curriculum standard

apprenticeship

NOVA SCOTIA APPRENTICESHIP AGENCY

TRANSPORT TRAILER TECHNICIAN

2022

Based on National Harmonization Recommendations

NOVA SCOTIA

Version #1.0

Atlantic Apprenticeship Curriculum Standard

Transport Trailer Technician

Preface

This Nova Scotia Curriculum Standard (NSCS) is intended to assist instructional staff in the design and delivery of technical, in-class training in support of the apprenticeship program.

This NSCS contains all the technical training elements required to complete the apprenticeship program and has been developed based on the 2021 Red Seal Occupational Standard (RSOS) for the trade.

Implementation of the NSCS for Apprenticeship training is outlined in the following table.

Level	Implementation Effective
Level 1	2022-2023
Level 2	2023-2024

The above implementation schedule was current at time of publication.

Granting of credit or permission to challenge level examinations (if applicable) for pre-apprenticeship training for this trade will be based on the content outlined in this standard. Training providers must contact the Nova Scotia Apprenticeship Agency for more information on the process and requirements for determining eligibility for credit towards an apprenticeship program.

Acknowledgements

The Nova Scotia Apprenticeship Agency (Agency) wishes to acknowledge the contributions of trade advisory committee members, tradespersons, industry establishments, professional associations, labour organizations, training providers, government departments and agencies, and all others who contributed to this publication.

Special thanks are offered to the following representatives who contributed greatly to the original draft of the standard and provided expert advice throughout its development.

Dan Muise	Northeast Truck and Trailer
Dave Rossiter	Northeast Truck and Trailer
Dave VanHattem	Nova Scotia Community College
Ian Cunningham	Eassons Transport Ltd.
Jim Perry	MacKay's Truck and Trailer Center Ltd.
Mike Legresley	Nova Truck Centres

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User Guide

Nova Scotia Curriculum Standards (NSCS) are developed based on Red Seal Occupational Standards (RSOS) or Nova Scotia Occupational Standards (NSOS) and industry consultation. This document represents the minimum content to be delivered as part of the apprenticeship program for this trade.

The NSCS documents are purposefully constructed for ease of use and flexibility of structure in order to adapt to all delivery requirements. They detail units of training, unit outcomes and objectives. They do not impose a delivery model or teaching format.

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

This document includes a Level Structure to facilitate mobility for apprentices moving from one jurisdiction to another.

Structure

The content of the NSCS is divided into units. Unit codes are used as a means of identification and are not intended to convey the order of delivery. It is at the discretion of the training provider to deliver the content in the required logical sequence of delivery within the level. Units may be delivered one at a time or concurrently within a level, provided all outcomes are met.

The Learning Outcomes describe what the apprentice should know or be able to do at the end of training. Wording of the Learning Outcomes, “Demonstrate knowledge of…” acknowledges the broad spectrum of ways in which knowledge can be assessed (i.e. practical projects, multiple choice testing, presentations, etc.) by instructional staff within the training.

User Guide (continued)

The Occupational Standard (OS) to Curriculum Comparison chart maps the OS trade skills/sub-tasks to the curriculum standard.

Each unit of training in the curriculum standard lists both theoretical and practical objectives, which represent the minimum content that must be covered during technical training. Detailed content/bulleted lists for each objective have not been developed. Where detail is required for clarity, content has been provided.

The practical objectives represent the tasks/skills that apprentices must be exposed to during technical training. An individual or group performance of the task/skill is recommended; if not possible, an instructor demonstration is acceptable. Training Providers should use practical, hands-on learning whenever possible, whether identified in the curriculum standard as a practical objective or not.

Each unit also provides suggested hours (a guide only), which can be adjusted for apprentice learning, delivery methods, practical/hands-on learning, examinations, registration, holidays, storm days, etc.

Glossary of Terms

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

ADJUST	To put in good working order; regulate; bring to a proper state or position.
APPLICATION	The use to which something is put and/or the circumstance in which an individual would use it.
CHARACTERISTIC	A feature that helps to identify, tell apart or describe recognizably; a distinguishing mark or trait.
COMPONENT	A part that can be separated from or attached to a system; a segment or unit.
DEFINE	To state the meaning of (a word, phrase, etc.).
DESCRIBE	To give a verbal account of; tell about in detail.
EXPLAIN	To make plain or clear; illustrate; rationalize.
IDENTIFY	To point out or name objectives or types.
INTERPRET	To translate information from observation, charts, tables, graphs and written material.
MAINTAIN	To keep in a condition of good repair or efficiency.
METHOD	A means or manner of doing something that has procedures attached to it.
OPERATE	How an object works; to control or direct the functioning of.
PROCEDURE	A prescribed series of steps taken to accomplish an end.
PURPOSE	The reason for which something exists or is done, made or used.

Glossary of Terms (continued)

SERVICE	Routine inspection and replacement of worn or deteriorating parts. An act or business function provided to a customer in the course of an individual's profession (e.g., haircut).
TECHNIQUE	Within a procedure, the manner in which technical skills are applied.
TEST	v. To subject to a procedure that ascertains effectiveness, value, proper function or other quality. n. A way of examining something to determine its characteristics or properties, or to determine whether or not it is working correctly.
TROUBLESHOOT	To follow a systematic procedure to identify and locate a problem or malfunction and its cause.

Essential Skills Profiles

Through extensive research, the Government of Canada and other national and international agencies have identified and validated key essential skills for the workplace. These skills are used in nearly every job and at different levels of complexity. They provide the foundation for learning all other skills and enable people to evolve with their jobs and adapt to workplace change.

Essential Skills Profiles describe how workers in various occupations use each of the key essential skills. They include:

- a brief description of the occupation;
- examples of tasks that illustrate how each essential skill is applied; and,
- complexity ratings that indicate the level of difficulty of the example tasks.

Essential Skills profiles can be found on the Employment and Social Development Canada (ESDC) website at https://www.canada.ca/en/services/jobs/training/initiatives/skills-success/tools.html

The development and improvement of these Essential Skills is inherent throughout the apprenticeship training program as apprentices work towards achieving journeyperson status.

Profile Chart

Performs Common Occupational Skills			
CHT-100 Safety	CHT-105 Tools and Equipment	CHT-110 Hoisting and Lifting	CHT-115 Communication and Documentation
CHT-120 Preventive Maintenance	CHT-125 Start, Move and Park Vehicle	CHT-130 Fasteners, Tubing, Hoses and Fittings	CHT-135 Lubrication and Fluid Servicing
CHT-140 Gaskets, Seals, and Sealing Compounds	CHT-145 Bearings	CHT-150 Metallurgy	CHT-155 Cutting and Heating
CHT-160 MIG Welding	CHT-625 Shielded Metal Arc Welding	TTT-265 Trailer Motor Vehicle Inspection (MVI)	
Diagnoses and Services Suspension Systems			
TTT-220 Suspension Systems			
Diagnoses and Services Brake Systems			
CHT-610 Hydraulic Brake Systems I	CHT-615 Introduction to Air Brake Systems	TTT-235 Advanced Braking and Control Systems	
Diagnoses and Services Axles and Wheel End Assemblies			
CHT-165 Tires, Rims, Wheels and Hubs	TTT-205 Fixed, Self-Steering and Lift Axles	TTT-210 Wheel and Axle Alignment	
Diagnoses and Services Trailer Chassis, Bodies and Coupling Devices			
TTT-200 Frames and Chassis	TTT-215 Trailer Bodies	TTT-225 Coupling Devices	TTT-230 Landing Gear
Diagnoses and Services Electric and Electronic Systems			
CHT-175 Electrical and Electronic Principles	CHT-180 Batteries	CHT-185 Lighting Circuits	CHT-190 Wiring Harnesses and Accessories
TTT-240 Trailer Monitoring and Control Systems			

Profile Chart (continued)

Diagnoses and Services Hydraulic Systems			
CHT-195 Introduction to Hydraulics	CHT-600 Hydraulic Fittings, Piping, Tubing and Hoses	CHT-605 Hydraulic Reservoirs, Coolers and Filters	
Diagnoses and Services Temperature Control Systems			
CHT-620 Ozone Depleting Substances	TTM-250 Charging and Starting Systems	TTT-245 Fuel Systems	TTT-255 High Voltage, Hybrid and Alternative Drive Systems
TTT-260 Introduction to Refrigeration and Heating Systems			

Level Structure

Level 1, 9 Weeks (270 hrs)

Code	Unit Title	Hrs*	Pg	Practical Objectives*
MENT-1801	Workplace Mentoring I	6	22	
CHT-100	Safety	9	23	
CHT-105	Tools and Equipment	9	25	
CHT-110	Hoisting and Lifting	6	27	
CHT-115	Communication and Documentation	6	29	
CHT-120	Preventive Maintenance	3	31	
CHT-125	Start, Move and Park Vehicle	3	32	
CHT-130	Fasteners, Tubings, Hoses and Fittings	9	33	
CHT-135	Lubrication and Fluids Servicing	18	34	
CHT-140	Gaskets, Seals and Sealing Compounds	3	36	
CHT-145	Bearings	3	37	
CHT-150	Metallurgy	3	38	
CHT-155	Cutting and Heating	9	40	Set up, operate and shut down oxy-fuel equipment.
CHT-160	Metal Inert Gas (MIG) Welding	9	42	
CHT-165	Tires, Rims, Wheels and Hubs	12	44	
CHT-170	Engine Principles	21	46	
CHT-175	Electrical and Electronic Principles	30	47	
CHT-180	Batteries	6	49	
CHT-185	Lighting Circuits	6	51	
CHT-190	Wiring Harnesses and Accessories	18	53	Repair an electrical connection.
CHT-195	Introduction to Hydraulics	18	55	
CHT-600	Hydraulic Fittings, Piping, Tubing and Hoses	6	57	
CHT-605	Hydraulic Reservoirs, Coolers and Filters	6	59	
CHT-610	Hydraulic Brake Systems I	15	61	
CHT-615	Introduction to Air Brake Systems	15	63	
CHT-620	Ozone Depleting Substances	6	65	
CHT-625	Shielded Metal Arc Welding (SMAW)	9	66	
CHT-630	Introduction to Steering System Components	12	68	

Level Structure (continued)

Level 2, 5 Weeks (150 hrs)

Code	Unit Title	Hrs*	Pg	Practical Objectives*
TTT-200	Frames and Chassis	6	71	
TTT-205	Fixed, Self-Steering and Lift Axles	9	74	
TTT-210	Wheel and Axle Alignment	6	77	
TTT-215	Trailer Bodies	12	79	
TTT-220	Suspension Systems	12	82	Perform a basic alignment check.
TTT-225	Coupling Devices	6	85	
TTT-230	Landing Gear	6	87	
TTT-235	Advanced Braking and Control Systems	12	89	
TTT-240	Trailer Monitoring and Control Systems	6	92	
TTT-245	Fuel Systems	9	95	
TTT-250	Charging & Starting Systems	9	97	
TTT-255	High Voltage, Hybrid and Alternative Drive Systems	6	99	
TTT-260	Introduction to Refrigeration and Heating Systems	9	101	
TTT-265	Trailer MVI	6	103	
TTT-270	Workplace Mentoring II	6	105	
TTT-275	Program Review	30	108	

***Hours:** The time it should take to cover the unit (a guide only).

***Practical Objectives:** The tasks/skills apprentices must be exposed to during technical training. An individual or group performance of the task/skill is recommended; if not possible, an instructor demonstration is acceptable. Training Providers should use practical, hands-on learning whenever possible, whether identified in the curriculum as a practical objective or not.

2021 Occupational Standard Sub-task to Curriculum Unit Comparison

2021 RSOS Task		Curriculum Guide Unit	
Task 1 - Performs safety related functions			
1.01	Maintains safe work environment	CHT-100	Safety
		CHT-125	Start, Move and Park Vehicle
1.02	Uses PPE and safety equipment	CHT-100	Safety
Task 2 - Uses and maintains tools and equipment			
2.01	Uses hand, electric and pneumatic tools	CHT-105	Tools and Equipment
2.02	Uses measuring, testing and diagnostic equipment	CHT-105	Tools and Equipment
2.03	Uses hoisting, lifting, staging and access equipment	CHT-110	Hoisting and Lifting
2.04	Uses welding equipment	CHT-150	Metallurgy
		CHT-155	Cutting and Heating
		CHT-160	Metal Inert Gas (MIG) Welding
		CHT-625	Shielded Metal Arc Welding (SMAW)
2.05	Uses gas, plasma and arc air cutting equipment	CHT-150	Cutting and Heating
		CHT-160	Metal Inert Gas (MIG) Welding
		CHT-625	Shielded Metal Arc Welding (SMAW)
2.06	Uses electronic devices and systems for diagnostics and programming	CHT-175	Electrical and Electronic Principles
		TTT-240	Trailer Monitoring and Control Systems
Task 3 - Performs routine work practices			
3.01	Maintains fluids and lubricants	CHT-120	Preventive Maintenance
		CHT-135	Lubrication and Fluids Servicing
3.02	Lubricates parts and components	CHT-135	Lubrication and Fluids Servicing
3.03	Cleans parts and components	CHT-120	Preventative Maintenance
		CHT-130	Fasteners, Tubing, Hoses and Fittings
3.04	Uses fasteners, sealants, adhesives and gaskets	CHT-140	Gaskets, Seals and Sealing Compounds
3.05	Maintains hoses, tubing and fittings	CHT-130	Fasteners, Tubing, Hoses and Fittings

2021 RSOS Task		Curriculum Guide Unit	
Task 4 - Organizes work			
4.01	Uses documentation.	CHT-115	Communication and Documentation
		CHT-120	Preventive Maintenance
4.02	Plans daily tasks.		
Task 5 - Uses communication and mentoring techniques			
5.01	Uses communication techniques	CHT-115	Communication and Documentation
		TTT-270	Workplace Mentoring II
5.02	Uses mentoring techniques	MENT-1801	Workplace Mentoring I
		TTT-270	Workplace Mentoring II
Task 6 - Diagnoses suspension systems			
6.01	Diagnoses air suspension systems	TTT-220	Suspension Systems
6.02	Diagnoses spring suspension systems	TTT-220	Suspension Systems
6.03	Diagnoses rubber suspension systems	TTT-220	Suspension Systems
Task 7 - Services suspension systems			
7.01	Maintains suspension systems	TTT-220	Suspension Systems
7.02	Repairs air suspension systems	TTT-220	Suspension Systems
7.03	Repairs spring suspension systems	TTT-220	Suspension Systems
7.04	Repairs rubber suspension systems	TTT-220	Suspension Systems
Task 8 - Diagnoses brake systems			
8.01	Diagnoses disc brake systems	CHT-610	Hydraulic Brake Systems I
		TTT-235	Advanced Braking and Control Systems
8.02	Diagnoses drum brake systems	CHT-610	Hydraulic Brake Systems I
		TTT-235	Advanced Braking and Control Systems
8.03	Diagnoses air brake systems	CHT-615	Introduction to Air Brake Systems
		TTT-235	Advanced Braking and Control Systems
8.04	Diagnoses hydraulic brake systems	CHT-610	Hydraulic Brake Systems I
		TTT-235	Advanced Braking and Control Systems
8.05	Diagnoses electric brake systems	TTT-235	Advanced Braking and Control Systems
8.06	Diagnoses electronic braking control systems	TTT-235	Advanced Braking and Control Systems
Task 9 - Services brake systems			
9.01	Maintains brake systems	CHT-610	Hydraulic Brake Systems I

2021 RSOS Task		Curriculum Guide Unit	
		CHT-615	Introduction to Air Brake Systems
		TTT-235	Advanced Braking and Control Systems
9.02	Repairs disc brake systems	CHT-610	Hydraulic Brake Systems I
		TTT-235	Advanced Braking and Control Systems
9.03	Repairs drum brake systems	CHT-610	Hydraulic Brake Systems I
		TTT-235	Advanced Braking and Control Systems
9.04	Repairs air brake systems	CHT-615	Introduction to Air Brake Systems
		TTT-235	Advanced Braking and Control Systems
9.05	Repairs hydraulic brake systems	CHT-610	Hydraulic Brake Systems I
		TTT-235	Advanced Braking and Control Systems
9.06	Repairs electric brake systems	TTT-235	Advanced Braking and Control Systems
9.07	Repairs electronic braking control systems	TTT-235	Advanced Braking and Control Systems
Task 10 - Diagnoses axles and wheel end assemblies			
10.01	Diagnoses fixed, self-steering and lift axles	TTT-205	Fixed, Self-Steering and Lift Axles
10.02	Diagnoses hubs and bearings	CHT-145	Bearings
		CHT-165	Tires, Rims, Wheels and Hubs
10.03	Diagnoses tires and rims	CHT-165	Tires, Rims, Wheels and Hubs
		TTT-210	Wheel and Axle Alignment
Task 11 - Services axles and wheel end assemblies			
11.01	Maintains axles and wheel end assemblies	CHT-165	Tires, Rims, Wheels and Hubs
		TTT-205	Fixed, Self-Steering and Lift Axles
11.02	Repairs fixed axles, hubs and bearings	CHT-145	Bearings
		CHT-165	Tires, Rims, Wheels and Hubs
		TTT-205	Fixed, Self-Steering and Lift Axles
11.03	Repairs self-steering and lift axles	TTT-205	Fixed, Self-Steering and Lift Axles
11.04	Replaces tires and rims	CHT-165	Tires, Rims, Wheels and Hubs
11.05	Repairs tires	CHT-165	Tires, Rims, Wheels and Hubs
Task 12 - Diagnoses trailer chassis and trailer bodies			
12.01	Diagnoses trailer chassis	TTT-200	Frames and Chassis

2021 RSOS Task		Curriculum Guide Unit	
12.02	Diagnoses trailer bodies	TTT-215	Trailer Bodies
Task 13 - Services trailer chassis and trailer bodies			
13.01	Maintains trailer chassis	TTT-200	Frames and Chassis
13.02	Repairs trailer chassis	TTT-200	Frames and Chassis
13.03	Maintains trailer bodies	TTT-215	Trailer Bodies
13.04	Repairs trailer bodies	TTT-215	Trailer Bodies
Task 14 - Diagnoses coupling devices and landing gear			
14.01	Diagnoses coupling devices	TTT-225	Coupling Devices
14.02	Diagnoses landing gear	TTT-230	Landing Gear
Task 15 - Services coupling devices and landing			
15.01	Maintains coupling devices	TTT-225	Coupling Devices
15.02	Repairs coupling devices	TTT-225	Coupling Devices
15.03	Maintains landing gear	TTT-230	Landing Gear
15.04	Repairs landing gear	TTT-230	Landing Gear
Task 16 - Diagnoses electric and electronic systems			
16.01	Diagnoses lighting systems	CHT-185	Lighting Circuits
16.02	Diagnoses wiring systems	CHT-190	Wiring Harnesses and Accessories
16.03	Diagnoses trailer monitoring and control systems	TTT-240	Trailer Monitoring and Control Systems
Task 17 - Services electric and electronic systems			
17.01	Maintains electric and electronic systems	CHT-175	Electrical and Electronic Principles
		CHT-180	Batteries
17.02	Repairs lighting and wiring systems	CHT-185	Lighting Circuits
		CHT-190	Wiring Harnesses and Accessories
17.03	Repairs trailer monitoring and control systems	TTT-240	Trailer Monitoring and Control Systems
Task 18 - Diagnoses hydraulic systems			
18.01	Diagnoses self-contained hydraulic systems	CHT-195	Introduction to Hydraulics
		CHT-600	Hydraulic Fittings, Piping, Tubing and Hoses
		CHT-605	Hydraulic Reservoirs, Coolers and Filters
18.02	Diagnoses auxiliary-powered hydraulic systems	CHT-195	Introduction to Hydraulics
		CHT-600	Hydraulic Fittings, Piping, Tubing and Hoses
		CHT-605	Hydraulic Reservoirs, Coolers and Filters

2021 RSOS Task		Curriculum Guide Unit	
Task 19 - Services hydraulic systems			
19.01	Maintains hydraulic systems	CHT-195	Introduction to Hydraulics
		CHT-600	Hydraulic Fittings, Piping, Tubing and Hoses
		CHT-605	Hydraulic Reservoirs, Coolers and Filters
19.02	Repairs hydraulic systems	CHT-195	Introduction to Hydraulics
		CHT-600	Hydraulic Fittings, Piping, Tubing and Hoses
		CHT-605	Hydraulic Reservoirs, Coolers and Filters
Task 20 - Diagnoses temperature control systems			
20.01	Diagnoses fuel systems	TTT-245	Fuel Systems
20.02	Diagnoses charging and starting systems	TTT-250	Charging & Starting Systems
20.03	Diagnoses high-voltage electric, hybrid and alternative drive systems	TTT-255	High Voltage, Hybrid and Alternative Drive Systems
20.04	Diagnoses refrigeration and heating systems	TTT-260	Introduction to Refrigeration and Heating Systems
Task 21 - Services temperature control systems			
21.01	Maintains fuel systems	TTT-245	Fuel Systems
21.02	Repairs fuel systems	TTT-245	Fuel Systems
21.03	Maintains charging and starting systems	TTT-250	Charging & Starting Systems
21.04	Repairs charging and starting systems	TTT-250	Charging & Starting Systems
21.05	Maintains high-voltage electric, hybrid and alternative drive systems	TTT-255	High Voltage, Hybrid and Alternative Drive Systems
21.06	Repairs high-voltage electric, hybrid and alternative drive systems	TTT-255	High Voltage, Hybrid and Alternative Drive Systems
21.07	Maintains refrigeration and heating systems	TTT-260	Introduction to Refrigeration and Heating Systems
21.08	Repairs refrigeration and heating systems	CHT-620	Ozone Depleting Substances
		TTT-260	Introduction to Refrigeration and Heating Systems

Level 1
9 Weeks (270 hours)

MENT-1801 Workplace Mentoring I (6 hrs)

Learning Outcomes:

- Demonstrate strategies to assist in learning skills in the workplace.

Red Seal Occupational Standard Reference:

6.01 Uses communications techniques.
6.02 Uses mentoring techniques.

Suggested Hours:

6 Hours

Objectives and Content:

1. Describe the importance of your own experiences.
2. Identify partners involved in apprenticeship.
3. Describe the shared responsibilities for workplace learning.
4. Determine your own learning preferences and explain how these relate to learning new skills.
5. Describe the importance of different types of skills in the workplace.
6. Describe the importance of essential skills in the trade.
7. Identify different ways of learning.
8. Identify learning preferences.
9. Identify different learning needs and strategies to meet learning goals.
10. Identify techniques for effective communication.
11. Identify strategies to assist in learning a skill.

Practical Objectives

N/A

CHT-100 Safety (9 hrs)

Learning Outcomes:

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

2021 Red Seal Occupational Standard Reference:

1.01 Maintains safe work environment.
1.02 Uses PPE and safety equipment.

Suggested Hours:

9 Hours

Objectives and Content:

1. Identify types of personal protective clothing and equipment and describe their applications.

2. Describe the care and maintenance of personal protective equipment (PPE).

3. Identify workplace hazards and describe safe work practices.
   - i) personal
   - ii) shop/facility
     - fire
     - explosion
     - gases
     - electrical
     - housekeeping
     - awareness of surroundings
   - iii) environmental awareness
   - iv) vehicle/equipment
     - restraint systems
     - lock out/tag out
     - high voltage systems
     - high pressure systems
     - hydraulic
     - fuel
     - air

- fire suppression systems

4. Identify and explain workplace safety and health regulations.
   i) federal
      - material safety data sheets (MSDS)
      - workplace hazardous material information system (WHMIS)
   ii) provincial/territorial
      - occupational health and safety (OHS)

Practical Objectives:

N/A

CHT-105 Tools and Equipment (9 Hrs)

Learning Outcomes:

- Demonstrate knowledge of hand and power tools, their applications, maintenance and procedures for use.
- Demonstrate knowledge of measuring tools, their applications, maintenance and procedures for use.
- Demonstrate knowledge of diagnostic tools, their applications and maintenance.
- Demonstrate knowledge of shop equipment, their applications, maintenance and procedures for use.

2021 Red Seal Occupational Standard Reference:

2.01 Uses hand, electric and pneumatic tools.
2.02 Uses measuring, testing and diagnostic equipment.

Suggested Hours:

9 Hours

Objectives and Content:

1. Identify types of hand tools and describe their applications and procedures for use.

2. Describe the procedures used to store and maintain hand tools.

3. Identify types of power tools and describe their applications and procedures for use.
   i) electric/cordless
   ii) pneumatic
   iii) hydraulic

4. Describe the procedures used to store and maintain power tools.

5. Identify types of measuring tools and describe their applications and procedures for use.
   i) imperial
   ii) metric

6. Identify types of diagnostic tools and describe their applications.

7. Describe the procedures used to store and maintain measuring and diagnostic tools.

8. Identify types of shop equipment and describe their applications and procedures for use.

9. Describe the procedures used to store and maintain shop equipment.

Practical Objectives

N/A

CHT-110 Hoisting and Lifting (6 Hrs)

Learning Outcomes:

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

2021 Red Seal Occupational Standard Reference:

2.03 Uses hoisting, lifting, staging and access equipment.

Suggested Hours:

6 Hours

Objectives and Content:

1. Define terminology associated with hoisting and lifting.

2. Identify hazards and describe safe work practices pertaining to hoisting and lifting.

3. Identify and interpret codes and regulations pertaining to hoisting and lifting.

4. Identify types of hoisting and lifting equipment and describe their applications, limitations and procedures for use.
   i) vehicle
   ii) component/equipment
   iii) jack stands and cribbing

5. Identify types of hoisting and lifting equipment accessories and describe their applications and procedures for use.
   i) chain
   ii) chain hoist
   iii) slings
   iv) shackles

6. Describe the procedures used to inspect, store and maintain hoisting and lifting equipment and accessories.

7. Describe the procedures used to determine lift points and perform lifts.

8. Identify hand signals used to perform hoisting and lifting operations.

Practical Objectives:

N/A

CHT-115 Communication and Documentation (6 Hrs)

Learning Outcomes:

- Demonstrate knowledge of effective communication practices.
- Demonstrate knowledge of trade related documentation.
- Demonstrate knowledge of vehicle identification codes.

2021 Red Seal Occupational Standard Reference:

4.01 Uses documentation.
5.01 Uses communication techniques.

Suggested Hours:

6 Hours

Objectives and Content:

1. Describe the importance of effective communication.
   - i) customers
   - ii) co-workers
   - iii) related professionals
   - iv) journeyperson/apprentice
   - v) operator

2. Locate and interpret identification codes found on the vehicle and vehicle components.

3. Identify and interpret types of service related documents.
   - i) work orders
     - service report writing
     - identify complaint, cause and correction
   - ii) schematics and service information
   - iii) technical service bulletins (TSB)/recalls
   - iv) preventive maintenance schedules
   - v) parts lists
   - vi) time estimates

Practical Objectives:

N/A

CHT-120 Preventive Maintenance (3 Hrs)

Learning Outcomes:

- Demonstrate knowledge of preventive maintenance and its purpose.
- Demonstrate knowledge of the procedures used to perform preventive maintenance.

2021 Red Seal Occupational Standard Reference:

3.01 Maintains fluids and lubricants.
3.03 Cleans parts and components.
4.01 Uses documentation.

Suggested Hours:

3 Hours

Objectives and Content:

1. Define terminology associated with preventive maintenance.

2. Describe preventive maintenance programs.
   - i) scheduled lubrication
   - ii) scheduled servicing
   - iii) scheduled cleaning
   - iv) inspections
   - v) completing documentation
   - vi) legal responsibilities

3. Describe the procedures used to perform preventive maintenance.

Practical Objectives:

N/A

CHT-125 Start, Move and Park Vehicle (3 Hrs)

Learning Outcomes:

- Demonstrate knowledge of the procedures used to start-up, operate and shut-down equipment/vehicle.
- Demonstrate knowledge of the procedures used to prepare equipment/vehicle to be towed or pushed.
- Demonstrate knowledge of equipment/vehicle lock-out procedures.

2021 Red Seal Occupational Standard Reference:

1.01 Maintains safe work environment.

Suggested Hours:

3 Hours

Objectives and Content:

1. Identify hazards and describe safe work practices pertaining to entering, starting, moving and parking vehicles.

2. Describe the procedures used to start-up and shut down equipment/vehicles.

3. Describe the procedures used to operate equipment/vehicles.

4. Describe the procedures used to prepare equipment/vehicles to be towed or pushed.

5. Describe the procedures used to lock-out equipment/vehicles prior to servicing.

Practical Objectives:

N/A

CHT-130 Fasteners, Tubings, Hoses and Fittings (9 Hrs)

Learning Outcomes:

- Demonstrate knowledge of fasteners, tubings, hoses and fittings, their applications and procedures for use.

2021 Red Seal Occupational Standard Reference:

3.04 Uses fasteners, sealants, adhesives and gaskets.
3.05 Maintains hoses, tubing and fittings.

Suggested Hours:

9 Hours

Objectives and Content:

1. Identify hazards and describe safe work practices pertaining to fasteners, tubings, hoses and fittings.

2. Identify specialty tools and equipment used to remove and install fasteners, tubings, hoses and fittings and describe their applications and procedures for use.

3. Identify types of fasteners and describe their applications and procedures for use.

4. Identify types of tubings and hoses and describe their applications and procedures for use.

5. Identify types of fittings and describe their applications and procedures for use.

Practical Objectives

N/A

CHT-135 Lubrication and Fluids Servicing (18 Hrs)

Learning Outcomes:

- Demonstrate knowledge of lubricants and fluids, their characteristics and applications.
- Demonstrate knowledge of the procedures to lubricate vehicle/equipment components.
- Demonstrate knowledge of the procedures for lubrication and fluid servicing.

2021 Red Seal Occupational Standard Reference:

3.01 Maintains fluids and lubricants.
3.02 Lubricates parts and components.

Suggested Hours:

18 Hours

Objectives and Content:

1. Define terminology associated with lubrication/coolants and fluids servicing.

2. Identify hazards and describe safe work practices pertaining to lubrication and fluid servicing.
   i) personal
   ii) equipment
   iii) environmental

3. Identify specialty tools and equipment used for lubrication and fluid servicing and describe their applications and procedures for use.

4. Identify types of lubricants and fluids and describe their applications.

5. Identify the properties and characteristics of lubricants and fluids.

6. Identify types of filters and describe their characteristics and applications.

7. Describe the procedures used to check lubricant and fluid levels and condition.

8 Describe the procedures used to sample fluids.

9. Describe the procedures used to change fluids and filters.

10. Describe the procedures used to lubricate vehicle/equipment components.

11. Identify types of automatic lubrication systems and describe their purpose and operation.

12. Describe the procedures used to service and maintain automatic lubrication systems.

13. Describe the procedures used to handle, store and dispose of lubricants and fluids.

Practical Objectives:

N/A

CHT-140 Gaskets, Seals and Sealing Compounds (3 Hrs)

Learning Outcomes:

- Demonstrate knowledge of gaskets, seals and sealing compounds, their applications and procedures for use.

2021 Red Seal Occupational Standard Reference:

3.06 Uses fasteners, sealing devices, adhesives and gaskets.

Suggested Hours:

3 Hours

Objectives and Content:

1. Define terminology associated with gaskets, seals and sealing compounds.

2. Identify hazards and describe safe work practices pertaining to gaskets, seals and sealing compounds.

3. Identify specialty tools and equipment used to remove and install gaskets, seals and sealing compounds and describe their applications and procedures for use.

4. Identify types of gaskets and seals and describe their applications.

5. Identify types of sealing compounds and describe their applications.
   i) room temperature vulcanizing
   ii) anaerobic

6. Describe the procedures used to remove, fabricate and install gaskets.

7. Describe the procedures used to remove and install seals.

8. Describe the procedures used to apply sealing compounds.

Practical Objectives:

N/A

CHT-145 Bearings (3 Hrs)

Learning Outcomes:

- Demonstrate knowledge of bearings and their applications.
- Demonstrate knowledge of the procedures to remove and install bearings.

2021 Red Seal Occupational Standard Reference:

10.02 Diagnoses hubs and bearings.
11.02 Repairs fixed axles, hubs and bearings.

Suggested Hours:

3 Hours

Objectives and Content:

1. Define terminology associated with bearings.

2. Identify hazards and describe safe work practices pertaining to bearings.

3. Identify specialty tools and equipment used to remove and install bearings and describe their applications and procedures for use.

4. Identify types of bearings and describe their applications.
   i) friction
   ii) anti-friction

5. Describe bearing failure and its causes.

6. Describe the procedures used to remove and install bearings.

7. Describe the procedures used to lubricate and maintain bearings.

Practical Objectives:

N/A

CHT-150 Metallurgy (3 Hrs)

Learning Outcomes:

- Demonstrate knowledge of metals and their characteristics.
- Demonstrate knowledge of material testing procedures.

2021 Red Seal Occupational Standard Reference:

2.04 Uses welding and cutting equipment.

Suggested Hours:

3 Hours

Objectives and Content:

1. Define terminology associated with metallurgy.

2. Identify types of metals.
   - i) ferrous
   - ii) plain carbon steels
   - iii) cast irons
   - iv) low alloy steels
   - v) heat treated steels
   - vi) stainless steels
   - vii) non ferrous

3. Describe mechanical and physical properties of metals.
   - i) common mechanical properties
     - tensile strength
     - ductility
     - hardness
     - brittleness
   - ii) common physical properties
     - melting point
     - electrical and thermal conductivity
     - corrosion resistance
     -

4. Identify common metal tests and describe their associated procedures.
   - i) hardness tests (Rockwell and Brinell)

ii) spark testing
iii) file test
iv) magnetic test

Practical Objectives:

N/A

CHT-155 Cutting and Heating (9 Hrs)

Learning Outcomes:

- Demonstrate knowledge of cutting and heating equipment and accessories.
- Demonstrate knowledge of the procedures used to cut and heat using oxy-fuel equipment.

2021 Red Seal Occupational Standard Reference:

2.04 Uses welding and cutting equipment.
2.05 Uses gas, plasma and arc air cutting.

Suggested Hours:

9 Hours

Objectives and Content:

1. Define terminology associated with cutting and heating.
   i) oxy-fuel
   ii) induction

2. Identify hazards and describe safe work practices pertaining to cutting and heating.
   i) personal
   ii) shop/facility
      - awareness of surroundings
   iii) equipment/vehicle
   iv) ventilation
   v) cutting and heating equipment

3. Identify and interpret codes and regulations pertaining to oxy-fuel cutting and heating.

4. Identify cutting and heating equipment and accessories and describe their applications.
   i) oxy-fuel
   ii) plasma-arc
   iii) induction

5. Describe the procedures used to set-up, adjust and shut-down oxy-fuel equipment.

6. Describe the procedures used to inspect and maintain oxy-fuel equipment.

7. Describe the procedures used to transport and store oxy-fuel equipment.

8. Describe the procedures used to cut and heat material using oxy-fuel equipment.

9. Describe the procedures used to solder, braze and fuse using oxy-fuel equipment.

Practical Objectives:

1. Set up, operate and shut down oxy-fuel equipment.

CHT-160 Metal Inert Gas (MIG) Welding (9 Hrs)

Learning Outcomes:

- Demonstrate knowledge of MIG welding equipment and accessories.
- Demonstrate knowledge of the procedures used to weld using MIG welding equipment.

2021 Red Seal Occupational Standard Reference:

2.04 Uses welding and cutting equipment.
2.05 Uses gas, plasma and arc air cutting.

Suggested Hours:

9 Hours

Objectives and Content:

1. Define terminology associated with MIG welding.

2. Identify hazards and describe safe work practices pertaining to MIG welding.
   i) personal
   ii) shop/facility
      - awareness of surroundings
   iii) equipment/vehicle
   iv) ventilation
   v) MIG equipment

3. Describe MIG welding processes and their applications.
   i) Gas Metal Arc Welding (GMAW)
   ii) Flux-Cored Arc Welding (FCAW)

4. Identify MIG welding equipment, consumables and accessories and describe their applications.

5. Describe the procedures used to set-up, adjust and shut-down MIG welding equipment.

6. Describe the procedures used to inspect and maintain MIG welding equipment.

7. Identify the types of welds performed using MIG welding equipment.
   i) joints

ii) positions

8. Describe the procedures used to weld using MIG welding equipment.

9. Describe weld defects, their causes and prevention.

Practical Objectives:

N/A

CHT-165 Tires, Rims, Wheels and Hubs (12 Hrs)

Learning Outcomes:

- Demonstrate knowledge of tires, rims and wheels, their characteristics and applications.
- Demonstrate knowledge of the procedures used to service and repair tires, rims and wheels.

2021 Red Seal Occupational Standard Reference:

10.02 Diagnoses hubs and bearings.
10.03 Diagnoses tires and rims.
11.02 Repairs fixed axles, hubs and bearings.
11.04 Replaces tires and rims.
11.05 Repairs tires.

Suggested Hours:

12 Hours

Objectives and Content:

1. Define terminology associated with tires, rims, wheels, and hubs.

2. Identify hazards and describe safe work practices pertaining to tires, rims, wheels, and hubs.

3. Identify codes and regulations pertaining to tires, rims, wheels and hubs.
   i) jurisdictional requirements

4. Identify specialty tools and equipment used to service and repair tires, wheels, and hubs and describe their applications and procedures for use.

5. Identify types of tires and describe their characteristics and applications.
   i) on-road
      - radial
      - bias-ply
      - tube
      - tubeless
   ii) off-road
      - loaded

- non-loaded

6. Identify types of rims and wheel assemblies and describe their characteristics and applications.

7. Identify tire and wheel assembly components and accessories and describe their purpose.

8. Describe the procedures used to inspect and maintain tires, rims wheels, and hubs.

9. Describe the procedures used to remove and install tires, rims wheels, and hubs.

10. Describe the procedures used to repair tires, wheel assemblies, and hubs.

11. Describe the procedures used to balance wheels.

Practical Objectives:

N/A

CHT-170 Engine Principles (21 Hrs)

Learning Outcomes:

- Demonstrate knowledge of engine operating principles.
- Demonstrate knowledge of major engine components, their purpose and operation.

2021 Red Seal Occupational Standard Reference:

N/A

Suggested Hours:

21 Hours

Objectives and Content:

1. Define terminology associated with engine principles.

2. Explain the principles and theories of engine operation.

3. Identify types and classifications of engines and describe their applications.

4. Identify major engine components and describe their purpose and operation.

Practical Objectives:

N/A

CHT-175 Electrical and Electronic Principles (30 Hrs)

Learning Outcomes:

- Demonstrate knowledge of electrical and electronic principles.
- Demonstrate knowledge of the principles of magnetism.
- Demonstrate knowledge of electrical and electronic testing devices and their procedures for use.

2021 Red Seal Occupational Standard Reference:

2.06 Uses electronic devices and systems for diagnostics and programming. (Introduction)

Suggested Hours:

30 Hours

Objectives and Content:

1. Define terminology associated with electricity, electronics and magnetism.

2. Identify hazards and describe safe work practices pertaining to electricity, electronics and magnetism.

3. Explain the principles of electricity and electronics.

4. Explain the principles of magnetism.

5. Describe Ohm's law and its applications.

6. Describe the procedures used to perform electrical-related calculations using Ohm's law.

7. Identify types of circuits and describe their characteristics and applications.
   i) electrical
   ii) electronic

8. Identify electrical components and describe their purpose and operation.

9. Identify electronic components and describe their purpose and operation.
   i) diodes

ii) transistors
iii) capacitors
iv) resistors

10. Identify testing devices used to test circuits and describe their applications and procedures for use.

11. Identify and interpret information found on schematics.

12. Describe electrical malfunctions and their causes.

13. Describe the procedures used to test circuits.

Practical Objectives:

N/A

CHT-180 Batteries (6 Hrs)

Learning Outcomes:

- Demonstrate knowledge of batteries and their operating principles.
- Demonstrate knowledge of the procedures used to service and test batteries.

2021 Red Seal Occupational Standard Reference:

17.01 Maintains electric and electronic systems.

Suggested Hours:

6 Hours

Objectives and Content:

1. Define terminology associated with batteries.

2. Identify hazards and describe safe work practices pertaining to batteries.
   i) personal
   ii) shop/facility
   iii) vehicle

3. Identify equipment used to test and recharge batteries and describe their applications and procedures for use.

4. Identify types of batteries and describe their applications, construction and operating principles.

5. Describe the procedures used to remove and install batteries.

6. Describe the procedures used to activate, maintain and store batteries.
   i) maintenance free
   ii) dry charge
   iii) gel

7. Describe the procedures used to boost start engines
   i) battery booster
   ii) cables

8. Identify battery problems and describe the procedures used to diagnose and correct them.

Practical Objectives:

N/A

CHT-185 Lighting Circuits (6 Hrs)

Learning Outcomes:

- Demonstrate knowledge of conventional lighting circuits, their components and operation.
- Demonstrate knowledge of the procedures used to service and repair conventional lighting circuits.

2021 Red Seal Occupational Standard Reference:

16.01 Diagnoses lighting systems.
17.02 Repairs lighting and wiring systems.

Suggested Hours:

6 Hours

Objectives and Content:

1. Define terminology associated with lighting circuits.

2. Identify hazards and describe safe work practices pertaining to lighting circuits.

3. Identify specialty tools and equipment used to service and repair lighting circuits and describe their applications and procedures for use.

4. Identify types of lighting circuits and describe their components, purpose and operation.
   i) high voltage
   ii) low voltage

5. Interpret electrical symbols and wiring diagrams relating to lighting circuits.

6. Describe the procedures used to inspect and maintain lighting circuits and their components.

7. Identify lighting circuit problems and their causes.

8. Describe the procedures used to diagnose lighting circuits.

9. Describe the procedures used to remove and install cl lighting circuit-components.

10. Describe the procedures to repair lighting circuits and components.

Practical Objectives:

N/A

CHT-190 Wiring Harnesses and Accessories (18 Hrs)

Learning Outcomes:

- Demonstrate knowledge of wiring harnesses and accessories, their purpose and operation.
- Demonstrate knowledge of the procedures used to service and repair wiring harnesses and accessories.

2021 Red Seal Occupational Standard Reference:

16.02 Diagnoses wiring systems.
17.02 Repairs lighting and wiring systems.

Suggested Hours:

18 Hours

Objectives and Content:

1. Define terminology associated with wiring harnesses and accessories.

2. Identify hazards and describe safe work practices pertaining to wiring harnesses and accessories.

3. Identify specialty tools and equipment used to service and repair wiring harnesses and accessories and describe their applications and procedures for use.

4. Identify types of wiring harnesses and their components and describe their purpose and operation.

5. Identify types of wiring accessories and their components and describe their purpose and operation.
   i) switches
   ii) relays
   iii) plugs
   iv) sealed connectors
   v) resistors
   vi) solenoids

6. Interpret electrical symbols and wiring diagrams relating to wiring harnesses and accessories.

7. Describe the procedures used to inspect and maintain wiring harnesses and accessories and their components.

8. Identify wiring harness and accessory component problems and their causes.

9. Describe the procedures used to diagnose wiring harnesses and accessories.

10. Describe the procedures used to remove and install wiring harnesses and accessories and their components.

11. Describe the procedures used to repair wiring harnesses, plugs, connectors and their components.

Practical Objectives:

1. Repair an electrical connection.

CHT-195 Introduction to Hydraulics (18 Hrs)

Learning Outcomes:

- Demonstrate knowledge of the principles of hydraulics.
- Demonstrate knowledge of hydraulic components, their purpose and operation.
- Demonstrate knowledge of the procedures used to remove, install, service and maintain hydraulic components.

2021 Red Seal Occupational Standard Reference:

18.01 Diagnoses self-contained hydraulic systems. (Introduction)
19.01 Maintains hydraulic systems. (Introduction)
19.02 Repairs hydraulic systems. (Introduction)

Suggested Hours:

18 Hours

Objectives and Content:

1. Define terminology associated with hydraulics.

2. Identify hazards and describe safe work practices pertaining to hydraulics.

3. Explain the principles and theories of hydraulics.
   i) Pascal's law
   ii) Bernoulli's principle

4. Describe units of measure as they relate to hydraulics.

5. Identify hydraulic-related formulae and describe their applications.

6. Identify and interpret hydraulic-related symbols and abbreviations found on schematics.

7. Describe the properties of hydraulic fluids.

8. Identify tools and equipment used to remove, install, service and maintain hydraulic components and describe their applications and procedures for use.

9. Identify hydraulic components and describe their purpose, applications and operation.
   i) pumps
      - positive displacement
      - non-positive displacement
      - fixed displacement
      - variable displacement
   ii) actuators
      - linear
      - rotary
   iii) pressure control valves
   iv) directional control valves
   v) flow control valves
   vi) accumulators

10. Describe the procedures used to remove and install hydraulic components.

11. Describe the procedures used to service and maintain hydraulic components.

Practical Objectives:

N/A

CHT-600 Hydraulic Fittings, Piping, Tubing and Hoses (6 Hrs)

Learning Outcomes:

- Demonstrate knowledge of hydraulic fittings, piping, tubing and hoses, their characteristics and applications.
- Demonstrate knowledge of the procedures used to maintain hydraulic fittings, piping, tubing and hoses.
- Demonstrate knowledge of the procedures used to remove and install hydraulic fittings, piping, tubing and hoses.

2021 Red Seal Occupational Standard Reference:

18.01 Diagnoses self-contained hydraulic systems.
19.01 Maintains hydraulic systems.
19.02 Repairs hydraulic systems.

Suggested Hours:

6 Hours

Objectives and Content:

1. Define terminology associated with hydraulic fittings, piping, tubing and hoses.

2. Identify hazards and describe safe work practices pertaining to hydraulic fittings, piping, tubing and hoses.

3. Identify specialty tools and equipment used to remove and install hydraulic fittings, piping, tubing and hoses and describe their applications and procedures for use.

4. Identify types of hydraulic fittings and describe their characteristics and applications.

5. Identify types of hydraulic piping and tubing and describe their characteristics and applications.

6. Identify types of hydraulic hoses and describe their characteristics and applications.

7. Describe the procedures used to inspect and maintain hydraulic fittings, piping, tubing and hoses.

8. Describe the procedures used to remove and install hydraulic fittings, piping, tubing and hoses.

Practical Objectives:

N/A

CHT-605 Hydraulic Reservoirs, Coolers and Filters (6 Hrs)

Learning Outcomes:

- Demonstrate knowledge of hydraulic reservoirs, coolers and filters, their applications and operation.
- Demonstrate knowledge of the procedures used to service and repair hydraulic reservoirs, coolers and filters.

2021 Red Seal Occupational Standard Reference:

18.01 Diagnoses self-contained hydraulic systems.
19.01 Maintains hydraulic systems.
19.02 Repairs hydraulic systems.

Suggested Hours:

6 Hours

Objectives and Content:

1. Define terminology associated with hydraulic reservoirs, coolers and filters.

2. Identify hazards and describe safe work practices pertaining to hydraulic reservoirs, coolers and filters.

3. Identify specialty tools and equipment used to service and repair hydraulic reservoirs, coolers and filters and describe their applications and procedures for use.

4. Identify types of hydraulic reservoirs and describe their characteristics and applications.
   i) vented
   ii) pressurized

5. Identify hydraulic reservoir components and describe their purpose and operation.

6. Identify types of coolers and filters and describe their characteristics and applications.

7. Identify cooler and filter components and describe their purpose and operation.

8. Describe the procedures used to inspect and maintain hydraulic reservoirs, coolers and filters and their components.

9. Identify hydraulic reservoir, cooler and filter problems and describe their causes.

10. Describe the procedures used to diagnose hydraulic reservoirs, coolers and filters and their components.

11. Describe the procedures used to remove and install hydraulic reservoirs, coolers and filters and their components.

12. Describe the procedures used to repair hydraulic reservoirs and coolers and their components.

Practical Objectives:

N/A

CHT-610 Hydraulic Brake Systems I (15 Hrs)

Learning Outcomes:

- Demonstrate knowledge of hydraulic brake systems, their components and operation.
- Demonstrate knowledge of the procedures used to service and repair hydraulic brake systems.

2021 Red Seal Occupational Standard Reference:

8.01 Diagnoses disc brake systems.
8.02 Diagnoses drum brake systems.
8.04 Diagnoses hydraulic brake systems.
9.01 Maintains brake systems.
9.02 Repairs disc brake systems.
9.03 Repairs drum brake systems.
9.05 Repairs hydraulic brake systems.

Suggested Hours:

15 Hours

Objectives and Content:

1. Define terminology associated with hydraulic brake systems.
   i) drum
   ii) single disc

2. Identify hazards and describe safe work practices pertaining to hydraulic brake systems.

3. Identify specialty tools and equipment used to service and repair hydraulic brake systems and describe their applications and procedures for use.

4. Identify types of hydraulic brake systems and describe their applications and operation.
   i) drum
   ii) single disc

5. Identify hydraulic brake system components and describe their purpose and operation.

6. Describe the procedures used to inspect and maintain hydraulic brake systems and their components.

7. Identify hydraulic brake system problems and their causes.

8. Describe the procedures used to diagnose hydraulic brake systems.

9. Describe the procedures used to remove and install hydraulic brake system components.

10. Describe the procedures used to repair and adjust hydraulic brake systems and their components.

Practical Objectives:

N/A

CHT-615 Introduction to Air Brake Systems (15 Hrs)

Learning Outcomes:

- Demonstrate knowledge of air brake systems, their components and operation.
- Demonstrate knowledge of the procedures used to service and replace air brake systems components.

2021 Red Seal Occupational Standard Reference:

8.03 Diagnoses air brake systems.
9.01 Maintains brake systems.
9.04 Repairs air brake systems.

Suggested Hours:

15 Hours

Objectives and Content:

1. Define terminology associated with air brake systems.

2. Identify hazards and describe safe work practices pertaining to air brake systems.

3. Identify specialty tools and equipment used to service and repair air brake systems and describe their applications and procedures for use.

4. Identify types of air brake systems and describe their applications and operation.
   i) air
   ii) air over hydraulic

5. Identify air brake system components and describe their purpose and operation.
   i) compressors
   ii) reservoirs
   iii) governors
   iv) hoses, lines and fittings
   v) air dryers
   vi) foundation brakes
      - drum
      - disc brakes
   vii) brake chambers

viii) valves
ix) indicators and warning devices

6. Describe the procedures used to inspect and maintain air brake systems and components.

7. Identify air brake system problems and their causes.

8. Describe the procedures used to remove and install basic air brake system components.

9. Describe the procedures used to adjust air brake system components.

Practical Objectives:

N/A

CHT-620 Ozone Depleting Substances (6 Hrs)

Learning Outcomes:

- Demonstrate knowledge of handling ozone-depleting substances (refrigerants) used in motor vehicles.

2015 National Occupational Analysis Reference:

1.01 Maintains safe work environment. (Awareness of refrigerants)

Suggested Hours:

6 Hours

Objectives and Content:

1. Define terminology associated with ozone depleting substances.

2. Identify hazards and describe safe work practices pertaining to ozone depleting substances.

3. Identify and interpret codes, federal/provincial regulations and certifications pertaining to ozone depleting substances.

Practical Objectives:

N/A

CHT-625 Shielded Metal Arc Welding (SMAW) (9 Hrs)

Learning Outcomes:

- Demonstrate knowledge of SMAW equipment and accessories.
- Demonstrate knowledge of the procedures used to weld using SMAW equipment.

2021 Red Seal Occupational Standard Reference:

2.04 Uses welding equipment.
2.05 Uses gas, plasma and arc cutting equipment.

Suggested Hours:

9 Hours

Objectives and Content:

1. Define terminology associated with SMAW.

2. Identify hazards and describe safe work practices pertaining to SMAW.
   i) personal
   ii) shop/facility
      - awareness of surroundings
   iii) equipment/vehicle
   iv) ventilation
   v) SMAW equipment

3. Identify and interpret codes and regulations pertaining to SMAW.

4. Describe the SMAW process and its application.

5. Identify SMAW equipment, consumables and accessories and describe their applications and storage requirements.

6. Describe the procedures used to set-up, adjust and shut-down SMAW equipment.

7. Describe the procedures used to inspect and maintain SMAW equipment.

8. Identify the types of welds performed using SMAW equipment.
   i) joints

ii) positions

9. Describe the procedures used to weld using SMAW equipment.

10. Describe weld defects, their causes and prevention.

Practical Objectives:

N/A

CHT-630 Introduction to Steering Systems Components (12 Hrs)

Learning Outcomes:

- Demonstrate basic knowledge of steering systems, their components and operation.
- Demonstrate basic knowledge of the procedures used to service and replace steering systems components.

2021 Red Seal Occupational Standard Reference:

N/A

Suggested Hours:

12 Hours

Objectives and Content:

1. Define terminology associated with steering systems.

2. Identify hazards and describe safe work practices pertaining to steering systems.

3. Identify specialty tools and equipment used to service and replace steering system components and describe their applications and procedures for use.

4. Identify types of steering systems and describe their applications and operation.

5. Identify steering components and describe their purpose and operation.
   - i) steering columns
   - ii) steering linkage
   - iii) gear boxes
   - iv) hydraulic components
     - orbital motor
     - steering cylinders
     - power assist
     - priority valve
     -

6. Describe the procedures used to inspect and maintain steering systems and their components.

7. Describe the procedures used to remove and install steering system components.

8. Describe the procedures used to replace steering system components.

Practical Objectives:

N/A

Level 2
5 Weeks (150 hours)

TTT-200 Frames and Chassis (6 hrs)

Learning Outcomes:

- Demonstrate knowledge of frames and chassis, their components and operation.
- Demonstrate knowledge of the procedures to diagnose frames and chassis and their components.
- Demonstrate knowledge of the procedures to maintain and repair frames and chassis and their components.

2021 Red Seal Occupational Standard Reference:

12.01 Diagnose trailer chassis.
13.01 Maintains trailer chassis.
13.02 Repairs trailer chassis.

Suggested Hours:

6 Hours

Objectives and Content:

1. Define terminology associated with frames and chassis.

2. Identify hazards and safe work practices pertaining to frames and chassis.

3. Interpret standards and regulations pertaining to frames and chassis.
   i) Department of Transportation (wheelbase)

4. Identify tools and equipment used to diagnose and repair frames and chassis, and describe their applications and procedures for use.

5. Identify types of frames and describe their characteristics, applications and operation.
   i) frames
      - I-beam
      - ladder
      - unibody
      - channel

6. Identify types of trailer chassis and describe their characteristics, applications and operation.
    i) boosters
    ii) jeeps
    iii) converter dollies
    iv) high-boy
    v) low-boy
    vi) platform heavy-haul
    vii) tankers
    viii) bulk
    ix) vans

7. Identify trailer chassis components and describe their characteristics, applications and operation.
    i) sub-frames
    ii) slider rails
    iii) frame rails
    iv) cross members
    v) gussets
    vi) mounts
    vii) king pins
    viii) pintle hitch
    ix) bumper
    x) bolster plate
    xi) fifth wheel

8. Identify types of slider locking mechanisms and describe their characteristics, applications and operation.
    i) air-release
    ii) manual-release

10. Describe the procedures used to maintain frames and chassis and their components.

12. Describe the procedures used to diagnose frames and chassis and their components.

13. Identify inspections to diagnose frames and chassis and their components.

13. Identify possible defects found while performing inspections.
    i) cracks
    ii) corrosion
    iii) damaged
    iv) worn or missing components

14. Describe the procedures used to replace, modify and repair frames and chassis and their components.

15. Describe the procedures used to verify the repair of trailer chassis and their components.

16. Describe the procedures used to reinforce frames.

17. Describe the procedures used to modify a wheelbase.

Practical Objectives:

N/A

TTT-205 Fixed, Self-Steering and Lift Axles (9 Hrs)

Learning Outcomes:

- Demonstrate knowledge of fixed, self-steering and lift axles, their components and operation.
- Demonstrate knowledge of the procedures to diagnose fixed, self-steering and lift axles and their components.
- Demonstrate knowledge of the procedures to maintain and repair fixed, self-steering and lift axles, and their components

2021 Red Seal Occupational Standard Reference:

10.01 Diagnoses fixed, self-steering and lift axles.
11.01 Maintains axles and wheel end assemblies.
11.02 Repairs fixed axles, hubs and bearings.
11.03 Repairs self-steering and lift axles.

Suggested Hours:

9 Hours

Objectives and Content:

1. Define terminology associated with fixed, self-steering and lift axles.

2. Identify hazards and describe safe work practices pertaining to fixed, self-steering and lift axles.

3. Identify and interpret standards and regulations pertaining to fixed, self-steering and lift axles.

4. Identify tools and equipment used to diagnose and repair fixed, self-steering and lift axles, and describe their applications and procedures for use.

5. Identify fixed, self-steering and lift axles components, and describe their characteristics, applications and operation.
   i) fixed axles
      - studs
      - nuts

- seals
- races
- rollers
- cages
- wedges
- hub oil
- grease
- hub fasteners
- wheel bearings

ii) self-steering and lift axles

- kingpins
- tie-rod ends
- shock absorbers
- slack adjusters
- cams
- cam tubes
- bushings
- brake chambers
- steering bags
- stabilizer shocks

6. Explain bearing and spindle wear tolerances.

7. Describe cup and cone bearings, and seals.

8. Explain bearing preload and end play.

9. Describe the procedures used to maintain fixed, self-steering and lift axles and their components.

10. Describe the procedures used to diagnose fixed, self-steering and lift axles and their components.

11. Identify inspections performed to diagnose fixed, self-steering and lift axles and their components.

12. Identify possible faults found while performing inspections on components.

13. Describe the procedures used to remove, replace, adjust and repair fixed, self-steering and lift axles and their components.

14. Describe the procedures used to verify the repair of fixed, self-steering and lift axles, and their components.

Practical Objectives:

N/A

TTT-210 Wheel and Axle Alignment (6 Hrs)

Learning Outcomes:

- Demonstrate knowledge of the procedures to diagnose tires and rims.
- Demonstrate knowledge of the procedures to perform wheel and axle alignment.

2021 Red Seal Occupational Standard Reference:

10.03 Diagnose tires and rims

Suggested Hours:

6 Hours

Objectives and Content:

1. Define terminology associated with wheel and axle alignment.

2. Identify hazards and describe safe work practices pertaining to wheel and axle alignment.

3. Identify and interpret codes and regulations pertaining to wheel and axle alignment.

4. Identify tools and equipment used to perform wheel and axle alignment and describe their applications and procedures for use.

5. Identify types and sizes of tires and rims, and their components, and describe their characteristics, applications and operation.

6. Describe the procedures used to diagnose wheel and axle alignment issues.

7. Identify possible faults and irregularities found while performing inspections.

8. Describe the procedures used to adjust misalignment.

9. Describe tire wear limits and inflation pressures.

10. Describe normal and irregular tire wear.

11. Describe automatic inflation systems.

12. Describe tire pressure monitoring systems.

Practical Objectives:

N/A

TTT-215 Trailer Bodies (12 Hrs)

Learning Outcomes:

- Demonstrate knowledge of trailer bodies, their components and operation.
- Demonstrate knowledge of the procedures to diagnose trailer bodies and their components.
- Demonstrate knowledge of the procedures to maintain and repair trailer bodies and their components.

2021 Red Seal Occupational Standard Reference:

12.02 Diagnoses trailer bodies.
13.03 Maintains trailer bodies.
13.04 Repairs trailer bodies.

Suggested Hours:

12 Hours

Objectives and Content:

1. Define terminology associated with trailer bodies.

2. Identify hazards and safe work practices pertaining to trailer bodies.

3. Identify and interpret standards and regulations pertaining to trailer bodies.

4. Identify tools and equipment used to diagnose and repair trailer bodies and describe their applications and procedures for use.

5. Identify types of trailer bodies and their components and describe their characteristics, applications and operation.
   i) types
      - tankers
      - unibody
      - containers
      - vans
      - dump-style
      - float

- flat
- drop deck

ii) components
- posts and panels
- fiberglass reinforced panels (FRPs)
- aluminum and structural side panels
- bulk heads
- roof skin
- flooring
- door components
- rollers

6. Identify types of fasteners and rivets and describe their applications and procedures for use.
   i) huck bolt
   ii) sealing rivet
   iii) pop rivet
   iv) buck rivet

7. Identify types of doors and describe their characteristics, applications and operation.
   i) hinged
   ii) roll-up
   iii) curtain side

8. Describe the procedures used to insulate trailer bodies.
   i) rigid
   ii) spray
   iii) fiberglass

9. Describe the procedures used to maintain trailer bodies and their components.

10. Describe the procedures used to diagnose trailer bodies and their components.

11. Identify inspections performed to diagnose trailer bodies and their components.

12. Identify possible damage or defects found while performing inspections.
   i) bent or broken side rails
   ii) bent roof bows
   iii) corroded cross members
   iv) cracked or bent wall posts
   v) corroded or punctured side panels
   vi) cracked mounting points

vii) cracked or bent headers
viii) cracked or bent bulkheads
ix) corroded or punctured roof panel
x) cracked, bent or broken lift gates
xi) worn out pins and bushings

13. Describe the procedures used to remove, replace, adjust and repair trailer bodies and their components.

14. Describe the procedures used to verify the repair of trailer bodies and their components.

Practical Objectives:

N/A

TTT-220 Suspension Systems (12 Hrs)

Learning Outcomes:

- Demonstrate knowledge of suspension systems, their components and operation.
- Demonstrate knowledge of the procedures to diagnose suspension systems and their components.
- Demonstrate knowledge of the procedures to maintain and repair suspension systems and their components.

2021 Red Seal Occupational Standard Reference:

6.01 Diagnoses air suspension systems.
6.02 Diagnoses spring suspension systems.
6.03 Diagnoses rubber suspension systems.
7.01 Maintains suspension systems.
7.02 Repairs air suspension systems.
7.03 Repairs spring suspension systems.
7.04 Repairs rubber suspension systems.

Suggested Hours:

12 Hours

Objectives and Content:

1. Define terminology associated with trailer suspension systems.

2. Identify hazards and safe work practices pertaining to trailer suspension systems.

3. Identify tools and equipment used to diagnose and repair suspension systems, and describe their applications and procedures for use.

4. Identify suspension systems and describe their characteristics, applications and operation.
   i) air
   ii) spring
   iii) rubber

5. Identify suspension systems components and describe their characteristics, applications and operation.

i) air suspension systems
   - air valves
   - air springs
   - height control valves
   - fittings
   - air lines
   - shock absorbers (air bag)
   - air tanks

ii) spring suspension systems
   - leaves
   - spring saddles
   - bushings
   - u-bolts,
   - shock absorbers
   - equalizers
   - hangers
   - radius rods (torque rods)
   - center bolts
   - spring pins
   - walking beams

iii) rubber suspension systems
   - radius rods (torque rods)
   - wishbones
   - trunnion bushings
   - load cushion
   - shock absorbers

6. Explain air supply and operating pressures.

7. Describe the procedures used to maintain suspension systems and their components.
   i) air
   ii) spring
   iii) rubber

8. Describe the procedures used to diagnose suspension systems and their components.
   i) air
   ii) spring
   iii) rubber

9. Identify inspections performed to diagnose suspension systems components.

10. Identify possible faults and problems found while performing inspections.
   i) faults
      - leaks

- cracks
- tears
- wear
- kinks

ii) problems
- faulty pressure protection valves
- faulty emergency valves
- cut, kinked or leaking supply lines

11. Describe the procedures used to remove, replace, adjust and repair suspension system components.
    i) air
    ii) spring
    iii) rubber

12. Describe the procedures used to verify the repair of suspension systems and their components.

Practical Objectives:

1. Perform a basic alignment check.

TTT-225 Coupling Devices (6 Hrs)

Learning Outcomes:

- Demonstrate knowledge of coupling devices, their components, characteristics, applications and operation.
- Demonstrate knowledge of the procedures to diagnose coupling devices and their components.
- Demonstrate knowledge of the procedures to maintain and repair coupling devices and their components

2021 Red Seal Occupational Standard Reference:

14.01 Diagnoses coupling devices.
15.01 Maintains coupling devices.
15.02 Repairs coupling devices.

Suggested Hours:

6 Hours

Objectives and Content:

1. Define terminology associated with coupling devices.

2. Identify hazards and describe safe work practices pertaining to coupling devices.

3. Identify and interpret standards and regulations pertaining to coupling devices.
   i) training and certification requirements to repair coupling devices

4. Identify tools and equipment used to diagnose and repair coupling devices, and describe their applications and procedures for use.

5. Identify types of coupling devices and their components and describe their characteristics, applications and operation.
   i) fifth wheels
   ii) slide tracks
   iii) safety chains
   iv) pintle hooks
   v) couplers

vi) goose neck
vii) ball hitch
viii) wolf hitch

6. Identify types of locking mechanisms and describe their characteristics, applications and operation
   i) safety catches
   ii) safety chains
   iii) air actuators

7. Describe the procedures used to maintain coupling devices and their components.

8. Describe the procedures used to diagnose coupling devices and their components.

9. Identify inspections performed to diagnose coupling devices and their components.

10. Identify possible defects found while performing inspections.
    i) cracks on coupler or pick-up plate
    ii) worn coupling devices
    iii) seized components

11. Describe the procedures used to remove, replace, adjust, repair and rebuild coupling devices and their components.

12. Describe the procedures used to verify the repair of coupling devices and their components.

Practical Objectives:

N/A

TTT-230 Landing Gear (6 Hrs)

Learning Outcomes:

- Demonstrate knowledge of landing gear, their components and operation.
- Demonstrate knowledge of procedures to diagnose landing gear and their components.
- Demonstrate knowledge of procedures to maintain and repair landing gear and their components.

2021 Red Seal Occupational Standard Reference:

14.02 Diagnoses landing gear.
15.03 Maintains landing gear.
15.04 Repairs landing gear.

Suggested Hours:

6 Hours

Objectives and Content:

1. Define terminology associated with landing gear.

2. Identify hazards and describe safe work practices pertaining to landing gear.

3. Identify and interpret standards and regulations pertaining to land gear.

4. Identify tools and equipment used to diagnose and repair landing gear, and describe their applications and procedures for use.

5. Identify types of landing gear and their components, and describe their characteristics, applications and operation.
   i) landing gear
      - dolly leg
      - Air bag
   ii) components
      - cross shafts
      - pads

- braces
- crank handles
- gear box
- return spring
- air bag
- valves

6. Identify structures associated with landing gear.
   i) wing plates
   ii) supporting structures
   iii) braces
   iv) cross members

7. Describe the procedures used to maintain landing gear and their components.

8. Describe the procedures used to diagnose landing gear and their components.

9. Identify inspections performed to diagnose landing gear and their components.

10. Identify possible damage or defects found while performing inspections.
    i) cracked mounting brackets
    ii) worn cross shaft
    iii) defective crank handle
    iv) defective gear box
    v) crushed or cracked cross members
    vi) cracked, bent or missing pads
    vii) worn bearings
    viii) worn gears
    ix) uneven leg length

11. Describe the procedures used to remove, replace, adjust and repair landing gear and their components.

12. Describe the procedures used to verify the repair of landing gear and their components.

Practical Objectives:

N/A

TTT-235 Advanced Braking and Control Systems (12 Hrs)

Learning Outcomes:

- Demonstrate knowledge of trailer brakes, their components and operation.
- Demonstrate knowledge of anti-lock braking systems (ABS), their components and operation.
- Demonstrate knowledge of braking control systems, their components and operation.
- Demonstrate knowledge of the procedures to diagnose advanced braking and control systems and their components.
- Demonstrate knowledge of the procedures to maintain and repair advanced braking and control systems and their components.
-

2021 Red Seal Occupational Standard Reference:

8.01 Diagnoses disc brake systems.
8.02 Diagnoses drum brake systems.
8.03 Diagnoses air brake systems.
8.04 Diagnoses hydraulic brake systems.
8.05 Diagnoses electric brake systems.
8.06 Diagnoses electronic braking control systems.
9.01 Maintains brake systems.
9.02 Repairs disc brake systems.
9.03 Repairs drum brake systems.
9.04 Repairs air brake systems.
9.05 Repairs hydraulic brake systems.
9.06 Repairs electric brake systems.
9.07 Repairs electronic braking control systems

Suggested Hours:

12 Hours

Objectives and Content:

1. Define terminology associated advanced braking and control systems.

2. Identify hazards and describe safe work practices pertaining to advanced braking and control systems.

3. Identify and interpret standards and regulations pertaining to advanced braking and control systems.

4. Interpret information pertaining to braking and control systems found on schematics.

5. Identify tools and equipment used to diagnose and repair advanced braking and control systems, and describe their applications and procedures for use.

6. Identify types of trailer brakes and describe their components and operation.
   i) air
   ii) air over hydraulic
   iii) surge
   iv) electric
   v) electric-hydraulic

7. Explain the operating principles of advanced braking systems.

8. Identify advanced braking system components and describe their purpose and operation.
   i) tooth wheel (reluctor)
   ii) wheel speed sensor
   iii) sensor holder and spring clip
   iv) electronic control unit
   v) ABS warning lamp
   vi) blink code switch
   vii) valves and modulators

9. Explain the operating principles of control systems.
   i) anti-lock
   ii) roll stability

10. Identify roll stability control system components and describe their purpose and operation.
   i) control module
   ii) valves and modulators
   iii) related ABS components

11. Describe the procedures used to maintain advanced braking and control systems and their components.

12. Identify inspections performed to diagnose advanced braking and control systems and their components.

13. Identify possible faults found while performing inspections.

14. Describe the procedures used to diagnose advanced braking and control systems and their components.

15. Describe the procedures used to remove, replace, adjust and repair advanced braking and control systems and their components.

16. Describe the procedures used to verify the repair of advanced braking and control systems and their components.

Practical Objectives:

N/A

TTT-240 Trailer Monitoring and Control Systems (6 Hrs)

Learning Outcomes:

- Demonstrate knowledge of trailer monitoring and control systems, their components and operation
- Demonstrate knowledge of the procedures to diagnose and repair trailer monitoring and control systems and their components

2021 Red Seal Occupational Standard Reference:

2.06 Uses electronic devices and systems for diagnostics and programming.
16.03 Diagnoses trailer monitoring and control systems.
17.03 Repairs trailer monitoring and control systems.

Suggested Hours:

6 Hours

Objectives and Content:

1. Define terminology associated with trailer monitoring and control systems.

2. Identify hazards and describe safe work practices pertaining to trailer monitoring and control systems.

3. Identify and interpret standards and regulations pertaining to trailer monitoring and control systems.

4. Interpret information pertaining to trailer monitoring and control systems found on schematics and flow charts.

5. Identify tools and equipment used to diagnose and repair trailer monitoring and control systems, and describe their applications and procedures for use.

6. Identify types of trailer monitoring and control systems, and their components, and describe their characteristics, applications and operation
   i) temperatures
   ii) doors
   iii) GPS tracking systems

7. Describe electronic subsystems and describe their characteristics, applications and operation.
   i) input (sensors)
   ii) control
   iii) output (actuators)

8. Describe principles of electrical and electronic theory.
   i) Ohm's Law (current draw, resistance, voltage)
   ii) series circuits
   iii) parallel circuits
   iv) series/parallel circuits
   v) diodes
   vi) transistors

9. Identify gauges of electrical wiring and types of connectors.

10. Identify types of equipment accessories and options.
   i) data collection
   ii) GPS

11. Identify diagnostic resources.
   i) technical manual
   ii) manufacturer technical assistance
   iii) qualified trade experts

12. Describe the procedures used to diagnose trailer monitoring and control systems and their components.

13. Identify inspections, tests and diagnostics performed to diagnose trailer monitoring and control systems and their components.

14. Interpret results of tests and diagnostics.

15. Identify possible problems found while performing tests and diagnostics.
   i) corrosion
   ii) burnt components
   iii) broken wire connections
   iv) damaged harnesses
   v) faulty sensors

16. Describe the procedures used to remove, replace, adjust and repair trailer monitoring and control system components.

17. Describe the procedures used to verify the repair of trailer monitoring and control system components.

Practical Objectives:

N/A

TTT-245 Fuel Systems (9 Hrs)

Learning Outcomes:

Demonstrate knowledge of fuel systems, their components and operation.

- Demonstrate knowledge of procedures to diagnose fuel systems and their components.
- Demonstrate knowledge of procedures to maintain and repair fuel systems and their components.

2021 Red Seal Occupational Standard Reference:

20.01 Diagnoses fuel systems.
21.01 Maintains fuel systems.
21.02 Repairs fuel systems.

Suggested Hours:

9 Hours

Objectives and Content:

1. Define terminology associated with fuel systems.

2. Identify hazards and describe safe work practices pertaining fuel systems.

3. Identify and interpret standards and regulations pertaining to fuel systems.

4. Identify tools and equipment used to diagnose and repair fuel systems, and describe their applications and procedures for use.

5. Identify types of fuel systems and their components, and describe their characteristics, applications and operation
   i) fuel systems
      - diesel
      - propane
      - natural gas
   ii) components
      - fuel pumps
      - gas regulators
      - fuel tanks

- solenoids
- pressure regulators

6. Identify fuel system fluid levels.
   i) antifreeze
   ii) motor oil
   iii) fuel

7. Describe the procedures used to maintain fuel systems and their components.

8. Describe the procedures used to diagnose fuel systems and their components.

9. Identify possible problems, wear and damage, and conditions found while performing inspections.

10. Describe the procedures to remove, replace, adjust and repair fuel systems and their components.

11. Describe the procedures used to verify the repair of fuel systems and their components.

Practical Objectives:

N/A

TTT-250 Charging & Starting Systems (9 Hrs)

Learning Outcomes:

- Demonstrate knowledge of charging and starting systems, their components and operation.
- Demonstrate knowledge of procedures to diagnose charging and starting systems and their components.
- Demonstrate knowledge of procedures to maintain and repair charging and starting systems and their components.

2021 Red Seal Occupational Standard Reference:

20.02 Diagnoses charging and starting systems.
21.03 Maintains charging and starting systems.
21.04 Repairs charging and starting systems.

Suggested Hours:

9 Hours

Objectives and Content:

1. Define terminology associated with charging and starting systems.

2. Identify hazards and describe safe work practices pertaining to charging and starting systems.

3. Identify and interpret standards and regulations pertaining to charging and starting systems.

4. Identify tools and equipment used to diagnose and repair charging and starting systems, and describe their applications and procedures for use.

5. Identify types of charging and starting systems and their components, and describe their characteristics, applications and operation
   i) starters
   ii) alternators
   iii) pulleys

iv) idler pulleys
v) belts
vi) batteries
vii) wiring harnesses

6. Describe the procedures used to maintain charging and starting systems, and their components

7. Describe the procedures used to diagnose charging and starting systems, and their components

8. Identify possible worn, damaged or defective components found while performing inspections.
   i) corroded electric connectors
   ii) broken or loose belts
   iii) leaking batteries

9. Describe the procedures used to remove, replace, adjust and repair charging and starting systems, and their components.

10. Describe the procedures used to verify the repair of charging and starting systems, and their components.

Practical Objectives:

N/A

TTT-255 High Voltage, Hybrid and Alternative Drive Systems (6 Hrs)

Learning Outcomes:

- Demonstrate knowledge of high-voltage electric, hybrid and alternative drive systems, their components and operation.
- Demonstrate knowledge of procedures to diagnose high-voltage electric, hybrid and alternative drive systems, and their components
- Demonstrate knowledge of procedures to maintain and repair high-voltage electric, hybrid and alternative drive systems, and their components

2021 Red Seal Occupational Standard Reference:

20.03 Diagnoses high-voltage electric, hybrid and alternative drive systems.
21.05 Maintains high-voltage electric, hybrid and alternative drive systems.
21.06 Repairs high-voltage electric, hybrid and alternative drive systems.

Suggested Hours:

6 Hours

Objectives and Content:

1. Define terminology associated with high-voltage electric, hybrid and alternative drive systems.

2. Identify hazards and describe safe work practices pertaining to high voltage electric, hybrid and alternative drive systems.
   i) high voltage electricity

3. Identify and interpret standards and regulations pertaining to high voltage electric, hybrid and alternative drive systems.

4. Identify tools and equipment used to diagnose and repair high-voltage electric, hybrid and alternative drive systems, and describe their applications and procedures for use.

5. Identify high-voltage electric, hybrid and alternative drive systems and their components, and describe their characteristics, applications and operation

6. Describe the procedures used to maintain high-voltage electric, hybrid and alternative drive systems, and their components

7. Describe the procedures used to diagnose high-voltage electric, hybrid and alternative drive systems, and their components

8. Identify possible problems found while performing inspections

9. Describe the procedures used to repair high-voltage electric, hybrid and alternative drive systems, and their components

10. Describe the procedures used to verify the repair of high-voltage electric, hybrid and alternative drive systems, and their components

Practical Objectives:

N/A

TTT-260 Introduction to Refrigeration and Heating Systems (9 Hrs)

Learning Outcomes:

- Demonstrate knowledge of refrigeration systems, their components and operation.
- Demonstrate knowledge of heating systems, their components, characteristics, applications and operation.
- Demonstrate knowledge of procedures to diagnose refrigeration and heating systems, and their components.
- Demonstrate knowledge of procedures to maintain and repair refrigeration and heating systems, and their components.

2021 Red Seal Occupational Standard Reference:

20.04 Diagnoses refrigeration and heating systems
21.07 Maintains refrigeration and heating systems
21.08 Repairs refrigeration and heating systems

Suggested Hours:

9 Hours

Objectives and Content:

1. Define terminology associated with refrigeration and heating systems.

2. Identify hazards and describe safe work practices pertaining to refrigeration and heating systems.

3. Identify and interpret standards and regulations pertaining refrigeration and heating systems.
   i) Heating, Refrigeration and Air Conditioning Institute of Canada (HRAI) training and certification
   ii) manufacturer-specific training

4. Identify tools and equipment used to diagnose and repair refrigeration and heating systems, and describe their applications and procedures for use.

5. Identify types of heating systems and their components, and describe their characteristics, applications and operation.

6. Identify heating unit mounting structures, fasteners and reinforcements.

7. Identify types of refrigeration systems and their components, and describe their characteristics, applications and operation.

8. Identify refrigeration unit mounting structures, fasteners and reinforcements.

9. Describe the procedures used to maintain refrigeration and heating systems and their components.

10. Describe the procedures used to diagnose refrigeration and heating systems, and their components.

11. Identify possible problems found while performing inspections.

12. Describe the procedures used to repair refrigeration and heating systems and their components.

13. Describe the procedures used to verify the repair of refrigeration and heating systems and their components.

Practical Objectives:

N/A

TTT-265 Trailer Motor Vehicle Inspection (MVI) (6 Hrs)

Learning Outcomes:

- Demonstrate knowledge of a Trailer Motor Vehicle Inspection.
- Demonstrate knowledge of the procedures to perform a Trailer Motor Vehicle Inspection.

2021 Red Seal Occupational Standard Reference:

N/A. Provincial requirement.

Suggested Hours:

6 Hours

Objectives and Content:

1. Explain the purpose of a provincial motor vehicle inspection.

2. Identify individuals and authorities involved with provincial motor vehicleinspections, and explain their role, responsibilities and liabilities.
   - i) vehicle owner
   - ii) journeyperson
   - iii) shop owner
   - iv) government

3. Identify jurisdictional requirements pertaining to motor vehicle inspections.
   - i) inspection instructions
   - ii) specifications and tolerances
   - iii) documentation
     - inspection forms
     - rejection stickers
     - inspection stickers

4. Describe the procedures used to perform a provincial motor vehicle inspection.
   - i) vehicles
   - ii) trailers

Practical Objectives:

N/A

TTT-270 Workplace Mentoring II (6 hrs)

Learning Outcomes:

- Demonstrate knowledge of effective communication practices.
- Demonstrate knowledge of strategies for teaching workplace skills.

2021 Red Seal Occupational Standard Reference:

5.01 Uses communication techniques.
5.02 Uses mentoring techniques.

Suggested Hours:

6 Hours

Objectives and Content:

1. Identify communication and learning styles.
   - i) learning styles
     - audible
     - visual
     - experiential
     - theoretical
     - any combination of the above

2. Describe effective listening and speaking skills.
   - i) hearing
   - ii) interpreting
   - iii) reflecting
   - iv) responding
   - i) paraphrasing

3. Identify personal responsibilities and attitudes that contribute to on-the-job success.
   - i) asking questions
   - ii) working safely
   - iii) accepting constructive feedback
   - iv) time management and punctuality
   - v) respect for authority
   - vi) good stewardship of materials, tools and property
   - vii) efficient work practices

4. Identify the value of diversity in the workplace.

5. Identify communication that constitutes harassment and discrimination.
   i) harassment
      - objectionable conduct
      - comment or display made either on a one-time or continuous basis that demeans, belittles, or causes personal humiliation or embarrassment to the recipient
   ii) discrimination
      - an opinion or negative action of someone based on race, national or ethnic origin, colour, religion, age, sex, sexual orientation, marital status, family status, disability or conviction for which a pardon has been granted

6. Identify different roles played by a workplace mentor.

7. Describe the steps involved in teaching skills.
   i) identifying the point of the lesson
   ii) linking the lesson
   iii) demonstrating the skill
   iv) providing practice
   v) giving feedback
   vi) assessing skills and progress

8. Explain the importance of identifying the point of a lesson.

9. Identify how to choose a good time to present a lesson.

10. Explain the importance of linking the lessons.

11. Identify the components of the skill (the context).

12. Describe considerations in setting up opportunities for skill practice.

13. Explain the importance of providing feedback.

14. Identify techniques for giving effective feedback.

15. Describe a skills assessment.

16. Identify methods of assessing progress.

17. Explain how to adjust a lesson to different situations.

Practical Objectives:

N/A

TTT-275 Program Review (30 hrs)

Learning Outcomes:

- Demonstrate knowledge of the Occupational Standard and its relationship to the Certification Examination.
- Demonstrate knowledge of overall comprehension of the trade in preparation for the Certification Examination.

Occupational Standard Reference:

Entire Occupational Standard

Suggested Hours:

30 Hours

Objectives and Content:

1. Define and explain terminology associated with an RSOS.
   - i) major work activities (MWA)
   - ii) tasks
   - iii) sub-tasks

2. Explain how an RSOS is developed and the link it has with the Interprovincial Red Seal Examination.
   - i) development
   - ii) validation
   - iii) MWA and task weighting
   - iv) examination breakdown (pie-chart)

3. Identify Red Seal products and describe their use for preparing for the Interprovincial Red Seal Examination.
   - i) Red Seal website
   - ii) examination preparation guide
   - iii) self-assessment guide
   - iv) exam breakdowns/counselling sheets
   - v) sample questions

4. Explain the relationship between the RSOS and the Curriculum Standard.

5. Review Common Occupational Skills for the Transport Trailer Technician trade as identified in the RSOS.
   - i) safety-related functions
   - ii) tools and equipment
   - ii) routine work practices
   - iii) organizes work.
   - iv) communication and mentoring techniques

6. Review process to diagnose, maintain and repair suspension systems for the Transport Trailer Technician trade as identified in the RSOS.
   - i) air suspension systems
   - ii) spring suspension systems
   - iii) rubber suspension systems

7. Review process to diagnose, maintain and repair brake systems for the Transport Trailer Technician trade as identified in the RSOS.
   - i) disc brake systems
   - ii) drum brake systems
   - iii) air brake systems
   - iv) hydraulic brake systems
   - v) electric brake systems
   - vi) electronic braking control systems

8. Review process to diagnose, maintain and repair axles and wheel end assemblies for the Transport Trailer Technician trade as identified in the RSOS.
   - vii) fixed, self-steering and lift axles
   - viii) hubs and bearings
   - ix) tires and rims

9. Review process to diagnose, maintain and repair trailer chassis, bodies and coupling devices for the Transport Trailer Technician trade as identified in the RSOS.
   - i) trailer chassis
   - ii) trailer bodies
   - iii) coupling devices
   - iv) landing gear

10. Review process to diagnose, maintain and repair electric and electronic systems for the Transport Trailer Technician trade as identified in the RSOS.
    - i) lighting systems
    - ii) wiring systems
    - iii) trailer monitoring and control systems.

11. Review process to diagnose, maintain and repair hydraulic systems for the Transport Trailer Technician trade as identified in the RSOS.
    i) self-contained hydraulic systems
    ii) auxiliary-powered hydraulic systems

12. Review process to diagnose, maintain and repair temperature control systems for the Transport Trailer Technician trade as identified in the RSOS.
    i) fuel systems
    ii) charging and starting systems
    iii) high-voltage, electric, hybrid and alternative drive systems
    iv) refrigeration and heating systems (introduction)

Practical Objectives:

N/A

Feedback and Revisions

This curriculum standard will be amended periodically; comments or suggestions for improvements should be directed to:

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Any comments or suggestions received will be reviewed and considered to determine the course of action required. If the changes are deemed to be minor, they will be held for implementation during the next review cycle. If immediate change is deemed appropriate, it will result in a revision to this version of the AACS and will be detailed in the following section.

Version Changes

Revision Date	Revision	Implementation Date
July 2022 (v 1.0)	Developed based on the 2021 RSOS, National Harmonization Recommendations.	2022-2023 Training Year