



ONTARIO COLLEGE OF TRADES
ORDRE DES MÉTIERS DE L'ONTARIO

Apprenticeship
Training Standard

Residential
Air Conditioning
Systems Mechanic –
Branch 2

Trade Code: 313D

Development Date: September 2003

RESIDENTIAL AIR CONDITIONING SYSTEMS MECHANIC- BRANCH 2

NOTICE OF COLLECTION OF PERSONAL INFORMATION

1. At any time during your apprenticeship training, you may be required to show this training standard to the Ministry of Training, Colleges and Universities (the Ministry). You will be required to disclose the signed Apprenticeship Completion form to the Ministry in order to complete your program. The Ministry will use your personal information to administer and finance Ontario's apprenticeship training system, including confirming your completion and issuing your certificate of apprenticeship.
2. The Ministry will disclose information about your program completion and your certificate of apprenticeship to the Ontario College of Trades, as it is necessary for the College to carry out its responsibilities.
3. Your personal information is collected, used and disclosed by the Ministry under the authority of the Ontario College of Trades and Apprenticeship Act, 2009.
4. Questions about the collection, use and disclosure of your personal information by the Ministry may be addressed to the:

Manager, Employment Ontario Contact
Centre Ministry of Training, Colleges
and Universities
33 Bloor St. E, 2nd floor, Toronto, Ontario
M7A 2S3 Toll-free: 1-800-387-5656; Toronto:
416-326-5656
TTY: 1-866-533-6339 or 416-325-4084.

Please Note: Apprenticeship Training and Curriculum Standards were developed by the Ministry of Training, Colleges and Universities (MTCU). As of April 8th, 2013, the Ontario College of Trades (College) has become responsible for the development and maintenance of these standards. The College is carrying over existing standards without any changes.

However, because the Apprenticeship Training and Curriculum Standards documents were developed under either the Trades Qualification and Apprenticeship Act (TQAA) or the Apprenticeship and Certification Act, 1998 (ACA), the definitions contained in these documents may no longer be accurate and may not be reflective of the Ontario College of Trades and Apprenticeship Act, 2009 (OCTAA) as the new trades legislation in the province. The College will update these definitions in the future.

Meanwhile, please refer to the College's website (<http://www.collegeoftrades.ca>) for the most accurate and up-to-date information about the College. For information on OCTAA and its regulations, please visit: <http://www.collegeoftrades.ca/about/legislation-and-regulations>

RESIDENTIAL AIR CONDITIONING SYSTEMS MECHANIC- BRANCH 2

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RESIDENTIAL AIR CONDITIONING SYSTEMS MECHANIC- BRANCH 2

COMPETENCY ANALYSIS PROFILE Residential Air Conditioning Systems Mechanic- Branch 2 –313D

(All unshaded skill sets must be demonstrated/completed)

SKILL SETS

SKILLS

PROTECT SELF AND OTHERS 6230.0	Identify, interpret, and comply with safety directives 6230.01	Wear, adjust, and maintain personal protective equipment 6230.02	Practise good housekeeping in the workplace 6230.03	Handle and dispose designated substances and refrigerants 6230.04	Follow fire safety procedures 6230.05
	Operate emergency safety equipment 6230.06	Follow first aid procedures 6230.07	Report injuries 6230.08	Lock out equipment for repair or maintenance 6230.09	Work within safe physical limits 6230.10
	Operate material handling equipment 6230.11	Operate worker elevating platforms 6230.12	Handle and transport compressed gases and equipment 6230.13		

PLAN & PREPARE FOR SERVICE. INSTALLATION, OR MAINTENANCE OF RESIDENTIAL AIR CONDITIONING (AC) AND HEAT PUMP(HP) 6231.0	Read and interpret job documentation 6231.01	Calculate residential AC and HP parameters 6231.02	Identify and select AC and HP components and accessories 6231.03	Identify and select hand tools 6231.04	Identify and select power tools 6231.05
	Identify and select electrical measuring devices 6231.06	Identify and select pressure, temperature, and flow measuring devices 6231.07	Identify and select specialty instruments 6231.08	Identify and select installation materials and equipment 6231.09	Coordinate permits, inspections, and sub-trades 6231.10
	Complete planning records 6231.11	Communicate with others 6231.12			

RESIDENTIAL AIR CONDITIONING SYSTEMS MECHANIC- BRANCH 2

SKILL SETS

SKILLS

ASSEMBLE AND INSTALL RESIDENTIAL AIR CONDITIONING (AC) AND HEAT PUMP (HP) 6232.0	Inspect residential equipment at site 6232.01	Perform a site evaluation 6232.02	Coordinate material handling equipment and worker elevating platforms 6232.03	Prepare work site 6232.04	Coordinate mounting and support equipment 6232.05
	Assemble and install residential AC and HP 6232.06	Braze and solder piping 6232.07	Check system for leaks 6232.08	Evacuate and dehydrate system 6232.09	Wire in AC and HP 6232.10
	Complete installation records 6240.11				

COMMISSION RESIDENTIAL AIR CONDITIONING (AC) AND HEAT PUMP(HP) 6233.0	Charge residential system with refrigerant 6233.01	Set and verify electrical, electronic, and automated control systems 6233.02	Check and adjust air flow, water, and glycol levels 6233.03	Verify charging of residential system 6233.04	Verify residential system operating parameters 6233.05
	Start up and commission AC and HP 623306	Complete start-up and commissioning documentation 6233.07			

RESIDENTIAL AIR CONDITIONING SYSTEMS MECHANIC- BRANCH 2

SKILL SETS

SKILLS

SERVICE RESIDENTIAL AIR CONDITIONING (AC) AND HEAT PUMP (HP) 6234.0	Troubleshoot residential AC and HP 6234.01	Replace or repair residential AC and HP accessories and components 6234.02	Replace or repair residential zoning components 6234.03	Clean or replace heat transfer devices, coils, and heat exchangers 6234.04	Replace or repair condensate drains and components 6234.05
	Replace or repair AC and HP compressors 623406	Replace or repair the air side of residential equipment 6234.07	Replace or repair fans and motors 6234.08	Check operations and functions of total system 6234.09	Decommission residential AC and HP equipment 6234.10
	Clean up work site 6234.11	Complete servicing records 6234.12			

MAINTAIN RESIDENTIAL AIR CONDITIONING (AC) AND HEAT PUMP(HP) 6235.0	Check residential AC and HP accessories and components 6235.01	Clean or replace filter system and components 6235.02	Adjust and replace heat transfer medium 6235.03	Replace or repair piping 6235.04	Replace or repair AC and HP components 6235.05
	Check system for leakage 623506	Repair or replace refrigerant flow and metering devices 6235.07	Clean up work site 6235.08	Complete maintenance records 6235.09	

SERVICE AND/OR MAINTAIN; ELECTRICAL COMPONENTS OF RESIDENTIAL AIR CONDITIOINING (AC) AND HEAT PUMP (HP) 6236.0	Troubleshoot electrical components of residential AC and HP 6236.01	Repair or replace operating and safety controls 6236.02	Clean or replace electrical components 6236.03	Re-wire and repair system wiring 6236.04	Clean or replace actuator and damper/zone controls 6236.05
	Test and replace electronic components 623606	Test and replace electrical heaters, HRV/ERV and electronic air cleaners 6236.07	Complete electrical servicing or maintenance records 6236.08		

RESIDENTIAL AIR CONDITIONING SYSTEMS MECHANIC- BRANCH 2

SKILL SETS

SKILLS

<p>PERFORM CUSTOMER SERVICE</p> <p>6237.0</p>	<p>Determine nature of service or maintenance call</p> <p>6237.01</p>	<p>Conduct a site evaluation</p> <p>6237.02</p>	<p>Perform a diagnostic inspection</p> <p>6237.03</p>	<p>Estimate costs of service or maintenance call</p> <p>6237.04</p>	<p>Complete service or maintenance schedule</p> <p>6237.05</p>
	<p>Complete job work order</p> <p>6237.06</p>	<p>Instruct clients</p> <p>6237.07</p>			

PREFACE

This training standard was developed by the Workplace Training Branch of the Ministry of Training, Colleges, and Universities (MTCU), in partnership with the Provincial Advisory Committee and in consultation with representatives from the industry. This document is intended to be used by apprentice, supervisor/trainer and sponsor/employer as a "blueprint" for training and as a prerequisite for completion and certification.

This training document becomes the apprentice's only record of workplace training performance.

The supervisor/trainer and apprentice are required to sign off and date the skills following each successful acquisition, unless a skill is marked shaded (optional).

The care and maintenance of this training document are the joint responsibility of the apprentice and the sponsor/employer. By signing off the skill, the supervisor/trainer and the apprentice are indicating that the apprentice has demonstrated competence of the skill. This training standard has been developed specifically for documenting the apprentice's acquisition of skills of the trade.

DEFINITIONS

ACA

Apprenticeship and Certification Act, 1998

Certificate of Apprenticeship (C of A)

Certification issued to individuals who have demonstrated that they have completed an apprenticeship *in* Ontario.

Certificate of Qualification (C of Q)

Certification issued to C of Q applicants who have achieved a passing grade on the certification exam for their trade.

Competency Analysis Profile

A document that identifies the training needs of an individual trade and details the skills/skill sets that must be demonstrated.

Competence

The ability of an individual to perform a skill repeatedly and without assistance in the workplace to the standard set out in the Training Standard or Schedule of Training.

General Performance Objective (On-the-Job Skill Set)

Describes a set of skills, which include all performance objectives under that skill set.

Including

When used before a list of actions or items, the list is not exhaustive but contains major examples of the actions or items intended.

Industry Committee (IC) - under the ACA and Provincial Advisory Committee (PAC) under the TQAA

Under the ACA and TQAA, the Minister may appoint a provincial committee in any trade or group of trades to advise the Minister in matters relating to the establishment and operation of apprenticeship training programs and trades qualifications.

Journey person or Equivalent

A person who has acquired the knowledge and skills in a trade, occupation or craft as attested to by a provincial or territorial authority.

Mandatory

Status assigned to unshaded individual skills, skill sets or general performance objective, which must be signed off to demonstrate that the apprentice has completed their program.

Optional

Status assigned to shaded individual skills, skills sets or general performance objective for which sign-off is not required for the apprentice to complete the program.

Sign-off

Signature of the sponsor/employer of record or an individual, to whom that sponsor or employer has delegated signing authority, indicating an apprentice's achievement of competence.

Skill

Individual skill described in the Training Standard (note: does not mean the larger skill groups referred to in the Training Standard as Skill Sets, Training Units, or General Performance Objective, but the individual skills that make up those groups).

Skill Sets

Group of individual skills found in the Training Standard (may also be called Training Unit or General Performance Objective)

Skill Set Completion Form

Lists all skill sets and includes space for sign-off by sponsor/employer of record.

Sponsor/Employer

Means a person that has entered into a registered training agreement under which the person is required to ensure that an individual is provided with workplace-based training in a trade, other occupation, or skill set as part of an apprenticeship program approved by the Director.

Sponsor/Employer of Record

Refers to the sponsor or employer documented as the signatory to the current training agreement or contract. In order for an sponsor/employer to be considered for the training of apprentices, they must identify that the workplace has qualified journeypersons or equivalent on site and can identify that the workplace has the tools, equipment, materials, and processes which have been identified by Provincial Advisory Committees (PACs) or Industry Committees (ICs) to be required for the trade.

Supervisor

An individual who oversees the execution of a task or oversees the actions and work of others.

Trainer

A qualified trainer in a compulsory trade is a journeyperson with a Certificate of Qualification or in a voluntary trade is an individual who is considered equivalent to a journeyperson with a Certificate of Qualification.

TQAA

Trades Qualification and Apprenticeship Act.

Training Standard

A document that has been written in concise statements, which describe how well an apprentice must perform each skill in order to become competent. By using the document, trainers will be able to ensure that the apprentice is developing skills detailed for the occupation.

IMPORTANT DIRECTIONS

Apprentice

1. All complete skills or skill sets must be signed and dated by both the apprentice and sponsor/employer when either all terms of the contract have been completed or the apprentice leaves the employ of the employer.
2. It is the responsibility of the apprentice to inform the local Apprenticeship Client Services Office regarding the following changes:
 - change of sponsor/employer address;
 - change of apprentice name or address;
 - transfer to a new sponsor/employer.
3. The Skill Set Completion Form must be completed and signed by the current sponsor/employer and presented to the local Apprenticeship Client Services Office at the fulfillment of all terms of a Contract of Apprenticeship/Training Agreement.
4. The Apprentice Completion Form with the Completed and Authorized Training Standard must be presented to the local Apprenticeship Client Services Unit.

Sponsors/Employers and Supervisors/Trainers

The Training Standard identifies skills required for this trade/occupation and its related training program.

This Training Standard has been written in concise statements, which describe how an apprentice must perform each skill in order to become competent. Competence means being able to perform the task to the required standard.

By using this Training Standard, supervisors/trainers will be able to ensure that the apprentice is developing the skills detailed for the trade/occupation.

Supervisors/trainers and apprentices are required to sign off and date the skills following each successful acquisition.

Sponsors/employers participating in this training program will be designated as the Signing Authority and are required to attest to successful achievement by signing the appropriate box included at the end of each skill set.

ROLES & RESPONSIBILITIES OF APPRENTICE, SPONSOR/EMPLOYER AND SUPERVISOR/TRAINER

Apprentice "Apprenticeship is learning on the job"

- Practise safe work habits.
- Use your apprenticeship training standard as a journal to keep track of which skills you have achieved.
- Talk over your training plan with your Training Consultant, Employer, Union, or Sponsor.
- Know what tools are required for your trade and how to use them.
- Ask questions and keep asking.
- Talk to your employer about your training needs.
- Demonstrate enthusiasm and good work habits.
- Ensure that you and your supervisor/trainer sign off the skill/skill sets upon successful completion of the competency.

Sponsor/Employer "Training is an Investment"

- Demonstrate safe work habits.
- Attest to successful achievement by signing off the skill/skills sets.
- Provide opportunities and time for the apprentice to learn the trade.
- Offer practical trade training experiences that cover all the skill sets.
- Foster work ethics that support training while minimizing productivity losses.
- Set out clear expectations, then recognize or reward performance excellence.
- Involve both the apprentice and supervisor/trainer in developing the training plan.
- Use the Training Standard as a monitoring tool and part of regular performance evaluations.
- Select supervisors/trainers who have good communication skills and who work well with others.
- Encourage supervisors/trainers to take upgrading courses - (e.g. Train the Trainer, Mentor Coach, etc).
- Complete the Skill Set Completion Form once the apprentice has demonstrated competency in the training.
- Ensure that the apprentice always works under the direction of or has access to a qualified supervisor/trainer.
- Vary the apprentice's exposure to all the skills set out in the Training Standard.

Supervisor/Trainer

- Demonstrate safe work habits.
- Treat apprentices fairly and with respect.
- Use the Training Standard as a guide to evaluating competence in each skill area. By using the Training Standard, supervisors/trainers will be able to ensure that the apprentice is developing skills detailed for the trade/occupation.
- Review the Training Standard with the apprentice and develop a training plan.
- Respond fully to all questions.
- Be patient. Explain what is to be done, then show how it is done, and then let the apprentice demonstrate the task.
- Provide continuous feedback.
- Sign off individual skills/skill sets once the apprentice demonstrates competence in the skill.

Suggestions for Assessing the Progress of the Apprentice in the Workplace

- Use informal daily observation.
- Provide constructive feedback to build confidence.
- Allow the supervisor/trainer time to teach and demonstrate the skills.
- Take prompt action whenever problems occur.
- Conduct regular performance reviews involving the apprentice, supervisor/trainer, and sponsor/employer.
- Use the Training Standard as the reference for establishing the competency of the apprentice.

SKILL SET COMPLETION FORM

SKILLS SETS	TITLE	SIGNING AUTHORITY
6230.0	PROTECT SELF AND OTHERS	
6231.0	PLAN AND PREPARE FOR INSTALLATION, MAINTENANCE, OR SERVICE OF RESIDENTIAL AIR CONDITIONING (AC) AND HEAT PUMP (HP)	
6232.0	ASSEMBLE AND INSTALL RESIDENTIAL AIR CONDITIONING (AC) AND HEAT PUMP (HP)	
6233.0	COMMISSION RESIDENTIAL AIR CONDITIONING (AC) AND HEAT PUMP (HP)	
6234.0	SERVICE RESIDENTIAL AIR CONDITIONING (AC) AND HEAT PUMP (HP)	
6235.0	MAINTAIN RESIDENTIAL AIR CONDITIONING (AC) AND HEAT PUMP (HP)	
6236.0	SERVICE AND/OR MAINTAIN ELECTRICAL COMPONENTS OF RESIDENTIAL AIR CONDITIONING (AC) AND HEAT PUMP (HP)	
6237.0	PERFORM CUSTOMER SERVICE	

NOTE ON SHADED PERFORMANCE OBJECTIVES AND SKILLS

- Shaded performance objectives and skill sets are optional. The shaded skills do not have to be demonstrated or signed off for completion of the on-the-job component of the apprenticeship.
- The in-school curriculum learning outcomes will cover all the skill sets, both shaded and unshaded.
- The Certificate of Qualification examination will test the whole of the trade and may test both shaded and unshaded performance skill sets.

6230.00 PROTECT SELF AND OTHERS

GENERAL PERFORMANCE OBJECTIVE

Protect self and others by: identifying, interpreting, and complying with safety directives; wearing, adjusting, and maintaining personal protective equipment; practising good housekeeping in the workplace; handling and disposing designated substances and refrigerants; following fire safety and first aid procedures; reporting injuries; locking out equipment for repair or maintenance; working within safe physical limits; operating material handling equipment, worker elevating platforms, and emergency safety equipment; and, handling and transporting compressed gases and equipment.

PERFORMANCE OBJECTIVES

SKILLS

6230.01 Identify, interpret, and comply with safety directives provided in applicable Acts, Regulations, Legislation, and Codes including (not limited to) the Occupational Health and Safety Act (OHSA), Worker's Compensation Act (WCA), Ministry of Environment (MOE Regulations), Dangerous Goods Transportation Act (DGTA), Workplace Hazardous Materials Information System (WHMIS), Ontario Fire Code (OFC), Canadian Electrical Code (CEC), Mechanical Refrigeration Code (852), Energy Act (EA), and TSSA Act and Regulations.

Date Completed

Apprentice

Supervisor/Trainer

6230.02 Wear, adjust, and maintain personal protective equipment including (not limited to) safety and rubber boots, hard hats, gloves, glasses, goggles, masks, face shields, coveralls, fall-arrest equipment, and ear protectors, to ensure the correct fit and optimum protection for the wearer and the task being performed in compliance with manufacturer's specifications, company standards/policies, and applicable Acts, Regulations, Legislation, and Codes.

Date Completed

Apprentice

Supervisor/Trainer

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6230.00 PROTECT SELF AND OTHERS ...cont'd

6230.03 **Practise good housekeeping in the workplace** by cleaning up spills and leaks, keeping work area clean and clear of obstructions, and storing tools or equipment, so that the potential for accident or injury is prevented and tools or equipment are in place and available, in compliance with company standards/policies and applicable Acts, Regulations, Legislation, and Codes.

Date Completed

Apprentice

Supervisor/Trainer

6230.04 **Handle and dispose designated substances and refrigerants** using specified handling and storage equipment and disposing of recovered refrigerant, so that the operator is protected from injury, the environment from contamination, and procedures are followed in compliance with applicable Acts, Regulations, Legislation, and Codes, manufacturer's specifications, and company standards/policies.

Date Completed

Apprentice

Supervisor/Trainer

6230.05 **Follow fire safety procedures** including (not limited to): locating and assessing the severity of the fire; handling fire extinguishing equipment; suppressing minor fires; activating alarms; and, reporting incidents; in accordance with applicable Acts, Regulations, Legislation, and Codes, manufacturer's specifications, and company standards/policies.

Date Completed

Apprentice

Supervisor/Trainer

6230.06 **Operate emergency safety equipment** including (not limited to) fire equipment, respirators, and fall-arrest equipment, ensuring that procedures are carried out in a safe and efficient manner in accordance with company standards/policies, manufacturer's specifications, and applicable Acts, Regulations, Legislation, and Codes.

Date Completed

Apprentice

Supervisor/Trainer

6230.00 PROTECT SELF AND OTHERS ...cont'd

6230.07 **Follow first aid procedures** to treat conditions including (not limited to) sudden illness or minor injuries, burns, cuts, abrasions, falls, sprains, chemical inhalations, and contaminants in eyes, by using first aid equipment and following procedures so that the victim is stabilized and prepared for further first aid treatment, in accordance with applicable Acts, Regulations, Legislation, and Codes, and company standards/policies.

Date Completed	Apprentice	Supervisor/Trainer
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6230.08 **Report injuries** to supervisor or first aid personnel promptly and clearly, ensuring that the injured person is attended to, and information is reported precisely and accurately describing how incident occurred, so that future recurrence of similar accidents is prevented and reporting complies with company standards/policies, applicable Acts, Regulations, Legislation, and Codes.

Date Completed	Apprentice	Supervisor/Trainer
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6230.09 **Lock out equipment for repair or maintenance** by following company procedures including (not limited to): shutting down system; de-energizing equipment; tagging equipment; and, ensuring that power source is off and locked out prior to commencing maintenance or service; so that no damage or injury is caused to the operator or equipment, in compliance with applicable Acts, Regulations, Legislation, and Codes;

Date Completed	Apprentice	Supervisor/Trainer
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6230.10 **Work within safe physical limits** by applying lifting procedures for bending, lifting, transporting, or climbing with heavy loads, so that personal injury is prevented in accordance with applicable Acts, Regulations, Legislation, or Codes, and company standards/policies.

Date Completed	Apprentice	Supervisor/Trainer
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6230.00 PROTECT SELF AND OTHERS ...cont'd

6230.11 **Operate material handling equipment** including (not limited to) hoists, cranes, slings, cables, and chains, so that materials, parts, and equipment are removed, transported, and stored, in compliance with manufacturer's specifications, company standards/policies, and applicable Acts, Regulations, Legislation, and Codes.

Date Completed

Apprentice

Supervisor/Trainer

6230.12 **Operate worker elevating platforms** including (not limited to) ladders, boom truck, buckets, scaffolding, scissor lift, and articulating man lift, ensuring that the correct lifting procedures and equipment are used to move and hoist individuals, in compliance with manufacturer's specifications, company standards/policies, and applicable Acts, Regulations, Legislation, and Codes.

Date Completed

Apprentice

Supervisor/Trainer

6230.13 **Handle and transport compressed gases and equipment** including (not limited to) manifolds, tubing, gases, and hoses so that all compressed gases are handled, moved, and stored in accordance with applicable Acts, Regulations, Legislation, and Codes.

Date Completed

Apprentice

Supervisor/Trainer

Sponsor/Employer Name

Sponsor/Employer Signature

6231.00 PLAN AND PREPARE FOR INSTALLATION, MAINTENANCE, OR SERVICE OF RESIDENTIAL AIR CONDITIONING (AC) AND HEAT PUMP (HP)

GENERAL PERFORMANCE OBJECTIVE

Plan and prepare for installation, maintenance, or service of residential AC and HP by: reading and interpreting job documentation; calculating system parameters; identifying and selecting system components and equipment; identifying and selecting hand tools, power tools, electrical measuring devices, speciality instruments, pressure, temperature, and flow measuring devices, and installation materials; co-ordinating permits, inspections and sub-trades; completing planning documents; and, communicating with others.

PERFORMANCE OBJECTIVES

SKILLS

6231.01 **Read and interpret job documentation** including (not limited to) work order, manufacturer's specifications, mechanical and architectural engineering drawings, wiring diagrams, applicable Acts, Regulations, Legislation, and Codes, and Manufacturer's Installation, Operation and Maintenance (IOM) to identify: type and size of equipment; required permits; installation or service procedures; location of mechanical causeways; required tools, equipment, and materials; and any other information needed to plan the completion of an installation, service or maintenance job of a residential AC and HP system.

Date Completed

Apprentice

Supervisor/Trainer

6231.02 **Calculate residential AC and HP parameters** including (not limited to) heat loss/gain, ventilation, humidity, and filtration/purification parameters, by reading and interpreting industry standard charts, psychrometric charts, tables, or manuals, and using tape measure, calculators, scaled rules, or software, in order to determine that system has the correct parameters for the application, in accordance with work order, design specifications, applicable Acts, Regulations, Legislation, and Codes, and company standards/policies.

Date Completed

Apprentice

Supervisor/Trainer

6231.00 PLAN AND PREPARE FOR INSTALLATION, MAINTENANCE, OR SERVICE OF RESIDENTIAL AIR CONDITIONING (AC) AND HEAT PUMP (HP) ...cont'd

6231.03 **Identify and select AC and HP components and accessories** including (not limited to) condensing unit, air handler, evaporator, heat pump, heat recovery ventilator (HRV), controls, Energy Recovery Ventilator (ERV), fans, humidifier, filtration equipment, condensate pump, and dampers, ensuring that the components and equipment selected are the correct ones for the application, in accordance with design parameters, work order, manufacturer's specifications, applicable Acts, Regulations, Legislation, and Codes, and company standards/policies.

_____	_____	_____
Date Completed	Apprentice	Supervisor/Trainer

6231.04 **Identify and select hand tools** including (not limited to) screw drivers, wrenches, metal snips, brazing/cutting torches, swaging/flaring tools, hammers, tubing and pipe cutters, reamers, sockets, ratchets, and specialty tools, ensuring that the tools selected are the correct ones for the application and that tools are ready for use, in accordance with work order, manufacturer's specifications, and applicable Acts, Regulations, Legislation, and Codes.

_____	_____	_____
Date Completed	Apprentice	Supervisor/Trainer

6231.05 **Identify and select power tools** including (not limited to) drills, saws, pipe threaders, vacuum pumps, reclaimer/recoverer, and pressure washers, ensuring that the power tool selected is the correct one for the application and that tools are cleaned and ready for use, in accordance with work order, manufacturer's specifications, and applicable Acts, Regulations, Legislation, and Codes.

_____	_____	_____
Date Completed	Apprentice	Supervisor/Trainer

6231.06 **Identify and select electrical measuring devices** including (not limited to) ammeter, voltmeter, ohmmeter, multimeter, recorder, watt meter, and specialty instruments, ensuring that the electrical measuring devices are the correct ones for the application and that devices are cleaned, maintained, calibrated, and ready for use, in accordance with work order, manufacturer's specifications, and applicable Acts, Regulations, Legislation, and Codes.

_____	_____	_____
Date Completed	Apprentice	Supervisor/Trainer

6231.00 PLAN AND PREPARE FOR INSTALLATION, MAINTENANCE, OR SERVICE OF RESIDENTIAL AIR CONDITIONING (AC) AND HEAT PUMP (HP) ... cont'd

6231.07 **Identify and select pressure, temperature, and flow measuring devices** including (not limited to) air flow meter, liquid gauge, manifold gauge, manometer, thermometer, and tachometer, ensuring that the devices selected are the correct ones to measure the system operating parameters and that the devices are cleaned, calibrated, operational, and functioning, in accordance with manufacturer's specifications, work order, and applicable Acts, Regulations, Legislation, and Codes.

_____ Date Completed _____ Apprentice _____ Supervisor/Trainer

6231.08 **Identify and select speciality instruments** including (not limited to) micron gauges, refrigerant gauges, tachometers, scales, and infrared instruments, ensuring that the instruments are the correct ones to determine conditions and quantities of system and that instruments are cleaned, calibrated, operational and functioning, in accordance with manufacturer's specifications, work order, and applicable Acts, Code, Legislation, and Regulations.

_____ Date Completed _____ Apprentice _____ Supervisor/Trainer

6231.09 **Identify and select installation materials and equipment** including (not limited to) piping, insulation, brazing and soldering material, wiring, hangers, fasteners, drain tubing, solvents, nitrogen, material handling equipment, refrigerant, tools, and chaseway materials or equipment, ensuring that the installation materials selected are the correct ones to install the AC and HP system, in compliance with work order, design parameters, manufacturer's specifications, and applicable Acts, Regulations, Legislation, and Codes.

_____ Date Completed _____ Apprentice _____ Supervisor/Trainer

6231.10 **Coordinate permits, inspections, and sub-trades** to ensure that all permits and inspections have been arranged prior to the job and that sub-trades have been contacted and scheduled, in compliance with work order, industry or company standards/policies, and applicable Acts, Regulations, Legislation, and Codes.

_____ Date Completed _____ Apprentice _____ Supervisor/Trainer

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6231.00 PLAN AND PREPARE FOR INSTALLATION, MAINTENANCE, OR SERVICE OF RESIDENTIAL AIR CONDITIONING (AC) AND HEAT PUMP (HP) ... cont'd

6231.11 **Complete planning records** by checking that permits, work order, sign-off sheets, or manufacturer's checklists are available and ready for use, and that all planned requirements of the installation or service are identified and recorded, in accordance with company standards/policies and applicable Acts, Regulations, Legislation, and Codes.

Date Completed

Apprentice

Supervisor/Trainer

6231.12 **Communicate with others** to identify previous job operations, availability of tools, parts, and equipment, scheduling requirements, permits or inspections, and any other information needed to plan the installation, maintenance, or service job, ensuring that all information communicated is clear, concise, and accurate.

Date Completed

Apprentice

Supervisor/Trainer

Sponsor/Employer Name

Sponsor/Employer Signature

6232.00 ASSEMBLE AND INSTALL RESIDENTIAL AIR CONDITIONING (AC) AND HEAT PUMP (HP)

GENERAL PERFORMANCE OBJECTIVE

Assemble and install residential AC and HP by: inspecting residential equipment at site; performing a site evaluation; coordinating material handling equipment, worker elevating platforms, and mounting/support equipment; preparing work site; assembling and installing residential AC and HP; brazing and soldering piping; checking system for leaks; evacuating and dehydrating AC and HP system; wiring in AC and HP; and, completing installation records.

PERFORMANCE OBJECTIVES

SKILLS

6232.01 **Inspect residential equipment at site** by following required procedures including (not limited to): removing packaging; inspecting unit for damage; and, checking equipment design parameters; to ensure that the system conforms to the work order and manufacturer's specifications.

Date Completed

Apprentice

Supervisor/Trainer

6232.02 **Perform a site evaluation** by following required procedures including (not limited to): visually inspecting site for obstructions; measuring equipment parameters; placing equipment to layout; evaluating effectiveness and reliability of installation site design; checking that required utilities are installed and available; determining mechanical chaseways; and, discussing with the client the scope of the installation; so that the installation plan is verified and coincides with the scope of work and design parameters, in accordance with the client requirements, work order, manufacturer's specifications, industry standards, and applicable Acts, Regulations, Legislation, and Codes.

Date Completed

Apprentice

Supervisor/Trainer

RESIDENTIAL AIR CONDITIONING SYSTEMS MECHANIC- BRANCH 2

6232.00 ASSEMBLE AND INSTALL RESIDENTIAL AIR CONDITIONING (AC) AND HEAT PUMP (HP) ...cont'd

6232.03 **Coordinate material handling equipment and worker elevating platforms** including (not limited to) ladders, boom truck, buckets, scaffolding, scissor lift, articulating man lift, rigging equipment, power lifts, and cranes, ensuring that the correct equipment is identified, selected, and available for the size and weight of the load, height of the lift, and distance to be covered, in accordance with manufacturer's specifications, work order, company standards/policies, and applicable Acts, Regulations, Legislation, and Codes.

Date Completed

Apprentice

Supervisor/Trainer

6232.04 **Prepare work site** by following required procedures including (not limited to): setting up and arranging installation tools and equipment; checking that power or gas source is available; recovering refrigerant; removing and disposing of existing equipment including (not limited to) air handling equipment, heat pump, indoor coils, condensing unit, or refrigerant piping; removing obstacles and debris from work area; placing equipment to layout design; preparing mechanical chaseways; and, using drop sheets, hand and power tools or material handling equipment; so that the work site is prepared and ready for the installation of the system, in accordance with work order, company standards/policies, client requirements, and applicable Acts, Regulations, Legislation, and Codes.

Date Completed

Apprentice

Supervisor/Trainer

6232.05 **Coordinate mounting and support equipment** by following required procedures including (not limited to): visually checking site; checking job site conditions against the layout documentation; locating equipment; and, placing equipment on required mounts or supports including (not limited to) slabs, curbs, brackets, sleepers, pads, and hangers; so that the mounts or supports are located, positioned, and aligned, in accordance with installation plan, work order, manufacturer's specifications, customer requirements, industry standards, company standards/policies, and applicable Acts, Regulations, Legislation, and Codes.

Date Completed

Apprentice

Supervisor/Trainer

6232.00 ASSEMBLE AND INSTALL RESIDENTIAL AIR CONDITIONING (AC) AND HEAT PUMP (HP) ...cont'd

6232.06 **Assemble and install residential AC and HP** by following required procedures including (not limited to): assembling air handler and filtering equipment, condensing unit, indoor coil, heat pump, refrigerant, refrigerant accessories, piping, insulation, controls, drain line, condensate pump, indoor air quality equipment, humidifiers/dehumidifiers, system accessories, Heat Recovery Ventilator (HRV) or Energy Recovery Ventilator (ERV), mechanical chaseways, and mechanical ventilation; tying in the condensate line to the open drain; cutting pathways for the piping, wiring, and duct work; measuring and checking installation; lifting and moving using material handling equipment; placing equipment to layout design; and, using required hand or power tools; ensuring that residential AC and HP system is installed in accordance with work order, manufacturer's specifications, industry and company standards/policies, and applicable Acts, Regulations, Legislation, and Codes.

Date Completed	Apprentice	Supervisor/Trainer
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6232.07 **Braze and solder piping** by following required procedures including (not limited to): setting up oxygen, acetylene, propane, and nitrogen equipment, soldering devices, hoses, regulators, torch accessories and fire extinguishers; inspecting and cleaning piping; purging nitrogen; brazing and soldering piping using flux, brazing alloys, and solder; preparing piping chaseways; forming piping joints; and, cleaning, storing, and adjusting brazing or soldering equipment; so that leak-proof joints are formed and piping is installed, in accordance with work order, industry and company standards/policies, and applicable Acts, Regulations, Legislation, and Codes.

Date Completed	Apprentice	Supervisor/Trainer
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6232.08 **Check system for leaks** by following required procedures including (not limited to): visually inspecting; performing various leak tests; pressurizing the system; and, using nitrogen, gauges, soap solutions, electronic leak detectors, or air; to verify that there are no leaks and that the system integrity conforms with design parameters, manufacturer's specifications, company standards/policies, and applicable Acts, Regulations, Legislation, and Codes.

Date Completed	Apprentice	Supervisor/Trainer
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6232.00 ASSEMBLE AND INSTALL RESIDENTIAL AIR CONDITIONING (AC) AND HEAT PUMP (HP) ...cont'd

6232.09 **Evacuate and dehydrate system** by following required procedures including (not limited to): releasing nitrogen from system; evacuating system; and, using hand tools, manifold gauges, vacuum pumps, micron gauges, or thermistors; so that all moisture and non-condensables are removed from the system and that equipment is cleaned and ready for use, in compliance with work order, design parameters, manufacturer's specifications, company standards/policies, and applicable Acts, Regulations, Legislation, and Codes.

Date Completed

Apprentice

Supervisor/Trainer

6232.10 **Wire in AC and HP** by following required procedures including (not limited to): reading and interpreting electrical diagrams, schematics, 10M data, specifications or job documentation; preparing wiring chaseway; using hand or power tools, measuring instruments or electrical measuring instruments; and, visually inspecting wiring; so that the system wiring is correctly installed, in accordance with work order, design parameters, manufacturer's specifications, company standards/policies and applicable Acts, Regulations, Legislation, and Codes.

Date Completed

Apprentice

Supervisor/Trainer

6232.11 **Complete installation records** by recording operational parameters on manufacturer's or company check lists and completing warranty forms, ensuring that installation data is completed in a clear, concise, and legible manner, in accordance with job specifications and company standards/policies.

Date Completed

Apprentice

Supervisor/Trainer

Sponsor/Employer Name

Sponsor/Employer Signature

6233.00 COMMISSION RESIDENTIAL AIR CONDITIONING (AC) AND HEAT PUMP (HP)

GENERAL PERFORMANCE OBJECTIVE

Commission residential AC and HP by: charging system with refrigerant; setting and verifying electrical, electronic, and automated control systems; checking and adjusting air flow, water, and glycol levels; verifying charging of system; verifying operating parameters; starting up and commissioning system; and, completing start-up documentation.

PERFORMANCE OBJECTIVES

SKILLS

6233.01 **Charge residential system with refrigerant** by following required procedures including (not limited to): reading and interpreting rating and 10M specifications; using hand tools, manifold gauges, hoses, weigh scales, and charging cylinders; putting refrigerant into system; and ensuring that the system is charged; in accordance with manufacturer's specifications, design parameters, applicable Acts, Regulations, Legislation, and Codes and company standards/policies.

Date Completed	Apprentice	Supervisor/Trainer

6233.02 **Set and verify electrical, electronic, and automated control systems** by following required procedures including (not limited to): turning power on; checking primary and secondary voltage delivery, motor rotation, and oil levels; setting controls; adjusting hi/low pressures on air conditioners and heat pump; testing defrost controls on heat pump; checking crankcase heaters, fan cycling accessories, off-cycle timers, electronic or manual thermostat operations, zone control functions, and air quality accessory controls; and, using hand tools, specialty tools, gauges, temperature measuring instruments, electrical measuring instruments, simulators, and analyzers; so that all the control parameters are set to preset operational parameters, in accordance with manufacturer's specifications, design parameters, company standards/policies, and applicable Acts, Regulations, Legislation, and Codes.

Date Completed	Apprentice	Supervisor/Trainer

6233.00 COMMISSION RESIDENTIAL AIR CONDITIONING (AC) AND HEAT PUMP (HP) ...cont'd

6233.03 **Check and adjust air flow, water, and glycol levels** using hand tools, flow meters, gauges, and hydrometers to ensure that the system is operational and functioning at the specified parameters, in accordance with government regulations, manufacturer's specifications, codes, design parameters, and company standards/policies.

_____ Date Completed _____ Apprentice _____ Supervisor/Trainer

6233.04 **Verify charging of residential system** by following required procedures including (not limited to): reading and interpreting superheat and sub-cooling charts; checking refrigerant charge and oil levels; making necessary adjustments; using hand tools, manifold gauges, thermometers, psychometers, weigh scales, and reclaimers; and, documenting adjustments made to refrigerants; so that the pressure, temperatures, flows, and levels are operating at the specified parameters, in accordance with design parameters, manufacturer's specifications, company standards/policies, and applicable Acts, Regulations, Legislation, and Codes.

_____ Date Completed _____ Apprentice _____ Supervisor/Trainer

6233.05 **Verify residential system operating parameters** including (not limited to) pressure, temperatures, flow rate, voltages, amperage, fluid levels, and speeds, by checking using hand tools, pressure gauges, temperature measuring instruments, flow measuring instruments, electrical measuring instruments, level indicators, simulators, and tachometers, and by documenting results, so that the operating parameters are checked and recorded, in accordance with design parameters, manufacturer's specifications, job specifications, company standards/policies, and applicable Acts, Regulations, Legislation, and Codes.

_____ Date Completed _____ Apprentice _____ Supervisor/Trainer

6233.00 COMMISSION RESIDENTIAL AIR CONDITIONING (AC) AND HEAT PUMP (HP) ...cont'd

6233.06 **Start up and commission AC and HP** by following required procedures including (not limited to): verifying that all sub-trade work has been inspected and certified; verifying that all gas operations have been checked and certified; turning on power and starting up system; setting limit, operating, and safety controls; testing system parameters including (not limited to) pressure, temperatures, flow rate, voltage, amperage, levels, and speeds; making required adjustments; and, using hand or power tools, pressure gauges, temperature measuring instruments, flow measuring instruments, electrical measuring devices, or tachometers; so that the total system is verified to be operational and functioning, in accordance with design parameters, company standards/policies, and applicable Acts, Regulations, Legislation, and Codes.

Date Completed

Apprentice

Supervisor/Trainer

6233.07 **Complete start-up and commissioning documentation** by recording residential air cooling system operational parameters on manufacturer's or company check lists and completing warranty forms, ensuring that the documentation is completed in a clear, concise, and legible manner, in accordance with company standards/policies and applicable Acts, Regulations, Legislation, and Codes.

Date Completed

Apprentice

Supervisor/Trainer

Sponsor/Employer Name

Sponsor/Employer Signature

6234.00 SERVICE RESIDENTIAL AIR CONDITIONING (AC) AND HEAT PUMP (HP)

GENERAL PERFORMANCE OBJECTIVE

Service residential AC and HP by: troubleshooting, replacing, or repairing system accessories and components, zoning components, condensate drains and components, air side of equipment, fans, and motors; cleaning or replacing heat transfer devices, coils, and heat exchangers; replacing residential compressors; checking operations and functions of total system; decommissioning residential AC and HP equipment; cleaning up work site; and, completing service documentation.

PERFORMANCE OBJECTIVES

SKILLS

6234.01 **Troubleshoot residential AC and HP** by following required procedures including (not limited to): discussing with the client to determine nature of service call; performing an inspection and diagnostic check; reading and interpreting IOM charts; determining corrective actions or options; estimating cost of servicing; writing up a work sheet; and, using metres, gauges, and price lists; so that the scope of the service work is determined and documented, in accordance with company standards/policies, client requirements, and applicable Acts, Regulations, Legislation, and Codes.

Date Completed

Apprentice

Supervisor/Trainer

6234.02 **Replace or repair residential AC and HP accessories and components** by following required procedures including (not limited to): visually inspecting liquid/moisture indicators, accumulators, HRV/ERV, humidifier, pressure controls and other directly related components; replacing or repairing defective components and accessories; adjusting controls; and, documenting results; so that the system accessories are operational and functioning to design parameters, in accordance with work order, manufacturer's specifications, and applicable Acts, Regulations, Legislation, and Codes.

Date Completed

Apprentice

Supervisor/Trainer

6234.00 SERVICE RESIDENTIAL AIR CONDITIONING (AC) AND HEAT PUMP (HP) ...cont'd

6234.03 **Replace or repair residential zoning components** by following required procedures including (not limited to): discussing with the client to determine the nature of problem; inspecting bearings, linkages, dampers, actuators, and wiring; lubricating moving parts; replacing or repairing defective components; adjusting controls; using required hand tools, PCs, software, and lubricants; and, documenting results; so that the zoning components are operational and functioning in accordance with work order, client requirements, design parameters, manufacturer's specifications, and applicable Acts, Regulations, Legislation, and Codes.

Date Completed	Apprentice	Supervisor/Trainer
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6234.04 **Clean or replace heat transfer devices, coils, and heat exchangers** by following required procedures including (not limited to): determining gas technician licence requirements; coordinating required sub-trades; inspecting heat transfer mediums; visually inspecting components; conducting pressure and temperature differential tests; determining required pressures, flow, and velocities; adjusting air flow, filter media, pressures, or system components; replacing cracked or defective components; cleaning obstructed coils; using required hand tools, pressure gauges, thermometers, brushes, voltmeters, chemical solutions, vacuum, and power washers; and, documenting results; so that the heat exchanger is operational and functioning, in accordance with work order, design parameters, manufacturer's specifications, and applicable Acts, Regulations, Legislation, and Codes.

Date Completed	Apprentice	Supervisor/Trainer
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6234.05 **Replace or repair condensate drains and components** by following required procedures including (not limited to): visually inspecting drain piping, drain pans, humidifiers, and condensate pumps; checking operation, condition, and integrity of the components; replacing defective or worn parts; repairing pumps and defective wiring; using hand tools, chemical solutions, brushes, and psychrometers; and, documenting results; so that the condensate components are operational and functioning, in accordance with design parameters, manufacturer's specifications, company standards/policies, and applicable Acts, Regulations, Legislation, and Codes.

Date Completed	Apprentice	Supervisor/Trainer
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6234.00 SERVICE RESIDENTIAL AIR CONDITIONING (AC) AND HEAT PUMP (HP) ...cont'd

6234.06 **Replace AC and HP compressors** by following required procedures including (not limited to): visually inspecting compressor; determining cause of compressor failure; performing acid test; replacing defective compressor; recharging system; performing start-up of compressor; cleaning up work area; using hand or power tools, multimeters, compound gauges, recovery equipment, vacuum pump, and brazing equipment; and, documenting start-up parameters; so that the restored system performance meets design parameters, manufacturer's specifications, company standards/policies, and applicable Acts, Regulations, Legislation, and Codes.

Date Completed

Apprentice

Supervisor/Trainer

6234.07 **Replace or repair the air side of residential equipment** by following required procedures including (not limited to): discussing with the client problems such as high humidity, moulds, allergies, temperature swings, or general comfort levels; checking humidifiers, exhaust fans, HRV/ERV, dehumidifiers, and filtration equipment; replacing damaged or dirty media; cleaning coils, components, and condensate drain system; repairing dampers, actuators, or controls; performing test runs; using hand or power tools, brazing equipment, electrical metres, pressure gauges, and psychrometers; and, documenting results; so that the air quality is restored to design parameters, in accordance with manufacturer's specifications, company standards/policies, customer requirements, and applicable Acts, Regulations, Legislation, and Codes.

Date Completed

Apprentice

Supervisor/Trainer

6234.08 **Replace or repair fans and motors** by following required procedures including (not limited to): visually inspecting fan assembly, motors, bearings, pulleys, and belts; checking vibrations and running amperage; replacing or repairing defective components; lubricating bearings; cleaning fan and associated components; documenting results; and, using hand or power tools, measuring devices, gauges, thermometers, speciality tools, lubricants, and cleaning chemicals; so that the performance of the fans and motors is restored to design parameters, in accordance with manufacturer's specifications, and company standards/policies, and applicable Acts, Regulations, Legislation, and Codes.

Date Completed

Apprentice

Supervisor/Trainer

6234.00 SERVICE RESIDENTIAL AIR CONDITIONING (AC) AND HEAT PUMP (HP) ...cont'd

6234.09 **Check operations and functions of total system** by following required procedures including (not limited to): discussing with the client to determine air quality and to define problems; inspecting and checking operation and integrity of system; calibrating and making adjustments; using hand tools, pressure gauges, thermometers, and psychrometers; and, documenting results; so that the system is operating to maximize performance and to prevent damage, in accordance with design parameters, manufacturer's specifications, company standards/policies, and applicable Acts, Regulations, Legislation, and Codes.

_____ Date Completed _____ Apprentice _____ Supervisor/Trainer

6234.10 **Decommission residential AC and HP equipment** for resale, renovation, or moth balling by following required procedures including (not limited to): discussing with the client which system is to be decommissioned; checking that the utilities connected to the system have been shut off and locked out; disconnecting the system and accessories; removing liquids subject to freezing; pumping down system to reclaim refrigerant; sealing system; using required hand or power tools, material handling equipment, or safety equipment; and, completing documentation; so that the system is sealed and ready for transportation; in accordance with work order, industry standards, and applicable Acts, Codes, Legislation, and Regulations.

_____ Date Completed _____ Apprentice _____ Supervisor/Trainer

6234.11 **Clean-up work site** by: cleaning up liquids, broken pieces, and debris; replacing structures; removing all construction waste; and, using brooms or wet/dry vac; so that the work area is clean and clear of obstructions, tools or equipment are stored, and hazardous products are disposed of, in compliance with company standards/policies and applicable Acts, Regulations, Legislation, and Codes.

_____ Date Completed _____ Apprentice _____ Supervisor/Trainer

RESIDENTIAL AIR CONDITIONING SYSTEMS MECHANIC- BRANCH 2

6234.00 SERVICE RESIDENTIAL AIR CONDITIONING (AC) AND HEAT PUMP (HP) ...cont'd

6234.12 **Complete servicing records** by recording system operational parameters on manufacturer's or company check lists and warranty forms, ensuring that the documentation is completed in a clear, concise, and legible manner in accordance with company standards/policies and applicable Acts, Regulations, Legislation, and Codes.

Date Completed

Apprentice

Supervisor/Trainer

Sponsor/Employer Name

Sponsor/Employer Signature

6235.00 MAINTAIN RESIDENTIAL AIR CONDITIONING (AC) AND HEAT PUMP (HP)

GENERAL PERFORMANCE OBJECTIVE

Maintain residential AC and HP by: checking AC and HP accessories and components; cleaning or replacing filter system and components; adjusting and replacing heat transfer medium; replacing or repairing piping, and AC or HP components; repairing and replacing refrigerant flow and metering devices; checking system for leakage; cleaning up work site; and, completing maintenance documentation,

PERFORMANCE OBJECTIVES

SKILLS

6235.01 **Check residential AC and HP accessories and components** by following required procedures including (not limited to): discussing with the client to clarify nature of maintenance call; performing a system inspection and operations check; reading and interpreting IOM charts; determining corrective actions or options; using meters and gauges; and, writing up work sheet; so that the scope of the maintenance work is determined and documented, in accordance with company standards/policies, client requirements, and applicable Acts, Regulations, Legislation, and Codes.

Date Completed

Apprentice

Supervisor/Trainer

6235.02 **Clean or replace filter system and components** by following required procedures including (not limited to): inspecting air filters; measuring pressure and temperature differential; checking filter drier; cleaning or replacing filters; using hand tools, gauges, cleaning solutions, and thermometers; and, ensuring that the filter system is maintained and functioning to design parameters; in accordance with manufacturer's specifications, company standards/policies, and applicable Acts, Regulations, Legislation, and Codes.

Date Completed

Apprentice

Supervisor/Trainer

6235.00 MAINTAIN RESIDENTIAL AIR CONDITIONING {AC} AND HEAT PUMP (HP) ...cont'd

6235.03 **Adjust and replace heat transfer medium** by following required procedures including (not limited to): visually checking levels; checking air volume, water flow, glycol strength and flow, and refrigerant charge; adjusting levels; replacing medium; and, using required hand tools, gauges, psychrometers, thermometers, pressure gauges, hydrometer, and chemicals; so that the quality and quantity of the transfer medium is maintained, in accordance with manufacturer's specifications, system performance data, and applicable Acts, Regulations, Legislation, and Codes.

Date Completed	Apprentice	Supervisor/Trainer
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6235.04 **Replace or repair piping** by following required procedures including (not limited to): reading and interpreting job documentation; checking pumps, strainers, valves, gauges, insulation, supports, and piping; repairing or replacing defective piping, parts, or components; checking piping chaseway; brazing or soldering piping; using required hand and power tools, multimeter, flow meter, pressure gauges, and brazing or soldering equipment and materials; and, documenting results; so that the piping system is restored and functioning, in accordance with design parameters, in accordance with manufacturer's specifications, company standards/policies, and applicable Acts, Regulations, Legislation, and Codes.

Date Completed	Apprentice	Supervisor/Trainer
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6235.05 **Replace or repair AC and HP components** by following required procedures including (not limited to): visually inspecting filters, coils, fans, motors, bearings, belt and pulleys; checking amperage of motors; checking air volume; cleaning and lubricating parts; replacing worn belts and bearings; replacing motors and bearings; replacing damaged coil; brazing or re-piping damaged coil; and, using required hand or power tools, ammeter, multimeter, flow meter, pressure gauges, and brazing or soldering equipment; so that the air handler is restored to design parameters, in accordance with manufacturer's specifications, company standards/policies, and applicable Acts, Codes, Legislation and Regulations.

Date Completed	Apprentice	Supervisor/Trainer
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6235.00 MAINTAIN RESIDENTIAL AIR CONDITIONING (AC) AND HEAT PUMP (HP) ...cont'd

6235.06 **Check system for leakage** by following required procedures including (not limited to): checking gas, water, power sources, lubricants, and refrigerants; visually inspecting duct work; making necessary adjustments; and, using required hand tools, pressure gauges, and detectors; so that the system is leak free and is functioning to design parameters, in accordance with manufacturer's specifications and applicable Acts, Regulations, Legislation, and Codes.

Date Completed

Apprentice

Supervisor/Trainer

6235.07 **Repair or replace refrigerant flow and metering devices** by following required procedures including (not limited to): visually inspecting external piping and insulation; checking all operating components, piping integrity, supports, liquid/moisture indicator, filter driers, hermetic compressor, and metering devices; replacing driers, capacity controls, pressure regulators, and compressors; repairing defective piping, insulation, and supports; recharging system; using multimeters, pressure/temperature gauges, hand or power tools, recovery equipment, charging cylinder, electronic scales, brazing and soldering equipment; and, documenting results; so that the devices are restored and the system performance conforms to design parameters, manufacturer's specifications, company standards/policies, and applicable Acts, Regulations, Legislation, and Codes.

Date Completed

Apprentice

Supervisor/Trainer

6235.08 **Clean-up work site** by: cleaning up liquids, broken pieces, and debris; replacing structures; removing all construction waste; and, using brooms or wet/dry vac, so that the work area is clean and clear of obstructions, tools or equipment are stored, and hazardous products are disposed of, in compliance with environmental protocols, company standards/policies, and applicable Acts, Regulations, Legislation, and Codes.

Date Completed

Apprentice

Supervisor/Trainer

6235.00 MAINTAIN RESIDENTIAL AIR CONDITIONING (AC) AND HEAT PUMP (HP) ...cont'd

6235.09 **Complete maintenance records** by recording system operational parameters on manufacturer's or company check lists and warranty forms, ensuring that the documents are completed in a clear, concise, and legible manner, in accordance with company standards/policies and applicable Acts, Regulations, Legislation, and Codes.

Date Completed

Apprentice

Supervisor/Trainer

Sponsor/Employer Name

Sponsor/Employer Signature

6236.00 SERVICE AND/OR MAINTAIN ELECTRICAL COMPONENTS OF RESIDENTIAL AIR CONDITIONING (AC) AND HEAT PUMP (HP)

GENERAL PERFORMANCE OBJECTIVE

Service and/or maintain electrical components of residential AC and HP by: troubleshooting electrical components; repairing or replacing operating and safety controls; cleaning or replacing electrical components; re-wiring or repairing system wiring; cleaning or replacing actuator and damper/zone controls; testing and replacing electronic components, electrical heaters, HRV/ERV, and electronic air cleaners; and, completing electrical servicing or maintenance documentation.

PERFORMANCE OBJECTIVES

SKILLS

6236.01 **Troubleshoot electrical components of residential AC and HP** by following required procedures including (not limited to): discussing with the client to clarify nature of problem; visually inspecting the electrical systems; performing a diagnostic check; reading and interpreting IOM charts; determining corrective actions or options and calculating cost of work; using meters, gauges, hand or power tools, and price lists; and, writing up a work sheet; so that the work is determined and documented, in accordance with company standards/policies, client requirements, and applicable Acts, Regulations, Legislation, and Codes.

Date Completed

Apprentice

Supervisor/Trainer

6236.02 **Repair or replace operating and safety controls** by following required procedures including (not limited to): checking and testing temperature, pressure, humidity, voltage, and amperage; visually checking for damaged or defective controls; checking integrity of controls and wiring; repairing or replacing defective components; simulating conditions to check functions of controls; using thermometer, pressure gauge, hygrometer, psychrometer, multimeter, ammeter, voltmeter, ohmmeter, and manometer; and, documenting results; so that all controls are verified to be operational and functioning, in accordance with design parameters, company standards/policies, and applicable Acts, Regulations, Legislation, and Codes.

Date Completed

Apprentice

Supervisor/Trainer

6236.00 SERVICE AND/OR MAINTAIN ELECTRICAL COMPONENTS OF RESIDENTIAL AIR CONDITIONING (AC) AND HEAT PUMP (HP)...cont'd

6236.03 **Clean or replace electrical components** by following required procedures including (not limited to): visually inspecting capacitors, transformers, relays, terminal blocks, fuse blocks, contactors, coils, circuit breakers, thermal overloads, fuses, fuseable links, connectors, wiring, or switches; checking for oil leakage, defects, and discolouration; testing operation of components; cleaning components; replacing components; using hand tools, electrical measuring instruments, specialty tools and cleaning solvents; and, documenting results; so that the electrical system integrity is restored to meet design parameters, in accordance with company standards/policies, manufacturer's specifications, and applicable Acts, Regulations, Legislation, and Codes.

Date Completed

Apprentice

Supervisor/Trainer

6236.04 **Re-wire and repair system wiring** by following required procedures including (not limited to): inspecting for defects, discolouration, odours, and defective supports; re-wiring systems; inspecting and tightening all connections; checking for required wire size and wire supports; checking wiring chaseways; checking integrity of the exterior or interior system wiring; using hand or power tools, wire gauge, and electrical measuring equipment; and, documenting results; so that the wiring integrity is restored to meeting design parameters, in accordance with company standards/policies, and applicable Acts, Regulations, Legislation, and Codes.

Date Completed

Apprentice

Supervisor/Trainer

6236.05 **Clean or replace actuator and damper/zone controls** by following required procedures including (not limited to): checking and replacing electric and electronic actuators; checking and replacing solid state devices or transducers; cleaning and lubricating damper bearings; checking and replacing defective controls; checking and replacing dampers; using hand or power tools, solvents, lubricants, multimeters, simulators, and speciality tools; and, documenting results; so that the controls are operating to restore equipment integrity, in accordance with design parameters, company standards/policies, and applicable Acts, Regulations, Legislation, and Codes.

Date Completed

Apprentice

Supervisor/Trainer

RESIDENTIAL AIR CONDITIONING SYSTEMS MECHANIC- BRANCH 2

6236.00 SERVICE AND/OR MAINTAIN ELECTRICAL COMPONENTS OF RESIDENTIAL AIR CONDITIONING (AC) AND HEAT PUMP (HP)
...cont'd

6236.06 Test and replace electronic components by following required procedures including (not limited to): inspecting for defects, discolorations, odour, corrosion, and moisture; checking operation and functions of components; performing an operational test; verifying the grounding components; checking operational sequences and set up; replacing batteries or thermostat; modifying operational program; using hand or power tools, multimeter, simulators, and battery testers; and, documenting results; so that the electronic components are functioning to restore equipment integrity, in accordance with design parameters, company standards/policies, and applicable Acts, Regulations, Legislation, and Codes.

Date Completed Apprentice Supervisor/Trainer

6236.07 Test and replace electrical heaters, HRV/ERV and electronic air cleaners by following required procedures including (not limited to): visually inspecting for discoloration, odours, moisture, and corrosion; checking terminal connectors; performing resistance measurements; checking and repairing sequencers; checking operational sequencers; using hand or power tools, speciality tools, and multimeters; and, documenting results; so that the equipment is operational and functioning, in accordance with design parameters, manufacturer's specifications, company standards/policies, and applicable Acts, Regulations, Legislation, and Codes.

Date Completed Apprentice Supervisor/Trainer

6236.08 Complete electrical servicing or maintenance records by recording system operational parameters on manufacturer's or company check lists and warranty forms, ensuring that the documents are completed in a clear, concise, and legible manner, in accordance with company standards/policies and applicable Acts, Regulations, Legislation, and Codes.

Date Completed Apprentice Supervisor/Trainer

Sponsor/Employer Name Sponsor/Employer Signature

6237.00 PERFORM CUSTOMER SERVICE

GENERAL PERFORMANCE OBJECTIVE

Perform customer service procedures by: determining nature of service or maintenance call; conducting a site evaluation; performing a diagnostic inspection; estimating costs of service or maintenance; completing service or maintenance schedule and a job work order; and, instructing clients.

PERFORMANCE OBJECTIVES

SKILLS

6237.01 **Determine nature of service or maintenance call** by discussing problems with the client, asking clear and concise questions, listening, and repeating back what is heard, so that the client's concerns are clearly identified and understood before proceeding with a diagnostic check.

Date Completed

Apprentice

Supervisor/Trainer

6237.02 **Conduct a site evaluation** by checking the general condition of the system, equipment, and surrounding environment or facilities in order to assist in determining the nature and scope of the service or maintenance request, ensuring that the site evaluation is carried out, in accordance with job specifications, company standards/policies, and applicable Acts, Regulations, Legislation, and Codes.

Date Completed

Apprentice

Supervisor/Trainer

6237.03 **Perform a diagnostic inspection** by following required procedures including (not limited to): reading and interpreting JOM documentation, work order, manufacturer's specifications, mechanical and architectural engineering drawings, and applicable Acts, Regulations, Legislation, and Codes; identifying type, size, and capacity of equipment, system components, and parts; inspecting and checking the operation and integrity of the system; performing tests and checks of all parts of the system; determining the set points of each component of the system; and, checking efficiency outputs and parameters of the system; so that the system defects or faults are identified for further servicing or maintenance.

Date Completed

Apprentice

Supervisor/Trainer

6237.00 PERFORM CUSTOMER SERVICE ...cont'd

6237.04 **Estimate costs of service or maintenance call** by: determining corrective actions or options for repair or replacement; calculating time frames and labour, parts, or equipment costs; using work order, costing lists, manuals, and other documentation; communicating with employer or shop personnel to confirm estimates or costs; completing estimate sheet and bill of materials; going over quote with the client; and, obtaining client's signature of approval; so that the estimation sheets are completed and approved prior to undertaking service or maintenance work in accordance with company standards/policies.

_____ Date Completed	_____ Apprentice	_____ Supervisor/Trainer
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6237.05 **Complete service or maintenance schedule** which includes : servicing or maintenance parameters and procedures; parts; labour and inspection personnel; equipment; sub-trades; material handling equipment; permits; hand tools; power tools; location and layout of system; dates and times; and, work order; ensuring that the service or maintenance schedule is approved by employer and client.

_____ Date Completed	_____ Apprentice	_____ Supervisor/Trainer
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6237.06 **Complete job work order** after service or maintenance work has been completed to identify: parts and components used; labour costs; nature and scope of service or maintenance work; time taken; unit identification; warranty coverage and obligations; tools and equipment used; completion dates; and, system operation parameters; and by recording information on manufacturing or company servicing and maintenance check lists or warranty forms, ensuring that all Information is clear, legible, and concise in accordance with company standards/policies and applicable Acts, Regulations, Legislation, and Codes.

_____ Date Completed	_____ Apprentice	_____ Supervisor/Trainer
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6237.00 PERFORM CUSTOMER SERVICE ...cont'd

6237.07 **Instruct clients** on equipment operation, routine maintenance or servicing procedures, and location of controls and safeties, by using verbal communication, written job specifications, and manufacturer's specifications, ensuring that all the instructions are given in a clear, concise, and precise manner and that the client has signed off on the work order, in accordance with company standards/policies and applicable Acts, Regulations, Legislation, and Codes.

Date Completed

Apprentice

Supervisor/Trainer

Sponsor/Employer Name

Sponsor/Employer Signature

APPRENTICE RECORD

APPRENTICE NAME (Print):

SPONSOR/EMPLOYER INFORMATION	
Training Agreement #	
Name	
Address	
Telephone	
E-mail Address	

SUMMARY OF TRAINING	
Employment Start Date	
Employment End Date	
Total hours of training & instruction between dates of employment.	

Date Completed

Apprentice

Supervisor/Trainer

APPRENTICE RECORD

APPRENTICE NAME (Print):

SPONSOR/EMPLOYER INFORMATION	
Training Agreement #	
Name	
Address	
Telephone	
E-mail Address	

SUMMARY OF TRAINING	
Employment Start Date	
Employment End Date	
Total hours of training & instruction between dates of employment.	

Date Completed

Apprentice

Supervisor/Trainer

APPRENTICE RECORD

APPRENTICE NAME (Print):

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Training Agreement #	
Name	
Address	
Telephone	
E-mail Address	

SUMMARY OF TRAINING	
Employment Start Date	
Employment End Date	
Total hours of training & instruction between dates of employment.	

Date Completed

Apprentice

Supervisor/Trainer

APPRENTICE COMPLETION FORM

APPRENTICE INFORMATION	
Name (Print)	
Signature	
Client ID	

Skill Sets when completed should be signed by the Supervisor/Trainer and presented with this completion form to your local Apprenticeship Client Services Office. Any supporting documentation should also be attached.

In-school Completed Yes () No () Not applicable ()
 (Proof to be provided)

Hours completed as
 Per Contract: Yes () No () Not applicable ()

SPONSOR/EMPLOYER INFORMATION	
Name (Print)	
Address	
Telephone	
E-mail Address	
Signature of Signing Authority	

You will be required to disclose this signed form to the Ministry of Training, Colleges and Universities in order to complete your program. The Ministry will use your personal information to administer and finance Ontario's apprenticeship training system. For further information please see the notice/declaration for collection of personal information that is referenced in the table of contents of this training standard.