

# Interprovincial Program Guide

# Gasfitter - Class

# B

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# 2016

**CANADIAN  
STANDARD  
OF EXCELLENCE  
FOR SKILLED TRADES**



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Social Development Canada

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Développement social Canada

**Canada** 

# **GASFITTER - CLASS B**

**2016**

Trades and Apprenticeship Division

Division des métiers et de l'apprentissage

Labour Market Integration Directorate

Direction de l'intégration au marché du travail

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## Foreword

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*The Canadian Council of Directors of Apprenticeship (CCDA) recognizes this Interprovincial Program Guide (IPG) as the national curriculum for the occupation of Gasfitter - Class B.*

Jurisdictions have long recognized the benefit of pooling resources in the development and maintenance of apprenticeship training standards. A successful example of this is the Interprovincial Standards Red Seal Program itself. Essential to the establishment of standards is the development of suitable training systems and programs which enable tradespeople to acquire certification based on these standards. While certification is the responsibility of Apprenticeship administrators throughout Canada, the development and delivery of technical training is the responsibility of jurisdictions.

In 1999, work to develop common training for apprenticeship programs within the Atlantic Provinces began. To date, 22 Curriculum Standards have been developed through the Atlantic Standards Partnership (ASP) project to assist programming staff and instructors in the design and delivery of technical training. Similarly, the CCDA embarked on a process for the development of national IPGs for the Boilermaker, Carpenter and Sprinkler System Installer trades. At its January 2005 strategic planning session, the CCDA identified developing common training standards as one of the key activities in moving towards a more cohesive apprenticeship system.

With the support of Employment and Social Development Canada (ESDC), several provinces and territories have partnered to build on the ASP and the CCDA processes to further develop IPGs to be used across the country. This partnership will create efficiencies in time and resources and promote consistency in training and apprentice mobility.

## Acknowledgements

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In addition to the representatives above, various federal, provincial and territorial representatives contributed to the development of this document including the host province of Manitoba.

As this program guide will be amended periodically, comments or suggestions for improvement should be directed to:

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## User Guide

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According to the Canadian Apprenticeship Forum, the IPG is: "a list of validated technical training outcomes, based upon those sub-tasks identified as common core in the National Occupational Analysis (NOA), and validated by industry in the provinces and territories as incorporating the essential tasks, knowledge and skills associated with a given trade."

Learning outcomes contained in the IPG represent the minimum common core content for the development of jurisdictional training standards and outlines. IPGs are developed based on the NOAs and extensive industry consultation. The IPG is intended to assist program development staff in the design of jurisdictional plans of training. Each jurisdiction has the flexibility to add additional content.

The IPG was deliberately constructed for ease of use and flexibility of structure in order to adapt to all delivery requirements. It details units of training, unit outcomes and objectives. It does not impose a delivery model or teaching format.

Jurisdictions and/or training providers will select and develop delivery materials and techniques that accommodate a variety of learning styles and delivery patterns. The IPG does not dictate study materials, textbooks or learning activities to be used in delivery.

The IPG document includes a recommended levelling structure to facilitate mobility for apprentices moving from one jurisdiction to another. Because of difference in jurisdictional regulations and program durations, levels are offered as suggestions only.

### Structure

The IPG is divided into units which are identified by unique codes. The unit codes are used as a means of identification and are not intended to convey the order of delivery. Prerequisites have not been detailed. Each unit consists of *Learning Outcomes*, *NOA References* and *Objectives and Content*.

## User Guide *(continued)*

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The *Learning Outcomes* are the specific performances that must be evaluated. Wording of the learning outcomes, "Demonstrate knowledge of...", acknowledges the broad spectrum of ways in which knowledge can be shown. It is at the discretion of each jurisdiction to determine the manner in which learning outcomes are evaluated; theoretically, practically or a combination of both.

The *Objectives and Content* for the unit details the information to be covered in order to achieve the performances specified in the Learning Outcomes. These objectives can be either theoretical or practical in nature, based on the requirements identified through the industry consultation process. The learning activities used to cover the objectives are at the discretion of the jurisdiction; however, practically worded objective statements have been used where industry indicated a need for the apprentices to receive exposure to performing the task or skill outlined while attending technical training. For example, this exposure could be done through instructor demonstration or individual or group performance of the skill or task. This practical training will help to reinforce the theoretical component of the technical training.

Detailed content for each objective has not been developed. Where detail is required for clarity, content has been provided. The content listed within the IPG document is **not** intended to represent an inclusive list; rather, it is included to illustrate the intended direction for the objective. Content may be added or extended in jurisdictional training plans as required.

Jurisdictions are free to deliver the IPG units one at a time or concurrently, provided that all Learning Outcomes are met. The IPG does not indicate the amount of time to be spent on a particular unit as the length of time required to deliver the *Learning Outcomes* successfully will depend upon the learning activities and teaching methods used.



## **IPG Glossary of Terms**

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These definitions are intended as a guide to how language is used in the IPGs.

<b>ADJUST</b>	To put in good working order; regulate; bring to a proper state or position.
<b>APPLICATION</b>	The use to which something is put and/or the circumstance in which you would use it.
<b>CHARACTERISTIC</b>	A feature that helps to identify, tell apart, or describe recognizably; a distinguishing mark or trait.
<b>COMPONENT</b>	A part that can be separated from, or attached to, a system; a segment or unit.
<b>DEFINE</b>	To state the meaning of (a word, phrase, etc.).
<b>DEMONSTRATE</b>	To show or explain verbally, in written form, or by practical application.
<b>DESCRIBE</b>	To give a verbal account of; tell about in detail.
<b>DIAGNOSE</b>	To analyze or identify a problem or malfunction.
<b>EXPLAIN</b>	To make plain or clear; illustrate; rationalize.
<b>IDENTIFY</b>	To point out or name objectives or types.
<b>INTERPRET</b>	To translate information from observation, charts, tables, graphs, and written material.
<b>MAINTAIN</b>	To keep in a condition of good repair or efficiency.

## **IPG Glossary of Terms** *(continued)*

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<b>METHOD</b>	A means or manner of doing something that has procedures attached to it.
<b>OPERATE</b>	How an object works; to control or direct the functioning of.
<b>PROCEDURE</b>	A prescribed series of steps taken to accomplish an end.
<b>PURPOSE</b>	The reason for which something exists or is done, made or used.
<b>SERVICE</b>	Routine inspection and replacement of worn or deteriorating parts. An act or business function provided to a customer in the course of one's profession. (e.g., haircut).
<b>TECHNIQUE</b>	Within a procedure, the manner in which technical skills are applied.
<b>TEST</b>	v. To subject to a procedure that ascertains effectiveness, value, proper function, or other quality.  n. A way of examining something to determine its characteristics or properties, or to determine whether or not it is working correctly.
<b>TROUBLESHOOT</b>	To follow a systematic procedure to identify and locate a problem or malfunction and its cause.

## **Essential Skills Profiles**

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Essential Skills are the skills needed for work, learning and life. They provide the foundation for learning all the other skills that enable people to evolve within their jobs and adapt to workplace change.

Over the past several years, the Government of Canada has conducted research examining the skills people use at work. From this research, Essential Skills Profiles have been developed for various occupations.

For more information regarding Essential Skills and to access Essential Skills Profiles for specific occupations, visit Employment and Social Development Canada's website at:

<http://www.esdc.gc.ca/eng/jobs/les/profiles/index.shtml>

## Profile Chart

<b>COMMON OCCUPATIONAL SKILLS</b>			
GFB-100 Safety	GFB-150 Tools, Equipment and Testing Instruments	GFB-110 Drawings and Blueprint Reading 1	GFB-205 Drawings and Blueprint Reading 2
GFB-115 Gas Codes 1	GFB-200 Gas Codes 2	GFB-260 Job Planning	GFB-145 Hoisting, Lifting, and Rigging
GFB-140 Access Equipment			
<b>GAS PIPING PREPARATION AND ASSEMBLY</b>			
GFB-125 Tube and Tubing Systems	GFB-120 Steel Pipe and Fittings	GFB-130 Plastic Pipe and Fittings	
<b>VENTING AND AIR SUPPLY SYSTEMS</b>			
GFB-220 Venting Systems	GFB-245 Equipment Conversion and Combustion	GFB-225 Air Supply Systems	
<b>CONTROL AND ELECTRICAL SYSTEMS</b>			
GFB-135 Electrical Systems and Controls 1	GFB-210 Electrical Systems and Controls 2		
<b>INSTALLATION AND SERVICING OF SYSTEMS AND EQUIPMENT</b>			
GFB-105 Gas Origins and Fundamentals	GFB-230 Installation of Systems and Equipment	GFB-215 Gas Equipment	GFB-235 Propane Storage and Handling Systems
<b>TESTING AND COMMISSIONING OF GAS-FIRED SYSTEMS</b>			
GFB-250 Testing Appliances and Equipment	GFB-255 Commissioning and Decommissioning		
<b>SERVICING GAS-FIRED SYSTEMS</b>			
GFB-240 Service, Maintenance and Repair			

## Recommended Level Structure

LEVEL 1		
Unit Code	Title	Page
GFB-100	Safety	18
GFB-105	Gas Origins and Fundamentals	20
GFB-110	Drawings and Blueprint Reading 1	22
GFB-115	Gas Codes 1	24
GFB-120	Steel Pipe and Fittings	25
GFB-125	Tube and Tubing Systems	27
GFB-130	Plastic Pipe and Fittings	29
GFB-135	Electrical Systems and Controls 1	31
GFB-140	Access Equipment	33
GFB-145	Hoisting, Lifting and Rigging	34
GFB-150	Tool, Equipment and Testing Instruments	35
LEVEL 2		
Unit Code	Title	Page
GFB-200	Gas Codes 2	38
GFB-205	Drawings and Blueprint Reading 2	39
GFB-210	Electrical Systems and Controls 2	41
GFB-215	Gas Equipment	43
GFB-220	Venting Systems	45
GFB-225	Air Supply Systems	47
GFB-230	Installation of Systems and Equipment	48
GFB-235	Propane Storage and Handling Systems	51
GFB-240	Service, Maintenance and Repair	52
GFB-245	Equipment Conversion and Combustion	54
GFB-250	Testing Appliances and Equipment	56
GFB-255	Commissioning and Decommissioning	58
GFB-260	Job Planning	59

## 2014 NOA Sub-task to IPG Unit Comparison

NOA Sub-task		IPG Unit	
<b>Task 1 - Performs safety-related functions.</b>			
1.01	Uses personal protective equipment (PPE) and safety equipment.	GFB-100	Safety
1.02	Maintains safe work environment.	GFB-100	Safety
<b>Task 2 - Maintains and uses tools and equipment.</b>			
2.01	Maintains hand, power and powder-actuated tools.	GFB-150	Tools, Equipment and Testing Instruments
2.02	Uses technical instruments and testers.	GFB-135	Electrical Systems and Controls 1
		GFB-150	Tools, Equipment and Testing Instruments
		GFB-210	Electrical Systems and Controls 2
2.03	Uses access equipment.	GFB-140	Access Equipment
2.04	Operates lifting, rigging and hoisting equipment.	GFB-145	Hoisting, Lifting and Rigging
<b>Task 3 - Plans and prepares for installation, service and maintenance.</b>			
3.01	Interprets drawings and codes.	GFB-110	Drawings and Blueprint Reading 1
		GFB-205	Drawings and Blueprint Reading 2
		GFB-115	Gas Codes 1
		GFB-200	Gas Codes 2
3.02	Selects systems, equipment and components.	GFB-260	Job Planning
3.03	Organizes work.	GFB-260	Job Planning
<b>Task 4 - Fits tube and tubing for gas piping systems.</b>			
4.01	Prepares tube and tubing for fitting.	GFB-125	Tube and Tubing Systems
4.02	Bends tube and tubing for gas piping systems.	GFB-125	Tube and Tubing Systems
4.03	Connects tube and tubing for gas piping systems.	GFB-125	Tube and Tubing Systems
<b>Task 5 - Fits plastic pipe for gas piping systems.</b>			
5.01	Prepares plastic pipe for fitting.	GFB-130	Plastic Pipe and Fittings
5.02	Connects plastic pipe for gas piping systems.	GFB-130	Plastic Pipe and Fittings

NOA Sub-task		IPG Unit	
<b>Task 6 - Fits steel pipe for gas piping systems.</b>			
6.01	Prepares steel pipe for fitting.	GFB-120	Steel Pipe and Fittings
6.02	Connects steel pipe for gas piping systems.	GFB-120	Steel Pipe and Fittings
<b>Task 7 - Installs venting.</b>			
7.01	Lays out venting.	GFB-220	Venting Systems
7.02	Prepares venting material for assembly.	GFB-220	Venting Systems
7.03	Connects material for venting.	GFB-220	Venting Systems
<b>Task 8 - Installs air supply system.</b>			
8.01	Lays out air supply system.	GFB-225	Air Supply Systems
8.02	Connects air supply systems.	GFB-225	Air Supply Systems
<b>Task 9 - Installs draft control systems.</b>			
9.01	Installs natural draft control systems.	GFB-220	Venting Systems
9.02	Installs mechanical draft control systems.	GFB-220	Venting Systems
<b>Task 10 - Selects and installs electronic components.</b>			
10.01	Performs selection and installation of combustion controls.	GFB-135	Electrical Systems and Controls 1
		GFB-210	Electrical Systems and Controls 2
		GFB-245	Equipment Conversion and Combustion
10.02	Performs selection and installation of flame safeguards.	GFB-135	Electrical Systems and Controls 1
		GFB-210	Electrical Systems and Controls 2
10.03	Performs selection and installation of safety and operating controls.	GFB-135	Electrical Systems and Controls 1
		GFB-210	Electrical Systems and Controls 2
<b>Task 11 - Selects and installs electrical components.</b>			
11.01	Selects electrical components.	GFB-135	Electrical Systems and Controls 1
		GFB-210	Electrical Systems and Controls 2
11.02	Performs assembly and connection of electrical components.	GFB-135	Electrical Systems and Controls 1
		GFB-210	Electrical Systems and Controls 2

NOA Sub-task		IPG Unit	
<b>Task 12 - Installs automation and instrumentation control systems.</b>			
12.01	Performs selection of automation and instrumentation control systems.	GFB-135	Electrical Systems and Controls 1
		GFB-210	Electrical Systems and Controls 2
12.02	Performs assembly and connection of automation and instrumentation control systems.	GFB-135	Electrical Systems and Controls 1
		GFB-210	Electrical Systems and Controls 2
<b>Task 13 - Installs gas-fired system piping and equipment.</b>			
13.01	Installs gas-fired equipment.	GFB-230	Installation of Systems and Equipment
		GFB-215	Gas Equipment
13.02	Installs gas piping equipment.	GFB-120	Steel Pipe and Fittings
		GFB-230	Installation of Systems and Equipment
13.03	Connects gas supply to equipment.	GFB-215	Gas Equipment
		GFB-230	Installation of Systems and Equipment
13.04	Connects equipment to energy distribution systems.	GFB-215	Gas Equipment
		GFB-230	Installation of Systems and Equipment
<b>Task 14 - Installs gas-fired system components.</b>			
14.01	Installs valve trains.	GFB-215	Gas Equipment
		GFB-230	Installation of Systems and Equipment
		GFB-245	Equipment Conversion and Combustion
14.02	Installs accessories.	GFB-120	Steel Pipe and Fittings
		GFB-125	Tube and Tubing Systems
		GFB-130	Plastic Pipe and Fittings
		GFB-215	Gas Equipment
		GFB-230	Installation of Systems and Equipment
<b>Task 15 - Installs propane storage and handling systems.</b>			
15.01	Installs propane storage systems.	GFB-235	Propane Storage and Handling Systems
15.02	Installs propane handling systems.	GFB-235	Propane Storage and Handling Systems



NOA Sub-task		IPG Unit	
<b>Task 16 - Tests gas-fired systems.</b>			
16.01	Tests gas piping systems.	GFB-250	Testing Appliances and Equipment
16.02	Performs start-up procedures.	GFB-250	Testing Appliances and Equipment
<b>Task 17 - Commissions gas-fired systems</b>			
17.01	Performs testing, adjusting and balancing procedures.	GFB-230	Installation of Systems and Equipment
		GFB-250	Testing Appliances and Equipment
17.02	Completes commissioning report and handover.	GFB-255	Commissioning and Decommissioning
<b>Task 18 - Maintains gas-fired systems.</b>			
18.01	Inspects system components and operation.	GFB-105	Gas Origins and Fundamentals
		GFB-240	Service, Maintenance and Repair
18.02	Performs maintenance activities.	GFB-105	Gas Origins and Fundamentals
		GFB-240	Service, Maintenance and Repair
<b>Task 19 - Repairs gas-fired systems.</b>			
19.01	Diagnoses gas-fired equipment and components.	GFB-105	Gas Origins and Fundamentals
		GFB-240	Service, Maintenance and Repair
19.02	Selects replacement components.	GFB-105	Gas Origins and Fundamentals
		GFB-240	Service, Maintenance and Repair
		GFB-245	Equipment Conversion and Combustion
19.03	Replaces components.	GFB-105	Gas Origins and Fundamentals
		GFB-240	Service, Maintenance and Repair
		GFB-245	Equipment Conversion and Combustion
19.04	Verifies operation.	GFB-105	Gas Origins and Fundamentals
		GFB-240	Service, Maintenance and Repair
		GFB-245	Equipment Conversion and Combustion
<b>Task 20 - Decommissions gas-fired systems.</b>			
20.01	Disconnects appliances and accessories.	GFB-255	Commissioning and Decommissioning
20.02	Removes gas-fired systems and components.	GFB-255	Commissioning and Decommissioning



# **LEVEL 1**

**Learning Outcomes:**

- Demonstrate knowledge of safety equipment, their applications, maintenance and procedures for use.
- Demonstrate knowledge of safe work practices.
- Demonstrate knowledge of regulatory requirements pertaining to safety.

**2014 National Occupational Analysis Reference:**

- 1.01 Uses personal protective equipment (PPE) and safety equipment.
- 1.02 Maintains safe work environment.

**Objectives and Content:**

1. Define terminology associated with safety.
2. Identify and describe workplace safety and health regulations.
  - i) federal
    - Material Safety Data Sheets (MSDS)
    - Workplace Hazardous Material Information System (WHMIS)
    - Transportation of Dangerous Goods (TDG)
  - ii) provincial/territorial
    - Occupational Health and Safety (OH&S)
  - iii) municipal
3. Identify types of personal protective equipment (PPE) and clothing and describe their applications and limitations.
4. Describe the procedures used to care for and maintain PPE.
5. Identify hazards and describe safe work practices.
  - i) personal
  - ii) workplace
    - job hazard assessment procedures
    - tools and equipment
    - lock out/tag out
    - hot work and fire watch
    - confined space awareness
    - trenches and excavations

- explosion and fire
- ventilation
- fall protection
- housekeeping
- iii) hazardous materials
  - solvents
  - toxic materials
  - fuel gases
  - fumes
  - asbestos
  - lead-based paint
- iv) environmental contamination

6. Identify hazards and describe safe work practices pertaining to fuel gases.

## **GFB-105 Gas Origins and Fundamentals**

### **Learning Outcomes:**

- Demonstrate knowledge of fuel gases, their properties and characteristics.
- Demonstrate knowledge of the principles of combustion and their application to gas equipment.
- Demonstrate knowledge of combustion and leakage testing.

### **2014 National Occupational Analysis Reference:**

- 18.01 Inspects system components and operation.
- 18.02 Performs maintenance activities.
- 19.01 Diagnoses gas-fired equipment and components.
- 19.02 Selects replacement components.
- 19.03 Replaces components.
- 19.04 Verifies operation.

### **Objectives and Content:**

1. Define terminology associated with gas origins and fundamentals.
2. Identify hazards and describe safe work practices pertaining to gas origins and fundamentals.
3. Describe the origins of gases.
4. Describe the transportation and distribution systems of gases.
5. Describe how gases get their scent (natural and artificial).
6. Identify types of common fuel gases and describe their properties and characteristics.
  - i) natural gas
  - ii) propane
  - iii) butane
7. Identify the causes of incomplete combustion and corrosive damage.

8. Describe the properties and formulas involved in the properties of gases.
  - i) specific gravity
  - ii) density
  - iii) chemical reaction
  - iv) scientific formula
  - v) gas laws
  - vi) lower and upper flammability limits
  
9. Describe derating based on elevation.

## **GFB-110 Drawings and Blueprint Reading 1**

### **Learning Outcomes:**

- Demonstrate knowledge of basic drawing and sketching techniques.
- Demonstrate knowledge of the blueprints and their applications.
- Demonstrate knowledge of interpreting and extracting information from drawings.

### **2014 National Occupational Analysis Reference:**

3.01 Interprets drawings and codes.

### **Objectives and Content:**

1. Define terminology associated with blueprint reading and sketching as they pertain to Gasfitters.
2. Identify types of lines found on blueprints.
  - i) visible line
  - ii) hidden line
  - iii) central line
  - iv) dimension line
  - v) extension line
3. Identify symbols found on blueprints.
4. Identify types of views found on blueprints.
  - i) plan
  - ii) elevation
  - iii) section
5. Identify the types of scales and describe their characteristics and applications.
  - i) metric scale rule (S.I.)
  - ii) architect scale rule (imperial)
6. Identify types of sketching and drawing equipment and describe their applications and procedures for use.
  - i) hand sketches
  - ii) Isometric
  - iii) material take-off



7. Describe the procedures used to label three basic views on an object.
- i) plan view
  - ii) elevation
  - iii) section

## GFB-115 Gas Codes 1

### Learning Outcomes:

- Demonstrate knowledge of codes, *Acts* and regulations specific to the gas industry.

### 2014 National Occupational Analysis Reference:

3.01 Interprets drawings and codes.

### Objectives and Content:

1. Define terminology associated with gas codes.
2. Identify agencies and bodies for governing gas installations and describe their authority and agencies of operation.
  - i) American National Standards Institute (ANSI)
  - ii) American Society of Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE)
  - iii) American Society of Mechanical Engineers (ASME)
  - iv) American Society of Testing and Materials (ASTM)
  - v) Canadian Standards Association
    - CSA B149.1 Natural Gas and Propane Installation Code
    - CSA B149.2 Propane Storage and Handling Code
    - CSA B149.3 Field Approval of Fuel Related Components on Appliances and Equipment Code
  - vi) National Building Code of Canada (NBC)
  - vii) National Fire Protection Association (NFPA)
  - viii) Underwriters Laboratories Canada (ULC)
3. Identify the authorities responsible for authorizing permits in the appropriate jurisdiction.
4. Identify regulations pertaining to fuel gases and combustion.

## **GFB-120 Steel Pipe and Fittings**

### **Learning Outcomes:**

- Demonstrate knowledge of threaded, flanged, and welded steel pipe and fittings.
- Demonstrate knowledge of the procedures to join steel pipe.

### **2014 National Occupational Analysis Reference:**

- 6.01 Prepares steel pipe for fitting.
- 6.02 Connects steel pipe for gas piping systems.
- 13.02 Installs gas piping equipment.
- 14.02 Installs accessories.

### **Objectives and Content:**

1. Define terminology associated with steel pipe and fittings.
2. Identify hazards and describe safe work practices pertaining to steel pipe and fittings.
3. Interpret codes, standards and regulations pertaining to steel pipe and fittings.
4. Identify tools and equipment used to prepare and thread steel pipe, and describe their applications and procedures for use.
5. Identify tools and equipment used for welding and joining steel pipe, and describe their applications and procedures for their use.
6. Describe the procedures used to calculate piping offsets.
7. Identify the factors to consider for selecting steel pipe.
  - i) schedule numbers and grades
  - ii) pressure ratings
  - iii) pipe sizes and lengths
  - iv) protective coatings and linings
  - v) cathodic protection
  - vi) codes and regulations

- vii) manufacturers' specifications
  - viii) manufacturing techniques
  - ix) approved alternate piping products
8. Identify types of threaded pipe fittings, and describe their characteristics and applications.
    - i) malleable
    - ii) steel
    - iii) stainless
  9. Describe the procedures used to join threaded pipe and install fittings on pipe.
  10. Describe the procedures used to prepare steel pipe to be welded.
  11. Describe the procedures used to pressure test steel piping systems.
    - i) inspections
    - ii) equipment required
    - iii) calculations
  12. Describe the procedures used to purge steel piping systems.
    - i) equipment required
    - ii) calculations
    - iii) purge point openings
    - iv) inert gas
  13. Describe procedures used to install steel piping.
    - i) installation
    - ii) code requirements
    - iii) protection
    - iv) manufacturers' specifications
  14. Describe procedures for sizing steel piping.

## **GFB-125 Tube and Tubing Systems**

### **Learning Outcomes:**

- Demonstrate knowledge of tube and tubing systems, their applications, maintenance and procedures for use.
- Demonstrate knowledge of tube bending equipment and techniques.

### **2014 National Occupational Analysis Reference:**

- 4.01 Prepares tube and tubing for fitting.
- 4.02 Bends tube and tubing for gas piping systems.
- 4.03 Connects tube and tubing for gas piping systems.
- 14.02 Installs accessories.

### **Objectives and Content:**

1. Define terminology associated with tube and tubing systems.
2. Identify hazards and describe safe work practices associated with tube and tubing systems as well as pertaining to bending tube and tubing.
3. Interpret codes, standards, regulations and AHJ requirements associated with tube and tubing systems as well as pertaining to bending tube and tubing.
4. Identify tools and equipment relating to tube and tubing systems and bending, and describe their applications and procedures for use.
5. Identify types of connections, fittings and valves, and describe their applications.
  - i) brazed
  - ii) mechanical
6. Identify types of tube and tubing systems and describe their applications.
7. Identify the factors to consider for selecting tube and tubing systems for bending.
8. Describe procedures used to install tube and tubing.
  - i) sizing
  - ii) installation

- iii) code requirements
  - iv) protection
  - v) manufacturers' specifications
9. Describe the procedures used to pressure test a tube and tubing systems.
- i) inspections
  - ii) equipment required
10. Describe the procedures used to purge tube and tubing systems.
11. Describe procedures for sizing tube and tubing.

## **GFB-130 Plastic Pipe and Fittings**

### **Learning Outcomes:**

- Demonstrate knowledge of plastic pipe and fittings, and their associated joining techniques.

### **2014 National Occupational Analysis Reference:**

- 5.01 Prepares plastic pipe for fitting.
- 5.02 Connects plastic pipe for gas piping systems.
- 14.02 Installs accessories.

### **Objectives and Content:**

1. Define terminology associated with plastic pipe and fittings.
2. Identify hazards and describe safe work practices pertaining to plastic pipe and fittings.
3. Interpret codes, standards, regulations and AHJ requirements pertaining to plastic pipe and fittings.
4. Identify the factors to consider for selecting plastic pipe and fittings.
  - i) types
  - ii) pressure and temperature ratings
  - iii) sizes
  - iv) manufacturers' specifications/certification requirements
5. Identify tools and equipment relating to plastic pipe and fittings, and describe their applications and procedures for use.
6. Identify the types of fittings used with plastic pipe and describe their applications.
7. Describe the procedures used to join plastic pipe.
  - i) safety requirements
  - ii) fabrication process and materials
  - iii) drilling and cleaning

- iv) assembly
  - v) testing
  - vi) allowing for pipe expansion and contraction
8. Describe the procedures used to handle and store plastic pipe and fittings.
  9. Describe procedures for sizing plastic piping.
  10. Describe the procedures used to replace or repair plastic pipe and fittings.



## **GFB-135 Electrical Systems and Controls 1**

### **Learning Outcomes:**

- Demonstrate knowledge of electrical codes and standards applicable to gas installation.
- Demonstrate knowledge of the basic concepts of electricity.
- Demonstrate knowledge of electrical circuits and their operation.
- Demonstrate knowledge of wiring diagrams.

### **2014 National Occupational Analysis Reference:**

- 2.02 Uses technical instruments and testers.
- 10.01 Performs selection and installation of combustion controls.
- 10.02 Performs selection and installation of flame safeguards.
- 10.03 Performs selection and installation of safety and operating controls.
- 11.01 Selects electrical components.
- 11.02 Performs assembly and connection of electrical components.
- 12.01 Performs selection of automation and instrumentation control systems.
- 12.02 Performs assembly and connection of automation and instrumentation control systems.

### **Objectives and Content:**

1. Define terminology associated with electricity as related to the trade.
2. Identify hazards and describe safe work practices pertaining to working with electricity.
3. Identify and interpret regulations pertaining to working with electricity.
4. Describe the C22.1 Canadian Electrical Code (CEC).
  - i) conductor ampacities and sizing
  - ii) purpose of and sizing of bonding conductors
  - iii) purpose of and sizing of grounding conductors
  - iv) conductor colour coding and purpose
5. Interpret electrical related information found on drawings and specifications.
  - i) schematic
  - ii) ladder

6. Explain the basic principles of electricity.
  - i) electrical theory
    - Ohm's law
    - Power law
  - ii) magnetism and electromagnetism
  - iii) electrical circuits
    - series
    - parallel
    - series-parallel
  - iv) currents
    - direct current (DC)
    - alternating current (AC)
  - v) AC power supplies
  - vi) transformer operation
  - vii) millivolt systems
7. Identify types of electrical measuring instruments and describe their applications and procedures for use.
8. Identify types of related electrical equipment and components and describe their characteristics, operation and applications.
9. Describe the procedures used to inspect, maintain and store electrical measuring instruments.
10. Identify power types.
  - i) single phase
  - ii) three phase

## **GFB-140 Access Equipment**

### **Learning Outcomes:**

- Demonstrate knowledge of the selection, assembly and procedures for using access equipment.

### **2014 National Occupational Analysis Reference:**

2.03 Uses access equipment.

### **Objectives and Content:**

1. Define terminology associated with access equipment.
2. Identify hazards and describe safe work practices pertaining to access equipment.
3. Identify codes and regulations pertaining to access equipment.
  - i) training and certification requirements
  - ii) job site specific requirements
4. Identify types of access equipment and describe their characteristics and applications.
5. Describe the procedures used to erect and dismantle access equipment.
6. Describe the procedures used to inspect, maintain and store access equipment.

## **GFB-145 Hoisting, Lifting and Rigging**

### **Learning Outcomes:**

- Demonstrate knowledge of hoisting, lifting and rigging equipment, their applications, limitations and procedures for use.

### **2014 National Occupational Analysis Reference:**

2.04 Operates lifting, rigging and hoisting equipment.

### **Objectives and Content:**

1. Define terminology associated with hoisting, lifting and rigging.
2. Identify hazards and describe safe work practices pertaining to hoisting, lifting and rigging.
3. Identify codes and regulations pertaining to hoisting, lifting and rigging.
4. Identify types of rigging equipment and accessories.
5. Describe the procedures used to inspect, maintain and store hoisting, lifting and rigging equipment.
6. Identify types of knots, hitches and bends, and describe the applications and procedures used to tie them.
7. Identify and describe procedure used to communicate during hoisting, lifting and rigging operations.
  - i) hand signals
  - ii) electronic communications
  - iii) audible/visual
8. Identify the factors to consider when selecting and attaching rigging equipment to the load.
  - i) load characteristics
  - ii) sling angle
  - iii) environment
  - iv) working load limit

## **GFB-150 Tools, Equipment and Testing Instruments**

### **Learning Outcomes:**

- Demonstrate knowledge of tools and equipment, their applications, maintenance and procedures for use.
- Demonstrate knowledge of testing instruments, their applications, maintenance and procedures for use.

### **2014 National Occupational Analysis Reference:**

- 2.01 Maintains hand, power and powder-actuated tools.
- 2.02 Uses technical instruments and testers.

### **Objectives and Content:**

1. Define terminology associated with tools, equipment and testing instruments.
2. Identify hazards and describe safe work practices pertaining to tools and equipment.
3. Identify types of hand tools and describe their applications and procedures for use.
4. Describe the procedures used to inspect, maintain and store hand tools.
5. Identify types of power tools and describe their applications and procedures for use.
  - i) electric
  - ii) hydraulic
  - iii) pneumatic
  - iv) gas powered
  - v) powder-actuated
6. Identify power tool attachments and consumables and describe their applications and procedures for use.
7. Identify types of measuring tools and describe their applications and procedures for use.

8. Describe the procedures used to calibrate, recalibrate, inspect, maintain and store measuring tools and equipment according to manufacturer's specifications.
9. Identify types of testing instruments and equipment and describe their applications and procedures for use.
10. Describe the procedures used to inspect, maintain and store testing instruments and equipment according to manufacturer's specifications.
11. Identify types of combustible gas indicators and describe their applications and procedures for use.
12. Describe pressure measuring tools.
  - i) manometers
  - ii) mechanical gauges
13. Identify different types of gas pressures that are measured using pressure measuring tools.
  - i) standing line pressures
  - ii) operating line pressures
  - iii) gauge pressures
  - iv) absolute pressures
  - v) conversion between different pressures

## **LEVEL 2**

## **GFB-200 Gas Codes 2**

### **Learning Outcomes:**

- Demonstrate knowledge of codes, *Acts* and regulations specific to the gas industry.

### **2014 National Occupational Analysis Reference:**

3.01 Interprets drawings and codes.

### **Objectives and Content:**

1. Define advanced terminology associated with gas codes.
2. Interpret codes applicable to gas installations.
  - i) CSA B149.1 Natural Gas and Propane Installation Code
  - ii) CSA B149.2 Propane Storage and Handling Code
  - iii) Canadian Electrical Code (CEC)
    - C22.1
3. Identify regulations governing Gasfitter - Class B scope of responsibilities and limitations.
4. Interpret regulations pertaining to fuel gases and combustion.



## **GFB-205 Drawings and Blueprint Reading 2**

### **Learning Outcomes:**

- Demonstrate knowledge of the procedures to read and interpret information pertaining to gasfitters found on construction drawings and blueprints.
- Demonstrate knowledge of the procedures to develop a material list from information contained in construction drawings.

### **2014 National Occupational Analysis Reference:**

3.01 Interprets drawings and codes.

### **Objectives and Content:**

1. Define types of drawings and blueprints and their applications.
  - i) architectural
  - ii) structural
  - iii) mechanical
  - iv) electrical
  - v) plot
  - vi) specifications and schedules
  
2. Identify shop drawing projections and blueprint views and describe their applications.
  - i) projections
    - orthographic
    - oblique
    - isometric
    - pictorial
  - ii) views
    - plan
    - section
    - detail
    - elevation
    - cross section
  
3. Interpret and describe the use of information on drawings and blueprints.
  - i) lines
  - ii) legend

- iii) symbols and abbreviations
    - mechanical
    - electrical
    - architectural
  - iv) title block
  - v) notes and specifications
  - vi) schedules
  - vii) scales
4. Describe metric and imperial systems of measurement and the procedures used to perform conversions.
5. Describe procedures used to compile a materials list from information found on construction drawings and blueprints.

## **GFB-210 Electrical Systems and Controls 2**

### **Learning Outcomes:**

- Demonstrate knowledge of electrical codes and standards applicable to gas installation.
- Demonstrate knowledge of the concepts of electricity.
- Demonstrate knowledge of electrical circuits and their operation.
- Demonstrate knowledge of electrical wiring diagrams.
- Demonstrate knowledge of electrical controls and control circuits their application, maintenance, servicing and procedures for use.
- Demonstrate knowledge of motors, their applications, maintenance, and procedures for use and testing.

### **2014 National Occupational Analysis Reference:**

- 2.02 Uses technical instruments and testers.
- 10.01 Performs selection and installation of combustion controls.
- 10.02 Performs selection and installation of flame safeguards.
- 10.03 Performs selection and installation of safety and operating controls.
- 11.01 Selects electrical components.
- 11.02 Performs assembly and connection of electrical components.
- 12.01 Performs selection of automation and instrumentation control systems.
- 12.02 Performs assembly and connection of automation and instrumentation control systems.

### **Objectives and Content:**

1. Define terminology associated with electricity as related to the trade.
2. Identify hazards and describe safe work practices pertaining to working with electricity.
3. Identify and interpret regulations pertaining to working with electricity.
4. Describe the C22.1 Canadian Electrical Code (CEC).
5. Interpret information on drawings and create electrical wiring diagrams.
6. Describe types of electrical measuring instruments and their applications and procedures for use.

7. Identify types of related electrical equipment and components and describe their characteristics, operation and applications.
8. Describe the procedures used to inspect, maintain and store electrical measuring instruments.
9. Describe power types.
  - i) single phase
  - ii) three phase
10. Describe the operation of motors and their controls.
11. Describe the procedures used to test and troubleshoot control circuits.
  - i) diagrams
  - ii) auxiliary devices
  - iii) polarity
  - iv) electrical sequence of operation
12. Describe the procedures used to test, service, maintain and troubleshoot controls, control systems and their components.
13. Describe the procedures for the installation of flame safeguard controls.
14. Describe the different types of flame sensing devices.
  - i) flame rod
  - ii) thermocouples
  - iii) thermopiles

## **GFB-215 Gas Equipment**

### **Learning Outcomes:**

- Demonstrate knowledge of gas equipment, their components, application and operation.
- Demonstrate knowledge of the procedures used to install, convert and reactivate gas appliances.

### **2014 National Occupational Analysis Reference:**

- 13.01 Installs gas-fired equipment.
- 13.03 Connects gas supply to equipment.
- 13.04 Connects equipment to energy distribution systems.
- 14.01 Installs valve trains.
- 14.02 Installs accessories.

### **Objectives and Content:**

1. Define terminology associated with gas equipment.
2. Identify and interpret regulations, codes and standards pertaining to gas equipment.
3. Identify hazards and describe safe work practices pertaining to gas equipment.
4. Describe gas equipment and their components and describe their application, operation and procedures for use.
  - i) burners
  - ii) ignition systems
  - iii) flame sensing devices
  - iv) control and safeties
5. Identify types of burners, their classifications and performance characteristics.
  - i) atmospheric
  - ii) premix
  - iii) nozzle mix
6. Identify types of non-vented gas equipment and describe their components and operation.

7. Identify different types of gas burning equipment.
  - i) furnaces
  - ii) fireplaces
  - iii) appliances
  - iv) commercial kitchens
  - v) boilers
  - vi) process burners
  - vii) combustion air heater
  
8. Describe the different types of meters.
  - i) positive displacement
  - ii) inferential meters
  
9. Identify the different uses for meters.
  - i) pressure
  - ii) temperature
  - iii) flow rate
  
10. Describe flow rate calculations.
  - i) clocking
  - ii) orifice flow
  - iii) correction factor
  
11. Describe the procedures for installing a meter.
  - i) installation criteria
  - ii) manufacturers' specifications
  - iii) applications
  
12. Describe the installation of valve train components and their operation.
  
13. Identify different types of flow controllers.
  - i) ratio regulators
  - ii) ratio controllers
  - iii) limiting orifices
  - iv) metering orifices

## **GFB-220 Venting Systems**

### **Learning Outcomes:**

- Demonstrate knowledge of venting systems, their components, applications and operation.
- Demonstrate knowledge of the procedures used to install and maintain venting systems.

### **2014 National Occupational Analysis Reference:**

- 7.01 Lays out venting.
- 7.02 Prepares venting material for assembly.
- 7.03 Connects material for venting.
- 9.01 Installs natural draft control systems.
- 9.02 Installs mechanical draft control systems.

### **Objectives and Content:**

1. Define terminology associated with venting systems.
2. Interpret codes and regulations pertaining to venting systems.
3. Identify venting system types and components and describe their application, operation and procedures for use.
  - i) appliances
  - ii) vents
  - iii) chimneys and liners
  - iv) terminations
  - v) special venting systems
4. Describe the procedures used to design, install, maintain and inspect venting systems.
  - i) venting requirements
  - ii) sizing tables
  - iii) appliance types
    - fan-assisted
    - drafthood-equipped
    - direct vent

- iv) chimneys and liners
  - v) terminations
  - vi) BH venting systems
5. Describe the procedures used to determine venting requirements.
- i) building types
  - ii) equipment



## **GFB-225 Air Supply Systems**

### **Learning Outcomes:**

- Demonstrate knowledge of requirements for combustion, dilution and ventilation air.
- Demonstrate knowledge of sizing and installation of air supply systems.

### **2014 National Occupational Analysis Reference:**

- 8.01 Lays out air supply system.
- 8.02 Connects air supply control systems.

### **Objectives and Content:**

1. Identify codes and industry standards that apply to air supply.
2. Describe the effects that different building components have on air supply.
3. Explain the operation of the combustion air and ventilation air systems.
4. Describe the function of interlock components of mechanical combustion air systems.
5. Explain service and adjustment procedures for mechanical combustion air systems.
6. Explain the calculations used to determine air supply requirements.
7. Identify manufacturers' specifications for the conditioning of air supply.

## **GFB-230 Installation of Systems and Equipment**

### **Learning Outcomes:**

- Demonstrate knowledge of the installation of equipment.
- Demonstrate knowledge of installing gas system components.
- Demonstrate knowledge of installing appliance ancillary devices and equipment.

### **2014 National Occupational Analysis Reference:**

- 13.01 Installs gas-fired equipment.
- 13.02 Installs gas piping equipment.
- 13.03 Connects gas supply to equipment.
- 13.04 Connects equipment to energy distribution systems.
- 14.01 Installs valve trains.
- 14.02 Installs accessories.
- 17.01 Performs testing, adjusting and balancing procedures.

### **Objectives and Content:**

1. Define terminology associated with the installation of systems and equipment.
2. Identify hazards and describe safe work practices pertaining to installation of systems and equipment.
3. Identify codes and regulations pertaining to installation of systems and equipment.
4. Identify the types of tools and equipment used in installation of systems and equipment.
5. Describe the procedures used to select the appropriate appliance for different types of applications.
6. Describe the procedures used to select the appropriate piping for the application.
7. Describe energy efficiency as it relates to appliances.
8. Describe the procedures used to install appliances and equipment.

9. Identify the different types of appliances.
  - i) boilers/gas fired hot water boosters
  - ii) commercial cooking equipment
  - iii) commercial clothes dryers
  - iv) construction heaters
  - v) catalytic heaters
  - vi) carbon dioxide generators
  - vii) air handling units/roof-top units
  
10. Describe different types of pressure regulators.
  - i) pilot operated
  - ii) direct operated
  - iii) lever operated
  - iv) single ported balanced
  - v) double ported balanced
  - vi) zero governors
  - vii) proportional
  - viii) two-stage regulator system (propane)
  
11. Describe the selection, installation and maintenance requirements for pressure regulators.
  
12. Describe requirements for venting.
  - i) pressure regulators
  - ii) over pressure relief
  
13. Describe ancillary devices and equipment, their installation, application, operation and procedures for use.
  - i) air filters and cleaners
    - media filters
    - electrostatic filters
    - electronic air cleaners
    - ultraviolet (UV) lights
    - HEPA filters
  - ii) humidifiers
    - controls
  - iii) cooling coils
  - iv) pumps
    - circulating
    - condensate
    - feed water

- v) economizers
- vi) water treatment
  - neutralizers
  - boiler chemicals
  - water softeners
- vii) draft control
  - dampers
  - induced fan
- viii) steam ancillary components
  - relief valves
  - steam traps
  - regulating valves

14. Describe the procedure to purge piping and equipment before start-up.

## **GFB-235 Propane Storage and Handling Systems**

### **Learning Outcomes:**

- Demonstrate knowledge of properties and characteristics of propane.
- Demonstrate knowledge of propane storage and handling systems.
- Demonstrate knowledge of procedure used to install propane systems.

### **2014 National Occupational Analysis Reference:**

15.01 Installs propane storage systems.

15.02 Installs propane handling systems.

### **Objectives and Content:**

1. Define terminology associated with propane storage and handling systems.
2. Identify hazards and describe safe work practices pertaining to propane storage and handling systems.
3. Identify codes and regulations pertaining to propane storage and handling systems.
4. Describe propane systems.
  - i) delivery
  - ii) storage
  - iii) distribution
  - iv) gas supply systems
5. Describe propane systems installation.
6. Describe the protection and maintenance of distribution systems.

## **GFB-240 Service, Maintenance and Repair**

### **Learning Outcomes:**

- Demonstrate knowledge of maintaining appliances and equipment.
- Demonstrate knowledge of repairing appliances and equipment.

### **2014 National Occupational Analysis Reference:**

- 18.01 Inspects system components and operation.
- 18.02 Performs maintenance activities.
- 19.01 Diagnoses gas-fired equipment and components.
- 19.02 Selects replacement components.
- 19.03 Replaces components.
- 19.04 Verifies operation.

### **Objectives and Content:**

1. Define terminology associated with servicing, maintaining and repairing appliances and equipment.
2. Identify hazards and describe safe work practices pertaining to servicing, maintaining and repairing appliances and equipment.
3. Identify codes and regulations pertaining to servicing, maintaining and repairing appliances and equipment.
4. Identify tools, equipment and materials used to assist in servicing, maintaining and repairing appliances and equipment.
5. Describe troubleshooting and testing as it applies to equipment ladder/schematic and pictorial/wiring diagrams.
6. Describe troubleshooting and testing procedures as they apply to servicing, maintaining and repairing appliances and equipment.
  - i) sequence of operations
7. Describe the procedures to repair and replace components.
8. Describe the procedure used to purge existing systems or components after repair.

9. Describe the different types of servicing.
  - i) annual
  - ii) emergency
  - iii) preventative
  
10. Describe troubleshooting and repairing pressure regulators.
  
11. Describe performance of flame sensing components.
  - i) scanner check
  - ii) flame signal
  - iii) ignition spark response
  - iv) pilot drop out
  - v) pilot turn down
  - vi) flame failure response

## **GFB-245 Equipment Conversion and Combustion**

### **Learning Outcomes:**

- Demonstrate knowledge of gas equipment, their applications, maintenance and procedures for use.
- Demonstrate knowledge of conversion equipment, their applications, maintenance and procedures for use.
- Demonstrate knowledge of orifices, the procedures used for sizing and conversion.
- Demonstrate knowledge of combustion and leakage testing.

### **2014 National Occupational Analysis Reference:**

- 10.01 Performs selection and installation of combustion controls.
- 14.01 Installs valve trains.
- 19.02 Selects replacement components.
- 19.03 Replaces components.
- 19.04 Verifies operation.

### **Objectives and Content:**

1. Define terminology associated with gas equipment, conversion burners and orifices, their application, maintenance and procedures for use.
2. Identify codes and regulations pertaining to conversions.
3. Identify the requirements of combustion theory and chemical processes involved in combustion.
4. Describe incomplete combustion, its causes, products and implications.
5. Determine suitability of appliance for conversion.
6. Describe conversion burner selection criteria.
7. Describe the procedures for selecting and sizing an orifice for conversion.



8. Describe the procedures used to prepare burners for conversion.
  - i) atmospheric
  - ii) fan assisted
  - iii) forced draft
  
9. Describe the procedures used to convert an appliance from one fuel type to another fuel type.

## **GFB-250 Testing Appliances and Equipment**

### **Learning Outcomes:**

- Demonstrate knowledge of testing instruments, their applications, maintenance and procedures for use.
- Demonstrate knowledge of techniques to test and maintain appliances and equipment, and procedures for use.

### **2014 National Occupational Analysis Reference:**

- 16.01 Tests gas piping systems.
- 16.02 Performs start-up procedures.
- 17.01 Performs testing, adjusting and balancing procedures.

### **Objectives and Content:**

1. Define terminology associated with testing appliances and equipment.
2. Identify hazards and describe safe work practices pertaining to testing appliances and equipment.
3. Identify codes and regulations pertaining to testing appliances and equipment.
4. Identify tools and equipment used to assist in testing appliances and equipment.
5. Describe the tests and inspections for appliances and equipment.
  - i) pressure testing
  - ii) meter dial test
  - iii) hydrostatic/air test
  - iv) bubble test
6. Describe the testing of appliances and equipment for safety, reliability and efficiency.
  - i) verify safeties and interlocks
  - ii) confirm operating parameters
    - flame signal
    - temperature rise
    - manifold pressure
    - communications

- systems integration according to manufacturers' specifications
  - systems operation according to intended design
  - iii) combustion analysis
7. Explain the liabilities and responsibilities for the testing of appliances and equipment.
- i) manufacturer
  - ii) Gasfitter - Class B
  - iii) AHJ
  - iv) building owner/representative
8. Identify manufacturers' required frequency for testing and maintenance of appliances and equipment.
9. Identify requirements for testing systems that have been altered or repaired.

## **GFB-255 Commissioning and Decommissioning**

### **Learning Outcomes:**

- Demonstrate knowledge of the procedures to commission and decommission appliances and equipment.

### **2014 National Occupational Analysis Reference:**

17.02 Completes commissioning report and handover.

20.01 Disconnects appliances and accessories.

20.02 Removes gas-fired systems and components.

### **Objectives and Content:**

1. Define terminology associated with commissioning and decommissioning of appliances and equipment.
2. Identify hazards and describe safe work practices pertaining to commissioning and decommissioning of appliances and equipment.
  - i) confined spaces
  - ii) asbestos containing materials
  - iii) lead-based paint
  - iv) energy isolation
  - v) environmental consideration
  - vi) mercury
  - vii) material recycling
3. Identify codes and regulations pertaining to commissioning and decommissioning of appliances and equipment.
4. Identify tools and equipment used to assist in commissioning and decommissioning of appliances and equipment.
5. Identify information pertaining to the commissioning and decommissioning of appliances and equipment.
6. Describe the procedures used to decommission appliances and equipment.
  - i) boiler lay up (wet/dry)
  - ii) prepare for transportation
  - iii) drain condensing appliances

## **GFB-260 Job Planning**

### **Learning Outcomes:**

- Demonstrate knowledge of the procedures used to plan and organize jobs.

### **2014 National Occupational Analysis Reference:**

- 3.02 Selects systems, equipment and components.
- 3.03 Organizes work.

### **Objectives and Content:**

1. Define terminology associated with job planning activities.
2. Identify sources of information relevant to job planning.
  - i) documentation
  - ii) drawings
  - iii) related professionals
  - iv) clients
3. Identify the factors to consider for determining job requirements.
  - i) personnel
  - ii) tools and equipment
  - iii) materials
  - iv) permits
  - v) safety planning
4. Describe the procedures used to plan job tasks.
  - i) scheduling
  - ii) estimating
  - iii) coordinating site access
5. Describe the procedures used to receive and verify delivered materials.
6. Describe the procedures used to store, organize and maintain inventory.
7. Identify the purpose of submittals and shop drawings, and describe the procedures used to interpret them.

8. Identify the types of material take-offs lists, and describe their applications and the procedures used to produce them.
  - i) material estimation
  - ii) material installation
  
9. Describe the procedures used to prepare work sites.
  - i) erecting barricades and flagging
  - ii) identifying hazards
  - iii) locating service points
  - iv) locating isolation points