**Occupational Analyses Series**

# Appliance Service Technician

**2011**


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|---|---|
| Trades and Apprenticeship Division | Division des métiers et de l'apprentissage |
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# FOREWORD

***The Canadian Council of Directors of Apprenticeship (CCDA) recognizes this National Occupational Analysis as the national standard for the occupation of Appliance Service Technician.***

**Background**

The first National Conference on Apprenticeship in Trades and Industries, held in Ottawa in 1952, recommended that the federal government be requested to cooperate with provincial and territorial apprenticeship committees and officials in preparing analyses of a number of skilled occupations. To this end, Human Resources and Skills Development Canada sponsors a program, under the guidance of the CCDA, to develop a series of National Occupational Analyses (NOAs).

The NOAs have the following objectives:

- to describe and group the tasks performed by skilled workers;
- to identify which tasks are performed in every province and territory;
- to develop instruments for use in the preparation of Interprovincial Red Seal Examinations and curricula for training leading to the certification of skilled workers;
- to facilitate the mobility of apprentices and skilled workers in Canada; and,
- to supply employers, employees, associations, industries, training institutions and governments with analyses of occupations.

# ACKNOWLEDGEMENTS

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# TABLE OF CONTENTS

# LIST OF PUBLISHED NATIONAL OCCUPATIONAL ANALYSES (Red Seal Trades)

| TITLE | NOC* Code |
|---|---|
| Agricultural Equipment Technician (2007) | 7312 |
| Appliance Service Technician (2011) | 7332 |
| Automotive Painter (2009) | 7322 |
| Automotive Service Technician (2009) | 7321 |
| Baker (2006) | 6252 |
| Boilermaker (2008) | 7262 |
| Bricklayer (2007) | 7281 |
| Cabinetmaker (2007) | 7272 |
| Carpenter (2010) | 7271 |
| Concrete Finisher (2006) | 7282 |
| Construction Craft Worker (2009) | 7611 |
| Construction Electrician (2008) | 7241 |
| Cook (2008) | 6242 |
| Electrical Rewind Mechanic (1999) | 7333 |
| Electronics Technician – Consumer Products (1997) | 2242 |
| Floorcovering Installer (2005) | 7295 |
| Glazier (2008) | 7292 |
| Hairstylist (2009) | 6271 |
| Heavy Duty Equipment Technician (2009) | 7312 |
| Industrial Electrician (2008) | 7242 |
| Industrial Mechanic (Millwright) (2009) | 7311 |
| Instrumentation and Control Technician (2010) | 2243 |
| Insulator (Heat and Frost) (2007) | 7293 |
| Ironworker (Generalist) (2010) | 7264 |
| Ironworker (Reinforcing) (2010) | 7264 |
| Ironworker (Structural/Ornamental) (2010) | 7264 |
| Landscape Horticulturist (2010) | 2225 |
| Lather (Interior Systems Mechanic) (2007) | 7284 |

* National Occupational Classification

| TITLE | NOC* Code |
|---|---|
| Machinist (2010) | 7231 |
| Metal Fabricator (Fitter) (2008) | 7263 |
| Mobile Crane Operator (2009) | 7371 |
| Motorcycle Mechanic (2006) | 7334 |
| Motor Vehicle Body Repairer (Metal and Paint) (2010) | 7322 |
| Oil Heat Systems Technician (2006) | 7331 |
| Painter and Decorator (2007) | 7294 |
| Partsperson (2010) | 1472 |
| Plumber (2010) | 7251 |
| Powerline Technician (2009) | 7244 |
| Recreation Vehicle Service Technician (2006) | 7383 |
| Refrigeration and Air Conditioning Mechanic (2009) | 7313 |
| Rig Technician (2008) | 8232 |
| Roofer (2006) | 7291 |
| Sheet Metal Worker (2010) | 7261 |
| Sprinkler System Installer (2009) | 7252 |
| Steamfitter — Pipefitter (2010) | 7252 |
| Tilesetter (2010) | 7283 |
| Tool and Die Maker (2010) | 7232 |
| Transport Trailer Technician (2008) | 7321 |
| Truck and Transport Mechanic (2010) | 7321 |
| Welder (2009) | 7265 |

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**These publications can be ordered or downloaded online at: www.red-seal.ca. Links to Essential Skills Profiles for some of these trades are also available on this website.**

# STRUCTURE OF ANALYSIS

To facilitate understanding of the occupation, the work performed by tradespersons is divided into the following categories:

| | |
|---|---|
| **Blocks** | the largest division within the analysis that is comprised of a distinct set of trade activities |
| **Tasks** | distinct actions that describe the activities within a block |
| **Sub-Tasks** | distinct actions that describe the activities within a task |
| **Key Competencies** | activities that a person should be able to do in order to be called 'competent' in the trade |

The analysis also provides the following information:

| | |
|---|---|
| **Context** | information to clarify the intent and meaning of tasks |
| **Trends** | changes identified that impact or will impact the trade including work practices, technological advances, and new materials and equipment |
| **Related Components** | a list of products, items, materials and other elements relevant to the block |
| **Tools and Equipment** | categories of tools and equipment used to perform all tasks in the block; these tools and equipment are listed in Appendix A |
| **Required Knowledge** | the elements of knowledge that an individual must acquire to adequately perform a task |

The appendices located at the end of the analysis are described as follows:

| | |
|---|---|
| **Appendix A — Tools and Equipment** | a non-exhaustive list of tools and equipment used in this trade |
| **Appendix B — Glossary** | definitions or explanations of selected technical terms used in the analysis |
| **Appendix C — Acronyms** | a list of acronyms used in the analysis with their full name |
| **Appendix D — Block and Task Weighting** | the block and task percentages submitted by each jurisdiction, and the national averages of these percentages; these national averages determine the number of questions for each block and task in the Interprovincial exam |
| **Appendix E — Pie Chart** | a graph which depicts the national percentages of exam questions assigned to blocks |
| **Appendix F — Task Profile Chart** | a chart which outlines graphically the blocks, tasks and sub-tasks of this analysis |

# DEVELOPMENT AND VALIDATION OF ANALYSIS

## Development of Analysis

A draft analysis is developed by a committee of industry experts in the field led by a team of facilitators from HRSDC. This draft analysis breaks down all the tasks performed in the occupation and describes the knowledge and abilities required for a tradesperson to demonstrate competence in the trade.

## Draft Review

The NOA development team then forwards a copy of the analysis and its translation to provincial and territorial authorities for a review of its content and structure. Their recommendations are assessed and incorporated into the analysis.

## Validation and Weighting

The analysis is sent to all provinces and territories for validation and weighting. Participating jurisdictions consult with industry to validate and weight the document, examining the blocks, tasks and sub-tasks of the analysis as follows:

| | |
|---|---|
| **BLOCKS** | Each jurisdiction assigns a percentage of questions to each block for an examination that would cover the entire trade. |
| **TASKS** | Each jurisdiction assigns a percentage of exam questions to each task within a block. |
| **SUB-TASKS** | Each jurisdiction indicates, with a YES or a NO, whether or not each sub-task is performed by skilled workers within the occupation in its jurisdiction. |

The results of this exercise are submitted to the NOA development team who then analyzes the data and incorporates it into the document. The NOA provides the individual jurisdictional validation results as well as the national averages of all responses. The national averages for block and task weighting guide the Interprovincial Red Seal Examination plan for the trade.

This method for the validation of the NOA also identifies common core sub-tasks across Canada for the occupation. If at least 70% of the responding jurisdictions perform a sub-task, it shall be considered common core. Interprovincial Red Seal Examinations are based on the common core sub-tasks identified through this validation process.

## Definitions for Validation and Weighting

| | |
|---|---|
| **YES** | sub-task performed by qualified workers in the occupation in a specific jurisdiction |
| **NO** | sub-task not performed by qualified workers in the occupation in a specific jurisdiction |
| **NV** | analysis Not Validated by a province/territory |
| **ND** | trade Not Designated in a province/territory |
| **NOT COMMON CORE (NCC)** | sub-task, task or block performed by less than 70% of responding jurisdictions; these will not be tested by the Interprovincial Red Seal Examination for the trade |
| **NATIONAL AVERAGE %** | average percentage of questions assigned to each block and task in Interprovincial Red Seal Examination for the trade |

## Provincial/Territorial Abbreviations

| | |
|---|---|
| **NL** | Newfoundland and Labrador |
| **NS** | Nova Scotia |
| **PE** | Prince Edward Island |
| **NB** | New Brunswick |
| **QC** | Quebec |
| **ON** | Ontario |
| **MB** | Manitoba |
| **SK** | Saskatchewan |
| **AB** | Alberta |
| **BC** | British Columbia |
| **NT** | Northwest Territories |
| **YT** | Yukon Territory |
| **NU** | Nunavut |

# ANALYSIS

Safe working procedures and conditions, accident prevention, and the preservation of health are of primary importance to industry in Canada. These responsibilities are shared and require the joint efforts of government, employers and employees. It is imperative that all parties are aware of circumstances and conditions that may lead to injury or harm. Safe learning experiences and work environments can be created by controlling the variables and behaviours that may contribute to accidents or injury.

It is generally recognized that safety-conscious attitudes and work practices contribute to a healthy, safe and accident-free work environment.

It is imperative to apply and be familiar with the Occupational Health and Safety (OH&S) Acts and Workplace Hazardous Materials Information System (WHMIS) Regulations. As well, it is essential to determine workplace hazards and take measures to protect oneself, co-workers, the public and the environment.

Safety education is an integral part of training in all jurisdictions. As safety is an imperative part of all trades, it is assumed and therefore it is not included as a qualifier of any activities. However, the technical safety tasks and sub-tasks specific to the trade are included in this analysis.

# SCOPE OF THE APPLIANCE SERVICE TECHNICIAN TRADE

"Appliance Service Technician" is this trade's official Red Seal occupational title approved by the CCDA. This analysis covers tasks performed by appliance service technicians whose occupational title has been identified by some provinces and territories of Canada under the following names:

| | NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Appliance Service Technician | ✓ | ✓ | ✓ | ✓ | | ✓ | | | ✓ | ✓ | ✓ | | ✓ |

Appliance service technicians repair and service consumer related appliance products including, but not limited to:

- central vacuum systems
- clothes washers
- cooking ventilation systems
- dehumidifiers
- dishwashers
- electric clothes dryers
- electric fireplaces
- electric freezers
- electric ranges
- electric refrigerators
- electric water heaters
- gas clothes dryers
- gas ranges
- humidifiers
- ice makers
- microwave ovens
- residential air conditioners
- waste compactors
- waste disposers
- water coolers
- window and portable air conditioners

Appliance service technicians identify appliance concerns by performing diagnostic procedures with testing equipment. Based on their assessment, they provide work and cost estimates to the customer. They may provide installation and maintenance services. They disassemble appliances, repair, remove and replace components, and reassemble appliances. They recover refrigerant gases and transfer the gases into approved storage containers for disposal according to jurisdictional regulations. Appliance service technicians may be called to demonstrate the use and care of the appliance to the customer.

Appliance service technicians may specialize in certain types or brands of appliances. They may be self-employed or employed by retail and manufacturer repair departments, utility companies or appliance service shops. Technicians may be supplied with service vehicles. The work environment may vary considerably because most of the work is in customers' homes.

Key attributes for people entering this trade are communication, organizational and problem-solving skills. The physical considerations of the work include bending, kneeling and moving large appliances. If safety procedures are not followed there is an increased risk of physical injury due to electrical shocks, cuts, burns and muscle strain.

Appliance service technicians may consult and coordinate with other tradespeople such as refrigeration and air conditioning mechanics, electricians, gas fitters and plumbers.

With experience, appliance service technicians may move into technical training, sales or supervisory positions. They may also work in their own appliance service business.

# OCCUPATIONAL OBSERVATIONS

Manufacturers are using new technology and upgrades such as induction cooking technology, variable speed compressors and fans, and multiple evaporators for independent cooling zones.

The incorporation of steam into appliances such as washers, dryers, dishwashers and ranges is becoming more common and may offer improved cleaning and baking performance. Some manufacturers' workshops specialize in specific technological requirements for the repair of these new products.

Self-diagnosing appliances assist the technician in informing them where to focus their diagnosis. Appliances are becoming more integrated with electronic technology.

Appliance components are more disposable, making component replacement more common than component repair.

Advances in technology are resulting in an increased need for post-certification training of technicians on a continuous basis.

It is important that technicians have good customer communication and critical thinking skills in order to perform the diagnosis of appliances.

# ESSENTIAL SKILLS SUMMARY

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

Through extensive research, the Government of Canada and other national and international agencies have identified and validated nine essential skills. These skills are used in nearly every occupation and throughout daily life in different ways.

A series of CCDA-endorsed tools have been developed to support apprentices in their training and to be better prepared for a career in the trades. The tools can be used independently or with the assistance of a tradesperson, trainer, employer, teacher or mentor to:

- understand how essential skills are used in the trades;
- learn about individual essential skills strengths and areas for improvement; and
- improve essential skills and increase success in an apprenticeship program.

The tools are available online or for order at: www.hrsdc.gc.ca/essentialskills.

The essential skills profile for the appliance service technician trade indicates that the most important essential skills are **document use, oral communication and decision making**.

The application of these skills may be described throughout this document within the competency statements which support each subtask of the trade. The following are summaries of the requirements in each of the essential skills, taken from the essential skills profile. A link to the complete essential skills profile can be found at www.red-seal.ca.

***Reading***
Appliance service technicians require strong reading skills to read and comprehend operating instructions, safety warnings and online information to learn about appliances, new technologies and changes in the industry. They must read and interpret notes on work orders, which summarize customers' problems with the operation of appliances and previous repairs.

***Document Use***
Appliance service technicians refer to work orders and job specifications to determine the tasks to be performed and material required. They refer to the model numbers on various products to interpret parts breakdown drawings. Appliance service technicians must locate data such as tech sheets, and functions and specifications of components by studying the schematics for electrical and refrigerant systems in appliances.

***Writing***
Appliance service technicians use writing skills to prepare work orders and invoices to document work. They may keep personal logbooks on the details and status of tasks performed. On occasion, appliance service technicians may need to complete hazard or near-miss reports.

They write e-mails to parts suppliers and appliance manufacturers to confirm orders or request information.

***Oral Communication***
Appliance service technicians talk to customers about service concerns and repairs to be performed. They need strong communication skills when experiencing customer related stressful situations to promote good customer relations. They speak with supervisors regarding work schedules, normal work practices and any unusual occurrences such as unresolved customer complaints. Appliance service technicians also exchange information with co-workers and manufacturers' representatives.

***Numeracy***
Appliance service technicians calculate labour charges, add costs of parts and supplies, and then apply discounts and sales taxes. They calculate and present cost analyses to customers. Appliance service technicians measure and compare readings such as temperatures, pressures and clearances to ensure the readings are within manufacturers' established standards.

***Thinking Skills***
Appliance service technicians often have to use thinking skills to solve problems like organizing a job and diagnosing appliance issues. They must maintain adequate inventory and/or shop supplies. They must also find correct addresses, reconfirm appointments or make new arrangements.

***Working with Others***
As much as appliance service technicians often work independently to carry out repairs and service appliances, they must often collaborate and work with other trades to solve customer issues.

***Computer Use***
Appliance service technicians may use processing, bookkeeping, billing, accounting or communication software to accomplish tasks such as processing invoices and ordering parts. They must enter or retrieve information about customers, parts orders, service calls and repair jobs. They must also search on-line databases for information about appliance repairs.

***Continuous Learning***
Technical upgrading is offered by manufacturers when new products or equipment are introduced. Appliance service technicians may attend training seminars sponsored by appliance manufacturers to be certified to work on specific brands of appliances. They take general skill upgrading offered through apprenticeship programs, and regularly upgrade their skills as new appliance technologies and features enter the market.

# ROLES AND OPPORTUNITIES FOR SKILLED TRADES IN A SUSTAINABLE FUTURE

Climate change affects all of us. Trades play a large role in implementing solutions and adjusting to changes in the world.

Throughout this standard, there may be specific references to tasks, skills and knowledge that clearly show this trade's role in a more sustainable future. Each trade has different roles to play and contributions to make in their own way.

For example:

- Construction tradespeople need to consider the materials they are using, building methods, and improvements to mechanical and electrical installations. There are important changes to codes and standards to help meet the climate change goals and commitments set for 2030 and 2050. Retrofits and new construction of low-energy buildings provide enormous opportunities for workers in this sector. Concepts, such as energy efficiency and regarding buildings as systems are foundational.

- Automotive and mechanical trades are seeing a shift towards the electrification of vehicles and equipment. As a result, new skills and knowledge will be required for tradespeople working in this sector. There are mandates for sales of new light-duty zero-emission vehicles (ZEV) in Canada, with the goal of achieving 100% ZEV sales by 2035. Due to this mandate, the demand for these vehicles is growing quickly among consumers and fleets. With this escalating demand, the need for skilled workers to maintain and repair these vehicles is also increasing.

- In industrial and resource sectors, there is pressure to move towards increased electrification of industrial processes. Many industrial and commercial facilities are also being upgraded to improve energy efficiency in areas such as lighting systems, and new production processes and technologies. There are also opportunities in carbon capture, utilization and storage (CCUS), as well as the production and export of low-carbon hydrogen.

- Trades in the service sector may also need to be aware of responsible sourcing, as well as efficient use of products and materials. New ways of working better are always a part of the job.

There are fast-moving changes in guidelines, codes, regulations and specifications. Many are being implemented for the purpose of energy efficiency and climate change. Those that affect specific trades may be mentioned within the standard. Examples of these guidelines and legislation include:

- The National Energy Code of Canada for Buildings (NECB).
- The Canadian Net-Zero Emissions Accountability Act (CNZEAA).
- programs that encourage sustainable building design and construction such as Leadership in Energy and Environmental Design (LEED) and the Zero Carbon Building (ZCB) standards.
- the Montreal Protocol for phasing out R22 refrigerants.
- energy efficiency programs such as ENERGY STAR.
- principles of the United Nations Declaration for the Rights of Indigenous Peoples pertaining to energy sector development.

Apprentices and tradespeople need to increase their climate literacy and reinforce their own understanding of energy issues and environmental practices. It is important for them to understand why these changes are happening and their effect on trades' work. While individual tradespeople and apprentices may not be able to choose certain elements like; the architectural design of buildings, building material selection, regulatory requirements, use of electric vehicles and technologies, they must understand the impact of using these elements in their work. Impacts include using environmentally friendly products and following requirements related to the disposal and recycling of materials.

In apprenticeship, as well as in ongoing professional development, employers and instructors should encourage learning about these concepts, why they are important, how they are implemented, and the overarching targets they are aiming to achieve.

All in all, it's about doing the work better and building a better world.

# BLOCK A OCCUPATIONAL SKILLS

**Context**

The use of quality tools creates more efficiency in the trade.

Proper appliance installation contributes to the lifespan of the appliance. Proper handling can prevent damage to the appliance and property, as well as contributing to personal and public safety. Appliance service technicians are responsible for ensuring the safety of themselves and others in the work environment. They should be able to follow company, local and other jurisdictional regulations.

It is critical that appliance service technicians be constantly aware of their surroundings and the hazards that they may encounter.

**Trends**

The ability to communicate complex information is becoming more important. More appliances are being installed in confined spaces and in more challenging environments. The complexity of new appliances leads to a need for more expertise and knowledge in installation, servicing and maintenance.

Tools in the appliance servicing industry are becoming more sophisticated and specialized.

**Related Components**

All components apply.

**Tools and Equipment**

See Appendix A.

## Task 1 Performs safety-related functions.

**Required Knowledge**

| | |
|---|---|
| K 1 | location of personal protective equipment (PPE) and safety equipment |
| K 2 | OH&S regulations |
| K 3 | jurisdictional safety regulations |
| K 4 | dangerous conditions and potential hazards |
| K 5 | types and usage of PPE such as safety glasses, gloves, safety boots and non-slip overshoes |
| K 6 | types and usage of safety equipment |
| K 7 | required training and certification |

| | |
|---|---|
| K 8 | WHMIS and Material Safety Data Sheet (MSDS) |
| K 9 | first aid |
| K 10 | lockout procedures |
| K 11 | safety protocol |
| K 12 | company safety policy |
| K 13 | signage |
| K 14 | required ventilation |
| K 15 | job hazards assessment |

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**Sub-task**

**A-1.01 Maintains safe work environment.**

| NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NV | yes | NV | yes | yes | NV | yes | ND | yes | yes | NV | ND | NV |

**Key Competencies**

| | |
|---|---|
| A-1.01.01 | comply with lock-out and tag-out procedures |
| A-1.01.02 | identify and correct potential and existing hazards |
| A-1.01.03 | maintain clean work area |
| A-1.01.04 | acknowledge and inform surrounding co-workers concerning safety and well-being |
| A-1.01.05 | safely store materials and equipment |
| A-1.01.06 | dispose of materials and products according to jurisdictional regulations and MSDS |
| A-1.01.07 | identify and respect physical limitations of self and others |
| A-1.01.08 | set up or identify location of safety zone containing components such as first aid kit, WHMIS, fire extinguishers, MSDS and eye wash stations |
| A-1.01.09 | document items such as inspections, potential hazards, safety meetings, injuries and training according to jurisdictional regulations |
| A-1.01.10 | operate service vehicle in a safe manner according to jurisdictional regulations |

**Sub-task**

**A-1.02 Uses personal protective equipment (PPE) and safety equipment.**

| NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NV | yes | NV | yes | yes | NV | yes | ND | yes | yes | NV | ND | NV |

**Key Competencies**

| | |
|---|---|
| A-1.02.01 | identify site hazards and regulations requiring the use of PPE and safety equipment |
| A-1.02.02 | select PPE and safety equipment appropriate for individual tasks and situations |
| A-1.02.03 | maintain and store PPE and safety equipment |
| A-1.02.04 | apply local, jurisdictional and national safety regulations such as WHMIS and OH&S |
| A-1.02.05 | identify PPE damage such as excessively worn boots and cracked safety glasses |
| A-1.02.06 | recognize CSA-approved PPE and applicable safety equipment such as fire extinguishers and signage |
| A-1.02.07 | ensure proper fit of PPE such as respirators, particulate masks, face shields and gloves |
| A-1.02.08 | report and replace damaged or failed equipment |

## Task 2 Uses and maintains tools and equipment.

**Required Knowledge**

| | |
|---|---|
| K 1 | types of tools such as hammers, vacuum pumps, multimeters and nut drivers, and their maintenance |
| K 2 | diagnostic and measuring tools for refrigeration systems such as weigh scales, charging cylinders and compound gauges |
| K 3 | diagnostic and measuring tools for gas systems such as combustible gas leak detector, carbon monoxide detector and manometers |
| K 4 | types of soldering and brazing equipment such as torches and soldering guns |
| K 5 | soldering/brazing gases such as oxygen, MAPP™, propane, butane and acetylene |
| K 6 | alloys and fluxes |
| K 7 | limitations of use of tools |

| | |
|---|---|
| K 8 | Transportation of Dangerous Goods (TDG) regulations |
| K 9 | WHMIS |
| K 10 | ventilation requirements |
| K 11 | operating procedures |
| K 12 | storage procedures for recovery equipment and pressurized gases |

---

**Sub-task**

**A-2.01 Maintains tools and equipment.**

| NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NV | yes | NV | yes | yes | NV | yes | ND | yes | yes | NV | ND | NV |

**Key Competencies**

| | |
|---|---|
| A-2.01.01 | organize tools such as hand, diagnostic and measuring tools |
| A-2.01.02 | inspect tools and equipment for deficiency or damage |
| A-2.01.03 | repair or replace failed or damaged tools and equipment according to manufacturers' specifications |
| A-2.01.04 | calibrate diagnostic and measuring tools according to manufacturers' specifications, and local and jurisdictional regulations |
| A-2.01.05 | document tool and equipment maintenance |
| A-2.01.06 | clean and store tools and equipment according to manufacturers' specifications |

---

**Sub-task**

**A-2.02 Uses soldering and brazing equipment.**

| NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NV | yes | NV | yes | yes | NV | yes | ND | yes | yes | NV | ND | NV |

**Key Competencies**

| | |
|---|---|
| A-2.02.01 | recognize flammable materials |
| A-2.02.02 | match alloy to specific component to be soldered or brazed |
| A-2.02.03 | organize soldering and brazing equipment |
| A-2.02.04 | select and operate soldering and brazing equipment according to job requirements |

| | |
|---|---|
| A-2.02.05 | clean and maintain soldering equipment |
| A-2.02.06 | check and clean torch tips on brazing equipment |
| A-2.02.07 | recognize worn, damaged and failed soldering/brazing equipment, and tag and remove from service if necessary |
| A-2.02.08 | recognize hazards of use of soldering/brazing equipment |
| A-2.02.09 | store soldering/brazing equipment and supplies to avoid damage or injury |

**Sub-task**

**A-2.03 Uses recovery equipment.**

| NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NV | yes | NV | yes | yes | NV | yes | ND | yes | yes | NV | ND | NV |

**Key Competencies**

| | |
|---|---|
| A-2.03.01 | perform maintenance such as changing oil and filter, and checking for leaks according to manufacturers' specifications |
| A-2.03.02 | identify type of refrigerant such as R12, R22 and R134-A according to appliance documentation |
| A-2.03.03 | organize recovery equipment according to jurisdictional ODS (Ozone Depleting Substance) regulations |
| A-2.03.04 | select and operate recovery equipment according to type of refrigerant |

## Task 3 Organizes work.

**Required Knowledge**

| | |
|---|---|
| K 1 | parts and materials required |
| K 2 | normal appliance operations |
| K 3 | testing techniques |
| K 4 | electrical and electronic system requirements and components |
| K 5 | mechanical system requirements and components |
| K 6 | water system requirements and components |
| K 7 | air system requirements and components |
| K 8 | refrigeration sealed system requirements and components |
| K 9 | gas system requirements and components |

**Sub-task**

**A-3.01 Plans daily tasks.**

| NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NV | yes | NV | yes | yes | NV | yes | ND | yes | yes | NV | ND | NV |

**Key Competencies**

| | |
|---|---|
| A-3.01.01 | coordinate with other sub-trades such as electricians, carpenters and plumbers if required |
| A-3.01.02 | schedule tasks according to conditions such as customers' requests, location of customers, and urgency and length of job |
| A-3.01.03 | estimate materials, supplies and labour |
| A-3.01.04 | select materials and supplies according to job requirements |
| A-3.01.05 | determine if special equipment is required such as roller stands and lifts |
| A-3.01.06 | determine if assistance is required from co-workers |
| A-3.01.07 | verify availability of parts and materials to schedule daily tasks |

**Sub-task**

**A-3.02 Organizes parts and supplies.**

| NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NV | yes | NV | yes | yes | NV | yes | ND | yes | yes | NV | ND | NV |

**Key Competencies**

| | |
|---|---|
| A-3.02.01 | secure parts and supplies to ensure safe transfer from office to vehicle and from vehicle to job site |
| A-3.02.02 | ensure selected parts and supplies correspond to job requirements |
| A-3.02.03 | order parts and supplies, and enquire for availability |
| A-3.02.04 | maintain stock and inventory of parts and supplies |

## Task 4 Prepares for installation.

**Required Knowledge**

| | |
|---|---|
| K 1 | flooring requirements for various appliances |
| K 2 | appliance weight and dimensions |
| K 3 | manufacturers' installation specifications such as clearances required, accessibility and support requirements |
| K 4 | venting equipment and requirements for appliances such as dryers, gas appliances and over-the-range products |
| K 5 | type and location of utilities such as water, power, drain and gas |
| K 6 | work to be performed by other tradespersons |
| K 7 | applicable codes and regulations regarding installation of appliances |
| K 8 | existing site measurements |
| K 9 | types of appliances that can be converted such as ranges, dryers and barbecues |
| K 10 | conversion procedures such as component replacement and adjusting gas pressure, valves and regulators |
| K 11 | jurisdictional certifications and restrictions for working with gas |

### Sub-task A-4.01 Converts gas appliances. (NOT COMMON CORE)

| NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NV | no | NV | no | no | NV | no | ND | yes | yes | NV | ND | NV |

**Key Competencies**

| | |
|---|---|
| A-4.01.01 | select and use hand tools |
| A-4.01.02 | recognize if appliance matches gas supply |
| A-4.01.03 | remove and reinstall correct orifices |
| A-4.01.04 | reconfigure gas valve regulator for appropriate fuel according to manufacturers' specifications |
| A-4.01.05 | adjust air shutters according to manufacturers' specifications |
| A-4.01.06 | verify correct operation of appliances after conversion |
| A-4.01.07 | label appliance with supplied tags to indicate fuel used in appliance |

**Sub-task**

**A-4.02 Verifies appliance location.**

| NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NV | yes | NV | yes | no | NV | yes | ND | yes | yes | NV | ND | NV |

**Key Competencies**

| | |
|---|---|
| A-4.02.01 | inspect the flooring support and floor coverings to identify unsuitable flooring |
| A-4.02.02 | check flooring level to determine suitability of location |
| A-4.02.03 | determine appliance location taking into consideration factors such as door swing, room size and accessibility |
| A-4.02.04 | measure dimensions such as cabinets and counter height to ensure clearances are according to manufacturers' specifications |
| A-4.02.05 | advise customer of appropriateness of appliance location taking into account conditions such as air requirements and ambient temperature |

**Sub-task**

**A-4.03 Verifies water, power, drain, venting and gas connections.**

| NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NV | yes | NV | yes | no | NV | yes | ND | yes | yes | NV | ND | NV |

**Key Competencies**

| | |
|---|---|
| A-4.03.01 | verify that utility (electrical, plumbing and drainage) supplies are within specified distance from appliance according to manufacturers' specifications and jurisdictional codes |
| A-4.03.02 | recognize unsuitable connections such as worn and damaged valves, improper drain height and size, and improper venting material, vent size and vent termination |

## Task 5 Removes and installs appliances.

**Required Knowledge**

| | |
|---|---|
| K 1 | moving procedures such as lifting points and tilting of appliance |
| K 2 | appliance weight and size |
| K 3 | types of connection components such as hoses, compression fittings, wire nuts and clamps |
| K 4 | wire sizing and positioning |
| K 5 | hose position and routing |
| K 6 | locations of protective covers and access panels |
| K 7 | uncrating requirements such as tools, labour and space |
| K 8 | types of shipping materials such as suspension bolts, clips, styrofoam and tape |
| K 9 | mechanical aids and protective materials |
| K 10 | jurisdictional regulations regarding tagging and disposal of appliances and materials |
| K 11 | jurisdictional certifications and restrictions for working with gas |

**Sub-task**

**A-5.01 Handles appliance.**

| NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NV | yes | NV | yes | yes | NV | yes | ND | yes | yes | NV | ND | NV |

**Key Competencies**

| | |
|---|---|
| A-5.01.01 | perform proper lifting and moving procedures to prevent injury to technician and damage to unit and property |
| A-5.01.02 | protect flooring and work area using tools such as glides, moving blankets and carpet to prevent damage to flooring |
| A-5.01.03 | use mechanical aids such as dollies, straps and mechanical lifts to move appliances |
| A-5.01.04 | position and secure appliances according to manufacturers' specifications and jurisdictional regulations |

**Sub-task**
**A-5.02 Disconnects/reconnects water, power, drain, gas and venting.**

| NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NV | yes | NV | yes | yes | NV | yes | ND | yes | yes | NV | ND | NV |

**Key Competencies**

| | |
|---|---|
| A-5.02.01 | locate and access utility shut-offs |
| A-5.02.02 | turn off utility supplies such as water, power and gas according to applicable regulations to ensure a safe work environment |
| A-5.02.03 | prepare connections using materials such as thread sealer, hose gaskets and adhesives to avoid leaks |
| A-5.02.04 | install connectors to ensure secure electrical wiring and to prevent damage and injury |
| A-5.02.05 | clean existing accessible vent to promote adequate air flow for appliance |
| A-5.02.06 | upgrade existing venting system according to jurisdictional codes |

**Sub-task**
**A-5.03 Performs final inspection of connections.**

| NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NV | yes | NV | yes | yes | NV | yes | ND | yes | yes | NV | ND | NV |

**Key Competencies**

| | |
|---|---|
| A-5.03.01 | select and use tools and equipment such as leak detectors and soap solution to test for and identify gas leaks |
| A-5.03.02 | check mechanical connections for water, gas, drain and venting |
| A-5.03.03 | visually inspect connections to ensure secure electrical wiring and venting |
| A-5.03.04 | test appliance operation for conditions such as leaks, noises and vibration |
| A-5.03.05 | reinstall appliance protective covers and access panels |

**Sub-task**

**A-5.04 Prepares for disposal of appliances and materials.**

| NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NV | yes | NV | yes | yes | NV | yes | ND | yes | yes | NV | ND | NV |

**Key Competencies**

| | |
|---|---|
| A-5.04.01 | identify hazardous materials such as refrigerant and mercury switches that must be removed prior to disposal of appliance |
| A-5.04.02 | decommission appliances containing refrigerants according to jurisdictional regulations |
| A-5.04.03 | tag appliance according to jurisdictional regulations prior to disposal |

# BLOCK B ELECTRICAL AND ELECTRONIC SYSTEMS

| | |
|---|---|
| **Context** | Electronic and electrical systems control all functions of appliance operation. Servicing them is one of the most technical aspects of a technician's job. |
| **Trends** | Electrical and electronic systems are becoming more sophisticated. Service diagnostics are built into many new appliances requiring more knowledge and training. |
| **Related Components (including, but not limited to)** | Switches, relays, elements, timers, clocks, thermostats, motors, printed circuit (PC) boards, speed control, solenoids, direct current (DC) drive mechanism, sensors, interface boards, wires, terminals, connectors, inverters, cables. |
| **Tools and Equipment** | Personal protective equipment (PPE) and safety equipment, common measuring/testing equipment, common service tools, soldering and brazing tools. |

## Task 6 Diagnoses electrical and electronic components.

**Required Knowledge**

| | |
|---|---|
| K 1 | power supply systems |
| K 2 | testing procedures |
| K 3 | types of electrical components such as switches, elements, transformers and motors |
| K 4 | types of electronic components such as PC boards and solid state relays |
| K 5 | component functions |
| K 6 | components physical appearance and values such as resistance and capacitance |
| K 7 | types of procedures and test points for testing components and circuits such as resistance, voltage and amperage |
| K 8 | types of wiring diagrams such as schematics, pictorial, fault codes and technical data sheets |
| K 9 | types of wires such as high temperature, solid and braided |

| | |
|---|---|
| K 10 | types of connectors such as high heat/low heat, heat-sealed and crimp-on |
| K 11 | electronic circuitry |
| K 12 | thermal electric systems |

---

**Sub-task**

**B-6.01 Verifies power source.**

| NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NV | yes | NV | yes | yes | NV | yes | ND | yes | yes | NV | ND | NV |

**Key Competencies**

| | |
|---|---|
| B-6.01.01 | select and use test equipment such as multimeters and volt pens |
| B-6.01.02 | identify source voltage to validate the required voltage according to manufacturers' specifications |
| B-6.01.03 | ensure neutral conductor is identified according to electrical code |
| B-6.01.04 | ensure over-current protection devices such as breakers and fuses meet electrical code and manufacturers' specifications |

---

**Sub-task**

**B-6.02 Inspects electrical and electronic components and circuits.**

| NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NV | yes | NV | yes | yes | NV | yes | ND | yes | yes | NV | ND | NV |

**Key Competencies**

| | |
|---|---|
| B-6.02.01 | select and use tools and equipment that allow access and inspection of components |
| B-6.02.02 | disassemble/reassemble appliance to access components if required |
| B-6.02.03 | perform sensory inspection to identify failed components that may be thermally or physically damaged |
| B-6.02.04 | verify integrity of circuits such as wires, terminals, connectors and cables according to schematic diagrams |

**Sub-task**

**B-6.03 Tests electrical and electronic components and circuits.**

| NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NV | yes | NV | yes | yes | NV | yes | ND | yes | yes | NV | ND | NV |

**Key Competencies**

| | |
|---|---|
| B-6.03.01 | select and use tools and test equipment such as multimeters, ammeters temperature probes and temperature meters |
| B-6.03.02 | measure input and output voltages and interpret results to determine source of failed components |
| B-6.03.03 | perform circuit checks such as capacitance, resistance and inverter frequencies to identify failed components, connections and wires according to technical data sheets |

## Task 7 Repairs electrical and electronic systems.

**Required Knowledge**

| | |
|---|---|
| K 1 | types of electrical components such as switches, elements, transformers and motors |
| K 2 | types of electronic components such as PC boards and solid state relays |
| K 3 | types of motors such as brushed, brushless, variable speed and AC/DC |
| K 4 | electronic circuitry |
| K 5 | thermal electric systems |
| K 6 | types of wires such as high temperature, solid and braided |
| K 7 | types of connectors such as high heat/low heat, heat-sealed and crimp-on |

**Sub-task**

**B-7.01 Repairs wiring and connectors.**

| NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NV | yes | NV | yes | yes | NV | yes | ND | yes | yes | NV | ND | NV |

**Key Competencies**

| | |
|---|---|
| B-7.01.01 | select and use tools and equipment such as cutters, wire strippers and pliers |
| B-7.01.02 | disassemble/reassemble appliance if required to access components |
| B-7.01.03 | remove old connectors and failed wiring |
| B-7.01.04 | cut wire to length to prepare for connection and avoid strain on wire |
| B-7.01.05 | expose conductors by removing insulated coatings |
| B-7.01.06 | select and install connectors according to application, temperature environment, and wire gauge and type to ensure a secure connection |
| B-7.01.07 | insulate connectors if required using materials such as heat shrink, silicone and electrical tape to ensure electrical isolation according to manufacturers' specifications |
| B-7.01.08 | test operation of appliance after repair to ensure appliance is in working order |

**Sub-task**

**B-7.02 Replaces electrical and electronic components.**

| NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NV | yes | NV | yes | yes | NV | yes | ND | yes | yes | NV | ND | NV |

**Key Competencies**

| | |
|---|---|
| B-7.02.01 | select and use tools and equipment such as grounding straps and hand tools |
| B-7.02.02 | disassemble/reassemble appliance if required to access components |
| B-7.02.03 | remove failed devices and components taking care not to damage surrounding components |
| B-7.02.04 | fasten and secure replacement components using clips, tabs and screws according to manufacturers' specifications |
| B-7.02.05 | program PC boards to ensure correct operation according to manufacturers' specifications |
| B-7.02.06 | test operation of appliance after replacement of components to ensure appliance is in working order |

# BLOCK C MECHANICAL SYSTEMS

**Context**

Mechanical systems consist of the drive system, cabinet structure and suspension system. They provide the operation, appearance and structure of appliances. Appliance service technicians diagnose, repair and replace failed mechanical system components. These are some of the most physically demanding tasks for the technician.

**Trends**

Appliances are becoming more environmentally friendly and energy efficient. An increased use of lighter materials can lower manufacturing and shipping costs.

Appliance service technicians need to develop a broader knowledge of mechanical systems since more brands, different designs and mechanisms such as transmission-less systems are now on the market.

**Related Components (including, but not limited to)**

**Drive systems:** transmissions, clutches, belts, motors, rotor-stators, pulleys, bearings.

**Suspension systems:** cables, shocks, springs, rods, snubbers.

**Cabinets:** doors, panels, trim, hinges, legs, rollers, supports.

**Tools and Equipment**

Personal protective equipment (PPE) and safety equipment, common service tools, specialty dishwasher, washer and dryer tools, shop tools.

## Task 8 Diagnoses drive systems.

**Required Knowledge**

| | |
|---|---|
| K 1 | appliance makes and models |
| K 2 | component operation and interaction with other components |
| K 3 | drive system operation and function |
| K 4 | physical appearance of worn and failed components |
| K 5 | testing procedures, techniques and methods |

**Sub-task**

**C-8.01 Inspects drive system components.**

| NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NV | yes | NV | yes | yes | NV | yes | ND | yes | yes | NV | ND | NV |

**Key Competencies**

| | |
|---|---|
| C-8.01.01 | select and use tools and equipment that allow access and inspection of components |
| C-8.01.02 | access drive system components by removing panels and cabinets as required |
| C-8.01.03 | perform sensory inspection to identify failed components that may be worn and physically damaged |

**Sub-task**

**C-8.02 Tests drive system components.**

| NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NV | yes | NV | yes | yes | NV | yes | ND | yes | yes | NV | ND | NV |

**Key Competencies**

| | |
|---|---|
| C-8.02.01 | select and use tools such as socket wrenches and multimeters |
| C-8.02.02 | access drive system components by removing panels and cabinets as required |
| C-8.02.03 | perform operational test according to technical data sheet to identify failed components that may be worn and physically damaged, and to determine cause of failure |
| C-8.02.04 | perform individual tests on identified failed components according to manufacturers' specifications to confirm previous diagnostic findings |

## Task 9 Repairs drive systems.

**Required Knowledge**

| | |
|---|---|
| K 1 | types of specialty tools such as spanner wrenches, brake tools and spring tools |
| K 2 | rebuilding procedures |
| K 3 | repairing procedures |

| | |
|---|---|
| K 4 | drive system components |
| K 5 | drive system design |
| K 6 | replacement procedures |

---

**Sub-task**

**C-9.01 Repairs drive system components.**

| NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NV | yes | NV | yes | yes | NV | yes | ND | yes | yes | NV | ND | NV |

**Key Competencies**

| | |
|---|---|
| C-9.01.01 | select and use tools and equipment such as socket set and specialized pliers |
| C-9.01.02 | rebuild transmissions and clutches by changing components such as shaft seal, gears, pawls and brake/clutch pads |
| C-9.01.03 | adjust components such as motors, clutches and belt tensioners according to manufacturers' specifications to ensure correct operation and to prevent premature wear |
| C-9.01.04 | access drive system components by removing access panels and cabinets as required to remove foreign objects |
| C-9.01.05 | lubricate bearings, linkages and springs to prevent excessive wear and noise |
| C-9.01.06 | test operation of appliance after repair to ensure appliance is in working order |

---

**Sub-task**

**C-9.02 Replaces drive system components.**

| NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NV | yes | NV | yes | yes | NV | yes | ND | yes | yes | NV | ND | NV |

**Key Competencies**

| | |
|---|---|
| C-9.02.01 | access drive system components by removing parts such as access panels, support brackets and cabinets as required |
| C-9.02.02 | remove failed devices and components taking care not to damage surrounding components |

| | |
|---|---|
| C-9.02.03 | install replacement components using specialty tools such as spanner wrenches, spring tools and brake tools according to manufacturers' specifications |
| C-9.02.04 | adjust tensions if required according to manufacturers' specifications to ensure correct drive system operation |
| C-9.02.05 | test operation of appliance after replacement of components to ensure appliance is in working order |

## Task 10 Services cabinets and consoles.

**Required Knowledge**

| | |
|---|---|
| K 1 | types of cabinet and console damage such as dents, scratches, distortions, cracks and paint defects |
| K 2 | types of appliance structures such as cabinets, doors and panels |
| K 3 | types of materials such as metals, plastics and composites |
| K 4 | components that can be repaired |

**Sub-task**

**C-10.01 Inspects cabinets and consoles.**

| NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NV | yes | NV | yes | yes | NV | yes | ND | yes | yes | NV | ND | NV |

**Key Competencies**

| | |
|---|---|
| C-10.01.01 | select and use tools and equipment such as flashlights and mirrors |
| C-10.01.02 | perform sensory inspection to identify cabinet and console damage |
| C-10.01.03 | evaluate extent of damage to determine if repair or replacement is necessary by defining the damage as cosmetic or functional |
| C-10.01.04 | identify causes of damage and defects such as improper use, delivery damage and manufacturer defect, and report accordingly |

**Sub-task**

**C-10.02 Repairs cabinet and console components.**

| NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NV | yes | NV | yes | yes | NV | yes | ND | yes | yes | NV | ND | NV |

**Key Competencies**

| | |
|---|---|
| C-10.02.01 | select and use tools and equipment such as screwdrivers and wrenches |
| C-10.02.02 | perform small corrective operations such as straightening components and touching up panels |

**Sub-task**

**C-10.03 Replaces cabinet and console components.**

| NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NV | yes | NV | yes | yes | NV | yes | ND | yes | yes | NV | ND | NV |

**Key Competencies**

| | |
|---|---|
| C-10.03.01 | select and use tools and equipment such as screwdrivers, nut drivers and wrenches |
| C-10.03.02 | access cabinet and console components by removing parts such as screws and clips as required |
| C-10.03.03 | remove damaged parts taking care not to damage surrounding components |
| C-10.03.04 | check replacement components for damage and suitability |
| C-10.03.05 | install and adjust replacement components such as hinges, trims, door seals and panels according to manufacturers' specifications |
| C-10.03.06 | test operation of appliance after replacement of components to ensure appliance is in working order |

## Task 11 Diagnoses suspension systems.

**Required Knowledge**

| | |
|---|---|
| K 1 | types of system components such as shocks, springs, snubbers and cables |
| K 2 | types of suspension systems and components |
| K 3 | parameters and acceptable limits of suspension systems |
| K 4 | inspection and testing procedures |

---

**Sub-task**

**C-11.01 Inspects suspension systems.**

| NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NV | yes | NV | yes | yes | NV | yes | ND | yes | yes | NV | ND | NV |

**Key Competencies**

| | |
|---|---|
| C-11.01.01 | select and use tools and equipment such as flashlights and mirrors |
| C-11.01.02 | access suspension system components by removing panels and cabinets as required |
| C-11.01.03 | perform sensory inspection to identify failed components that may be worn and physically damaged |

---

**Sub-task**

**C-11.02 Tests suspension systems components.**

| NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NV | yes | NV | yes | yes | NV | yes | ND | yes | yes | NV | ND | NV |

**Key Competencies**

| | |
|---|---|
| C-11.02.01 | select and use tools and equipment such as nut drivers and screwdrivers |
| C-11.02.02 | access suspension system components by removing panels and cabinets as required |
| C-11.02.03 | perform operational test to identify failed components that may be worn and physically damaged, and to determine cause of failure |
| C-11.02.04 | perform individual tests on identified failed components according to manufacturers' specifications |

## Task 12 Repairs suspension systems.

**Required Knowledge**

| | |
|---|---|
| K 1 | acceptable component tolerances |
| K 2 | procedures to replace components and reassemble suspension systems |
| K 3 | repairing procedures |
| K 4 | suspension system design |
| K 5 | suspension system components |

**Sub-task**

**C-12.01 Repairs suspension system components.**

| NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NV | yes | NV | yes | yes | NV | yes | ND | yes | yes | NV | ND | NV |

**Key Competencies**

| | |
|---|---|
| C-12.01.01 | select and use tools and equipment such as pliers and socket sets |
| C-12.01.02 | access suspension system components by removing panels and cabinets as required |
| C-12.01.03 | remove shipping material if required according to manufacturer's specifications |
| C-12.01.04 | lubricate components such as linkages and springs to prevent excessive wear and noise |
| C-12.01.05 | adjust spring tension to ensure correct operation of system |
| C-12.01.06 | test operation of appliance after repair to ensure appliance is in working order |

**Sub-task**

**C-12.02 Replaces suspension system components.**

| NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NV | yes | NV | yes | yes | NV | yes | ND | yes | yes | NV | ND | NV |

**Key Competencies**

| | |
|---|---|
| C-12.02.01 | select and use tools and equipment |
| C-12.02.02 | access suspension system components by removing parts such as panels, support brackets and cabinets as required |
| C-12.02.03 | remove failed components taking care not to damage surrounding components |
| C-12.02.04 | install and adjust replacement components according to manufacturers' specifications |
| C-12.02.05 | adjust spring tension if required according to manufacturers' specifications to ensure suspension system operation |
| C-12.02.06 | test operation of appliance after replacement of components to ensure appliance is in working order |

# BLOCK D WATER SYSTEMS

| | |
|---|---|
| **Context** | Any appliance that uses or contains water has a water system. Proper installation and servicing of water systems can maintain correct operation and reduce the possibility of injury and property damage. |
| **Trends** | Energy saving appliances using less water and less energy with innovations such as smaller motors, DC motors, load sensors and alternating wash levels are becoming more common. Customers now demand quieter appliances because of lifestyle changes such as open concept plans and main floor laundry rooms. Steam components are introduced into appliances such as washers, ranges, dryers and dishwashers. Steam is said to, among other things, remove stains and wrinkles out of clothing, improve baking results and help clean heavily-soiled dishes. |
| **Related Components (including, but not limited to)** | Water valves, aerators, water controls, discharge valves, siphon breaks, pumps, hoses, seals, check valves, venturis, fasteners, filters, containers, tubs. |
| **Tools and Equipment** | See Appendix A. |

## Task 13 Diagnoses water systems.

**Required Knowledge**

| | |
|---|---|
| K 1 | supply requirements such as pressure, temperature and water quality |
| K 2 | water inlet components such as water valves, aerators and water controls |
| K 3 | water discharge components such as discharge valves, siphon breaks and pumps |
| K 4 | manufacturers' installation requirements |

**Sub-task**

**D-13.01 Verifies water supply.**

| NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NV | yes | NV | yes | yes | NV | yes | ND | yes | yes | NV | ND | NV |

**Key Competencies**

| | |
|---|---|
| D-13.01.01 | select and use tools and equipment such as thermometer, pressure gauge and water pump pliers |
| D-13.01.02 | disassemble/reassemble appliance to access components such as panels if required |
| D-13.01.03 | disconnect/reconnect supply lines from water source if required |
| D-13.01.04 | check for required water supply and pressure at the appliance by using flow meters and pressure gauges for proper fill levels and valve operation |
| D-13.01.05 | check for required water temperature to ensure proper appliance operation |
| D-13.01.06 | assess water quality for conditions such as water hardness, mineral content and pH levels |
| D-13.01.07 | check for leaks |

**Sub-task**

**D-13.02 Diagnoses water inlet and discharge components.**

| NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NV | yes | NV | yes | yes | NV | yes | ND | yes | yes | NV | ND | NV |

**Key Competencies**

| | |
|---|---|
| D-13.02.01 | select and use tools and equipment such as multimeter, screwdrivers and nut drivers |
| D-13.02.02 | disassemble/reassemble appliance to access components if required |
| D-13.02.03 | identify and locate failed components |
| D-13.02.04 | verify valves such as check valves and drain solenoids to ensure they operate properly |
| D-13.02.05 | visually inspect the screens for blockage |
| D-13.02.06 | verify there are no kinks or restrictions in hoses and supply line or discharge lines to manufacturers' specifications |
| D-13.02.07 | verify required voltage is present to operate component |
| D-13.02.08 | check for leaks |

**Sub-task**

**D-13.03 Identifies water leaks.**

| NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NV | yes | NV | yes | yes | NV | yes | ND | yes | yes | NV | ND | NV |

**Key Competencies**

| | |
|---|---|
| D-13.03.01 | select and use tools and equipment such as pinch off pliers, nut drivers and hose clamp pliers |
| D-13.03.02 | disassemble/reassemble appliance to access components if required |
| D-13.03.03 | perform sensory inspection of components and surrounding areas to identify source of leak |

## Task 14 Repairs water systems.

**Required Knowledge**

| | |
|---|---|
| K 1 | water system components such as water valves, hoses, seals, water controls, siphon breaks and aerators |
| K 2 | manufacturers' specifications and procedures |
| K 3 | fasteners such as fittings and clamps |
| K 4 | water system operation |

**Sub-task**

**D-14.01 Replaces water system components.**

| NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NV | yes | NV | yes | yes | NV | yes | ND | yes | yes | NV | ND | NV |

**Key Competencies**

| | |
|---|---|
| D-14.01.01 | select and use tools and equipment such as pinch off pliers, water pump pliers and nut drivers |
| D-14.01.02 | disassemble/reassemble appliance to access components if required |
| D-14.01.03 | remove failed components |
| D-14.01.04 | select approved replacement components |

| | |
|---|---|
| D-14.01.05 | install and connect replacement component such as valves, fill hoses, drain hoses, seals and pumps |
| D-14.01.06 | calibrate mechanical and electrical components after replacement such as ice makers, and washer and dishwasher dispensers |
| D-14.01.07 | test operation of appliance after replacement of components to ensure appliance is in working order |

---

**Sub-task**

**D-14.02 Repairs water system components.**

| NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NV | yes | NV | yes | yes | NV | yes | ND | yes | yes | NV | ND | NV |

**Key Competencies**

| | |
|---|---|
| D-14.02.01 | select and use tools and equipment such as screwdrivers, socket sets and wrenches |
| D-14.02.02 | disassemble/reassemble appliance to access components if required |
| D-14.02.03 | clean components such as wash arms in dishwashers and inlet screens using methods such as descaling or cleaning manually |
| D-14.02.04 | confirm water temperatures according to manufacturers' specifications |
| D-14.02.05 | fasten and adjust clamps and fittings on hoses or components to eliminate leaks |
| D-14.02.06 | align and level appliance according to manufacturers' specifications |
| D-14.02.07 | remove obstructions from components such as drains, vents, filters and pumps |
| D-14.02.08 | reconnect or secure drain hoses according to manufacturers' specifications |
| D-14.02.09 | test operation of appliance after repair of components to ensure appliance is in working order |

# BLOCK E AIR SYSTEMS

| | |
|---|---|
| **Context** | Forced air and static air systems can be present in all appliances. They circulate air, transfer heat, remove moisture and aid in the proper operation of appliances. |
| **Trends** | Many refrigerators now have integrated air ducting to improve air movement and temperatures consistency. The air flow of dryers has increased, resulting in less energy consumption. |
| **Related Components (including, but not limited to)** | Fans, blowers, motors, controls, condensers, evaporators, ducting. |
| **Tools and Equipment** | See Appendix A. |

## Task 15 Diagnoses forced air systems.

**Required Knowledge**

| | |
|---|---|
| K 1 | forced air system operation |
| K 2 | location and function of components |
| K 3 | normal noise level and vibration |
| K 4 | forced air system components such as fans, blowers, motors and controls |
| K 5 | cause and effect of failed components |

**Sub-task**

**E-15.01 Inspects forced air system.**

| NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NV | yes | NV | yes | yes | NV | yes | ND | yes | yes | NV | ND | NV |

**Key Competencies**

| | |
|---|---|
| E-15.01.01 | verify appliance has been installed according to manufacturers' specifications such as clearances and venting requirements |
| E-15.01.02 | select and use tools and equipment such as nut drivers, socket wrenches and air flow meters |
| E-15.01.03 | disassemble/reassemble appliance to access components if required |
| E-15.01.04 | identify source of excessive or abnormal heat and/or frost build-up caused by failed components such as motor or cooling fan |
| E-15.01.05 | perform sensory inspection to isolate source of abnormal noise and vibration |
| E-15.01.06 | perform verification of proper fan function according to manufacturers' specifications |
| E-15.01.07 | visually inspect exhaust air system for restrictions |
| E-15.01.08 | identify location of air flow blockage |
| E-15.01.09 | test operation of forced air system to identify source of problem |

**Sub-task**

**E-15.02 Inspects forced air system components.**

| NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NV | yes | NV | yes | yes | NV | yes | ND | yes | yes | NV | ND | NV |

**Key Competencies**

| | |
|---|---|
| E-15.02.01 | determine if proper power supply is present at components |
| E-15.02.02 | select and use tools and equipment such as nut drivers, socket sets and air flow meters |
| E-15.02.03 | disassemble/reassemble appliance to access components if required |
| E-15.02.04 | identify integrity of components such as fan blades and belts |
| E-15.02.05 | inspect for excessive build up of lint or dust on blades |
| E-15.02.06 | test operation of forced air system components to identify source of problem |

## Task 16 Repairs forced air systems.

**Required Knowledge**

| | |
|---|---|
| K 1 | forced air circulation |
| K 2 | types of components such as fans, blowers, motors, controls and switches |
| K 3 | normal operation of components |

**Sub-task**

**E-16.01 Clears airways.**

| NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NV | yes | NV | yes | yes | NV | yes | ND | yes | yes | NV | ND | NV |

**Key Competencies**

| | |
|---|---|
| E-16.01.01 | ensure ventilation is according to manufacturers' specifications |
| E-16.01.02 | select and use tools and equipment such as screwdrivers and nut drivers |
| E-16.01.03 | disassemble/reassemble appliance to access components if required |
| E-16.01.04 | remove obstructions that hinder proper air flow by methods such as removing foreign objects, and clearing and defrosting air flow channels |
| E-16.01.05 | test operation of appliance after clearing airways to ensure appliance is in working order |

**Sub-task**

**E-16.02 Replaces forced air system components.**

| NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NV | yes | NV | yes | yes | NV | yes | ND | yes | yes | NV | ND | NV |

**Key Competencies**

| | |
|---|---|
| E-16.02.01 | select and use tools and equipment such as nut drivers, screwdrivers and multimeters |
| E-16.02.02 | disassemble/reassemble appliance to access components if required |
| E-16.02.03 | remove broken or damaged components such as motors and fan blades |
| E-16.02.04 | select approved replacement component |

| | |
|---|---|
| E-16.02.05 | install components such as motors and fan blades |
| E-16.02.06 | test operation of appliance after replacement of components to ensure appliance is in working order |

## Task 17 Services static air systems.

**Required Knowledge**

| | |
|---|---|
| K 1 | heat principles such as conduction, convection and radiation |
| K 2 | appliance clearances necessary for air circulation |
| K 3 | air requirements for appliance operation |
| K 4 | appliance operation |

**Sub-task**

**E-17.01 Diagnoses static air systems.**

| NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NV | yes | NV | yes | yes | NV | yes | ND | yes | yes | NV | ND | NV |

**Key Competencies**

| | |
|---|---|
| E-17.01.01 | verify appliance has been installed according to manufacturers' specifications such as clearances and venting requirements |
| E-17.01.02 | perform sensory inspection of appliance, surrounding surfaces and areas to identify heat discharges and restrictions that inhibit proper air flow, and assess ambient air conditions |
| E-17.01.03 | check for excessive moisture build-up in appliance |

**Sub-task**

**E-17.02 Cleans static air systems.**

| NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NV | yes | NV | yes | yes | NV | yes | ND | yes | yes | NV | ND | NV |

**Key Competencies**

| | |
|---|---|
| E-17.02.01 | select and use tools and equipment such as nut drivers, shop vacuum and condenser brush |
| E-17.02.02 | disassemble/reassemble appliance to access condensers, evaporators, vent ducts and components if required |
| E-17.02.03 | remove obstructions using cleaning techniques such as vacuuming, brushing and defrosting |
| E-17.02.04 | remove failed mechanical vents if required |
| E-17.02.05 | replace mechanical vent if required |
| E-17.02.06 | perform sensory inspection of appliance to ensure system is in working order |

# BLOCK F REFRIGERATION SEALED SYSTEMS

| | |
|---|---|
| **Context** | When diagnosing and repairing sealed refrigeration systems, it is important that technicians have a full understanding of the refrigeration cycle to properly restore the integrity of the sealed system. Appliance service technicians must follow environmental regulations when using, handling and recovering refrigerants. |
| **Trends** | There is a trend towards systems that use less refrigerant and variable speed components. Use of these components increases the efficiency of the refrigeration cycle.<br>Manufacturers have introduced multiple evaporator systems and electronic systems that allow for independently controlled temperature compartments. |
| **Related Components (including, but not limited to)** | Compressor, drier, access valves, stepping valves, couplers, evaporators, condensers, heat exchangers, copper tubing, fans, controls. |
| **Tools and Equipment** | Personal protective equipment (PPE) and safety equipment, common service tools, specialty refrigeration tools, soldering and brazing tools, common measuring/testing equipment, shop tools. |

## Task 18 Diagnoses refrigeration sealed systems.

**Required Knowledge**

| | |
|---|---|
| K 1 | types of refrigerants, such as R134-A and R12 |
| K 2 | high and low pressure refrigeration sealed systems |
| K 3 | operation of components of refrigeration sealed systems |
| K 4 | refrigeration system flow |
| K 5 | heat transfer and absorption |
| K 6 | boiling points of types of refrigerants |
| K 7 | frost patterns of evaporator |
| K 8 | operating temperatures and pressures |
| K 9 | static and forced air flow systems |

| | |
|---|---|
| K 10 | clearance requirements according to manufacturers' specifications |
| K 11 | drier position and function |
| K 12 | dye type drier |
| K 13 | leak detection systems such as ultraviolet detection |
| K 14 | variable speed compressor systems |
| K 15 | multiple evaporator systems |
| K 16 | jurisdictional training and certification requirements regarding ODS |

---

**Sub-task**

**F-18.01 Checks for system leaks.**

| NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NV | yes | NV | yes | yes | NV | yes | ND | yes | yes | NV | ND | NV |

**Key Competencies**

| | |
|---|---|
| F-18.01.01 | visually inspect unit and components for physical damage such as broken tubing and shipping damage |
| F-18.01.02 | check for oil staining on refrigerant components such as evaporator, condenser and interconnecting tubing and joints |
| F-18.01.03 | select and use leak detection equipment such as electronic, nitrogen, ultraviolet and soap solution according to manufacturers' specifications and industry code of practice |
| F-18.01.04 | access system to check pressures and determine if system is low on charge |

---

**Sub-task**

**F-18.02 Checks condenser, evaporator and drier temperatures.**

| NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NV | yes | NV | yes | yes | NV | yes | ND | yes | yes | NV | ND | NV |

**Key Competencies**

| | |
|---|---|
| F-18.02.01 | perform sensory inspection of condenser, evaporator and drier to determine if system is operating correctly |
| F-18.02.02 | measure superheat using tools such as thermometer and manifold to determine if there is a system failure |
| F-18.02.03 | identify frost pattern on evaporator to determine if evaporator is active |
| F-18.02.04 | identify air flow problems such as failed fan component, dirty condenser and frosted evaporator |
| F-18.02.05 | interpret test results from temperatures recorded to determine if system is operating properly |

---

**Sub-task**

**F-18.03 Observes pressure of sealed refrigeration system.**

| NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NV | yes | NV | yes | yes | NV | yes | ND | yes | yes | NV | ND | NV |

**Key Competencies**

| | |
|---|---|
| F-18.03.01 | select, install and remove gauges from system to prevent refrigerant loss and contamination |
| F-18.03.02 | read gauges to identify correct pressures according to manufacturers' specifications |

---

## Task 19 Recovers refrigerant.

**Required Knowledge**

| | |
|---|---|
| K 1 | legislation related to refrigerant handling, recovery, transportation, recycling and reclaiming |
| K 2 | types and condition of recovery system equipment, recovery tanks and absorption cylinders |
| K 3 | labelling, tagging and logging procedures |
| K 4 | amounts and types of refrigerant to be recovered |
| K 5 | access valve installation methods such as soldering/brazing or piercing |

| | |
|---|---|
| K 6 | recovery processes |
| K 7 | decommissioning procedures |

---

**Sub-task**

**F-19.01 Assesses type and amount of refrigerant.**

| NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NV | yes | NV | yes | yes | NV | yes | ND | yes | yes | NV | ND | NV |

**Key Competencies**

| | |
|---|---|
| F-19.01.01 | read labels to determine type of refrigerant in system |
| F-19.01.02 | locate and understand rating plate to determine amount of refrigerant to be recovered |
| F-19.01.03 | use scales according to manufacturers' instructions to measure amount of refrigerant recovered |

---

**Sub-task**

**F-19.02 Evacuates sealed system to recovery units and recovery bottle.**

| NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NV | yes | NV | yes | yes | NV | yes | ND | yes | yes | NV | ND | NV |

**Key Competencies**

| | |
|---|---|
| F-19.02.01 | install access valves on low and high side of system according to industry code of practice to enable recovery of refrigerant |
| F-19.02.02 | select and secure hoses to access valves and recovery equipment according to location of access valves |
| F-19.02.03 | open valves from unit to recovery system and tank in correct sequence |
| F-19.02.04 | heat compressor and accumulator using heat guns as required to fully recover refrigerant |
| F-19.02.05 | verify complete evacuation according to applicable environmental regulations by observing gauges |
| F-19.02.06 | perform termination procedures to avoid release of refrigerant to atmosphere |

## Task 20 Repairs refrigeration sealed systems.

**Required Knowledge**

| | |
|---|---|
| K 1 | types of refrigerants |
| K 2 | brazing/soldering procedures and materials such as silfos and silver solder |
| K 3 | types of tubing such as steel and copper |
| K 4 | contaminants such as non-condensables, moisture, metal fragments and sanding dust |
| K 5 | required tubing temperature while brazing/soldering |
| K 6 | types of gauges and vacuum pumps |
| K 7 | vacuum readings |
| K 8 | operating pressures |
| K 9 | charging procedures |

**Sub-task**

### F-20.01 Prepares tubing for connections.

| NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NV | yes | NV | yes | yes | NV | yes | ND | yes | yes | NV | ND | NV |

**Key Competencies**

| | |
|---|---|
| F-20.01.01 | select tubing size and material type according to application |
| F-20.01.02 | cut and ream tubing using tools and equipment such as tube cutters and reamers to ensure clean and tight joints |
| F-20.01.03 | clean tubing with materials such as sand/emery cloth to ensure that solder adheres to tubing |
| F-20.01.04 | swage tubing if necessary using tools such as swaging tool and hammer |

**Sub-task**

**F-20.02 Replaces sealed refrigeration system components.**

| NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NV | yes | NV | yes | yes | NV | yes | ND | yes | yes | NV | ND | NV |

**Key Competencies**

| | |
|---|---|
| F-20.02.01 | select and use tools and equipment such as brazing torches and tube cutters |
| F-20.02.02 | remove failed components such as compressors, heat exchangers and inter-connecting tubing using methods such as cutting with tube cutter and sweating with torch |
| F-20.02.03 | remove and reinstall valve cores from drier and access valves to avoid heat damage to the valve cores from brazing process |
| F-20.02.04 | install new components using brazing methods and materials such as silfos, and silver solder and flux |
| F-20.02.05 | inspect joints by removing flux glass, using inspection mirror and flashlight |

**Sub-task**

**F-20.03 Evacuates system.**

| NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NV | yes | NV | yes | yes | NV | yes | ND | yes | yes | NV | ND | NV |

**Key Competencies**

| | |
|---|---|
| F-20.03.01 | connect access port hose on gauges to vacuum pump |
| F-20.03.02 | connect low/high side hose to appropriate valves on system |
| F-20.03.03 | open all valves and start pump to begin evacuation |
| F-20.03.04 | determine when evacuation is complete according to readings on gauges |
| F-20.03.05 | close manifold valves to isolate system from pump and turn off pump |

**Sub-task**

**F-20.04 Charges system.**

| NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NV | yes | NV | yes | yes | NV | yes | ND | yes | yes | NV | ND | NV |

**Key Competencies**

| | |
|---|---|
| F-20.04.01 | determine required charge according to manufacturers' specifications |
| F-20.04.02 | measure required amount of refrigerant using equipment such as scales and charging cylinder |
| F-20.04.03 | charge by liquid or vapour form to high or low side of system using tools and equipment such as gauges according to manufacturers' specifications |
| F-20.04.04 | verify operation of system by observing gauges and performing sensory checks |
| F-20.04.05 | remove gauges and seal system according to manufacturers' specifications |
| F-20.04.06 | follow applicable environmental regulations when handling refrigerant |

# BLOCK G

# GAS SYSTEMS (NOT COMMON CORE)

| | |
|---|---|
| **Context** | Many types of appliances are fuelled by gas. When working on gas appliances, safety is the number one priority. Appliance service technicians must be fully versed in the code regulations and gas properties for the safe use of gas-fired appliances. With the increase of airtight buildings, it is imperative for the technician to recognize if sufficient make-up air and venting is present for proper combustion of a gas-fired appliance. |
| **Trends** | In some jurisdictions there is an increase in the popularity of gas-fired appliances. Many of these appliances operate at a higher volume of gas. Dual-fuel ranges are becoming more prevalent in the industry. Manufacturers have introduced flame sensors which incorporate micro-amp technology in ranges. |
| **Related Components (including, but not limited to)** | Gas valves, igniters, tubing/piping, fittings, sealants, regulators, clamps, thermocouples, moisture exhaust vent, ignition control modules, spark modules, burners, switches. |
| **Tools and Equipment** | Personal protective equipment (PPE) and safety equipment, common measuring/testing equipment, common service tools, specialty gas tools, shop tools. |

## Task 21 Diagnoses gas system components and supply. (NOT COMMON CORE)

**Required Knowledge**

| | |
|---|---|
| K 1 | types of gas such as propane and natural gas |
| K 2 | gas characteristics such as volatility, density and odour |
| K 3 | flame colour and size |
| K 4 | air/fuel mixture |
| K 5 | static pressure according to rating plate |
| K 6 | orifice sizes |

| | |
|---|---|
| K 7 | primary and secondary air |
| K 8 | types of ignition systems such as electronic igniters, pilot light and hot surface igniters |
| K 9 | types and location of ignition system |
| K 10 | safety procedures pertaining to gas leaks |
| K 11 | types of gas fittings such as compression, flare and National Pipe Taper (NPT) thread |
| K 12 | types and operation of gas valves |
| K 13 | National Gas Code requirements |
| K 14 | manufacturers' specifications |
| K 15 | hazardous conditions when working with gas |
| K 16 | jurisdictional regulations |
| K 17 | venting and air requirements for gas appliances |
| K 18 | BTU ratings of gas appliances |
| K 19 | limitations of appliance technician certification |

---

**Sub-task**

**G-21.01 Identifies type of gas. (NOT COMMON CORE)**

| NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NV | no | NV | no | yes | NV | no | ND | yes | yes | NV | ND | NV |

**Key Competencies**

| | |
|---|---|
| G-21.01.01 | perform visual check of gas supply to indicate type of gas supplied |
| G-21.01.02 | read rating plate and labelled components to indicate type of gas present |
| G-21.01.03 | select and use manometers to assist in indicating type of gas supplied |

**Sub-task**

**G-21.02 Assesses flame quality. (NOT COMMON CORE)**

| NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NV | no | NV | no | yes | NV | no | ND | yes | yes | NV | ND | NV |

**Key Competencies**

| | |
|---|---|
| G-21.02.01 | perform sensory inspection of flame to note color, size and stability |
| G-21.02.02 | assess flame to identify incomplete combustion |

**Sub-task**

**G-21.03 Checks ignition system. (NOT COMMON CORE)**

| NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NV | no | NV | yes | yes | NV | no | ND | yes | yes | NV | ND | NV |

**Key Competencies**

| | |
|---|---|
| G-21.03.01 | visually check electronic ignition components such as hot surface igniter, spark module, igniters, flame sensor and switches |
| G-21.03.02 | check wiring from electronic module to igniters |
| G-21.03.03 | measure resistance of hot surface igniters using an ohmmeter to indicate the integrity of the igniter according to technical data sheet |
| G-21.03.04 | measure current draw using an ammeter to indicate the integrity of the igniter to manufacturers' specifications |
| G-21.03.05 | check condition and position of surface igniter in relation to burner head and cap |
| G-21.03.06 | perform function test to ensure proper ignition |

**Sub-task**

**G-21.04 Checks for gas leaks. (NOT COMMON CORE)**

| NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NV | no | NV | no | yes | NV | no | ND | yes | yes | NV | ND | NV |

**Key Competencies**

| | |
|---|---|
| G-21.04.01 | perform sensory inspection of connections |
| G-21.04.01 | perform leak test using tools and equipment such as soap solution and electronic leak detector |

**Sub-task**

**G-21.05 Verifies gas valve operation. (NOT COMMON CORE)**

| NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NV | no | NV | no | yes | NV | no | ND | yes | yes | NV | ND | NV |

**Key Competencies**

| | |
|---|---|
| G-21.05.01 | identify open or closed function of valve |
| G-21.05.02 | identify improper operation of a gas valve by measuring resistance reading on gas valve coil |
| G-21.05.03 | measure voltages and current draws to determine proper operation of the valve |
| G-21.05.04 | check and verify gas flow through valve using a manometer |

## Task 22 Repairs gas system components. (NOT COMMON CORE)

**Required Knowledge**

| | |
|---|---|
| K 1 | shut-off locations and procedures such as tag and lock-out procedures |
| K 2 | tools for specific repair |
| K 3 | adjustment procedures for surface igniter position and air shutters |
| K 4 | safety procedures |
| K 5 | gas codes and regulations |

| | |
|---|---|
| K 6 | material used for repair such as pipe dope and thread tape |
| K 7 | joint repair procedures |
| K 8 | gas connections |
| K 9 | safety components |
| K 10 | gas characteristics such as volatility, density and odour |
| K 11 | gas leak test procedures such as using soap solution or electronic leak detector |
| K 12 | manufacturers' specifications pertaining to emission levels |

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**Sub-task**

**G-22.01 Replaces gas system components. (NOT COMMON CORE)**

| NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NV | no | NV | no | yes | NV | no | ND | yes | yes | NV | ND | NV |

**Key Competencies**

| | |
|---|---|
| G-22.01.01 | select model-specific replacement components according to appliance documentation |
| G-22.01.02 | shut off gas supply if necessary to ensure safety of work environment |
| G-22.01.03 | remove and reinstall gas supply line or connector if required to remove failed components |
| G-22.01.04 | remove and replace failed components such as igniters, solenoids and gas valves |
| G-22.01.05 | verify that connections to replacement components are leak-free |

**Sub-task**

**G-22.02 Repairs gas leaks. (NOT COMMON CORE)**

| NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NV | no | NV | no | yes | NV | no | ND | yes | yes | NV | ND | NV |

**Key Competencies**

| | |
|---|---|
| G-22.02.01 | tighten loose flare and shoulder connections |
| G-22.02.02 | disassemble, clean, reseal and reassemble joints |
| G-22.02.03 | perform leak test after repair to ensure no leakage of gas |

# APPENDICES

# APPENDIX A TOOLS AND EQUIPMENT

### Personal Protective Equipment (PPE) and Safety Equipment

boot slip covers
drop sheets
face shield
fire extinguisher
first aid kit
gloves
hard hats
hearing protection
knee pads
reflective gear
respiratory mask
safety boots
safety glasses

### Common Service Tools

2 pound hammer
air sleds
Allen wrenches
cold chisels
combination wrenches
crimping pliers
dead blow hammer
drifts
drill bits
drills
electrostatic discharge (ESD) strap
files (round, half-round, triangular, flat)
flashlight
hacksaws
hammer
heat guns
knife
ladders
line splitter
lineman's pliers
locking pliers
needle nose pliers
nut drivers
pipe wrench
pullers
punches
ratchet/socket wrenches
scrapers
screwdrivers
side cutter pliers
sliders
slip joint pliers
snap ring pliers
tamper proof/security bit set
tin snips
trouble light
water pump pliers
wire stripper

### Common Measuring/Testing Equipment

ammeter
calculator
capacitor tester
measuring tape
microwave leak detector
multimeter
oven temperature tester
temperature recorders
test harnesses
thermometer
volt pen
water hardness test kit
watt meter/recorder

### Specialty Dishwasher, Washer and Dryer Tools

agitator removers
bearing installer
brake and clutch tools
hose clamp pliers
pinch-off pliers
spanner wrenches
spring tools
tub nut wrenches

### Specialty Refrigeration Tools

charging cylinder
compound gauges
condenser brush
electronic scale
fin comb
micron gauge
nitrogen pressure gauge
nitrogen tank
pinch-off pliers
process tube adapter set
reamers
recovery/recycling equipment
refrigerant leak detector
swedging and flaring tools
temporary piercing valves
tube benders
tubing cutters
ultra-violet light
vacuum pump

### Specialty Gas Tools

carbon monoxide detector
gas leak detector
manometer

### Shop Tools

air compressor
anti-static sheet
appliance carts
computer
dollies
grinder/wire wheel
impact tools
moving straps
power lift
saws
shop vacuum
tape machine
taps and dies
torque wrench
truck lifts
vices

### Soldering and Brazing Tools

flame arrester
gauges
heat proof work mats
heat shield
oxy-acetylene, propane and acetylene torches and tips
soldering gun

# APPENDIX B GLOSSARY

| | |
|---|---|
| **brazing** | to solder (two pieces of similar or dissimilar metals) together using a hard solder with a high melting point. Brazing does not involve the melting of the base metal |
| **conduction** | transmission or flow of heat from one body to another |
| **convection** | heat transfer in a gas or liquid by the movement of currents from one region to another |
| **drier** | component used in refrigeration systems to remove contaminants such as moisture and impurities |
| **forced air system** | system that provides ventilation and heat transfer through mechanical movement of air |
| **non-condensable** | matter which does not condense at the temperature and partial pressure at which it exists in the condenser, therefore imposing a higher head pressure on the system. |
| **radiant heat** | heat transfer from one body to another without the need for intervening matter |
| **radiation** | heat transfer or creation by wave motion (rapid vibration) |
| **snubber** | part of the suspension system that uses friction to dampen vibration and/or to limit movement |
| **soldering** | using a soft alloy to join metals |
| **static air system** | system that transfers heat using air flow without mechanical assistance |
| **swaging** | method of fitting attachment that incorporates a set of die sections designed to progressively reduce the collar or ferrule diameter to the required final value by mechanically forcing the fitting into the mating die sections. |
| **swedge** | to expand tubing diameter |

# APPENDIX C ACRONYMS

| | |
|---|---|
| **AC** | alternating current |
| **BTU** | British thermal unit |
| **CSA** | Canadian Standards Association |
| **DC** | direct current |
| **MAPP™** | methylacetylene propadiene propane |
| **MSDS** | Material Safety Data Sheet |
| **NTP** | National Pipe Taper |
| **ODS** | ozone depleting substance |
| **OH&S** | Occupational Health and Safety |
| **PC** | printed circuit |
| **pH** | potential of hydrogen |
| **PPE** | personal protective equipment |
| **TDG** | Transportation of Dangerous Goods |
| **WHMIS** | Workplace Hazardous Materials Information System |

# APPENDIX D BLOCK AND TASK WEIGHTING

**BLOCK A OCCUPATIONAL SKILLS**

| | NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU | National Average |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| % | NV | 10 | NV | 4 | 5 | NV | 15 | ND | 5 | 5 | NV | ND | NV | 7% |

Task 1 Performs safety-related functions.

| | NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| % | NV | 20 | NV | 10 | 20 | NV | 20 | ND | 30 | 5 | NV | ND | NV | 17% |

Task 2 Uses and maintains tools and equipment.

| | NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| % | NV | 20 | NV | 20 | 25 | NV | 25 | ND | 20 | 35 | NV | ND | NV | 24% |

Task 3 Organizes work.

| | NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| % | NV | 20 | NV | 22 | 25 | NV | 30 | ND | 30 | 5 | NV | ND | NV | 22% |

Task 4 Prepares for installation.

| | NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| % | NV | 20 | NV | 23 | 0 | NV | 15 | ND | 10 | 25 | NV | ND | NV | 16% |

Task 5 Removes and installs appliances.

| | NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| % | NV | 20 | NV | 25 | 30 | NV | 10 | ND | 10 | 30 | NV | ND | NV | 21% |

**BLOCK B ELECTRICAL AND ELECTRONIC SYSTEMS**

| | NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU | National Average |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| % | NV | 30 | NV | 31 | 28 | NV | 25 | ND | 30 | 30 | NV | ND | NV | 30% |

Task 6 Diagnoses electrical and electronic components.

| | NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| % | NV | 65 | NV | 63 | 60 | NV | 70 | ND | 60 | 65 | NV | ND | NV | 64% |

Task 7 Repairs electrical and electronic systems.

| | NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| % | NV | 35 | NV | 37 | 40 | NV | 30 | ND | 40 | 35 | NV | ND | NV | 36% |

**BLOCK C MECHANICAL SYSTEMS**

| | NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU | National Average |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| % | NV | 18 | NV | 16 | 26 | NV | 10 | ND | 15 | 15 | NV | ND | NV | 18% |

Task 8 Diagnoses drive systems.

| | NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| % | NV | 30 | NV | 23 | 30 | NV | 35 | ND | 25 | 35 | NV | ND | NV | 29% |

Task 9 Repairs drive systems.

| | NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| % | NV | 20 | NV | 25 | 35 | NV | 15 | ND | 25 | 10 | NV | ND | NV | 22% |

Task 10 Services cabinets and consoles.

| | NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| % | NV | 20 | NV | 10 | 5 | NV | 10 | ND | 10 | 10 | NV | ND | NV | 11% |

Task 11 Diagnoses suspension systems.

| | NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| % | NV | 20 | NV | 22 | 10 | NV | 20 | ND | 25 | 35 | NV | ND | NV | 22% |

Task 12 Repairs suspension systems.

| | NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| % | NV | 10 | NV | 20 | 20 | NV | 20 | ND | 15 | 10 | NV | ND | NV | 16% |

**BLOCK D WATER SYSTEMS**

| | NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU | National Average |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| % | NV | 14 | NV | 11 | 9 | NV | 15 | ND | 5 | 15 | NV | ND | NV | 12% |

Task 13 Diagnoses water systems.

| | NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| % | NV | 65 | NV | 60 | 30 | NV | 65 | ND | 60 | 40 | NV | ND | NV | 53% |

Task 14 Repairs water systems.

| | NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| % | NV | 35 | NV | 40 | 70 | NV | 35 | ND | 40 | 60 | NV | ND | NV | 47% |

**BLOCK E AIR SYSTEMS**

| | NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU | National Average |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| % | NV | 12 | NV | 8 | 5 | NV | 10 | ND | 10 | 10 | NV | ND | NV | 9% |

Task 15 Diagnoses forced air systems.

| | NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| % | NV | 35 | NV | 58 | 35 | NV | 60 | ND | 60 | 60 | NV | ND | NV | 51% |

Task 16 Repairs forced air systems.

| | NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| % | NV | 25 | NV | 42 | 45 | NV | 25 | ND | 30 | 30 | NV | ND | NV | 33% |

Task 17 Services static air systems.

| | NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| % | NV | 40 | NV | 0 | 20 | NV | 15 | ND | 10 | 10 | NV | ND | NV | 16% |

**BLOCK F REFRIGERATION SEALED SYSTEMS**

| | NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU | National Average |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| % | NV | 16 | NV | 30 | 24 | NV | 25 | ND | 30 | 15 | NV | ND | NV | 24% |

Task 18 Diagnoses refrigeration sealed systems.

| | NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| % | NV | 50 | NV | 41 | 15 | NV | 50 | ND | 50 | 50 | NV | ND | NV | 43% |

Task 19 Recovers refrigerant.

| | NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| % | NV | 15 | NV | 25 | 25 | NV | 20 | ND | 10 | 10 | NV | ND | NV | 17% |

Task 20 Repairs refrigeration sealed systems.

| | NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| % | NV | 35 | NV | 34 | 60 | NV | 30 | ND | 40 | 40 | NV | ND | NV | 40% |

**BLOCK G GAS SYSTEMS (NOT COMMON CORE)**

| | NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU | National Average |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| % | NV | 0 | NV | 0 | 3 | NV | 0 | ND | 5 | 10 | NV | ND | NV | NCC* |

Task 21 Diagnoses gas system components and supply. (NOT COMMON CORE)

| | NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| % | NV | 0 | NV | 0 | 20 | NV | 0 | ND | 60 | 60 | NV | ND | NV | NCC |

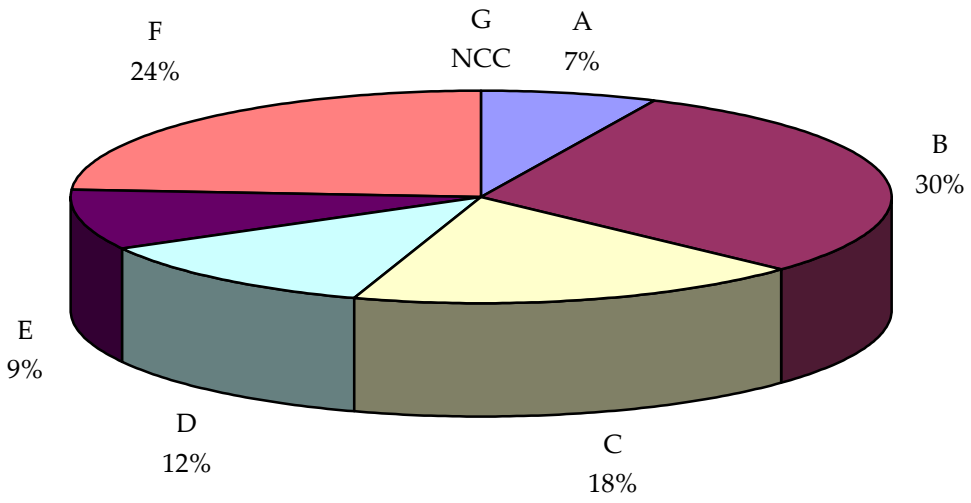
Task 22 Repairs gas system components. (NOT COMMON CORE)

| | NL | NS | PE | NB | QC | ON | MB | SK | AB | BC | NT | YT | NU | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| % | NV | 0 | NV | 0 | 80 | NV | 0 | ND | 40 | 40 | NV | ND | NV | NCC |

*NOT COMMON CORE

# APPENDIX E

## PIE CHART*




**TITLES OF BLOCKS**

| | | | |
|---|---|---|---|
| BLOCK A | Occupational Skills | BLOCK E | Air Systems |
| BLOCK B | Electrical and Electronic Systems | BLOCK F | Refrigeration Sealed Systems |
| BLOCK C | Mechanical Systems | BLOCK G | Gas Systems (NOT COMMON CORE) |
| BLOCK D | Water Systems | | |

*Average percentage of the total number of questions on an interprovincial examination, assigned to assess each block of the analysis, as derived from the collective input from workers within the occupation from all areas of Canada. Interprovincial examinations typically have from 100 to 150 multiple-choice questions.

# APPENDIX F

# TASK PROFILE CHART — Appliance Service Technician

| BLOCKS | TASKS | SUB-TASKS | | | |
|---|---|---|---|---|---|
| **A - OCCUPATIONAL SKILLS** | 1. Performs safety-related functions. | 1.01 Maintains safe work environment. | 1.02 Uses personal protective equipment (PPE) and safety equipment. | | |
| | 2. Uses and maintains tools and equipment. | 2.01 Maintains tools and equipment. | 2.02 Uses soldering and brazing equipment. | 2.03 Uses recovery equipment. | |
| | 3. Organizes work. | 3.01 Plans daily tasks. | 3.02 Organizes parts and supplies. | | |
| | 4. Prepares for installation. | 4.01 Converts gas appliances. **(NOT COMMON CORE)** | 4.02 Verifies appliance location. | 4.03 Verifies water, power, drain and gas connections. | |
| | 5. Removes and installs appliances. | 5.01 Handles appliance. | 5.02 Disconnects/ reconnects water, power, drain, gas and venting. | 5.03 Performs final inspection of connections. | 5.04 Prepares for disposal of appliances and materials. |
| **B - ELECTRICAL AND ELECTRONIC SYSTEMS** | 6. Diagnoses electrical and electronic components. | 6.01 Verifies power source. | 6.02 Inspects electrical and electronic components and circuits. | 6.03 Tests electrical and electronic components and circuits. | |
| | 7. Repairs electrical and electronic systems. | 7.01 Repairs wiring and connectors. | 7.02 Replaces electrical and electronic components. | | |

| BLOCKS | TASKS | SUB-TASKS | | |
|---|---|---|---|---|
| **C - MECHANICAL SYSTEMS** | 8. Diagnoses drive systems. | 8.01 Inspects drive system components. | 8.02 Tests drive system components. | |
| | 9. Repairs drive systems. | 9.01 Repairs drive system components. | 9.02 Replaces drive system components. | |
| | 10. Services cabinets and consoles. | 10.01 Inspects cabinets and consoles. | 10.02 Repairs cabinet and console components. | 10.03 Replaces cabinet and console components. |
| | 11. Diagnoses suspension systems. | 11.01 Inspects suspension systems. | 11.02 Tests suspension systems components. | |
| | 12. Repairs suspension systems. | 12.01 Repairs suspension system components. | 12.02 Replaces suspension system components. | |
| **D - WATER SYSTEMS** | 13. Diagnoses water systems. | 13.01 Verifies water supply. | 13.02 Diagnoses water inlet and discharge components. | 13.03 Identifies water leaks. |
| | 14. Repairs water systems. | 14.01 Replaces water system components. | 14.02 Repairs water system components. | |

| BLOCKS | TASKS | SUB-TASKS | | | | |
|---|---|---|---|---|---|---|
| **E - AIR SYSTEMS** | 15. Diagnoses forced air systems. | 15.01 Inspects forced air system. | 15.02 Inspects forced air system components. | | | |
| | 16. Repairs forced air systems. | 16.01 Clears airways. | 16.02 Replaces forced air system components. | | | |
| | 17. Services static air systems. | 17.01 Diagnoses static air systems. | 17.02 Cleans static air systems. | | | |
| **F - REFRIGERA-TION SEALED SYSTEMS** | 18. Diagnoses refrigeration sealed systems. | 18.01 Checks for system leaks. | 18.02 Checks condenser, evaporator and drier temperatures. | 18.03 Observes pressure of sealed refrigeration system. | | |
| | 19. Recovers refrigerant. | 19.01 Assesses type and amount of refrigerant. | 19.02 Evacuates sealed system to recovery units and recovery bottle. | | | |
| | 20. Repairs refrigeration sealed systems. | 20.01 Prepares tubing for connections. | 20.02 Replaces sealed refrigeration system components. | 20.03 Evacuates system. | 20.04 Charges system. | |
| **G - GAS SYSTEMS** **(NOT COMMON CORE)** | 21. Diagnoses gas system components and supply. **(NOT COMMON CORE)** | 21.01 Identifies type of gas. **(NOT COMMON CORE)** | 21.02 Assesses flame quality. **(NOT COMMON CORE)** | 21.03 Checks ignition system. **(NOT COMMON CORE)** | 21.04 Checks for gas leaks. **(NOT COMMON CORE)** | 21.05 Verifies gas valve operation. **(NOT COMMON CORE)** |
| | 22. Repairs gas system components. **(NOT COMMON CORE)** | 22.01 Replaces gas system components. **(NOT COMMON CORE)** | 22.02 Repairs gas leaks. **(NOT COMMON CORE)** | | | |