primary objective
2. Compliance is not optional
3. Most restrictive requirement applies
4. Documentation provides protection
5. Professional standards expected
6. Continuous learning required

7. Multiple authorities involved
8. Coordination essential
9. Updates regular and mandatory
10. Liability follows non-compliance

## **Code Reference Exercises**

### **Exercise 1: Pipe Sizing**

#### **Given:**

- Load: 350,000 BTU/hr
- Length: 150 feet
- Pressure: 7" W.C.
- Natural gas

#### **Solution:**

1. Convert to CFH: 350 CFH
2. Check Table 5.1
3. Find 150 feet column
4. Find >350 CFH
5. Select: 1¼" pipe

### **Exercise 2: Venting Size**

#### **Given:**

- Furnace: 100,000 BTU/hr
- Category I
- Vent height: 20 feet
- Lateral: 5 feet

#### **Solution:**

1. Check Table 8.2
2. Find 20 feet height
3. Find 5 feet lateral
4. Check 100,000 BTU
5. Select: 5" B-vent

## **Permit Application Practice**

### **Sample Application:**

**Project:** Replace 80,000 BTU furnace

**Information Required:**

- Owner: John Smith
- Address: 123 Main St.
- Contractor: ABC Heating
- License: G2-12345
- Equipment: Carrier 59MN7
- BTU: 80,000
- Efficiency: 95%
- Venting: 2" PVC

**Fee Calculation:**

- Base fee: \$100
- Gas permit: \$75
- Total: \$175

**Code Interpretation Scenarios****Scenario 1: Combustion Air**

**Situation:** Furnace room  $8' \times 10' \times 8'$

**Code Requirements:**

- Volume:  $640 \text{ ft}^3$
- Load: 100,000 BTU/hr
- Required:  $100,000/50 = 2,000 \text{ ft}^3$
- Inadequate - needs openings

**Solution:**

- Add two openings
- 100 sq in each
- 12" separation
- To adjacent space

**Scenario 2: Propane Tank Location**

**Situation:** 500-gallon tank installation

**Code Requirements:**

- 25 feet from building
- 10 feet from property line
- 10 feet from ignition sources

- Level, stable base

**Site Plan:**

- Mark all distances
- Show tank orientation
- Identify ignition sources
- Verify compliance

**Compliance Verification Exercises****Checklist Development:****Furnace Installation Compliance:**

- ☐ Permit obtained
- ☐ Equipment certified
- ☐ Clearances maintained
- ☐ Venting proper
- ☐ Combustion air adequate
- ☐ Gas piping sized correctly
- ☐ Electrical code compliant
- ☐ Testing completed
- ☐ Documentation complete
- ☐ Inspection passed

**Documentation Audit:****Required Documents:**

- ☐ Installation permit
- ☐ Equipment certification
- ☐ Test results
- ☐ Manufacturer instructions
- ☐ Warranty registration
- ☐ Customer sign-off
- ☐ Inspection certificate
- ☐ Service agreement
- ☐ Safety notifications
- ☐ Code compliance statement

**Key Terms and Definitions**

**AHJ:** Authority Having Jurisdiction - enforcement body.

**ANSI:** American National Standards Institute.



**ASME:** American Society of Mechanical Engineers.

**B149.1:** Natural Gas and Propane Installation Code.

**B149.2:** Propane Storage and Handling Code.

**CEC:** Canadian Electrical Code.

**Certification:** Official recognition of competence.

**CSA:** Canadian Standards Association.

**Directive:** Mandatory compliance order.

**Enforcement:** Code compliance actions.

**Grandfathering:** Existing installations exemption.

**HRAI:** Heating, Refrigeration and Air Conditioning Institute.

**Interpretation:** Official code clarification.

**Jurisdiction:** Legal authority area.

**License:** Permission to perform work.

**NFPA:** National Fire Protection Association.

**Permit:** Official work authorization.

**Provincial Amendment:** Local code modification.

**TSSA:** Technical Standards and Safety Authority.

**ULC:** Underwriters Laboratories of Canada.

## **End of Chapter 21**

This comprehensive chapter on Codes, Standards, and Regulations provides essential knowledge for navigating Canada's complex regulatory framework for gas installations. Understanding and applying these requirements ensures safe, compliant installations that protect public safety and limit liability.

Students must recognize that codes are minimum standards, multiple codes often apply simultaneously, and the most restrictive requirement governs. The ability to research, interpret,

and apply codes correctly distinguishes professional gas fitters from others. Regular updates and continuing education are not optional but essential for maintaining competence and compliance.

As technology advances and safety knowledge improves, codes evolve to reflect best practices. Gas fitters must stay current with changes, participate in the industry, and maintain high professional standards. Compliance protects not only the public but also technicians, contractors, and property owners from liability and ensures the gas fitting trade maintains its professional status.