RED SEAL

THE INTERPROVINCIAL STANDARDS RED SEAL PROGRAM

National Occupational Analysis

2012 Recreation Vehicle Service Technician

Human Resources and Skills Development Canada
Ressources humaines et Développement des compétences Canada
Canada

Occupational Analyses Series

Recreation Vehicle Service Technician

2012

Trades and Apprenticeship Division	Division des métiers et de l'apprentissage
Labour Market Integration Directorate	Direction de l'intégration au marché du travail
National Occupational Classification:	7384
Disponible en français sous le titre :	Technicien/technicienne de véhicules récréatifs

This publication can be downloaded online at: www.red-seal.ca.

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PDF
Cat. No.: HS42-1/5-2012E-PDF
ISBN: 978-1-100-21339-2

FOREWORD

The Canadian Council of Directors of Apprenticeship (CCDA) recognizes this National Occupational Analysis (NOA) as the national standard for the occupation of Recreation Vehicle 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 (HRSDC) sponsors a program, under the guidance of the CCDA, to develop a series of 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

The CCDA and HRSDC wish to express sincere appreciation for the contribution of the many tradespersons, industrial establishments, professional associations, labour organizations, provincial and territorial government departments and agencies, and all others who contributed to this publication.

Special acknowledgement is extended by HRSDC and the CCDA to the following representatives from the trade.

Mike Bretecher	Manitoba
Darren Gautreau	New Brunswick
George Goodrick	Nova Scotia
Darrel Gordon	Alberta
Kari Jeffcott	British Columbia
Kevin J. Martin	Recreation Vehicle Dealers Association (RVDA) of Canada
Jamie Russell	Recreation Vehicle Dealers Association (RVDA) of Canada
Richard Willard	Manitoba

This analysis was prepared by the Labour Market Integration Directorate of HRSDC. The coordinating, facilitating and processing of this analysis were undertaken by employees of the NOA development team of the Trades and Apprenticeship Division. The host jurisdiction of Alberta also participated in the development of this NOA.

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APPENDICES

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:

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
Context	information to clarify the intent and meaning of tasks
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 Human Resources and Skills Development Canada. 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 National Occupational Analysis (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 become aware of circumstances 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 RECREATION VEHICLE SERVICE TECHNICIAN TRADE

"Recreation Vehicle Service Technicians" is this trade's official Red Seal occupational title approved by the CCDA. This analysis covers tasks performed by recreation vehicle 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
Recreation Vehicle Mechanic				✓									
Recreation Vehicle Service Technician	✓	✓	✓				✓		✓	✓		✓	
Recreation Vehicle Technician					✓	✓							

Recreation vehicle (RV) service technicians work on systems and components of recreation vehicles, including electrical components, plumbing, propane gas components, appliances, exterior and interior components, structural frames and towing systems. They diagnose, repair, replace, install, adjust, test, maintain and modify these components and systems. They may also perform maintenance and repairs on trailer frames and running gear. They must be knowledgeable about each system's function and the interaction among various systems. However, it is important to note that they do not work on the motor or drive train components.

Recreation vehicles serviced in this trade include: class A, B, B+ and C motorhomes, travel trailers, fifth wheel trailers, park model trailers, truck campers and tent trailers. RV service technicians also work on toy haulers, utility trailers, flat deck trailers, construction living trailers and an assortment of mobile vehicles.

While recreation vehicle service technicians are experienced in all facets of the trade, many may develop specialized skills in areas such as electronics, appliances, hitching systems, and interior and exterior finishing.

Recreation vehicle service technicians are typically employed at RV dealerships, independent RV repair shops, RV manufacturers and may also be self-employed. They may work at indoor shops and outdoors at RV sites. Safety is important due to risks and hazards such as working at heights, with electricity, with explosive and volatile materials, and under vehicles.

Some important attributes include service, mechanical and mathematical skills, manual dexterity, an ability to plan and think sequentially and an ability to work as a team member. Customer relations skills are critical when providing on-site services. Sales skills are required when performing maintenance tasks and assisting customers with making decisions related to repair options.

The functions of recreation vehicle service technicians may overlap with a number of other trades such as partsperson, automotive service technician, electrician, plumber, gas fitter, carpenter, floorcovering installer, sheet metal worker, refrigeration and air conditioning mechanic, welder, motor vehicle body repairer, small engine repairer and appliance service technician.

Experienced recreation vehicle service technicians may advance to supervisory or training positions. They may also move into positions with manufacturers, wholesalers and sales divisions of RV dealerships.

OCCUPATIONAL OBSERVATIONS

The popularity of RVs is increasing. Because of this trend, technicians are required to have a wider range of skills. As well, many RVs are being constructed from more environmental friendly and light-weight construction materials. The variety of after-market products continues to grow. There is an increased use of residential style conveniences in RVs such as multi-media, satellite systems, electric fireplaces, and automated and remote control conveniences. As the RV trade is becoming more complex, RV consumers are less likely to work on their units.

The RV industry continues to be more safety conscious and is working with governing bodies to improve safety regulations.

Computerized testing equipment, including the use of handheld diagnostic computers, is becoming more popular. Advanced training in the use of complex electronics, computerized systems and schematics is required.

Appliances are often remote controlled and self-diagnosing. Electronic components are becoming smaller and self-diagnostics are being integrated into the controls, resulting in easier diagnosis. The use of fibre optics and LEDs is increasing. On-board fueling stations are becoming a trend in RVs.

More training options are becoming available to technicians including blended learning which combines e-learning and formal classroom training.

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 recreation vehicle service technician trade indicates that the most important essential skills are **document use, oral communication** and **thinking skills (problem solving)**.

The application of these skills may be described throughout this document within the competency statements which support each sub-task 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
Recreation vehicle service technicians read labels on products and decals on equipment for instructions. They read code books, service bulletins, technical update sheets, work orders and recall notices from manufacturers. They also read service memos, warranty information, and faxes or notes from customers describing a problem. Recreation vehicle service technicians also read manuals for training purposes for example, when learning how to repair new or unfamiliar systems, or equipment.

Document Use
Recreation vehicle service technicians refer to WHMIS labels and MSDS for information on how to handle, dispose of or mix products. They refer to code books, charts, checklists and work schedules. They also refer to these work orders to determine what repairs need to be done. Recreation vehicle service technicians complete work orders, including information about problems encountered, the cause and how the issues were resolved. They also complete time sheets to record or track tasks done from a number of work orders.

Recreation vehicle service technicians may draw or read sketches to clarify steps in a procedure, refer to troubleshooting charts to diagnose a problem, or refer to assembly diagrams and blueprints when installing equipment.

Writing
Recreation vehicle service technicians write notes to themselves, other co-workers and service managers about job details, customer requests, deadlines or supplies. They enter information in work orders to keep a record of tasks done for warranty purposes. They also write the reasons for recommending a particular procedure. They may also write warranty reports.

Numeracy
Recreation vehicle service technicians measure size and location openings such as for appliances and accessories. They also measure weights, voltage, amperage, resistance and pressures using various tools and equipment such as scales, volt-ohm meters (VOMs) and gauges. They develop a materials list based on this information. They may also estimate how much time it will take to complete various jobs.

Oral Communication
Recreation vehicle service technicians call suppliers to obtain information about products. They also talk to other staff to clarify orders, to discuss complex repair problems and to provide explanations of service. They communicate with customers to explain features and to demonstrate proper operation of a system. They also explain and present to them repair options. This communication is done with tact and respect for customers. Recreation vehicle service technicians may also instruct and direct the work and learning of apprentices in the shop.

Thinking Skills
Recreation vehicle service technicians use problem solving skills to assess problems with the vehicle, its components, equipment or appliances. They consider information provided to them by the customer to determine causes of a malfunction. They often depend on their experience, knowledge and observations to diagnose and repair problems as service manuals may not cover all possible issues. They may have to design replacement pieces that are no longer available. They also carry out detailed troubleshooting techniques to deal with unexpected problems or unique difficulties, for example when making customized changes to a recreation vehicle, when diagnosing recurring electrical failures or when locating the source of a leak. They will research information in service manuals, contact manufacturers' technical support lines, or consult with co-workers to help resolve problems.

Recreation vehicle service technicians use decision making skills to decide which tools and supplies to use, and which to bring on a service call. They also decide what repair or reconstruction to recommend taking into consideration time, cost and safety.

Working with Others
Recreation vehicle service technicians work as part of a team which includes other technicians, service managers, salespersons, partspersons, shop foremen, cleanup staff and, on occasion, mechanics. However, they usually work independently on the several tasks on the particular unit assigned to them. They coordinate tasks with others as necessary and sometimes work with a partner, for example, when blocking a trailer, installing insulation or stripping a roof. They may work alone on a service call.

Computer Use
Recreation vehicle service technicians may use computer applications. For example, they may use handheld computers to do diagnostic work, such as using a tester for refrigerators. They may have access to service and repair information through DVD or the Internet. They may also use point of sale computer programs.

Continuous Learning
Recreation vehicle service technicians learn continuously through hands-on experiences with a range of repairs. They learn from co-workers as a first resource. They read service manuals, wiring diagrams and schematics sent by manufacturers. They participate in training courses provided by manufacturers and suppliers. Recreation vehicle service technicians also learn from training material and information sources through multi-media training tools sent from manufacturers and from their customers who can give the history of repairs and modifications.

Trends The use of portable electronic devices for accessing and recording information is becoming prevalent. Computerized testing equipment is becoming a requirement in the work place. There is an increase in knowledge requirements and a need for training. Workplace safety continues to be enforced and monitored for improvements.

Related Components All components apply.

Tools and Equipment See Appendix A.

Task 1 Performs safety-related activities.

Context Recreational vehicle service technicians must be aware of and competent in the use of PPE and safety equipment. They also need to recognize and address potential hazards on the job.

Required Knowledge

K 1	types of PPE and safety equipment
K 2	location of safety equipment
K 3	types of hazards and how to recognize them
K 4	waste disposal procedures
K 5	procedures for maintaining cleanliness in work area such as cleaning up spills and removing debris and hazards
K 6	applicable safety acts and regulations such as WHMIS and related Occupation Health and Safety Acts (OH&S)
K 7	safety procedures

Sub-task

A-1.01 Uses personal protective equipment (PPE) and safety equipment.

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

Key Competencies

A-1.01.01	select and wear PPE such as safety glasses, safety boots, face shields and gloves according to job task and jurisdictional requirements
A-1.01.02	locate, select and operate safety equipment such as fire extinguishers and first aid kits according to jurisdictional requirements
A-1.01.03	inspect PPE and safety equipment to identify deficiencies such as expired fire extinguishers and exposed metal on steel toe boots
A-1.01.04	store PPE and safety equipment according to manufacturers' specifications
A-1.01.05	report defective PPE and safety equipment

Sub-task

A-1.02 Maintains safe work environment.

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

Key Competencies

A-1.02.01	verify safety guards on equipment such as saws, grinders and power tools are in place and in full working condition
A-1.02.02	clean up and dispose of hazards such as solvents, debris and waste according to type of hazard
A-1.02.03	store hazardous explosive and chemical items such as paints and solvents according to WHMIS and regulations
A-1.02.04	recognize and address safety hazards and violations such as condition of power cords, damaged electrical receptacles, hand rails and lifting devices according to regulations
A-1.02.05	maintain clean and organized work area
A-1.02.06	locate emergency exits and safety related equipment such as eye wash stations, first aid kits and fire extinguishers

Task 2 Uses and maintains tools and equipment.

Context Proper use and maintenance of tools and equipment will result in higher productivity and safety.

Required Knowledge

K 1	types of hands tools such as cutting, fastening and dismantling tools
K 2	purposes, styles and operation of hand tools
K 3	imperial /metric tool sizes
K 4	types of portable power tools such as electric, pneumatic and hydraulic
K 5	types of specialty tools such as recovery unit for air conditioning, laptop computers and portable information devices
K 6	purpose and operation of portable power tools
K 7	purpose and operation of stationary power tools such as electric, pneumatic and hydraulic
K 8	types and use of ladders such as step ladders, extension ladders and multipurpose ladders
K 9	types of scaffolding such as expandable and staged
K 10	types of lifting and moving equipment such as front end loaders, forklifts, jacks, hoists, stands and dollies
K 11	purpose and operation of lifting and moving equipment
K 12	purpose and operation of welding equipment
K 13	welding limitations according to jurisdictional regulations
K 14	purpose and operation of precision measuring devices
K 15	types and use of diagnostic tools such as pressure gauges, carbon monoxide detectors and thermometers

Sub-task

A-2.01 Maintains tools and equipment.

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

Key Competencies

A-2.01.01	recalibrate equipment such as electronic testers, manometers and scales according to manufacturers' specifications
A-2.01.02	clean tools and equipment
A-2.01.03	organize and store tools and equipment in a designated area according to manufacturers' specifications
A-2.01.04	lubricate and add fluids to tools such as jacks, trolley jacks and air tools according to manufacturers' specifications
A-2.01.05	identify and report tools to be serviced or replaced

Sub-task

A-2.02 Uses lifting, moving and access equipment.

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

Key Competencies

A-2.02.01	select lifting, moving and access equipment according to job task
A-2.02.02	determine lifting points according to manufacturers' specifications
A-2.02.03	operate lifting equipment such as hydraulic jacks and hoists according to manufacturers' specifications and regulations
A-2.02.04	operate moving equipment such as dollies, pallet jacks and forklifts
A-2.02.05	assemble and disassemble equipment such as scaffolding and ladders according to manufacturers' specifications and regulations

Task 3 — Performs common work practices and procedures.

Context Recreation vehicle service technicians interpret blueprints, drawings and schematics. They also perform pre-delivery inspections (PDI) and report their findings.

Required Knowledge

K 1	types of documents such as blueprints, drawings and schematics
K 2	common mechanical, hydraulic, welding, electronic and electrical symbols
K 3	drawing scales
K 4	metric/imperial systems and conversions
K 5	RV components, construction and operation for PDI checklist item verification

Sub-task

A-3.01 Uses blueprints, drawings, schematics and sketches.

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

Key Competencies

A-3.01.01	interpret documents such as diagrams, schematics and flow charts to determine actions to be performed
A-3.01.02	interpret symbols, dimensions and specifications
A-3.01.03	perform metric/imperial conversions
A-3.01.04	measure dimensions to ensure proper installation
A-3.01.05	sketch modifications of repairs and installations such as liquefied petroleum (LP) gas and electrical systems, and structure

Sub-task

A-3.02 Identifies outstanding recalls and service bulletins.

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

Key Competencies

A-3.02.01	interpret outstanding recalls and service bulletins to determine servicing requirements
A-3.02.02	ensure completion of servicing meets compliance requirements
A-3.02.03	update maintenance records to reflect compliance with outstanding recalls and service bulletins

Sub-task

A-3.03 Performs pre-delivery inspections (PDI).

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

Key Competencies

A-3.03.01	verify vehicle and component operation according to original equipment manufacturers' (OEM) checklists, dealer requirements and regulations
A-3.03.02	record and report findings
A-3.03.03	access and record component serial numbers and file for warranty purposes

Trends

With the addition of RV features such as dishwashers and washing machines, outside kitchens and secondary bathrooms, the demand on the plumbing systems has increased. Environmentally friendly products and components are making their way on the market, helping to reduce water consumption and waste.

Related Components (including, but not limited to)

Fresh water tank, tank drain, check valve inlet tubing, fresh water fill piping, tubing and fittings, vents, clamps, vent hose, tie down, sediment filter, pump, accumulator, hot water heater, faucets, shower heads, city water regulator, toilets, sinks, tubs, macerator, ice makers, dishwashers, line drains, water heater bypass, shutoff valves, manifolds, drinking water filter, crimps, black water tank, gray water tank, tank flushers, fittings, pipes, gate valves, sewer hoses, sewer hose adapters, traps, drains, termination caps, vent check, seals, closet flange, tank mounts, plumbing straps, rubber couplers, hose clamps, hangers, screws, bolts, nuts, washers, back flush adapter, vacuum breaker, freshwater fill, pumps (hand, manual electric and demand).

Tools and Equipment

See Appendix A.

Task 4 Diagnoses plumbing systems.

Context

Recreation vehicle service technicians need to diagnose plumbing system problems in order to efficiently repair potable and waste water systems.

Required Knowledge

K 1	operation of pumps, valves and fixtures
K 2	filtration systems
K 3	flushing and sanitizing procedures
K 4	plumbing components such as tubing, fittings, pumps and tanks
K 5	flood test procedures
K 6	flow test procedures
K 7	potential leakage areas
K 8	tank location, piping size and venting requirements

Sub-task

B-4.01 Diagnoses potable water systems.

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

Key Competencies

B-4.01.01	confirm customer's concern to isolate source of problem and determine required diagnostic actions
B-4.01.02	visually inspect potable water systems and venting for defects such as leaks, obstructions, low pressure and contaminants
B-4.01.03	perform leak test by pressurizing system with water or air
B-4.01.04	activate pumps to verify normal operation
B-4.01.05	verify connections to system components such as faucets, water heater and toilet
B-4.01.06	determine types of servicing required such as replacing or repairing fittings, lines and fixtures

Sub-task

B-4.02 Diagnoses waste water systems.

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

Key Competencies

B-4.02.01	confirm customer's concern to isolate source of problem and determine required diagnostic actions
B-4.02.02	visually inspect waste water systems and venting for defects such as leaks, obstructions and contaminants
B-4.02.03	verify connections to system components such as toilets, sewer valves and appliances by performing leak test by filling system with water
B-4.02.04	activate pumps to verify normal operation
B-4.02.05	determine cause of defect such as damaged storage tank, blockage and physical leaks
B-4.02.06	determine types of servicing required such as replacing or repairing fittings, pipes, tanks and valves

Task 5 Services potable water systems.

Context Recreation vehicle service technicians must know the limitations of each component when servicing potable water systems to ensure system integrity and safety.

Required Knowledge

K 1	types of antifreeze for potable water system
K 2	location of drain and bypass valves
K 3	types of bypass systems
K 4	impact of movement and vibration on tank and mounting hardware
K 5	storage tanks and materials
K 6	mounting hardware types, materials and requirements
K 7	removal and installation procedures
K 8	tubing and piping materials and sizes
K 9	thread sizes and types
K 10	types of fittings such as compression, threaded and barbed
K 11	pump operation
K 12	accumulators
K 13	types and operation of toilets, faucets and showers
K 14	types of valves, seals and hoses
K 15	tank location and venting requirements

Sub-task

B-5.01 Maintains potable water systems.

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

Key Competencies

B-5.01.01	flush system by filling fresh water tank and flushing water lines and related components
B-5.01.02	remove and replace drinking water filters
B-5.01.03	clean components such as screens, filters and aerators
B-5.01.04	sanitize potable water systems

B-5.01.05	winterize and de-winterize potable water systems
B-5.01.06	select and use tools and equipment such as filter wrenches, hand tools and cordless drills

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Sub-task

B-5.02 Repairs potable water systems.

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

Key Competencies

B-5.02.01	access repair area by removing items such as tank covers, access panels and cabinets
B-5.02.02	select and use tools and equipment such as filter wrenches, hand tools and cordless drills
B-5.02.03	replace faulty components such as water pumps, water tanks, accumulator, lines and fittings
B-5.02.04	repair components including valves, pumps, tanks and fixtures using methods such as plastic welding and installing rebuild kits.
B-5.02.05	perform leak test to ensure integrity of system

Sub-task

B-5.03 Installs potable water system.

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

Key Competencies

B-5.03.01	calculate load, demand and material required to determine installation strategy according to criteria such as component placement, customer needs, codes and manufacturers' specifications
B-5.03.02	select and use tools and equipment such as cutters, crimpers and hand tools
B-5.03.03	access installation area by removing items such as beds and cabinets
B-5.03.04	adjust area to accommodate new components by making modifications such as reinforcing structure, relocation of plumbing and enlarging installation area

B-5.03.05	install components such as hoses, tubing, fittings and tanks
B-5.03.06	verify potable water system operation and perform leak test to ensure system integrity

Task 6 Services waste water systems.

Context Recreation vehicle service technicians must know the limitation of each component when servicing waste water systems to ensure system integrity and maintain responsible disposal of waste water.

Required Knowledge

K 1	types of toilet chemicals and treatments
K 2	tank repairs and procedures
K 3	storage tank types, materials and sizes
K 4	removal and installation procedures
K 5	mounting hardware types, materials and requirements
K 6	collection and discharge system location
K 7	types of fittings such as threaded and slip
K 8	materials such as acrylonitrile butadiene styrene (ABS) and composite flexible materials
K 9	collection and discharge system operation
K 10	adhesive types and sealing techniques such as spin welding and gluing
K 11	tank location, piping size and venting requirements

Sub-task

B-6.01 Maintains waste water systems.

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

Key Competencies

B-6.01.01	clean holding tanks using various methods such as chemical treatments and rinsing systems
B-6.01.02	lubricate valves
B-6.01.03	winterize and de-winterize waste water system

Sub-task

B-6.02 Repairs waste water systems.

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

Key Competencies

B-6.02.01	access repair area by removing items such as tank covers, access panels and appliances
B-6.02.02	select and use tools and equipment such as hand tools and cordless drills
B-6.02.03	replace faulty components such as P-traps, gate valves, gaskets and venting systems
B-6.02.04	repair components including tanks, connections and valves using methods such as gluing and plastic welding
B-6.02.05	perform leak test to ensure system integrity

Sub-task

B-6.03 Installs waste water system components.

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

Key Competencies

B-6.03.01	calculate capacity and material required to determine installation strategy according to criteria such as component placement, customer needs, codes and manufacturers' specifications
B-6.03.02	select and use tools and equipment such as cutters, hand tools and hole saws
B-6.03.03	access installation area by removing items such as access panels and cabinets, or lifting RV
B-6.03.04	adjust area to accommodate new components by making modifications such as reinforcing structure, relocation of plumbing and enlarging installation area
B-6.03.05	install components such as pipes, valves, toilets, tanks, sensors and wires
B-6.03.06	verify waste water system operation and perform leak test to ensure system integrity

Trends	There is an increase in demand for power due to the popularity of powered consumer products. The use of electronics for monitoring, switching, regulating, remote control (infrared and ultra high frequency (UHF)) and self-diagnosing systems is predominant and becoming the standard. There is an increase use of LED lighting to decrease the power demand and for longevity.
Related Components (including, but not limited to)	Wires, connectors, fasteners (wrap, tie, screws, bolts), loom, receptacles, transfer switches, switches, control modules, power supply cord, plugs, diodes, panel boxes, batteries, solar panels, generators, energy management systems, converters, isolators, battery box and vent, conductors, circuit protection (fuses, fuse link, circuit breaker), distribution panel, lights, motors, fans, water pump, monitor panels, inverters.
Tools and Equipment	See Appendix A.

Task 7 Diagnoses electrical systems.

Context

Recreation vehicle service technicians must be able to differentiate between AC and DC systems to efficiently diagnose any electrical problems to ensure reliable repair. They also need to be aware of the ongoing changes and updates relating to these systems.

While working on the electrical system, recreation vehicle service technicians should be aware of the safety hazards associated with alternating and direct current.

Required Knowledge

K 1	AC system and components such as converters/inverters, transfer switch and breakers
K 2	DC system and components such as batteries, solar panels and fuses
K 3	types of batteries
K 4	Ohm's law formula and power formula
K 5	types and gauges of wires
K 6	testing procedures for voltage, current, resistance and frequency

K 7	diagnostic procedures for locating faults such as shorts and open connections
K 8	energy management systems
K 9	charging systems
K 10	codes

Sub-task

C-7.01 Diagnoses AC electrical and power supply systems.

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

Key Competencies

C-7.01.01	confirm customer's concern to isolate source of problem and determine required diagnostic actions
C-7.01.02	access electrical components to perform tests
C-7.01.03	visually inspect components such as shore cords, transfer switches and breakers for damage including corrosion, cuts and melting
C-7.01.04	select and use tools and equipment such as VOM, ground fault circuit interrupter (GFCI) tester and ammeter
C-7.01.05	check performance of power sources such as inverters, generators and shore power to ensure components comply with manufacturers' specifications
C-7.01.06	check components such as wire gauges and breakers to identify system capacity
C-7.01.07	test electrical system to identify possible faults such as shorts, opens and grounds
C-7.01.08	determine cause of defect such as shorts, open connections and faulty components
C-7.01.09	determine types of servicing required such as replacing breakers, GFCI and wire

Sub-task

C-7.02 Diagnoses DC electrical and power supply systems.

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

Key Competencies

C-7.02.01	confirm customer's concern to isolate source of problem and determine required diagnostic actions
C-7.02.02	access electrical components to perform tests
C-7.02.03	visually inspect components such as batteries, breakers, fuses and wires for defects including corrosion, cuts, melting and routing
C-7.02.04	select and use tools and equipment such as VOM, test lights and ammeters
C-7.02.05	check performance of power sources such as solar panels, inverters and converters to ensure compliance with manufacturers' specifications
C-7.02.06	perform checks and tests on battery such as specific gravity, load test and water level to confirm condition of battery
C-7.02.07	measure source voltage to ensure compliance with manufacturers' specifications
C-7.02.08	check components such as wire gauges and breakers to determine system capacity
C-7.02.09	test electrical system to identify possible faults such as shorts, opens and grounds
C-7.02.10	determine cause of defect such as shorts, open connections and faulty components
C-7.02.11	determine types of servicing required such as replacing resettable breakers, fuses and wires

Task 8 Services AC electrical system.

Context

The AC electrical system allows for the operation of consumer products contained within the vehicle. Recreation vehicle service technicians must be able to maintain, repair, replace and install AC electrical system and components in an expedient manner to ensure customer satisfaction.

While working on the electrical system, recreation vehicle service technicians should be aware of the safety hazards associated with alternating current.

Required Knowledge

K 1	AC system and components such as converters/inverters, transfer switches and breakers
K 2	DC systems such as inverters and converters
K 3	Ohm's law formula and power formula
K 4	types and gauges of wires
K 5	testing procedures for voltage, current, resistance and frequency
K 6	energy management systems
K 7	load and demand
K 8	wire containment techniques such as routing, fastening and wire protection
K 9	codes

Sub-task

C-8.01 Maintains AC electrical and power supply systems.

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

Key Competencies

C-8.01.01	visually inspect shore power cords for physical damage such as corrosion, cuts and melting
C-8.01.02	visually inspect grounds and connections to identify potential faults
C-8.01.03	perform maintenance tests such as hot skin test, AC power supply and distribution system operation verification and GFCI check
C-8.01.04	clean inverters and converters to prevent overheating
C-8.01.05	isolate potential problems and determine required actions

Sub-task

C-8.02 **Repairs AC power supply and distribution system.**

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

Key Competencies

C-8.02.01	access repair area by removing items such as panels, seats and cabinets
C-8.02.02	replace faulty components such as inverters, converters and transfer switches
C-8.02.03	rewire damaged circuits according to codes
C-8.02.04	modify existing electrical system to meet requirements such as codes, customer needs and space limitation
C-8.02.05	verify AC power supply and distribution system operation to ensure compliance with manufacturers' specifications
C-8.02.06	select and use tools and equipment such as meters, fish wires and wire strippers

Sub-task

C-8.03 **Installs AC power supply and distribution system components.**

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

Key Competencies

C-8.03.01	calculate load, demand and material required to determine installation strategy according to criteria such as component placement, customer needs, codes and manufacturers' specifications
C-8.03.02	select and use tools and equipment such as VOM, cordless drills and wire strippers
C-8.03.03	access installation area by removing items such as panels, seats and cabinets
C-8.03.04	adjust area to accommodate new components by making modifications such as enlarging installation area, changing location and adding ventilation
C-8.03.05	install components such as receptacles, inverters, converters, switches and breakers
C-8.03.06	verify AC power supply and distribution system operation to ensure compliance with manufacturers' specifications

Task 9 Services DC electrical system.

Context

The DC electrical system supplies power for the operation of the RV. Recreation vehicle service technicians must be able to maintain, repair, replace and install DC electrical system and components in an expedient manner to ensure customer satisfaction.

While working on the electrical system, recreation vehicle service technicians should be aware of the safety hazards associated with direct current.

Required Knowledge

K 1	DC system and components such as batteries, solar panels and fuses
K 2	AC system and components such as converters/inverters and breakers
K 3	types of batteries
K 4	recharging procedures
K 5	Ohm's law formula and power formula
K 6	types and gauges of wires
K 7	testing procedures for voltage, current, resistance and frequency
K 8	charging systems
K 9	wire containment techniques such as routing, fastening and wire protection
K 10	codes

Sub-task

C-9.01 Maintains DC electrical and power supply systems.

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

Key Competencies

C-9.01.01	maintain lead acid batteries using procedures such as checking water levels, charging battery, specific gravity test and load test
C-9.01.02	visually inspect components such as breakers, fuses and wires for defects including corrosion, cuts, loose connections and routing
C-9.01.03	select and use tools and equipment such as battery straps, battery terminal cleaner and wire brush

C-9.01.04	clean components and connections such as solar panels, battery terminals and inverters/converters
C-9.01.05	verify DC electrical and power supply system operation to ensure compliance with manufacturers' specifications

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Sub-task

C-9.02 **Repairs DC power supply and distribution systems.**

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

Key Competencies

C-9.02.01	access repair area by removing items such as panels, seats and cabinets
C-9.02.02	select and use tools and equipment such as wire strippers, wire crimpers and hand tools
C-9.02.03	rewire damaged circuits according to codes
C-9.02.04	modify existing electrical system to meet requirements such as codes, customer needs and space limitation
C-9.02.05	replace or repair faulty components such as batteries, power converters, switches, pumps and solar panels according to specifications
C-9.02.06	verify DC electrical and power supply system operation to ensure compliance with manufacturers' specifications

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Sub-task

C-9.03 **Installs DC power supply and distribution system components.**

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

Key Competencies

C-9.03.01	calculate load, demand and material required to determine installation strategy according to criteria such as component placement, customer needs, codes and manufacturers' specifications
C-9.03.02	select and use tools and equipment such as VOM, cordless drills and wire strippers

C-9.03.03	access installation area by removing items such as panels, seats, dishes and cabinets
C-9.03.04	adjust area to accommodate new components by making modifications such as enlarging installation area, changing location and adding ventilation
C-9.03.05	install components such as plugs, receptacles, inverters, converters, switches and breakers
C-9.03.06	verify DC power supply and distribution system operation to ensure compliance with manufacturers' specifications

Trends	There is an increased demand on LP gas systems due to the popularity of exterior kitchens and consumer products. The use of flex lines throughout the LP gas systems is more common.
Related Components (including, but not limited to)	Containers (tank and cylinder), hoses, flex lines, fasteners, quick connectors, brackets, valves, piping (iron), O-rings, fill gauges, T-fitting, QC fittings, regulator, tubing (neoprene, aluminium, copper), fittings, POL valves
Tools and Equipment	See Appendix A.

Task 10 Diagnoses LP gas systems.

Context Recreation vehicle service technicians require knowledge of codes and regulations related to LP gas systems to diagnose and recommend required repairs. They also need to understand and apply the basic principles of LP gas including the effects of temperature and pressure on the system. The high pressure gas system runs from the supply tank to the regulator while the low pressure gas system runs from the regulator to the appliances.

Required Knowledge

K 1	LP gas and related codes
K 2	tank and cylinder application
K 3	characteristics of LP gas
K 4	LP gas system components such as regulators, hoses, valves and tanks/cylinders
K 5	installation methods
K 6	testing procedures such as leak and system pressure
K 7	types of contaminants

Sub-task

D-10.01 Diagnoses LP gas supply system (high pressure).

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

Key Competencies

D-10.01.01	confirm customer's concern to isolate source of problem and determine required diagnostic actions
D-10.01.02	inspect system and components to ensure compliance with codes
D-10.01.03	visually inspect system and containers for expiry date and damage such as rust, dents and damaged welds
D-10.01.04	select and use tools and equipment such as hand tools, leak detectors and high pressure gauges
D-10.01.05	locate leaks
D-10.01.06	test operational pressure of propane system to meet code requirements and design specifications
D-10.01.07	determine cause of defect such as kinked hose, punctured hose and seized excess flow valve
D-10.01.08	determine types of servicing required such as repair or replacement of faulty components

Sub-task

D-10.02 Diagnoses LP gas distribution system (low pressure).

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

Key Competencies

D-10.02.01	confirm customer's concern to isolate source of problem and determine required diagnostic actions
D-10.02.02	visually inspect low pressure distribution system to ensure compliance with codes and for damage such as impacts, broken ground and unsecured gas lines
D-10.02.03	perform system tests such as drop pressure test, regulator lock-up test and system operating test according to codes

D-10.02.04	select and use tools and equipment such as hand tools, leak detectors and manometer
D-10.02.05	locate leaks
D-10.02.06	determine cause of defect such as contaminants, punctured lines and faulty components
D-10.02.07	determine types of servicing required such as repair or replacement of faulty components

Task 11 Services LP gas systems.

Context Recreation vehicle service technicians must be able to maintain, repair, replace and install LP gas systems and components in an expedient manner to ensure customer safety and satisfaction.

While working on the systems, recreation vehicle service technicians should be aware of the safety hazards associated with LP gas.

Required Knowledge

K 1	system components such as tanks, cylinders, o-rings, regulators and hoses
K 2	installation and removal procedures
K 3	types of valves
K 4	types, sizing and material of pipes and tubing
K 5	routing
K 6	regulator types and installation methods
K 7	testing procedures
K 8	types of sealants, fittings and threads, and their application
K 9	codes

Sub-task

D-11.01 Maintains LP gas supply systems.

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

Key Competencies

D-11.01.01	visually inspect components such as hoses, tanks, protective coverings and fasteners for damage and wear
D-11.01.02	perform system leak test using manometer
D-11.01.03	determine types of servicing required such as repair or replacement of faulty components

Sub-task

D-11.02 Repairs LP gas supply systems and components.

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

Key Competencies

D-11.02.01	access repair area by removing items such as heat shields and tank covers or by raising RV
D-11.02.02	select and use tools and equipment such as manometers, hand tools and flaring tools
D-11.02.03	replace or repair faulty components such as regulators, protective coverings, hoses, tanks, tubing, pipes and cylinders
D-11.02.04	re-secure cylinders and distribution system according to codes
D-11.02.05	remove contaminants to maximize supply of LP gas
D-11.02.06	perform drop pressure test and adjust pressure

Sub-task

D-11.03 Installs LP gas supply systems and components.

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

Key Competencies

D-11.03.01	calculate load, demand and material required to determine installation strategy according to criteria such as component placement, customer needs, codes and manufacturers' specifications
D-11.03.02	select and use tools and equipment such as pipe cutters, flaring tools and manometers
D-11.03.03	access installation area by removing items such as heat shields and tank covers or by raising RV
D-11.03.04	adjust area to accommodate new components by making modifications such as reinforcing structure, relocation of piping and enlarging installation area
D-11.03.05	install components such as regulators, tubing, venting, valves, disconnects and hoses
D-11.03.06	verify LP system operation and perform leak test to ensure compliance with codes

Trends

Electronic and digital remote operated appliances and products are becoming standard equipment. A single remote may operate multiple appliances and products. Consumer products are typically replaced rather than repaired. Appliances and products offer more customer convenience.

Related Components (including, but not limited to)

Water heaters: Thermocouple, electrode, burner, element, pilot assembly, switches, pressure relief valves, anodes, orifices, drain plug, direct spark ignition (DSI) board, bypass valves, high temperature thermal switch, gas thermostat, manual gas control valve, tank, electric valve, electric thermostat, insulation jacket, exterior assembly (housing/door), electrical connectors, high voltage cable, water mixer valve, wiring, fasteners.

Furnaces: Heat exchanger, electrodes, motor, fan, thermostat, vents, ducts, relay, pilot assembly, thermocouple, orifices, burner, limit switch/high temperature switch, sail switch, gaskets, DSI board, piezo lighter, combustion air hose, gas valve, capillary tubes, manual gas control, electric gas control, circuit breaker, wire, tubing, fasteners, gas connectors, thermopile, clamps, fan switch, electrical connectors, high voltage cable, LP appliance (heaters).

Ranges and ovens: Gas controls, regulator, burners, grates/racks, pilot assembly, piezo lighter, electrodes, vents, fasteners, oven doors, hinges, springs, seals, thermocouples, thermostat, orifices, clocks, lights, wire, manifold, piping, gaskets, quick connectors, rubber hoses, high voltage cable, switches, capillary tube, filters, fan components, insulation, safety valve and circuit board, LP appliances (barbeques, stoves).

Refrigerators and ice makers: Heat exchanger, electrodes, compressor, relay, thermostat (electric, gas), AC heating element, DC heating element, cooling unit, heat box, burner, orifice, thermocouple, tubing, piezo lighter, DSI board, power control, electric switch, gas valve, eyebrow board, high voltage cable, wire, electrical connectors, fuse, light switch, light, doors, gaskets, handles, hinges, baffles, shelving, thermistor, gas filter, bypass screw, flue cap, ducting, venting, wire harness, solenoid valve, drain tube, catch basin, fasteners, roof vent and cap, side vent, travel latch, humidity heater, fridge fan, door panels, water valves, piping.

Air conditioners and heat pumps: Selector switch, thermostat, control board, main board, relay board, start relay, start capacitor, run capacitor, motor, overload protector, compressor, heat strip assembly, cold control, changeover thermostat, ambient sensor, energy management systems, reversing valve, relay fan, wire harness, connectors, shrouds, ceiling assembly, equalizing valve, gaskets, seals, ducting, filter.

Washers and dryers: Motor, wires, fasteners, switches, pump, drum, hoses, bolts, pulleys, balancing springs, vents, filters, gaskets, seals, door, window, heating element, timer, water valves, mounts, thermostat, water level control.

Consumer products: Central vacuum system, fire place, smoke detectors, LP gas detectors, Carbon monoxide (CO) detectors, audio-video equipment, citizen's band (CB) radio, radio antenna, TV antenna, satellite system, GPS navigation system, rear vision camera, microwave dishwasher, humidifier, dehumidifier.

Tools and Equipment See Appendix A.

Task 12 Maintains appliances.

Context Recreation vehicle service technicians maintain appliances to ensure product performance. Regular maintenance of appliances is required according to manufacturers' specifications.

Required Knowledge

K 1	system requirements such as venting, structure, wiring and sizing
K 2	sequence of operations
K 3	supply systems such as AC and DC, LP gas and water systems
K 4	types of water heaters such as gas, electric, motor aid and hydronic
K 5	component operation
K 6	removal and installation procedures
K 7	service requirements
K 8	duct system routing and sizing
K 9	types of heating systems such as gravity, forced air combustion and hydronic
K 10	types of refrigerators and ice makers such as compressor and absorption
K 11	air conditioner and heat pump components
K 12	types of ignition systems such as automatic energy selector (AES), DSI, piezo and pilot
K 13	types of air conditioning systems such as basement and roof

Sub-task

E-12.01 Maintains water heaters and components.

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

Key Competencies

E-12.01.01	test operation of water heater
E-12.01.02	check water supply systems for leaks and blockages
E-12.01.03	check LP gas system for leaks and adjust for correct pressure
E-12.01.04	check and clean venting and combustion components for sooting and foreign object obstructions
E-12.01.05	check and adjust air fuel mixture for proper flame according to manufacturers' specifications
E-12.01.06	clean and test connections of circuit board and components
E-12.01.07	flush tank and replace anode rod
E-12.01.08	identify worn and damaged parts to recommend replacement or repair

Sub-task

E-12.02 Maintains furnaces and components.

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

Key Competencies

E-12.02.01	test operation of furnace
E-12.02.02	turn off and disconnect power and LP gas supply for safety purposes
E-12.02.03	access components by removing burner assembly, LP lines and motor cover
E-12.02.04	clean components such as motor shafts, blower wheel and micro switches
E-12.02.05	clean and test electrical connections such as circuit boards and electrodes
E-12.02.06	identify worn and damaged parts to recommend replacement or repair
E-12.02.07	check LP gas system for leaks and adjust for correct pressure
E-12.02.08	reinstall burner assembly, LP lines and motor cover
E-12.02.09	verify furnace operation

Sub-task

E-12.03 Maintains ranges and ovens.

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

Key Competencies

E-12.03.01	measure and calibrate gas pressure and AC/DC power supply using tools such as high temperature thermometer, VOMs and manometers
E-12.03.02	clean and adjust components such as burners, air shutters, pilots and electrodes for proper operation
E-12.03.03	perform LP gas system leak test to ensure safe operation
E-12.03.04	calibrate oven thermostat
E-12.03.05	identify worn and damaged parts to recommend replacement or repair
E-12.03.06	verify range and oven operation

Sub-task

E-12.04 Maintains refrigerators and ice makers.

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

Key Competencies

E-12.04.01	test operation of refrigerators and ice makers
E-12.04.02	turn off and disconnect power and LP gas supply
E-12.04.03	measure and calibrate gas pressure and AC/DC power supply using tools such as manometers and VOMs
E-12.04.04	clean components such as burners, orifices, fridge vents and flue tube
E-12.04.05	clean electrical connections such as circuit boards and electrodes
E-12.04.06	identify worn and damaged parts to recommend replacement or repair
E-12.04.07	check LP gas system for leaks and adjust for correct pressure
E-12.04.08	reinstall components such as burners, baffles and caps
E-12.04.09	verify refrigerator and ice maker operation

Sub-task

E-12.05 Maintains air conditioners and heat pump systems.

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

Key Competencies

E-12.05.01	test operation of air conditioners and heat pump systems
E-12.05.02	turn off and disconnect power supply
E-12.05.03	clean cooling coils and condenser fins of debris and foreign objects
E-12.05.04	clean return air filters to ensure adequate air flow
E-12.05.05	reconnect and turn on power supply to perform function test
E-12.05.06	identify worn and damaged parts to recommend replacement or repair

Task 13 Diagnoses appliances.

Context Recreation vehicle service technicians diagnose appliances to determine defects and recommend appropriate solutions.

Required Knowledge

K 1	system requirements
K 2	sequence of operations
K 3	AC and DC systems
K 4	LP gas systems
K 5	water system
K 6	types of water heaters such as LP gas, electric, motor aid and hydronic heaters
K 7	types of furnaces such as gravity, hydronic and forced air
K 8	types of refrigerators and ice makers such as compressor and absorption
K 9	types of ignition systems such as automatic energy selector (AES), DSI, piezo and pilot
K 10	types of air conditioning systems such as basement and roof
K 11	types and location of consumer products such as entertainment, safety and navigation
K 12	electronic climate control systems

Sub-task

E-13.01 Diagnoses water heaters.

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

Key Competencies

E-13.01.01	confirm customer's concern to isolate source of problem and determine required diagnostic action
E-13.01.02	measure power and gas supply to ensure voltage and gas pressure comply with manufacturers' specifications
E-13.01.03	visually inspect tank and related components for conditions such as corrosion, burnt wires, poor installation and foreign objects
E-13.01.04	check operation of components such as thermostats, circuit boards, energy cut off (ECO), gas valves, electrodes/thermocouples and heating elements using measuring tools such as VOMs and ammeters
E-13.01.05	verify by-pass, mixing and check valves to determine flow direction according to manufacturers' specifications
E-13.01.06	determine type of servicing required such as adjustment or replacement of faulty components

Sub-task

E-13.02 Diagnoses furnaces.

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

Key Competencies

E-13.02.01	confirm customer's concern to isolate source of problem and determine required diagnostic action
E-13.02.02	measure power and gas supply to ensure voltage and gas pressure comply with manufacturers' specifications
E-13.02.03	check air flow at registers for possible obstructions
E-13.02.04	visually inspect intake and exhaust venting
E-13.02.05	visually inspect combustion chambers and related components for conditions such as corrosion, burnt wires, poor installation and foreign objects
E-13.02.06	verify burner operation by inspecting flame characteristics

E-13.02.07 check operation of components such as thermostats, circuit boards, high limit switches, gas valves, electrodes and thermocouples using measuring tools such as VOMs, manometers and ammeter

E-13.02.08 determine type of servicing required such as adjustment or replacement of faulty components

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Sub-task

E-13.03 Diagnoses ranges and ovens.

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

Key Competencies

E-13.03.01 confirm customer's concern to isolate source of problem and determine required diagnostic action

E-13.03.02 measure power and gas supply to ensure voltage and gas pressure meet manufacturers' specifications using tools such as high temperature thermometer, VOMs and manometers

E-13.03.03 visually inspect components including burners, pilots, safety valves and electrodes for conditions such as corrosion, burnt wires, poor installation and foreign objects

E-13.03.04 perform operational test by cycling unit

E-13.03.05 test thermostat to ensure oven is cycling at specified temperature

E-13.03.06 determine type of servicing required such as adjustment or replacement of faulty components

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Sub-task

E-13.04 Diagnoses refrigerators and ice makers.

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

Key Competencies

E-13.04.01 confirm customer's concern to isolate source of problem and determine required diagnostic action

E-13.04.02 measure power and gas supply to ensure voltage and gas pressure comply with manufacturers' specifications using tools such as VOMs and manometers

E-13.04.03	check operation of components including thermostats, circuit boards, high limit switches, gas valves, electrodes, water valves, timer switches and thermocouples using measuring tools such as VOMs and manometers
E-13.04.04	visually inspect components including burners, pilots, gas valves and electrodes for conditions such as corrosion, burnt wires, poor installation, combustion and foreign objects
E-13.04.05	measure temperature of refrigerator and freezer compartments and cooling unit components such as condenser fins and boiler tubes
E-13.04.06	identify worn and damaged components to be replaced or repaired
E-13.04.07	check venting and levelling to ensure proper conditions for testing
E-13.04.08	inspect door gasket to ensure adequate contact
E-13.04.09	by-pass control and circuitry to check cooling performance as per manufacturers' specifications
E-13.04.10	determine type of servicing required such as adjustment or replacement of faulty components

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Sub-task

E-13.05 Diagnoses air conditioners and heat pumps.

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

Key Competencies

E-13.05.01	confirm customer's concern to isolate source of problem and determine required diagnostic action
E-13.05.02	measure power supply to ensure voltage complies with manufacturers' specifications using tools and equipment such as VOMs and ammeter
E-13.05.03	check operation of components such as capacitors, motors, relays and control units by using VOMs, digital and infrared thermometers while conducting performance test
E-13.05.04	visually inspect components including motors and condenser fins for conditions such as corrosion, burnt wires, poor installation and foreign objects
E-13.05.05	determine type of servicing required such as adjustment or replacement of faulty components or units

Task 14 Repairs appliances and consumer products.

Context Recreation vehicle service technicians repair appliances and consumer products to restore products to working condition. Consumer products are defined as accessories, add-ons and options including entertainment, safety, convenience and navigation products. Some consumer products cannot be repaired and are only replaced.

Required Knowledge

K 1	system requirements and components
K 2	sequence of operation
K 3	supply systems such as AC and DC, LP gas and water systems
K 4	motor aid systems
K 5	installation and removal procedures
K 6	types of refrigerators and ice makers such as compressor and absorption
K 7	air conditioner and heat pump components
K 8	types of heating systems such as gravity, forced air combustion and hydronic
K 9	system requirements such as venting, structure, wiring and sizing
K 10	product operation
K 11	types of ignition systems such as automatic energy selector (AES), direct spark ignition (DSI), piezo and pilot
K 12	types of consumer products such as entertainment, safety, convenience and navigation
K 13	types of air conditioning systems such as basement and roof

Sub-task

E-14.01 Repairs water heaters.

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

Key Competencies

E-14.01.01	shut off and disconnect AC and DC power, LP gas and water to prevent injury
E-14.01.02	drain water heater to prevent damage to RV
E-14.01.03	adjust electrodes to ensure spark gap, ground and position

E-14.01.04	adjust gas pressure according to manufacturers' specifications to establish optimal flame operation
E-14.01.05	adjust air shutter on burner tube to ensure air fuel mixture
E-14.01.06	replace defective water heater or components such as gas valves, circuit boards, thermostats, ECO, thermocouples, heating elements, electrode switches and inner tanks using tools such as backup wrenches, VOMs and manometers
E-14.01.07	perform gas leak test to ensure safe operation
E-14.01.08	perform operation tests to verify repairs

Sub-task

E-14.02 Repairs furnaces.

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

Key Competencies

E-14.02.01	calibrate thermostat and anticipator to ensure proper operation
E-14.02.02	disconnect AC/DC power and LP gas supply to furnace to prevent injury
E-14.02.03	disconnect ducting and venting to remove furnace
E-14.02.04	add and modify ducting and venting to ensure proper air flow
E-14.02.05	adjust electrodes to ensure spark gap, ground and position
E-14.02.06	adjust gas pressure according to manufacturers' specifications to establish optimal flame operation
E-14.02.07	replace faulty components such as gas valves, high limit and micro switches, thermostat, and blower motor using tools such as gas line wrenches, Allen keys and screwdrivers
E-14.02.08	test operation of furnace using independent power and gas supplies
E-14.02.09	reinstall furnace by reconnecting ducting, venting, electrical and gas in RV
E-14.02.10	perform LP gas leak test to ensure safe operation
E-14.02.11	perform operational test

Sub-task

E-14.03 Repairs ranges and ovens.

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

Key Competencies

E-14.03.01	disconnect AC/DC power and LP gas supply to ranges and ovens to prevent injury
E-14.03.02	replace ranges and ovens or components such as burner valves, oven safety valves, thermostats, gaskets, seals, igniters and LP gas regulators
E-14.03.03	calibrate thermostat to required temperature settings by using tools such as high temperature thermometers and screwdrivers, and adjust combustion air
E-14.03.04	adjust oven door to ensure proper seal
E-14.03.05	reconnect AC/DC power and LP gas supply to ranges and ovens
E-14.03.06	perform LP pressure and leak tests to ensure safe operation
E-14.03.07	perform operational test

Sub-task

E-14.04 Repairs refrigerators and ice makers.

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

Key Competencies

E-14.04.01	disconnect AC/DC power, LP gas and water supply to refrigerator and ice maker to prevent injury and damage
E-14.04.02	add and modify venting to ensure adequate air flow
E-14.04.03	adjust electrodes to ensure spark gap and ground
E-14.04.04	adjust gas pressure according to manufacturers' specifications to establish optimal flame operation
E-14.04.05	replace refrigerators and ice makers or faulty components including gas valves, high limit switches, thermostats and circuit boards using tools such as gas line wrenches, screwdrivers, VOMs and manometers
E-14.04.06	test operation of refrigerators and ice makers using independent power and gas supplies

E-14.04.07 perform LP gas and water leak test to ensure safe operation

E-14.04.08 perform operation tests

Sub-task

E-14.05 Repairs air conditioners and heat pumps.

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

Key Competencies

E-14.05.01 disconnect AC/DC power and discharge capacitors

E-14.05.02 add and modify venting to ensure adequate air flow

E-14.05.03 replace air conditioners or components including motors, relays and capacitors using tools such as analog VOMs, digital ammeters and screwdrivers

E-14.05.04 perform operational test

Sub-task

E-14.06 Replaces consumer products.

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

Key Competencies

E-14.06.01 verify required supply sources for proper operation

E-14.06.02 replace components such as fuses, breakers and mounting hardware

E-14.06.03 remove product using tools such as screwdrivers, cordless drills and wrenches

E-14.06.04 modify interior and exterior components for consumer product

E-14.06.05 modify and install venting

E-14.06.06 exchange and secure product according to manufacturers' specifications

E-14.06.07 replace gaskets and seals

E-14.06.08 verify operation of consumer product

Task 15 Installs appliances and consumer products.

Context Recreation vehicle service technicians install appliances and consumer products to enhance consumer convenience and comfort.

Required Knowledge

K 1	supply systems such as AC and DC, LP gas and water systems
K 2	installation procedures
K 3	thermostat location
K 4	system requirements such as venting, structure, wiring and sizing
K 5	system and product operation
K 6	types of refrigerators and ice makers such as compressor and absorption
K 7	air conditioner and heat pump components
K 8	types of heating systems such as gravity, forced air combustion and hydronic
K 9	types of water heaters such as gas, electric, motor aid and hydronic
K 10	types of ignition systems such as DSI, piezo and pilot
K 11	types of consumer products such as entertainment, safety, convenience and navigation
K 12	types of air conditioning systems such as basement, wall and roof

Sub-task

E-15.01 Installs appliances and components.

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

Key Competencies

E-15.01.01	identify and lay out location of appliance installation by visually inspecting for obstructions and by measuring proposed location in relation to propane, water and power supply
E-15.01.02	cut out opening using tools and equipment such as tin snips, jigsaws and reciprocating saws according to manufacturers' specifications
E-15.01.03	reinforce structure to support appliances
E-15.01.04	insert, secure and seal appliances according to manufacturers' specifications
E-15.01.05	connect AC/DC power, LP gas and water supply to appliances
E-15.01.06	install ducting and venting to appliances

E-15.01.07	install supplementary devices such as cooling fans, duct booster fan and heating strip, according to manufacturers' specifications
E-15.01.08	perform gas and water leak tests to verify safe operation
E-15.01.09	verify operation by cycling appliance

Sub-task

E-15.02 Installs consumer products and components.

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

Key Competencies

E-15.02.01	identify and lay out location of product installation by visually inspecting obstructions and measuring proposed location in relation to power, LP gas, and water supply
E-15.02.02	cut out opening using tools and equipment such as tin snips, jigsaws and reciprocating saws according to manufacturers' specifications
E-15.02.03	insert, secure and seal product according to manufacturers' specifications
E-15.02.04	connect appliance by installing components such as ducting, venting, electrical and gas in RV
E-15.02.05	fasten and seal product for safety of occupants
E-15.02.06	perform LP gas and water leak tests to verify safe operation
E-15.02.07	verify operation of consumer product

Trends

Products, such as residential style items and fabric patterns, are making their way into the RV market providing a more home-like feel to the interior living space of the RV. European design, including rounded corners and moulded cabinets, are becoming more popular. There is an increase in the use of remote controlled products such as awnings and roof vents, and environmentally friendly products. The selection of paint schemes, the availability of roofing materials such as vinyl, and the range of adhesives and sealants have increased. Adhesives rather than fasteners are increasingly being used in sandwich construction. Modular construction is becoming more common.

Related Components (including, but not limited to)

Interior components: paneling, mouldings, furniture and cabinets, flooring (carpet, hardwood, linoleum, ceramic tile), plywood, laminate, hardware (hinges, catches), fasteners (screws, nails, staples), interior soft goods (upholstery, valance, blinds), closet hardware, magazine and spice racks, stovetop covers, sink covers, smooth edge, gas lift props.

Exterior components: Aluminium siding and roofing, ethylene propylene diene monomer **(**EPDM) rubber sheeting, fibreglass sheeting and caps, windows, doors, awnings, add-a-rooms, ladders, grab handles, roof racks, storage hatches, vents (roof, fridge, stove, furnace, plumbing, washer/dryer), door and hatch holders, skirts, fender skirts, rock guard, clearance/taillights, bottom board, underbelly materials, insulation (fibreglass, foam), mouldings, vinyl inserts, plywood, paneling, various structural materials (wood, aluminium, steel).

Tools and Equipment

See Appendix A.

Task 16 Diagnoses interior and exterior components.

Context

Recreation vehicle service technicians diagnose structural and cosmetic damages, and wear of interior and exterior components to identify and determine type of service required.

Required Knowledge

K 1	RV construction
K 2	interior component materials

K 3	potential defects to material
K 4	inspection procedures and sequence
K 5	exterior component materials
K 6	sealant application techniques

Sub-task

F-16.01 Diagnoses interior components.

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

Key Competencies

F-16.01.01	confirm customer's concern to isolate source of problem and determine required diagnostic action
F-16.01.02	visually inspect components such as sidewalls, ceiling, flooring, soft good and cabinetry to identify defects such as cracks, torn upholstery and delamination
F-16.01.03	determine cause of defect such as leak, binding, environmental conditions and misuse
F-16.01.04	access damaged area by removing components to facilitate in-depth inspection
F-16.01.05	determine type of servicing required such as adjustment or replacement of faulty components

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Sub-task

F-16.02 Diagnoses exterior components.

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

Key Competencies

F-16.02.01	confirm customer's concern to isolate source of problem and determine required diagnostic action
F-16.02.02	visually inspect components such as sidewalls, roof, sub floor structures, sealants, doors, awnings, mouldings and windows to identify damages such as corrosion, delamination and misalignment of fasteners

F-16.02.03 determine cause of defect such as sealant failure, UV damage and impact

F-16.02.04 access damaged area by removing components such as windows, doors and awnings, to facilitate in-depth inspection

F-16.02.05 perform moisture and leak test to detect point of entry of water

F-16.02.06 determine type of servicing required such as adjustment or replacement of faulty components

Task 17 Services interior components.

Context Recreation vehicle service technicians maintain, repair and install interior components to ensure cosmetic appearance and functionality of the RV.

Required Knowledge

K 1 materials of soft goods such as upholstery, fabric, foams, leather, vinyl, screening and canvas

K 2 procedures to remove and install interior components

K 3 materials and construction of sidewalls, ceiling, flooring and sub-flooring

K 4 insulation materials

K 5 types of fasteners and adhesives

K 6 routing of electrical circuits, venting, LP gas lines and plumbing

K 7 building materials such as fibreglass, plastics and composites

K 8 construction methods such as stapling, bonding and framing

K 9 interior components such as cabinetry, flooring and furniture

Sub-task

F-17.01 Maintains interior components.

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

Key Competencies

F-17.01.01 adjust hardware, door, trims and upholstery using tools such as pliers and screwdrivers

F-17.01.02 lubricate hinges, door slides and locks using products such as silicone based lubricants and white lithium grease

F-17.01.03 apply protective coatings and fire retardant to soft goods and carpeting to prevent wear and staining damages

F-17.01.04 clean interior components using products such as furniture polish, appliance wax and upholstery shampoo

F-17.01.05 identify worn and damaged parts to recommend replacement or repair

---

Sub-task

F-17.02 Repairs interior components.

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

Key Competencies

F-17.02.01 move, relocate and re-secure components such as studding, furniture and wall trim

F-17.02.02 prepare area by measuring, laying out and cutting work surface such as decor panels and flooring by using techniques such as sanding, filling, nailing and applying adhesive

F-17.02.03 replace soft goods hardware such as snaps and buttons

F-17.02.04 repair wood, fabric and vinyl surfaces using materials such as batten tape, wood putties and seam sealers

F-17.02.05 repair plastic components from scratches, cracks and gouges by using materials such as epoxies, paint and resins

F-17.02.06 replace interior components such as window coverings, panels, cabinets, laminates, foam, fabrics, closet doors and hardware, trim and mouldings

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Sub-task

F-17.03 Installs interior components.

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

Key Competencies

F-17.03.01 move, relocate and re-secure components such as studding, furniture and wall trim

F-17.03.02 measure, lay out and cut wall panels, ceiling panels and flooring using tools such as carpenter squares, jig saws, drills and routers

F-17.03.03 position, level and secure interior components using tools such as drills, levels, air nailers and finishing staplers

F-17.03.04 touch up finishes after installation by applying stain varnishes, tapes, trims and batten mouldings

Task 18 Services exterior components.

Context Recreation vehicle service technicians service exterior components to provide a weather resistant and structurally sound vehicle to the consumer. They also perform repairs to maintain cosmetic appearance and functionality of the RV.

Required Knowledge

K 1 RV construction materials and products such as rubber, aluminium, wood, vinyl, fibreglass, galvanized metal, acrylonitrile butadiene styrene (ABS) plastic and fibre-reinforced plastic (FRP)

K 2 repair and replacement procedures for roofing, walls and underbelly

K 3 construction and installation of exterior components

K 4 modification and fabrication procedures of RV structure

K 5 adhesives and sealants

K 6 use of products for longevity of exterior components such as rubber conditioners, sealants, waxes, cleaners and UV protectants

Sub-task

F-18.01 Maintains exterior components.

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

Key Competencies

F-18.01.01 clean exterior components by removing contaminants

F-18.01.02 lubricate exterior components such as awnings, steps, locks and hinges

F-18.01.03 adjust hardware such as door latches and locks

F-18.01.04 check operation of components such as lights, locks, awnings and vents

F-18.01.05 apply products such as rubber conditioners, sealants, waxes, cleaners, paint shields and UV protectants to prevent deterioration

F-18.01.06 identify worn and damaged parts to recommend replacement or repair

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Sub-task

F-18.02 Repairs exterior components.

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

Key Competencies

F-18.02.01 access damaged area by removing components such as ladders, windows, aluminium sidings, doors, vents and mouldings

F-18.02.02 replace joists, studs, rafters, ducting and insulation

F-18.02.03 repair damaged area by using techniques such as reapplying sealants, adding structural reinforcements and refinishing FRP panel

F-18.02.04 replace exterior components such as windows, doors, hatches, vents, outlets, awnings, wheel wells, aluminium skin and rock guards

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Sub-task

F-18.03 Installs exterior components.

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

Key Competencies

F-18.03.01 measure, lay out and cut material to prepare for installation of components such as roofing, siding, sub floor and underbelly

F-18.03.02 remove and relocate existing components to aid in installation of new exterior components such as EPDM rubber, vents, awnings and ladders

F-18.03.03 position, level and secure exterior components using fasteners such as adhesives, screws, rivets, staples, nuts and bolts

F-18.03.04 apply sealants and finishing products such as paints, silicones, putty and self-levelling sealants

F-18.03.05 install decals and striping to enhance cosmetic appearance

Trends

Power levelling systems in RVs are becoming more popular with features such as remote, touch pad and automatic controls. Generators have been moving to inverter systems making them quieter, fuel efficient and allowing for a more stable power supply. There is an increase in the use of spread axle configurations which provides a smoother ride and less tongue weight on the tow vehicle.

Related Components (including, but not limited to)

Guide tubes, motors, hydraulic pumps, fittings and hoses, valves, solenoids, hydraulic rams, relays, circuit boards, jacks, actuators, cables, pulleys, winches, telescopic posts, generators, backing plate, brake shoes, calipers, pads, activating levers, adjustment springs, anchor springs, electromagnets, adjusters, wire, wire connectors, brake cylinders, brake lines, brake line fittings and connectors, master cylinders, hydraulic actuators, DC circuit breakers, fuses, break-away and cable, 12-volt batteries, wheel drums, rotors, mounting hardware (U-bolts, spring bolts and nuts), axles, saddles, spindles, inner and outer bearings and races, d-washers, castellated nuts, grease seals, dust caps, cotter pins, springs, air bags, hangers, shackles, bushings, equalizers, torsion axles, shock absorbers, rubber bushings, wheels, tires, rear mount hitch, tongue jacks (screw, hydraulic and electric), landing gear (mechanical, hydraulic and electric), slide mechanisms (mechanical, hydraulic and electric), electric motors, ball couplers, king pin and box, jack legs, gears, safety chains, pin locks, roller pins, tapered pins, frame, bumpers, skid plates.

Tools and Equipment

See Appendix A.

Task 19 Maintains chassis and mechanical components.

Context

Maintenance of chassis and mechanical components will ensure safe and reliable operation of running gear, levelling systems, slide-out, lifting systems and generators.

Required Knowledge

K 1	types of tools such as liquid gauges, compression testers, spark plug wrenches, gap testers, calipers and torque wrenches
K 2	frame components such as couplers, frame rails, bumpers and safety chains

K 3	fasteners such as carriage bolts and floor deck screws
K 4	rust and electrolysis
K 5	frame materials such as aluminum and steel
K 6	axle components
K 7	brake types and adjustment procedures
K 8	tire pressure, wear and alignment
K 9	component tolerances and capacities
K 10	types of lubricants and fluids
K 11	location of reservoirs and lubrication points
K 12	bearing and seal placement
K 13	types of levelling system components
K 14	operation of levelling systems such as manual, electrical and hydraulic
K 15	types of slide-out and lifting systems
K 16	operation of slide-out and lifting systems
K 17	procedures for checking power supply
K 18	generator components
K 19	maintenance procedures and service schedules
K 20	small engine operation
K 21	generator operating principles

Sub-task

G-19.01 Maintains frames.

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

Key Competencies

G-19.01.01	visually inspect undercoating for defects such as chipping and peeling
G-19.01.02	sand, prep, paint and undercoat frame according to manufacturers' specifications
G-19.01.03	inspect frame for deficiencies such as rust, cracks, frame to axle misalignment and improper gauge using tools such as calipers and alignment tools
G-19.01.04	visually inspect mounting points for frame components such as floor to frame and slide-out mechanism
G-19.01.05	clean, adjust and lubricate components such as steps, couplers, bumpers and pin box

Sub-task

G-19.02 Maintains running gear.

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

Key Competencies

G-19.02.01	check tires for defects such as wear, low pressure and rim damage
G-19.02.02	adjust and test brakes using ammeters to verify current load of magnets
G-19.02.03	bleed and flush hydraulic trailer brakes to remove air in system or contaminants
G-19.02.04	clean and lubricate moving parts on brake assemblies
G-19.02.05	repack bearings, replace grease seals and inspect for wear such as brinelling, rust spots and spindle damage
G-19.02.06	measure drums and rotors for excessive wear using measuring tools such as micrometers and calipers
G-19.02.07	inspect bushings for movement
G-19.02.08	lubricate bushings according to bushing type

Sub-task

G-19.03 Maintains levelling systems.

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

Key Competencies

G-19.03.01	check electrical source for specified DC voltage and amperage using tools such as VOMs and load testers
G-19.03.02	inspect wiring connections, gauge and routing
G-19.03.03	check hydraulic fluid level, fill and visually inspect for debris and contaminants such as dirt and water
G-19.03.04	lubricate levelling system components such as manual and electric jacks
G-19.03.05	verify levelling system operation

G-19.03.06 calibrate automatic levelling controls according to manufacturers' instructions

G-19.03.07 check hydraulic system for leaks in components such as hoses, fittings and cylinders using methods including visual inspection and hydraulic pressure gauges

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Sub-task

G-19.04 Maintains slide-out and lifting systems.

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

Key Competencies

G-19.04.01 check electrical source for specified DC voltage and amperage using tools such as VOMs and load tester

G-19.04.02 inspect wiring connections, gauge and routing

G-19.04.03 verify slide-out and lifting system operation for factors such as alignment, gap, and full extension and retraction

G-19.04.04 lubricate components such as cables, gears, pulleys, tubes and rollers

G-19.04.05 check hydraulic system for leaks in components such as hoses, fittings and cylinders using methods such as visual inspection and hydraulic pressure gauges

G-19.04.06 check hydraulic fluid level, fill and visually inspect for debris and contaminants such as dirt and water

G-19.04.07 check gaskets and sweeps for conditions such as fit, cracks, tears and adhesion

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Sub-task

G-19.05 Maintains generators.

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

Key Competencies

G-19.05.01 check generator components such as spark plugs and ignition for compliance with specifications such as gap, timing and compression

G-19.05.02 change oil and change filters such as fuel, air and oil filters

G-19.05.03	visually inspect and test starting system switches and harnesses for functionality
G-19.05.04	visually inspect fuel delivery systems for leaks and connections
G-19.05.05	visually inspect installation and supporting hardware
G-19.05.06	check electrical source for specified DC voltage and amperage using tools such as VOMs, ammeters and load testers
G-19.05.07	inspect wiring connections, gauge and routing
G-19.05.08	verify generator operation by testing AC output voltage and frequency, and exercising generator

Task 20 Diagnoses chassis and mechanical components.

Context Diagnosis of chassis and mechanical component problems will ensure servicing is done to correct problems and ensure a safe and reliable repair.

Required Knowledge

K 1	types of tools such as liquid gauges, compression testers, spark plug wrenches, gap testers, calipers, VOMs and torque wrenches
K 2	rust and electrolysis
K 3	types of fasteners
K 4	paints, primers and undercoating materials
K 5	frame types such as I beam, tubular and C channels
K 6	frame styles such as "A" frames, 5th wheel and pole
K 7	types, sizes and weight capacities of hitch couplers
K 8	bumper types and attachments
K 9	frame material such as ferrous and non-ferrous
K 10	components such as axles, suspension and brakes
K 11	tire types, pressures and load ranges
K 12	torque specifications
K 13	signs of wheel damage, bearing wear and overheating
K 14	axle and spring capacities
K 15	wheel alignment specifications such as camber, caster and toe
K 16	axle suspension types such as steel spring, torsion and air ride
K 17	trailer brake wiring circuits
K 18	location and function of break-away switches

K 19	brake assembly specifications
K 20	hydraulic brake system components
K 21	levelling system operation
K 22	hydraulic, mechanical and electrical/electronic systems
K 23	sequence of operation
K 24	DC systems
K 25	electric motor operation
K 26	slide-out, lifting and locking systems such as electrical, hydraulic and mechanical
K 27	operation of slide-out and lifting systems
K 28	service intervals
K 29	small engine operation
K 30	generator operating principles
K 31	energy management systems

Sub-task

G-20.01 Diagnoses frames.

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

Key Competencies

G-20.01.01	confirm customer's concern to isolate source of problem and determine required diagnostic actions
G-20.01.02	measure frame for alignment according to manufacturers' specifications using tools and equipment such as measuring tapes and alignment machines
G-20.01.03	visually inspect frame for defects such as peeling undercoat, corrosion cracks, bends and broken bolts
G-20.01.04	determine cause of defect such as poor maintenance, accidents and rough road conditions
G-20.01.05	determine servicing requirements according manufacturers' specifications to repair defects

Sub-task

G-20.02 Diagnoses running gear.

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

Key Competencies

G-20.02.01	confirm customer's concern to isolate source of problem and determine required diagnostic actions
G-20.02.02	interpret tire tread wear such as cupping, and outer and inner wear
G-20.02.03	identify worn, loose or broken suspension parts such as bushings, hangers, equalizers, shocks, springs, bolts and shackles
G-20.02.04	test braking system using ammeters
G-20.02.05	check for brake problems such as scored brake drums, seized parts and delaminated linings, defective magnets, broken springs and out of adjustment
G-20.02.06	test voltage drop and amp draw using VOMs and ammeters to locate and isolate electrical problem between trailer and tow vehicle
G-20.02.07	visually inspect hydraulic brakes for leaks
G-20.02.08	test hydraulic brakes system through manual activation according to manufacturers' specifications
G-20.02.09	determine cause of defect such as poor maintenance, defective parts and rough road conditions
G-20.02.10	determine servicing requirements such as repairing seals, bearings, bushings and springs according manufacturers' specifications

Sub-task

G-20.03 Diagnoses levelling systems.

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

Key Competencies

G-20.03.01	confirm customer's concern to isolate source of problem and determine required diagnostic actions
G-20.03.02	access and visually inspect components such as switches, seals, fittings, cylinders and hoses

G-20.03.03	check hydraulic fluid for level and contaminants
G-20.03.04	test levelling system as per operating instructions
G-20.03.05	check hydraulic system for leaks in components such as hoses, fittings and cylinders using methods such as visual inspection and hydraulic pressure
G-20.03.06	check electrical source for specified DC voltage and amperage using tools such as VOMs, ammeters and load testers
G-20.03.07	inspect wiring connections, gauge and routing
G-20.03.08	inspect levelling system components such as manual and electric jacks for adequate lubrication
G-20.03.09	determine cause of defect such as poor maintenance, defective parts and operator misuse
G-20.03.10	determine servicing requirements such as replacing jacks, and repairing fittings and hoses according manufacturers' specifications

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Sub-task

G-20.04 Diagnoses slide-out and lifting systems.

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

Key Competencies

G-20.04.01	confirm customer's concern to isolate source of problem and determine required diagnostic actions
G-20.04.02	check electrical source for specified DC voltage and amperage using tools such as VOMs, ammeters and load testers
G-20.04.03	inspect wiring connections, gauge and routing
G-20.04.04	test electrical/electronic components such as solenoids, relays and control boards for operation using tools such as ammeters and VOMs
G-20.04.05	check cables, gears, pulleys, tubes and rollers for lubrication and wear
G-20.04.06	check hydraulic system for leaks in components such as hoses, fittings and cylinders using methods such as visual inspection and hydraulic pressure gauges
G-20.04.07	visually inspect hydraulic fluid for level and contaminants
G-20.04.08	check gaskets and sweeps for conditions such as fit, cracks, tears and adhesion
G-20.04.09	inspect slide-out and lifting system components such as drive gears, guide tubes, motors and cables

G-20.04.10	determine cause of defect such as poor maintenance, defective parts and operator misuse
G-20.04.11	determine servicing requirements such as replacing cylinders, cables, motors and winches, and repairing fittings and hoses according manufacturers' specifications

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Sub-task

G-20.05 Diagnoses generators.

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

Key Competencies

G-20.05.01	confirm customer's concern to isolate source of problem and determine required diagnostic actions
G-20.05.02	check generator components including spark plugs and ignition, that items such as gap, timing and compression meet specifications
G-20.05.03	check filters such as fuel, air and oil for contamination
G-20.05.04	inspect and test starting system switches and harnesses for operation
G-20.05.05	visually inspect fuel delivery systems for leaks and connections
G-20.05.06	visually inspect installation and supporting hardware
G-20.05.07	check electrical source for specified DC voltage and amperage using tools such as VOMs, ammeters and load testers
G-20.05.08	inspect wiring connections, gauge and routing
G-20.05.09	verify generator operation by testing AC output voltage and frequency
G-20.05.10	check generator windings for shorts and continuity
G-20.05.11	perform tests such as compression and ignition using tools such as compression tester, spark plug gauges and spark testers
G-20.05.12	determine cause of defect such as poor maintenance and defective parts
G-20.05.13	determine servicing requirements such as replacing circuit boards, spark plugs and breakers, and repairing fuel supply, DC electrical, fittings and hoses according manufacturers' specifications

Task 21 Repairs chassis and mechanical systems.

Context Repairs done in a professional and timely manner will ensure a safe and reliable repair. The proper functioning of chassis and mechanical systems is critical to overall RV operation.

Required Knowledge

K 1	frame material such as ferrous and non-ferrous
K 2	rust and electrolysis
K 3	undercoating materials
K 4	paints and primers
K 5	frame types such as 5th wheel and trailer
K 6	bumper types and attachments
K 7	assembly of components
K 8	compatibility of replacement parts
K 9	DC electrical circuits
K 10	use of connectors according to conditions such as moisture and vibration
K 11	operation of steps
K 12	torque requirements of components
K 13	axle capacities and attached components such as saddles, springs and shackles
K 14	types of lubricants
K 15	bearing wear
K 16	bolt patterns on hubs
K 17	axle suspension types such as steel spring, torsion and air ride
K 18	operating procedures of levelling systems
K 19	types of slide-out and levelling systems such as manual, electric and hydraulic and their related components
K 20	types of lifting systems such as cable, direct drive and hydraulic and their related components
K 21	small engine operation
K 22	fuel systems such as gas, diesel and LP gas
K 23	generator components such as carburetor, fuel pump and ignition system

Sub-task

G-21.01 Repairs frames and components. (NOT COMMON CORE)

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

Key Competencies

G-21.01.01	sand, prep, paint and undercoat frame according to manufacturers' specifications
G-21.01.02	grind out weld and crack, and re-fasten using tools such as a grinders, welders, presses, jacks and hammers
G-21.01.03	reattach existing components such as outriggers, couplers, jacks, floor mounts and steps using tools and materials including welders, wrenches, bolts and fasteners
G-21.01.04	align frame components using tools and equipment such as measuring tools, welders, drills and grinders
G-21.01.05	lubricate components such as steps, couplers and jacks
G-21.01.06	adjust components such as steps, couplers, bumpers and pin box using tools such as socket wrenches and hammers
G-21.01.07	clean components such as steps, couplers and metal surfaces
G-21.01.08	fabricate frame components such as support, brackets and consumer products according manufacturers' specifications
G-21.01.09	modify replacement components for fit and use
G-21.01.10	verify frame component repair

Sub-task

G-21.02 Repairs running gear.

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

Key Competencies

G-21.02.01	repair and replace tires according to defect
G-21.02.02	replace damaged brake parts using tools such as wrenches, sockets, pliers and spring tools
G-21.02.03	bleed and flush hydraulic trailer brakes to remove air in system and contaminants

G-21.02.04	clean and lubricate brake components
G-21.02.05	repack and replace bearings
G-21.02.06	replace bushings and lubricate according to bushing type
G-21.02.07	adjust brakes according to specifications
G-21.02.08	replace springs using tools such as hammers, wrenches and jacks
G-21.02.09	verify brake repair by testing operation
G-21.02.10	verify running gear repair by checking items such as alignment, torques and air pressure using tools such as measuring tools, torque wrenches and pressure gauges

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Sub-task

G-21.03 Repairs levelling systems.

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

Key Competencies

G-21.03.01	replace or repair electrical wiring and connections by means such as soldering and crimping
G-21.03.02	fill hydraulic fluid to manufacturers' specifications
G-21.03.03	drain and flush hydraulic fluid reservoirs
G-21.03.04	replace and repair levelling system components such as manual and electric jacks
G-21.03.05	calibrate automatic levelling controls according to manufacturers' guidelines
G-21.03.06	repair hydraulic system leaks by replacing seals, hoses, fittings and cylinders
G-21.03.07	replace components such as cylinders, motors and pumps
G-21.03.08	bleed hydraulic lines to remove air
G-21.03.09	verify repair by testing levelling system operation

Sub-task

G-21.04 Repairs slide-out and lifting systems.

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

Key Competencies

G-21.04.01	replace and repair electrical wiring and connections by means such as soldering and crimping
G-21.04.02	re-align slide-out and lifting system using tools such as tape measures, wrenches and sockets
G-21.04.03	lubricate components such as cables, gears, pulleys, tubes and rollers according to manufacturers' specifications
G-21.04.04	fill hydraulic fluid to manufacturers' specifications
G-21.04.05	drain and flush hydraulic fluid reservoirs
G-21.04.06	repair hydraulic system leaks by replacing seals, hoses, fittings and cylinders
G-21.04.07	route and crimp cables using tools such as cable crimper and fish tape
G-21.04.08	replace components such as pumps, motors, solenoids and circuit boards
G-21.04.09	bleed hydraulic lines to remove air
G-21.04.10	verify repair by testing slide-out and lifting system operation

Sub-task

G-21.05 Repairs generators.

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

Key Competencies

G-21.05.01	replace components such as fuel pumps, spark plugs and starter
G-21.05.02	tune and adjust generator by adjusting carburetor, fuel mixture and revolutions per minute (rpm)
G-21.05.03	clean, re-build and replace carburetors
G-21.05.04	change oil and filters such as fuel, air and oil filters
G-21.05.05	repair leaks in fuel delivery systems by replacing components such as fuel lines and fittings

G-21.05.06	replace or repair electrical wiring and connections by means such as soldering and crimping
G-21.05.07	replace generator according to manufactures' installation instructions
G-21.05.08	verify generator operation by testing AC output voltage and frequency, and exercising generator

Task 22 Installs chassis and mechanical components.

Context Recreation vehicle service technicians install new levelling systems and components, and generators for comfort, ease of operation and convenience of the consumer.

Required Knowledge

K 1	weight restriction of installed components
K 2	proposed location for levelling system components
K 3	types of levelling systems such as manual, electric and hydraulic
K 4	system tolerances such as ground clearances, weight capacities and travel
K 5	DC systems
K 6	generator specifications and requirements such as intended load, size and venting
K 7	fuel required such as gas, diesel and LP gas
K 8	drawings, diagrams and schematics

Sub-task

G-22.01 Installs levelling systems and components.

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

Key Competencies

G-22.01.01	ensure levelling system is compatible with vehicle according to factors such as weight, size and customer preference
G-22.01.02	prepare and modify location for components by moving other RV components or building or installing mounts
G-22.01.03	position and secure components according to manufactures' specifications

G-22.01.04	route and connect electrical wiring and hydraulic hoses considering factors such as pinch points, heat and secure mounting
G-22.01.05	verify levelling system operation

Sub-task

G-22.02 Installs generators.

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

Key Competencies

G-22.02.01	prepare and modify location for generator such as moving other RV components in order to install generator according to application
G-22.02.02	position and secure mounting components as per RV manufacturers' specifications to prepare for generator installation
G-22.02.03	position and secure generator according to manufacturers' specifications
G-22.02.04	route and connect electrical wiring and fuel lines considering factors such as pinch points, heat and secure mounting
G-22.02.05	ensure exhaust system is installed to allow venting according to Canadian Standards Association (CSA) code book
G-22.02.06	verify generator operation

Trends The popularity of short box tow vehicles continues to grow and is resulting in an increase in more complex fifth wheel hitches. New technology in braking systems is advancing towards wireless connections. There is increasing popularity of factory installed braking and hitching systems on tow vehicles.

Related Components (including but not limited to) Class I, II, III, IV, and V receiver hitches, 5th wheel hitches (king pin style, goose neck), nuts and bolts, weight distribution, anti-sway devices, swing hitches, balls, ball mounts, hitch pins and clips, safety chains, clevises, shackles, camper tie-downs, quick links, s-hooks, brake controls, wire pin plugs, break-away switches, auxiliary braking systems, base plates, tow bars, drop hitches, lube pumps, transmission coolers, safety cables, drive line disconnects, diodes.

Tools and Equipment See Appendix A.

Task 23 Diagnoses towing systems.

Context Recreation vehicle service technicians need to recognize and diagnose towing system problems to ensure safety of the customer and others.

Required Knowledge

K 1	tow vehicle components such as fifth wheel hitches, weight distribution and tie downs
K 2	tow vehicle requirements such as hitch classes and capacities
K 3	installation and adjustment procedures
K 4	braking system operation
K 5	diodes and electrical circuits
K 6	towed vehicle components such as base plates, tow bars and auxiliary brake systems
K 7	towed vehicle requirements such as auxiliary braking, weight restriction and safety break-away switches

Sub-task

H-23.01 Diagnoses tow vehicle systems.

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

Key Competencies

H-23.01.01	confirm customer's concern to isolate source of problem and determine required diagnostic actions
H-23.01.02	inspect systems including hitching, braking systems and lighting for operational faults such as improper setup, damage and malfunctions
H-23.01.03	visually inspect components such as fifth wheel hitch, weight distribution system and tie downs for damage including wear, fatigue and loose fasteners
H-23.01.04	perform various tests such as electrical circuit testing, to isolate issues between tow and towed vehicle
H-23.01.05	determine cause of defect such as shorts, corroded connectors and worn hitching components
H-23.01.06	determine types of servicing required such as replacing plugs, hitches and brake controls

Sub-task

H-23.02 Diagnoses towed vehicle systems.

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

Key Competencies

H-23.02.01	confirm customer's concern to isolate source of problem and determine required diagnostic actions
H-23.02.02	inspect systems including hitching, braking and lighting for operational faults such as improper setup, damage and malfunctions
H-23.02.03	visually inspect components such as tow bars, base plates and auxiliary brake systems for damage including wear, fatigue, loose fasteners and operation
H-23.02.04	perform various tests such as electrical circuit testing and lube systems pressure test, to isolate issues between tow and towed vehicle
H-23.02.05	determine cause of defect such as shorts, corrosion and wear
H-23.02.06	determine types of servicing required such as replacing plugs, hitches and braking system

Task 24 Services towing systems.

Context Recreation vehicle service technicians install towing systems to provide customers with the comfort and convenience of using their existing vehicle to increase their versatility. It is critical that technicians properly maintain these systems in order to ensure safety and worry-free travelling.

Required Knowledge

K 1	tow vehicle systems such as fifth wheel, weight distribution and frame mounts
K 2	tow vehicle electrical system
K 3	hitch weights, clearances and towing limitations
K 4	lubrication requirements of components
K 5	installation requirements and procedures of components
K 6	towed vehicle components such as tow bars, base plates and brake assists
K 7	towed vehicle requirements such as auxiliary braking, weight restriction and safety break-away switches
K 8	installation and removal procedures of towed vehicle components
K 9	limitations of towed vehicle components
K 10	towed vehicle electrical systems
K 11	trailer hook-up and unhooking procedures
K 12	compatibility of components

Sub-task

H-24.01 Maintains tow vehicle systems.

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

Key Competencies

H-24.01.01	visually inspect components for wear, corrosion and lack of lubrication
H-24.01.02	lubricate and protect components such as electrical connections and hitching components
H-24.01.03	verify operation of electrical system by using diagnostic equipment

H-24.01.04	replace components such as hitches, brake controls and sway controls
H-24.01.05	repair components such as fifth wheel hitch, torsion hitch and electrical components

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Sub-task

H-24.02 Maintains towed vehicle systems.

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

Key Competencies

H-24.02.01	visually inspect components for wear, corrosion and lack of lubrication
H-24.02.02	lubricate and protect components such as tow bars and electrical connections
H-24.02.03	verify operation of electrical system by using diagnostic equipment
H-24.02.04	replace components such as spacers, shims, springs, boots and cables
H-24.02.05	repair components such as tow bars, lube pumps, auxiliary braking system and driveline disconnect devices

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Sub-task

H-24.03 Installs tow vehicle systems and components.

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

Key Competencies

H-24.03.01	calculate load and material requirements to determine installation strategy such as component selection and placement, and customer needs
H-24.03.02	select and use tools and equipment such as air tools, measuring devices and hand tools
H-24.03.03	access installation area by removing items such as interior/exterior body parts or by raising tow vehicle
H-24.03.04	adjust area to accommodate new components by making manufacturers' recommended modifications
H-24.03.05	install components such as hitches, weight distribution hitches and anti-sway devices
H-24.03.06	verify tow system operation and setup

Sub-task

H-24.04 Installs towed vehicle systems and components.

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

Key Competencies

H-24.04.01	calculate load and material requirements to determine installation strategy such as component selection and placement, and customer needs
H-24.04.02	select and use tools and equipment such as air tools, measuring devices and hand tools
H-24.04.03	access installation area by removing items such as interior/exterior body parts or by raising towed vehicle
H-24.04.04	adjust area to accommodate new components by making manufacturers' recommended modifications
H-24.04.05	install components such as lubrication systems, hitches, base plates and braking systems
H-24.04.06	verify towed system operation and setup

APPENDICES

APPENDIX A TOOLS AND EQUIPMENT

Hand Tools

air inflators
anchor spring tools
awls
basin wrenches
battery carrying straps
bearing packers
bearing pullers
brake adjustment tools
brake spring pliers
brushes
butane igniters
cable crimpers
calculators
carpet stretchers
caulking guns
centre punches
channel lock pliers
clamps
coaxial crimpers
creepers
date stamp equipment
digital cameras
drain buckets and funnels
easy outs
faucet wrenches
files
filter wrenches
flaring tools
flashlights
flue cleaners
glue guns
hack saws
hammers
hand drills
hand saws
heat guns
hole punches
hydraulic testers
jumper leads
nibblers
notched trowels
nut drivers
paint brushes
PEX crimpers
pipe cutters
pipe seamers
pipe wrenches
pliers
pop riveters
propane torches
pry bars
routers
rubber mallets
screening tools
screw drivers
scribes
snakes
snap fastener tools
socket sets
soldering guns/irons
spin weld drivers
staplers
straightedges
stud finders
thread taps
tile cutters
tin snips
tire pressure gauges
tire valve stem tools
toilet wands
torque wrenches
tread depth gauges
trowels
tube benders
tube cutters
utility knives
valve installer tools
vice grips
wire brushes
wire crimping tools

Hand Tools *(cont'd)*

wire cutters
wire strippers
wood clamps
wrenches

Measuring Tools

air flow meters
alternator testers
ammeters (with induction pickup)
carbon-pile battery load testers
circuit board testers
computers
DC test lights
dial indicators
digital VOMs
diode testers
hydrometers
leak detectors (liquid and electronic)
levels
manometers (dial and U-tube)
measuring tapes
micrometers
moisture meters
outlet testers
oven temperature testers
plumb lines
scales
squares
thermometers
Volt-ohm meters
water pressure gauges
weigh scales

Portable Power Tools and Stationary Power Tools

air chisels
air compressors
air nailers
air nozzles
air staplers
angle grinders
band saws
battery chargers
battery starters
circular saws
die grinders
drill bits
drill presses
electric drills
electric staplers
hole saws
impact wrenches
jig saws
mitre saws
power washers
reciprocating saws
rooter
router bits
sanders/grinders
saw blades
screw guns
solvent baths
table saws
wet/dry vacuums

Lifting and Moving Equipment, Ladders and Scaffolding

camper lift jacks
camper loaders
dollies
floor jacks
fork lifts
hoists
jack stands
ladders (step ladders, extendable)
scaffolding
scissor lifts

Welding Tools and Equipment

arc welders
chipping hammer
clamps
gas welders
magnets
plastic welder
plasma cutters
wire feed welders

Personal Protective Equipment (PPE) and Safety Equipment

coveralls
eye wash station
face masks
face shield
fall arrest
fire extinguisher
gloves
goggles
hearing protection
helmet
knee pads
safety boots
safety glasses

APPENDIX B GLOSSARY

add-a-room — a structure consisting of three walls that can be attached to an RV awning to create an additional room; they are sometimes available in hard-walled versions called "Florida rooms"

anode rod — when used in a water heater, attracts corrosion causing products in the water; these products attack the anode rod instead of the metal tank itself; the anode rod should be inspected yearly and changed when it is reduced to about 1/4 of its original size; the rods are used only in steel water heater tanks

awning — the canvas or aluminium shade which is mounted on an RV; they may be automatic, in which case the awning is installed on a spring-loaded roll-up, or they may be manually propped up by a pole

ball mount — the portion of the trailer which holds the hitch, ball, and the connecting device for the sway bars on a weight-distributing hitch, and the ball alone on a weight-carrying hitch

battery — the auxiliary battery installed in some RV units to provide 12 Volt lighting when the tow vehicle is not connected; when installed with an automatic charging solenoid, it charges through the tow vehicle alternator system, assuming the tow vehicle is wired with a charge line

camber — wheel alignment - number of degrees each wheel is off of vertical; looking from the front, tops of wheels farther apart than bottoms means positive camber; as the load pushes the front end down, or the spring get weak, camber would go from positive to none to negative

chassis — the frame of a vehicle; this is a main structure of a vehicle, which all other parts attach to regardless whether it is unibody or frame construction

class A motorhome — an RV with the living accommodation built on or as an integral part of a self-propelled motor vehicle

class B motorhome — also known as a camping van conversion; these RVs are compact units made from a cargo van, customized to include sleeping, eating and bathroom facilities with raised roof to provide additional headroom; they are popular because they can often be parked in family garages, used to tow a boat or driven as a second vehicle

class C motorhome	an RV with the living accommodation built on a cutaway van chassis; a full-size bed in the cabover section allows for ample seating, galley and bathroom facilities in the coach; sometimes referred to as a mini-motorhome
class 1 (Class I) hitch	trailer hitch with capacity of up to 2,000 lbs gross trailer weight and 200 lbs tongue weight
class 2 (Class II) hitch	trailer hitch with weight carrying rating of up to 3,500 lbs gross trailer weight and 300/350 lbs tongue weight
class 3 (Class III) hitch	trailer hitch with weight carrying rating of up to 5,000 lbs gross trailer weight and 500 lbs tongue weight
class 4 (Class IV) hitch	trailer hitch with weight carrying rating of up to 10,000 lbs gross trailer weight and 1,000-1,200 lbs tongue weight
class 5 (Class v) hitch	any trailer hitch with capacity greater than 10,000 lbs gross trailer weight and 1,000-1,200 lbs tongue weight
consumer product	goods that satisfy personal wants through their direct consumption or use
converter	a device for changing 120-V AC into 12-V DC electrical power
coupler	the part of the trailer that attaches to the ball of hitch
fifth wheel hitch	a hitch that mounts in the bed of pickup truck
frame	the part of a vehicle which all other parts attach to; frame usually refers to a non-unibody chassis
gas pressure	LP gas pressure must be 11" of water column (6.25 oz per sq. in.), checking and adjusting requires a manometer
generator	an electrical device powered by gasoline, diesel, or sometimes propane, for generating 120 volt AC power
hitch	a device which attaches directly to a tow vehicle providing the connection between the tow vehicle and the trailer
hitchball	the steel ball attached to the towing vehicle that connects with the travel trailer
holding tanks	there are three different holding tanks on most RVs: - fresh water tank (holds fresh water that can be stored for later use), - grey water tank (holds the waste water from the sinks and showers), - black water tank (holds the waste water from the toilet)

inverter	a device for changing 12-volt DC into 120-volt AC power
LP gas	liquefied petroleum gas; propane is one formulation and butane is the other; propane fuels RV appliances, such as the stove and refrigerator
regulator	the LP valve controlling the gas flow through all appliances, and maintaining the appropriate pressure in the LP gas system
running gear	a general term referring to the suspension system, axles, brakes, bearings, wheel and tires
safety chains	a set of chains that are attached to both the trailer A-Frame and the tow vehicle while towing; safety chains are intended to keep the trailer attached to the tow vehicle in the event of a hitch failure, preventing the trailer from completely separating from the tow vehicle
shore power	electricity provided by an external plug to an external power source
slide-out	additional living space that slides out, either by hydraulics, electricity or manually, when the RV is set up for camping
towed vehicle	the term for a vehicle that is being towed by a motorhome; it is also know as a dinghy
tongue jack	the lifting device which raises the trailer tongue hitch off of the hitch ball
tow vehicle	the vehicle that pulls a trailer
trailer brakes	brakes that are built into the trailer and are activated either by electric impulse or by a surge mechanism
underbelly	area between the frame that normally contain the holding tanks and could be covered with cloth lining, plastic lining or aluminium sheeting

Source Material:

RVHotlineCanada.com is credited as a reference source for terms found in this glossary

APPENDIX C ACRONYMS

ABS	acrylonitrile butadiene styrene
AC	alternate current
AES	automatic energy selector
CO	carbon monoxide
CSA	Canadian Standards Association
DC	direct current
DSI	direct spark ignition
ECO	energy cut off
EPDM	ethylene propylene diene monomer
GFCI	ground fault circuit interrupter
GPS	global positioning system
LED	light emitting diode
LP	liquefied petroleum
MSDS	material safety data sheet
OH&S	Occupational Health and Safety
PPE	personal protective equipment
RV	recreation vehicle
UHF	ultra high frequency
VOM	volt-ohm meter
WHMIS	Workplace Hazardous Materials Information System

APPENDIX D BLOCK AND TASK WEIGHTING

BLOCK A COMMON OCCUPATIONAL SKILLS

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	National Average
%	NV	NV	NV	NV	NV	NV	12	ND	7	5	ND	NV	ND	8%

Task 1 Performs safety-related activities.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	NV	NV	NV	NV	NV	NV	38	ND	30	25	ND	NV	ND	31%

Task 2 Uses and maintains tools and equipment.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	NV	NV	NV	NV	NV	NV	25	ND	30	25	ND	NV	ND	27%

Task 3 Performs common work practices and procedures.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	NV	NV	NV	NV	NV	NV	37	ND	40	50	ND	NV	ND	42%

BLOCK B PLUMBING SYSTEMS

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	National Average
%	NV	NV	NV	NV	NV	NV	13	ND	10	10	ND	NV	ND	11%

Task 4 Diagnoses plumbing systems.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	NV	NV	NV	NV	NV	NV	40	ND	40	40	ND	NV	ND	40%

Task 5 Services potable water systems.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	NV	NV	NV	NV	NV	NV	30	ND	30	30	ND	NV	ND	30%

Task 6 Services waste water systems.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	NV	NV	NV	NV	NV	NV	30	ND	30	30	ND	NV	ND	30%

BLOCK C ELECTRICAL SYSTEMS

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	National Average
%	NV	NV	NV	NV	NV	NV	16	ND	15	25	ND	NV	ND	18%

Task 7 Diagnoses electrical systems.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	NV	NV	NV	NV	NV	NV	50	ND	34	50	ND	NV	ND	45%

Task 8 Services AC electrical system.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	NV	NV	NV	NV	NV	NV	25	ND	33	20	ND	NV	ND	26%

Task 9 Services DC electrical system.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	NV	NV	NV	NV	NV	NV	25	ND	33	30	ND	NV	ND	29%

BLOCK D LP GAS SYSTEMS

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	National Average
%	NV	NV	NV	NV	NV	NV	12	ND	10	25	ND	NV	ND	16%

Task 10 Diagnoses LP gas systems.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	NV	NV	NV	NV	NV	NV	60	ND	50	50	ND	NV	ND	53%

Task 11 Services LP gas systems.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	NV	NV	NV	NV	NV	NV	40	ND	50	50	ND	NV	ND	47%

BLOCK E APPLIANCES AND CONSUMER PRODUCTS

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	National Average
%	NV	NV	NV	NV	NV	NV	17	ND	18	15	ND	NV	ND	17%

Task 12 Maintains appliances.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	NV	NV	NV	NV	NV	NV	20	ND	27	30	ND	NV	ND	26%

Task 13 Diagnoses appliances.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	NV	NV	NV	NV	NV	NV	30	ND	27	30	ND	NV	ND	29%

Task 14 Repairs appliances and consumer products.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	NV	NV	NV	NV	NV	NV	35	ND	36	30	ND	NV	ND	33%

Task 15 Installs appliances and consumer products.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	NV	NV	NV	NV	NV	NV	15	ND	10	10	ND	NV	ND	12%

BLOCK F INTERIOR AND EXTERIOR

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

Task 16 Diagnoses interior and exterior components.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	NV	NV	NV	NV	NV	NV	34	ND	34	20	ND	NV	ND	29%

Task 17 Services interior components.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	NV	NV	NV	NV	NV	NV	33	ND	33	30	ND	NV	ND	32%

Task 18 Services exterior components.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	NV	NV	NV	NV	NV	NV	33	ND	33	50	ND	NV	ND	39%

BLOCK G CHASSIS AND MECHANICAL COMPONENTS

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	National Average
%	NV	NV	NV	NV	NV	NV	12	ND	17	10	ND	NV	ND	13%

Task 19 Maintains chassis and mechanical components.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	NV	NV	NV	NV	NV	NV	30	ND	30	10	ND	NV	ND	23%

Task 20 Diagnoses chassis and mechanical components.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	NV	NV	NV	NV	NV	NV	20	ND	30	45	ND	NV	ND	32%

Task 21 Repairs chassis and mechanical systems.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	NV	NV	NV	NV	NV	NV	25	ND	30	40	ND	NV	ND	32%

Task 22 Installs chassis and mechanical components.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	NV	NV	NV	NV	NV	NV	25	ND	10	5	ND	NV	ND	13%

BLOCK H TOWING SYSTEMS

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	National Average
%	NV	NV	NV	NV	NV	NV	8	ND	8	5	ND	NV	ND	7%

Task 23 Diagnoses towing systems.

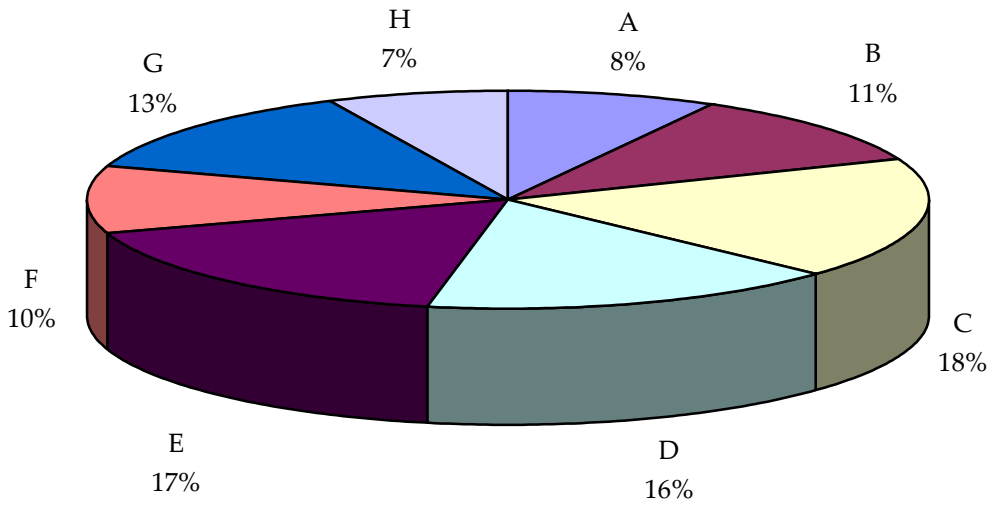
	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	NV	NV	NV	NV	NV	NV	40	ND	50	50	ND	NV	ND	47%

Task 24 Services towing systems.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	NV	NV	NV	NV	NV	NV	60	ND	50	50	ND	NV	ND	53%

APPENDIX E

PIE CHART*



TITLES OF BLOCKS

BLOCK A	Common Occupational Skills	BLOCK E	Appliances and Consumer Products
BLOCK B	Plumbing Systems	BLOCK F	Interior and Exterior
BLOCK C	Electrical Systems	BLOCK G	Chassis and Mechanical Components
BLOCK D	LP Gas Systems	BLOCK H	Towing 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 — Recreation Vehicle Service Technician

BLOCKS	TASKS	SUB-TASKS		
A - COMMON OCCUPATIONAL SKILLS	1. Performs safety-related activities.	1.01 Uses personal protective equipment (PPE) and safety equipment.	1.02 Maintains safe work environment.	
	2. Uses and maintains tools and equipment.	2.01 Maintains tools and equipment.	2.02 Uses lifting, moving and access equipment.	
	3. Performs common work practices and procedures.	3.01 Uses blueprints, drawings, schematics and sketches.	3.02 Identifies outstanding recalls and service bulletins.	3.03 Performs pre-delivery inspections (PDI).
B - PLUMBING SYSTEMS	4. Diagnoses plumbing systems.	4.01 Diagnoses potable water systems.	4.02 Diagnoses waste water systems.	
	5. Services potable water systems.	5.01 Maintains potable water systems.	5.02 Repairs potable water systems.	5.03 Installs potable water system.
	6. Services waste water systems.	6.01 Maintains waste water systems.	6.02 Repairs waste water systems.	6.03 Installs waste water system components.
C - ELECTRICAL SYSTEMS	7. Diagnoses electrical systems.	7.01 Diagnoses AC electrical and power supply systems.	7.02 Diagnoses DC electrical and power supply systems.	
	8. Services AC electrical system.	8.01 Maintains AC electrical and power supply systems.	8.02 Repairs AC power supply and distribution system.	8.03 Installs AC power supply and distribution system components.

BLOCKS	TASKS	SUB-TASKS				
	9. Services DC electrical system.	9.01 Maintains DC electrical and power supply systems.	9.02 Repairs DC power supply and distribution systems.	9.03 Installs DC power supply and distribution system components.		
D - LP GAS SYSTEMS	10. Diagnoses LP gas systems.	10.01 Diagnoses LP gas supply system (high pressure).	10.02 Diagnoses LP gas distribution system (low pressure).			
	11. Services LP gas systems.	11.01 Maintains LP gas supply systems.	11.02 Repairs LP gas supply systems and components.	11.03 Installs LP gas supply systems and components.		
E - APPLIANCES AND CONSUMER PRODUCTS	12. Maintains appliances.	12.01 Maintains water heaters and components.	12.02 Maintains furnaces and components.	12.03 Maintains ranges and ovens.	12.04 Maintains refrigerators and ice makers.	12.05 Maintains air conditioners and heat pump systems.
	13. Diagnoses appliances.	13.01 Diagnoses water heaters.	13.02 Diagnoses furnaces.	13.03 Diagnoses ranges and ovens.	13.04 Diagnoses refrigerators and ice makers.	13.05 Diagnoses air conditioners and heat pumps.
	14. Repairs appliances and consumer products.	14.01 Repairs water heaters.	14.02 Repairs furnaces.	14.03 Repairs ranges and ovens.	14.04 Repairs refrigerators and ice makers.	14.05 Repairs air conditioners and heat pumps.
		14.06 Replaces consumer products.				
	15. Installs appliances and consumer products.	15.01 Installs appliances and components.	15.02 Installs consumer products and components.			
F - INTERIOR AND EXTERIOR	16. Diagnoses interior and exterior components.	16.01 Diagnoses interior components.	16.02 Diagnoses exterior components.			

BLOCKS	TASKS	SUB-TASKS				
	17. Services interior components.	17.01 Maintains interior components.	17.02 Repairs interior components.	17.03 Installs interior components.		
	18. Services exterior components.	18.01 Maintains exterior components.	18.02 Repairs exterior components.	18.03 Installs exterior components.		
G - CHASSIS AND MECHANICAL COMPONENTS	19. Maintains chassis and mechanical components.	19.01 Maintains frames.	19.02 Maintains running gear.	19.03 Maintains levelling systems.	19.04 Maintains slide-out and lifting systems.	19.05 Maintains generators.
	20. Diagnoses chassis and mechanical components.	20.01 Diagnoses frames.	20.02 Diagnoses running gear.	20.03 Diagnoses levelling systems.	20.04 Diagnoses slide-out and lifting systems.	20.05 Diagnoses generators.
	21. Repairs chassis and mechanical systems.	21.01 Repairs frames and components. (NOT COMMON CORE)	21.02 Repairs running gear.	21.03 Repairs levelling systems.	21.04 Repairs slide-out and lifting systems.	21.05 Repairs generators.
	22. Installs chassis and mechanical components.	22.01 Installs levelling systems and components.	22.02 Installs generators.			
H - TOWING SYSTEMS	23. Diagnoses towing systems.	23.01 Diagnoses tow vehicle systems.	23.02 Diagnoses towed vehicle systems.			
	24. Services towing systems.	24.01 Maintains tow vehicle systems.	24.02 Maintains towed vehicle systems.	24.03 Installs tow vehicle systems and components.	24.04 Installs towed vehicle systems and components.	