# Diesel Technology Standards and Skills

September 2024

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## Health & Safety Standards

### Standard 1: Safety and Health in a Diesel Technology Environment

Students will apply health and safety practices in a diesel shop environment, effectively managing and maintaining equipment and tools, utilizing appropriate personal protective equipment (PPE), adhering to established personal safety protocols, safely handling hazardous materials, and demonstrating preparedness for emergency situations.

* Aligned Industry Recognized Credentials: OSHA10 – General Industry, ASE-Entry-Level Certifications: Diesel Engines, Electrical/Electronic Systems, Brakes, Suspension and Steering, or Inspection, Maintenance, and Minor Repair

#### Skills:

1. Identify, describe, and demonstrate the effective use of Safety Data Sheets (SDS) to meet documentation requirements.
2. Locate emergency equipment, first aid kit, and emergency action and response plan, including labels and signage that follow OSHA Hazard Communication Program (HAZCOM).
3. Demonstrate safe dress, use of relevant safety gear, and personal protective equipment (PPE), e.g., safety equipment, gloves, proper footwear, earplugs, and eye protection.
4. Demonstrate safe body mechanics, including appropriate lifting techniques and ergonomics aimed at minimizing injury.
5. Demonstrate the safe use, proper maintenance, and correct storage of hand tools and power tools in accordance with manufacturer guidelines.
6. Demonstrate the correct use of lifts, jacks, and jack stands to prevent vehicle-related accidents.
7. Demonstrate the proper Lock-out/Tag-out (LOTO) procedures to effectively prevent the accidental energization of machinery during maintenance or repair activities.
8. Demonstrate safe practices for starting and shutting down diesel engines, including verifying proper attachment of the exhaust system, inspecting for leaks, and ensuring adequate ventilation in the work area.
9. Apply safe procedures for handling, charging, disconnecting, and reconnecting vehicle batteries to prevent shorts, acid burns, and explosions.
10. Identify and apply safe storage and handling of flammable and combustible materials to reduce the risk of fire.
11. Demonstrate proper handling, storage, disposal, and spill response for hazardous materials, including refrigerants, coolants, fuels, oils, solvents, used oil, batteries, antifreeze, and other automotive fluids, while ensuring compliance with local, state, and federal environmental regulations.
12. Demonstrate welding and cutting safety precautions including the use of PPE, fire-resistant barriers, and ventilation.
13. Understand and apply fire safety protocols, including the correct use of a fire extinguisher, identification of fire hazards, and execution of evacuation procedures.

## Technical & Integrated Academic Standards

### Standard 2: Role of Diesel Technology Professionals in Society

Students will demonstrate a comprehensive understanding of the contributions of diesel technology to transportation, industry, and environmental sustainability.

#### Skills:

1. Analyze the role of diesel technology in the development and efficiency of modern transportation systems, including heavy-duty vehicles, trains, and maritime transport.
2. Explain how diesel-powered machinery has revolutionized industrial operations, focusing on its impact in construction, agriculture, and manufacturing sectors.
3. Analyze the impact of Massachusetts' Low Emission Vehicle (LEV) program and the 2021 Advanced Clean Trucks regulations on diesel technology, focusing on emission reduction technologies, compliance with greenhouse gas standards, and the adoption of alternative fuels.

### Standard 3: Tools, Instrumentation, and Diagnostic Equipment

Students will demonstrate proficiency in the identification, use, and maintenance of tools, fasteners, diagnostic and measurement instruments used in diesel technology, with a focus on safety and precision in alignment with industry standards.

* Aligned Industry Recognized Credentials: ASE – Entry-Level Certifications: Diesel Engines, Electrical/Electronic Systems, Brakes, Suspension and Steering, or Inspection, Maintenance, and Minor Repair

#### Skills:

1. Identify and apply the proper use and techniques for hand tools including screwdrivers, pliers, hammers, punches, chisels, sockets, and extensions.
2. Identify and demonstrate the proper use of combination wrenches, open-end wrenches, box-end wrenches, pipe wrenches, adjustable wrenches, torque wrenches, and Allen wrenches.
3. Identify and demonstrate the proper use of distinct types of files, hacksaws, thread cutting taps, thread cutting dies, wire brushes, gasket scrapers, and bench vises.
4. Demonstrate the safe use and maintenance of power tools including air impact wrenches, impact sockets, and bench grinders.
5. Identify and demonstrate the proper use of an electric drill, including selecting the appropriate drill bits, understanding the differences in drilling speeds for various metals, and drilling holes accurately to specifications.
6. Demonstrate appropriate use of electric soldering irons, explain their application, and identify suitable types of solder for electrical components.
7. Demonstrate the proper use of both precision measuring tools (such as vernier calipers, inside and outside micrometers, depth gauges, feeler gauges, hole gauges, telescoping gauges, snap gauges, and dial indicators) and low-precision measuring tools (such as steel rules, tape measures, and combination squares) for accurate and practical measurement tasks in diesel component assessment.
8. Demonstrate the proper use and application of diagnostic tools, including digital multimeters, compression testers, fuel pressure testers, and injector testers, to assess the performance of diesel engine components.
9. Compare and contrast various types of fasteners and their applications.
10. Recognize SAE metric bolt head markings and explain their significance.
11. Identify and describe the function of common nuts, washers, lock washers, and snap rings.
12. **Explain the concept of fastener torque, torque sequence, the use of torque specification charts, and the application of torque angle gauges.**
13. Demonstrate the proper use of a torque wrench for fastener installation and apply torque angle gauges for precise tightening procedures.

### Standard 4: General Engine Diagnosis

Students will be able to conduct comprehensive diagnostic tests and inspections to determine and apply appropriate corrective actions for general engine diagnosis.

* Aligned Industry Recognized Credentials: ASE – Entry Level Certification – Diesel Engines, ASE – Entry Level Certification – Inspection, Maintenance, and Minor Repair

#### Skills:

1. Evaluate the customer’s description of the problem, perform basic diagnostic checks (such as visual inspection and use of diagnostic tools), and determine the next steps in the diagnostic process.
2. Identify the engine model and serial number to research relevant vehicle and service information, including precautions, procedures, and technical bulletins.
3. Identify system components, configurations, and types of the following: cylinder head(s), valve train, engine block, engine lubrication, engine cooling, air induction, exhaust, fuel, and engine braking.
4. Use appropriate electronic service tool(s) and procedures to diagnose problems; check, record, and clear diagnostic codes; check and record trip/operational data; reset maintenance monitor (if applicable); interpret digital multimeter (DMM) readings.
5. Apply inspection techniques to evaluate the engine assembly and compartment for fuel, oil, diesel exhaust fluid (DEF), and coolant levels and condition.
6. Identify causes of engine fuel, oil, coolant, air, and other leaks to determine needed action.
7. Interpret engine noises and evaluate engine exhaust color, density, and odor to determine needed action.
8. Identify causes of surging, rough operation, misfiring, low power, slow deceleration, slow acceleration, and shutdown problems and determine needed action.
9. Conduct inspection of engine compartment wiring harness, connectors, seals, and locks; check for proper routing and condition.
10. Analyze the condition of belts, tensioners, pulleys, and adjust belt(s), if required.
11. Perform air intake system restriction and leakage tests and evaluate test results to determine and recommend necessary actions.
12. Perform intake manifold pressure (boost) test, test crankcase pressure, and test cylinder compression.
13. Diagnose and propose solutions for no cranking, cranks but fails to start, hard starting, and starts but does not continue to run problems.
14. Diagnose surging, rough operation, misfiring, low power, slow deceleration, slow acceleration, and shutdown problems; determine needed action.
15. Isolate and diagnose engine related vibration problems.
16. Inspect engine mounts for looseness and deterioration.
17. Check and record electronic diagnostic codes and trip/operational data; monitor electronic data; verify customer programmable parameters; clear diagnostic trouble codes; verify the repair; and determine if further diagnosis is needed.

### Standard 5: Cylinder Head and Valve Train Diagnosis and Repair

Students will be able to disassemble, inspect, clean, and reassemble cylinder head assemblies and related engine components, using basic tools and techniques, to check for wear and ensure proper function.

* Aligned Industry Recognized Credentials: ASE – Entry Level Certification – Diesel Engines, ASE – Entry Level Certification – Inspection, Maintenance, and Minor Repair

#### Skills:

1. Disassemble, inspect, and evaluate cylinder head assembly components, identifying wear, damage, and necessary repairs to ensure serviceability and functionality.
2. Demonstrate cleaning and inspecting the condition of threaded holes, studs, and bolts, determining the necessary actions for repair or replacement to restore optimal functionality.
3. Measure and interpret the thickness, surface finish, and integrity of cylinder head mating surfaces, checking for warpage, cracks, or damage, and inspect core and gallery plugs to determine required corrective actions.
4. Disassemble head and inspect valves, guides, seats, springs, retainers, rotators, locks, and seals to determine repair or replacement needs for effective engine operation.
5. Measure valve head height relative to deck and valve face-to-face contact, determining necessary action.
6. Test and analyze injector sleeves and seals, utilizing pressure testing and precise measurement of injector tips or nozzle protrusion to verify serviceability.
7. Inspect and diagnose pushrods, rocker arms, and rocker arm shafts for wear, damage, or blockages, determining appropriate repairs or replacements.
8. Inspect and evaluate wiring harnesses and brackets for wear, bending, cracks, improper routing, looseness, or blockages, determining necessary repairs or replacements to ensure proper electrical functionality.
9. Clean, reassemble, and verify the proper installation and functionality of cylinder head assembly components, ensuring all parts meet operational standards.
10. Install, adjust, and verify cam followers, valve clearances, and injector settings for proper alignment and peak engine efficiency.
11. Inspect and adjust overhead camshaft components, valve bridges, and bearings, ensuring proper alignment, endplay, and backlash to meet manufacturer specifications.

### Standard 6: Engine Block Diagnosis and Repair

Students will demonstrate the ability to use diagnostic tools and techniques to evaluate, maintain, and repair engine block and crankshaft components, ensuring they function correctly and meet manufacturer’s specifications.

* Aligned Industry Recognized Credentials: ASE – Entry Level Certification – Diesel Engines, ASE – Entry Level Certification – Inspection, Maintenance, and Minor Repair

#### Skills:

1. Evaluate crankcase pressure test results to determine necessary corrective actions for engine operation issues.
2. Remove, inspect, and service pans, covers, vents, gaskets, seals, wear rings, and crankcase ventilation components, and install them according to manufacturer specifications to ensure proper function.
3. Disassemble, clean, and inspect engine block for cracks, damage, and surface warpage, and measure mating surfaces, passages, and plugs; evaluate the condition of threaded holes, studs, dowel pins, and bolts; and determine repair or replacement needs.
4. Inspect cylinder sleeve counterbore and lower bore, analyze bore distortion, and determine necessary corrective actions.
5. Clean, inspect, and measure cylinder walls or liners for wear and damage, and determine whether to repair or replace components.
6. Replace or reinstall cylinder liners and seals and adjust liner height (protrusion) to meet operational specifications.
7. Inspect and evaluate in-block camshaft and camshaft bearings for wear and damage, and measure and adjust end play; determine needed action to ensure proper operation.
8. Clean and inspect crankshaft for surface cracks and journal damage; analyze the condition of oil passages and vibration damper; measure journal diameter; and determine necessary corrective actions.
9. Inspect and evaluate main and connecting rod bearings for wear patterns and damage and replace as needed; check and adjust bearing clearances and crankshaft end play to manufacturer specifications.
10. Inspect, install, and time the gear train and measure gear backlash; determine necessary adjustments to maintain proper timing and performance.
11. Assemble and install pistons and connecting rods into the block, check rod bearing clearances, and ensure proper alignment and clearances.
12. Evaluate the condition of piston cooling jets (nozzles) and determine necessary repairs or replacements.
13. Inspect crankshaft vibration damper and engine mounts for serviceability, analyze wear and damage, and determine needed action.
14. Install and align the flywheel housing and inspect and measure the mating surfaces between the flywheel housing and transmission/engine housing; measure flywheel housing face and bore runout to ensure proper alignment.
15. Inspect and evaluate the flywheel or flexplate, including ring gear and mounting surfaces, for cracks, wear, and runout; determine necessary corrective actions for optimal functionality.

### Standard 7: Lubrication and Cooling Systems Diagnosis and Repair

Students will be able to diagnose, service, and repair engine lubrication and cooling systems using advanced diagnostic tools and techniques, ensuring the proper functioning of oil and coolant systems for optimal engine performance and longevity.

* Aligned Industry Recognized Credentials: ASE – Entry Level Certification – Diesel Engines, ASE – Entry Level Certification – Inspection, Maintenance, and Minor Repair

#### Skills:

1. Verify and evaluate engine oil pressure and temperature, inspecting the functionality of pressure sensors/switches and gauges to determine if corrective actions are required.
2. Inspect, measure, and service the oil pump, housing, drives, pipes, and screens; adjust drive gear clearance, if applicable, to maintain proper oil flow and pressure.
3. Assess and inspect oil pressure and check operation of regulator valves and by-pass valves, ensuring optimal oil pressure control within the engine.
4. Inspect, clean, test, and reinstall or replace oil cooler components, including by-pass valves, oil thermostat, lines, and hoses, to maintain effective oil temperature regulation.
5. Evaluate the lubrication and cooling systems of the turbocharger to determine and implement necessary repairs.
6. Perform engine oil and filter service, adding the correct type and amount of oil while ensuring all components meet manufacturer standards.
7. Evaluate engine coolant type, additives, freeze level, supplemental coolant additive (SCA) level, condition, and consumption to determine needed action.
8. Verify and assess coolant temperature and check the operation of temperature and level sensors/switches and temperature gauge to ensure accurate cooling system function.
9. Inspect, reinstall, and adjust pulleys, tensioners, and drive belts, ensuring proper alignment and tension for smooth engine operation.
10. Inspect and replace thermostats, bypasses, housings, seals, and coolant restrictors to maintain proper engine temperature control.
11. Demonstrate flushing and refilling the cooling system, bleeding the system, and recycling coolant for effective temperature regulation.
12. Inspect and service coolant conditioners, filters, valves, lines, fittings, and housings, to ensure proper system filtration and flow.
13. Inspect and repair or replace water pumps, housings, hoses, and idler pulleys or drive gears to maintain adequate coolant circulation within the engine.
14. Evaluate and determine action for the radiator, pressure caps, and tanks, addressing any issues that may impair cooling performance.
15. Inspect, service, and repair fan systems (hydraulic, pneumatic, and electronic), including the fan hub, fan clutch, fan controls, fan thermostat, fan shroud, and airflow management systems, ensuring efficient engine cooling.
16. Pressure test the cooling system and pressure caps to identify potential leaks or weaknesses, determining and implementing required repairs.

### Standard 8: Air Induction and Exhaust Systems Diagnosis and Repair

Students will demonstrate the ability to diagnose, inspect, service, and repair air induction and exhaust systems using appropriate tools and techniques to meet industry standards.

* Aligned Industry Recognized Credentials: ASE – Entry Level Certification – Diesel Engines, ASE – Entry Level Certification – Inspection, Maintenance, and Minor Repair

#### Skills:

1. Inspect and service air induction system: piping, hoses, clamps, and mounting; check for air restrictions and leaks, reset restriction indicator (if applicable); service or replace air filter as needed.
2. Inspect, repair, and replace intake manifold, gaskets, temperature and pressure sensors, and connections.
3. Inspect, clean, test, and replace the charge air cooler and piping system as necessary.
4. Inspect and repair/replace exhaust manifold, gaskets, piping, mufflers, and mounting hardware.
5. Inspect, test, repair/replace preheater, inlet air heater, glow plug systems, and controls.
6. Inspect engine compression/exhaust brake housing, valves, seals, lines, and fittings; repair or replace as needed.
7. Inspect crankcase ventilation system, service as needed.
8. Inspect, test, and adjust engine compression/exhaust brake control circuits, switches, and solenoids; repair or replace as needed.
9. Inspect, test, service, and replace exhaust gas recirculation (EGR) system components, including the EGR valve, cooler, piping, sensors, controls, and wiring.
10. Inspect, test, and replace exhaust after treatment system components and controls, including diesel oxidation catalyst (DOC), selective catalytic reduction (SCR), diesel exhaust fluid (DEF), diesel particulate filter (DPF); verify the regeneration system operation.
11. Inspect, test, and replace fixed and variable turbochargers, including pneumatic, hydraulic, and electronic controls and actuators; inspect, test, and replace the wastegate and associated controls.

### Standard 9: Fuel System Diagnosis and Repair

Students will demonstrate the ability to diagnose, inspect, test, and repair fuel system components, including mechanical and electronic systems, using industry-standard tools and diagnostic procedures.

* Aligned Industry Recognized Credentials: ASE – Entry Level Certification – Diesel Engines, ASE – Entry Level Certification – Inspection, Maintenance, and Minor Repair

#### Skills:

1. Inspect fuel level, quality, and consumption; determine needed action.
2. Inspect fuel tanks, vents, caps, mounts, valves, screens, crossover system, supply and return lines and fillings; determine needed action.
3. Inspect, clean, and test fuel transfer (lift) pump, pump drives, screens, fuel/water separators/indicators, filters, heaters, coolers, electronic control module (ECM) cooling plates, and mounting hardware; determine needed action.
4. Inspect and test low pressure regulator systems (check valves, pressure regulator valves, and restrictive fillings); determine needed action.
5. Inspect fuel system for air; determine needed action; prime and bleed fuel system; inspect primer pump.
6. Identify components of an electronic fuel management system.
7. Inspect and test power, ground circuits, and connections; measure and interpret voltage, voltage drop, amperage, and resistance using a digital multimeter (DMM); determine needed action.
8. Perform diagnostic procedures using vehicle’s on-board computer and recommended electronic diagnostic tools (including PC-based software or data scan tools); determine needed action.
9. Record and monitor electronic diagnostic codes and trip/operational data; clear codes and perform further diagnosis as needed.
10. Locate and use service information, including diagnostic procedures, flow charts, and wiring diagrams.
11. Inspect and replace electrical connector terminals, seals, and locks.
12. Inspect, test, and replace switches, sensors, controls, actuator components, and circuits as needed.
13. Access and interpret customer programmable parameters using recommended electronic diagnostic tools.
14. Inspect, test, adjust, remove, and install electronic unit injectors (EUI) and related components; recalibrate ECM, if applicable.
15. Perform cylinder contribution tests and on-engine inspections for hydraulic electronic unit injectors, system controls, high-pressure oil supply, and common rail injection systems; determine needed action.
16. Inspect high-pressure injection lines, hold downs, fittings, and seals; determine needed action.

### Standard 10: Electrical/Electronic Systems Diagnosis and Repair

Students will demonstrate the ability to analyze, diagnose, and repair electrical and electronic systems by interpreting wiring diagrams, testing circuits, and utilizing diagnostic equipment to ensure proper system functionality.

* Aligned Industry Recognized Credentials: ASE – Entry Level Certification – Electrical/Electronic Systems, ASE – Entry Level Certification – Inspection, Maintenance, and Minor Repair

#### Skills:

1. Identify electrical/electronic system components and their configurations within vehicle systems.
2. Demonstrate understanding of electrical circuit types (series, parallel, and series-parallel) by applying principles of electricity, including Ohm’s Law.
3. Analyze electrical/electronic circuits using wiring diagrams to diagnose potential faults or issues.
4. Utilize test equipment correctly to measure source voltage, voltage drop (including grounds), current flow, continuity, and resistance; interpret the readings.
5. Evaluate circuit continuity using electronic service tools; check and record diagnostic codes, clear codes, and determine corrective actions by interpreting digital multimeter (DMM) readings.
6. Measure applied voltages, circuit voltages, and voltage drops; assess the health of circuits to diagnose issues such as excessive resistance or poor connections.
7. Demonstrate testing current flow using a DMM or clamp-on ammeter to detect faults and irregularities in circuit operation.
8. Assess resistance in circuits and components using a DMM to determine if repairs or adjustments are needed.
9. Diagnose shorts, grounds, and opens in circuits; develop a repair plan to restore functionality.
10. Troubleshoot parasitic battery drain (key-off) by performing appropriate tests and identifying sources of the drain; recommend corrective action.
11. Inspect and test fusible links, circuit breakers, relays, solenoids, diodes, and fuses; replace components as necessary to maintain circuit protection.
12. Evaluate spike suppression devices and replace them as necessary to protect sensitive electronic systems.
13. Inspect, repair, or replace electrical connectors, seals, terminal ends, and wiring; verify proper routing and securement of wiring to ensure system integrity.
14. Analyze frequency and pulse width signals in circuits using appropriate test equipment; adjust or repair systems as needed.
15. Diagnose communication faults in data bus networks; determine necessary repairs to restore system communication.

### Standard 11: Battery Diagnosis and Repair

Students will demonstrate the ability to diagnose, test, and repair battery systems by performing load tests, evaluating charge levels, servicing components, and safely jump-starting vehicles following OSHA safety standards.

* Aligned Industry Recognized Credentials: ASE – Entry Level Certification – Electrical/Electronic Systems, ASE – Entry Level Certification – Inspection, Maintenance, and Minor Repair

#### Skills:

1. Identify battery type and explain the system configuration.
2. Perform a battery load and capacitance test; determine and implement the necessary corrective action.
3. Assess the battery’s state of charge using an open circuit voltage test; evaluate results and determine next steps.
4. Inspect, clean, and service battery components, including cables, connectors, battery box, mounts, and hold-downs; replace components as needed to ensure reliability.
5. Apply the appropriate charging method (slow or fast) based on battery type and condition and monitor the charging process for safety and effectiveness.
6. Execute a safe vehicle jump-start using jumper cables and a booster battery or auxiliary power supply, following industry and OSHA safety standards.
7. Identify low voltage disconnect (LVD) systems.

### Standard 12: Starting System Diagnosis and Repair

Students will demonstrate diagnosing, testing, and repairing starting systems according to industry standards, ensuring safe and efficient operation.

* Aligned Industry Recognized Credentials: ASE – Entry Level Certification – Electrical/Electronic Systems, ASE – Entry Level Certification – Inspection, Maintenance, and Minor Repair

#### Skills:

1. Perform starter circuit cranking voltage and voltage drop tests using appropriate diagnostic tools; determine needed corrective actions to ensure proper operation.
2. Inspect and test components of the starter control circuit, including key switches, push buttons, magnetic switches; replace faulty components, as necessary.
3. Demonstrate testing starter relays and solenoids/switches, connectors, terminals, and wires and harnesses (including over-crank protection) for proper functionality; replace components that do not meet performance standards.
4. Demonstrate removing and replacing starter units; inspect the flywheel ring gear or flex plate for signs of damage or wear and determine if repairs or replacements are required.

### Standard 13: Charging System Diagnosis and Repair

Students will demonstrate diagnosing, testing and repairing charging systems, including alternators and related components, to ensure proper vehicle operation and compliance with industry standards.

* Aligned Industry Recognized Credentials: ASE – Entry Level Certification – Electrical/Electronic Systems, ASE – Entry Level Certification – Inspection, Maintenance, and Minor Repair

#### Skills:

1. Identify and understand the operation of the generator (alternator) and its role within the vehicle's charging system.
2. Evaluate instrument panel voltmeters and indicator lamps; determine and implement necessary corrective actions.
3. Inspect, diagnose, and replace alternator drive belts, pulleys, fans, tensioners, and mounting brackets; adjust belts and assess alignment accuracy.
4. Conduct voltage and amperage output tests on the charging system; perform AC ripple tests; interpret results and formulate necessary actions.
5. Execute voltage drop tests on the charging circuit; assess findings and recommend repairs.
6. Demonstrate removal and installation of an alternator; verify proper functioning after replacement.
7. Inspect cables, wires, and connectors within the charging circuit for damage, corrosion, or poor connections; determine necessary repairs or replacements.

### Standard 14: Lighting Systems Diagnosis and Repair

Students will be able to diagnose and repair vehicle lighting systems by analyzing diagnostic data, evaluating, and testing lighting components, and performing necessary repairs or replacements to ensure optimal functionality and safety.

* Aligned Industry Recognized Credentials: ASE – Entry Level Certification – Electrical/Electronic Systems, ASE – Entry Level Certification – Inspection, Maintenance, and Minor Repair

#### Skills:

1. Analyze vehicle on-board computer data to perform diagnostic procedures using electronic diagnostic equipment and tools (including PC-based software and data scan tools); determine and implement corrective actions.
2. Identify issues such as brighter than normal, intermittent, dim, or non-operational headlights and daytime running lights (DRL); diagnose and determine necessary repairs.
3. Evaluate and perform tests on headlights, including aiming and replacement as required.
4. Inspect and test headlight and dimmer circuit components (switches, relays, wires, terminals, connectors, sockets, and control modules); repair or replace as necessary.
5. Inspect and test parking, clearance, and taillight circuit components (switches, bulbs/LEDs, sockets, connectors, terminals, relays, wires, and control modules); repair or replace as needed.
6. Inspect and test instrument panel light circuit components (switches, relays, bulbs/LEDs, sockets, connectors, terminals, wires, and printed circuits/control modules); repair or replace as needed.
7. Inspect and test interior cab light circuit components (switches, bulbs, sockets, connectors, terminals, wires, and control modules); repair or replace as necessary.
8. Inspect and test tractor-to-trailer multi-wire connectors; repair or replace as needed.
9. Inspect and test stoplight circuit components (switches, bulbs/LEDs, sockets, connectors, terminals, wires, and control modules); repair or replace as needed.
10. Inspect and test turn signal and hazard circuit components (flashers, switches, relays, bulbs/LEDs, sockets, connectors, terminals, wires, and control modules); repair or replace as necessary.
11. Inspect and test reverse light and warning device circuit components (switches, bulbs/LEDs, sockets, horns, buzzers, connectors, terminals, wires, and control modules); repair or replace as needed.

### Standard 15: Gauges and Warning Devices

Students will be able to diagnose and repair vehicle gauge and warning systems by evaluating sensors, sending units, gauges, switches, relays, bulbs/LEDs, and related circuitry using electronic diagnostic tools, and implementing necessary repairs or calibrations to ensure accurate operation.

* Aligned Industry Recognized Credentials: ASE – Entry Level Certification – Electrical/Electronic Systems, ASE – Entry Level Certification – Inspection, Maintenance, and Minor Repair

#### Skills:

1. Identify and describe the sensor/sending units, gauges, switches, relays, bulbs/LEDs, wires, terminals, connectors, sockets, printed circuits, and control components/modules within the instrument cluster, driver information system, and warning systems.
2. Analyze diagnostic data from the vehicle’s on-board computer using recommended electronic diagnostic tools and software; determine necessary actions for addressing issues.
3. Diagnose causes of intermittent, high, low, or absent gauge readings; formulate and implement corrective measures.
4. Investigate data bus-driven gauge malfunctions; identify and apply appropriate solutions.
5. Inspect and evaluate gauge circuit components, including sensor/sending units, gauges, connectors, terminals, and wires; perform repairs or replacements as needed.
6. Assess and test warning device components, including lights, audible indicators, circuit sensors, bulbs/LEDs, sockets, connectors, and control modules; repair or replace faulty parts as necessary.
7. Inspect, test, replace, and calibrate electronic speedometers, odometers, and tachometers to ensure accurate performance.

### Standard 16: Related Electrical Systems Diagnosis and Repair

Students will be able to diagnose, test, and repair auxiliary electrical systems such as horn, wipers, mirrors, heaters, power outlets, windows, and door locks by using diagnostic equipment to identify issues and apply appropriate repairs to ensure proper functionality.

* Aligned Industry Recognized Credentials: ASE – Entry Level Certification – Electrical/Electronic Systems, ASE – Entry Level Certification – Inspection, Maintenance, and Minor Repair

#### Skills:

1. Diagnose causes of constant, intermittent, or non-functional horn operation and determine appropriate corrective actions.
2. Inspect and test horn circuit relays, switches, connectors, wires, and control modules; perform repairs or replacements, as necessary.
3. Identify and diagnose issues with wiper operation, speed control, and parking position; determine and implement corrective actions.
4. Inspect and test wiper motor components, including resistors, park switches, relays, and control modules; perform repairs or replacements as needed.
5. Inspect, adjust, and replace wiper motor transmission linkages, arms, and blades to ensure proper alignment and operation.
6. Inspect and test windshield washer system components, including motor/pump, relays, switches, connectors, and wires; perform repairs or replacements as necessary.
7. Evaluate side view mirror components such as motors and heating circuits; test relays, switches, connectors, and wires; repair or replace as needed.
8. Inspect and test heater and A/C electrical components, including clutches, motors, resistors, relays, switches, and control modules; perform repairs or replacements as necessary.
9. Inspect and test auxiliary power outlets, including integral fuses, connectors, wires, and control modules; determine and apply necessary corrective actions.
10. Diagnose issues with slow, intermittent, or non-operational power side windows and determine appropriate corrective actions.
11. Inspect and test power side window motors, switches, relays, and control modules; perform repairs or replacements as needed.
12. Inspect and test block heaters for functionality and determine necessary repairs.
13. Inspect and test cruise control electrical components; repair or replace faulty switches, relays, or actuators.
14. Analyze and evaluate electric door lock circuits, including switches, relays, controllers, and wires; apply necessary repairs or replacements based on diagnostic findings.
15. Evaluate the function of keyless and remote lock/unlock devices; diagnose issues and implement corrective actions.
16. Inspect and test engine cooling fan control components, including switches and control modules; perform repairs or replacements as necessary.

### Standard 17: Air Brakes - Air Supply and Service Systems

Students will demonstrate proficiency in diagnosing and repairing air brake systems by evaluating and servicing air supply, application, and control components to ensure optimal performance and safety.

* Aligned Industry Recognized Credentials: ASE – Entry Level Certifications – Brakes, ASE – Entry Level Certification – Inspection, Maintenance, and Minor Repair

#### Skills:

1. Identify brake system components and configurations.
2. Analyze air brake system malfunctions such as poor stopping, air leaks, premature wear, pulling, grabbing, dragging, or balance issues; determine and implement corrective actions.
3. Evaluate air system build-up time and performance; apply necessary adjustments or repairs to ensure efficient operation.
4. Inspect air reservoirs/tanks for oil, water, and contamination; drain and clean as necessary, and take corrective action based on findings.
5. Examine compressor drive gear, coupling, and inlet components; perform necessary repairs or replacements to ensure optimal functionality.
6. Inspect and repair air compressor oil supply and coolant lines, fittings, and mounting brackets; replace components as required.
7. Assess and adjust air system pressure controls, including governors, unloader assembly valves, filters, lines, hoses, and fittings; perform repairs or replacements to ensure accurate pressure regulation.
8. Evaluate and repair air system lines, hoses, fittings, and couplings to ensure proper function and prevent leaks or malfunctions.
9. Inspect and replace air tank relief (safety) valves, check valves, and drain valves; ensure they are functioning correctly to maintain system safety and efficiency.
10. Demonstrate draining air tanks and checking tank for contamination; determine necessary corrective action.
11. Clean and service air drier systems, including filters, valves, heaters, wiring, and connectors; repair or replace components as needed to maintain air quality.
12. Inspect and test brake application (foot) valves, fittings, and mounts; ensure pedal operation is correct and perform replacements as necessary.
13. Evaluate and repair stop light circuit switches, wiring, and connectors to ensure proper functionality and safety.
14. Inspect and test hand brake (trailer) control valves, lines, fittings, and mountings; perform repairs or replacements to ensure reliable braking.
15. Assess and replace brake relay valves, quick release valves, tractor protection valves, and emergency (spring) brake control/modulator valves as needed to ensure effective braking performance.
16. Inspect and test low pressure warning devices, air pressure gauges, and related wiring and connectors; repair or replace as needed to ensure accurate pressure monitoring.

### Standard 18: Air Brakes - Foundation/Mechanical Brake Systems and Parking Brakes

Students will be able to diagnose, inspect, and service air brake systems and their components, including foundation brakes, slack adjusters, brake chambers, and parking brakes, to ensure optimal performance, safety, and compliance with regulatory standards.

* Aligned Industry Recognized Credentials: ASE – Entry Level Certifications – Brakes, ASE – Entry Level Certification – Inspection, Maintenance, and Minor Repair

#### Skills:

1. Analyze and diagnose poor stopping, brake noise, premature wear, pulling, grabbing, or dragging issues in the foundation brake, slack adjuster, and brake chamber; determine and implement corrective actions.
2. Inspect and evaluate service brake chambers, including diaphragm, clamp, spring, pushrod, clevis, and mounting brackets; repair or replace components as necessary.
3. Inspect and service slack adjusters to ensure proper function; perform adjustments or replacements as needed.
4. Assess and repair camshafts (S-cams), tubes, rollers, bushings, seals, spacers, retainers, brake spiders, shields, anchor pins, and springs; replace components as required.
5. Inspect, clean, and adjust air disc brake caliper assemblies; determine and execute necessary repairs.
6. Measure and evaluate brake shoes or pads; perform required actions for maintenance or replacement.
7. Inspect rotor and mounting surface; measure rotor thickness, thickness variation, and lateral runout; perform necessary actions for repair or replacement.
8. Inspect and measure brake drum diameter, brake lining thickness and condition, and determine needed action.
9. Inspect and test parking (spring) brake chamber diaphragm and seals for leaks; replace the chamber as needed and dispose of removed chambers according to local regulations.
10. Evaluate and repair parking (spring) brake check valves, lines, hoses, and fittings; replace components as necessary.
11. Inspect and test parking (spring) brake application and release valve; replace as needed.
12. Manually release and reset parking (spring) brakes following manufacturer’s recommendations; ensure proper function and safety.

### Standard 19: Hydraulic Brake Systems

Students will demonstrate the ability to diagnose, inspect, and repair hydraulic braking system components, including master cylinders, brake lines, valves, and disc brake assemblies, to ensure proper function and safety of the vehicle’s braking system.

* Aligned Industry Recognized Credentials: ASE – Entry Level Certifications – Brakes, ASE – Entry Level Certification – Inspection, Maintenance, and Minor Repair

#### Skills:

1. Diagnose and resolve issues with stopping power, premature wear, pulling, dragging, balance, or pedal feel caused by hydraulic system malfunctions; determine and implement necessary corrective actions.
2. Evaluate brake pedal pushrod length, pedal travel, pedal effort, and pedal feel and make necessary adjustments to ensure proper alignment and function.
3. Inspect and assess the master cylinder for internal or external leaks and damage; replace or repair components as required.
4. Examine hydraulic system brake lines, flexible hoses, and fittings for leaks and damage, conduct repairs or replacements as necessary.
5. Assess and evaluate metering, load sensing/proportioning, proportioning, and combination valves; replace components as needed to maintain system performance.
6. Inspect and test the brake pressure differential valve and warning light circuit, including switches, bulbs, wiring, and connectors; perform repairs or replacements to ensure functionality.
7. Inspect and assess disc brake caliper assemblies; replace components as necessary to maintain proper braking performance.
8. Evaluate brake fluid condition, perform bleeding and/or flushing of the hydraulic system, and ensure the correct type of fluid is used.

### Standard 20: Hydraulic Brakes - Mechanical/Foundation and Power Assist Systems

Students will be able to diagnose, inspect, and repair mechanical foundation components and power assist systems to ensure optimal braking performance, safety, and reliability.

* Aligned Industry Recognized Credentials: ASE – Entry Level Certifications – Brakes, ASE – Entry Level Certification – Inspection, Maintenance, and Minor Repair

#### Skills:

1. Diagnose issues related to poor stopping, brake noise, premature wear, pulling, grabbing, dragging, or pedal feel due to mechanical components; formulate and implement necessary corrective actions.
2. Inspect and measure rotors and mounting surface, measure rotor thickness, thickness variation, and lateral runout; determine and perform required maintenance or replacement actions.
3. Inspect and clean disc brake caliper assemblies, measure disc brake pads, and evaluate mounting hardware; conduct necessary adjustments or replacements.
4. Inspect and measure brake drum diameter, brake lining thickness and condition, and determine needed action.
5. Evaluate parking brake operation; inspect parking brake application and holding devices; adjust and replace components as needed.
6. Identify stopping issues caused by the brake assist (booster) system; determine and implement necessary actions to address the issues.
7. Inspect, test, repair, or replace hydraulic brake assist (booster), hoses, and control valves; ensure proper fluid type is used.
8. Check the functionality of the emergency (back-up, reserve) brake assist system; determine required actions.
9. Evaluate wheel bearing condition and its effect on power assist units; inspect and replace as needed to ensure smooth operation of both mechanical and power assist components.
10. Clean, lubricate, and replace wheel bearings and races/cups; replace seals and wear rings; inspect spindle/tube; inspect and replace retaining hardware and adjust as needed.
11. Inspect or replace extended service wheel bearing assemblies.

### Standard 21: Antilock Brake Systems and Automatic Traction Control

Students will be able to diagnose, evaluate, and repair antilock brake system (ABS) and automatic traction control (ATC) components to ensure optimal vehicle braking performance and safety.

* Aligned Industry Recognized Credentials: ASE – Entry Level Certifications – Brakes, ASE – Entry Level Certification – Inspection, Maintenance, and Minor Repair

#### Skills:

1. Evaluate the operation of antilock brake system (ABS) warning lights (including dash-mounted trailer ABS warning lights) and determine corrective actions.
2. Analyze and diagnose antilock brake system (ABS) electronic controls and components using self-diagnosis and specified test equipment (scan tool, PC computer), and determine appropriate interventions.
3. Assess causes of poor stopping and wheel lock-up related to antilock brake system (ABS) failures; formulate and implement necessary corrective actions.
4. Assess and evaluate the functionality of antilock brake system (ABS) air, hydraulic, electrical, and mechanical components; perform required actions to restore optimal operation.
5. Examine and adjust or replace antilock brake system (ABS) wheel speed sensors and circuits based on diagnostic results and performance needs.
6. Apply manufacturer procedures to bleed ABS hydraulic circuits; ensure proper hydraulic system functionality and address any identified issues.
7. Evaluate the operation of automatic traction control (ATC) warning lights and determine necessary actions based on the observed performance.
8. Analyze and diagnose automatic traction control (ATC) electronic controls and components using self-diagnosis and specified test equipment (scan tool, PC computer), and determine appropriate corrective actions.

### Standard 22: Power Steering System Units

Students will be able to diagnose and resolve issues in steering columns, units, and linkages to ensure optimal performance, safety, and alignment of the vehicle’s steering system.

* Aligned Industry Recognized Credentials: ASE – Entry Level Certifications -Suspension and Steering, ASE – Entry Level Certification – Inspection, Maintenance, and Minor Repair

#### Skills:

1. Identify and explain suspension and steering system components and configurations.
2. Disable and enable supplemental restraint system (SRS) and verify indicator lamp operation.
3. Analyze the sources of noise, looseness, and binding issues in fixed and driver-adjustable steering columns and shafts; formulate appropriate corrective actions.
4. Evaluate and service steering shaft components such as U-joints, slip joints, bearings, bushings, and seals; synchronize shaft phases as necessary.
5. Inspect operation of tilt and telescoping steering column.
6. Assess and adjust cab mounting and ride height to meet specifications.
7. Calibrate the steering wheel alignment to ensure proper centering.
8. Implement and restore the supplemental restraint system (SRS) following manufacturer guidelines.
9. Diagnose causes of various issues within the power steering system including noise, binding, and fluid problems; prescribe corrective measures.
10. Determine the appropriate type of power steering fluid; evaluate fluid levels and condition; recommend necessary actions.
11. Execute a power steering system flush, refill, and air purge procedure.
12. Conduct pressure, temperature, and flow tests on the power steering system; interpret results and recommend actions.
13. Inspect and service or replace the power steering reservoir, including filters, seals, and gaskets.
14. Assess the condition of the power steering pump drive gear and coupling; replace components as required.
15. Examine and adjust or replace the power steering pump, its mountings, and brackets.
16. Inspect and replace components of the power steering system cooler, lines, hoses, clamps, and fittings.
17. Evaluate and repair or replace integral type power steering gears (single and/or dual) and their mountings.
18. Inspect tie rod ends, ball joints, kingpins, pitman arms, and idler arms; realign the pitman arm, lubricate, and replace components as needed.
19. Inspect and adjust steering wheel stops to ensure proper function.
20. Lubricate and maintain steering arms and linkages to ensure optimal performance.

### Standard 23: Suspension Systems

Students will be able to inspect, diagnose, and service suspension system components, including axles, springs, shock absorbers, and air suspension systems, to ensure optimal vehicle stability, ride quality, and safety.

* Aligned Industry Recognized Credentials: ASE – Entry Level Certifications -Suspension and Steering, ASE – Entry Level Certification – Inspection, Maintenance, and Minor Repair

#### Skills:

1. Inspect front axles and attaching hardware; determine the necessary actions for repair or replacement.
2. Evaluate and service kingpins, steering knuckle bushings, locks, bearings, seals, and covers; identify and execute appropriate corrective actions.
3. Examine shock absorbers, bushings, brackets, and mounts; replace components as needed.
4. Inspect leaf springs, center bolts, clips, pins, bushings, shackles, U-bolts, slippers, insulators, brackets, and mounts; determine and implement necessary adjustments or replacements.
5. Analyze axle-aligning devices such as radius rods, track bars, stabilizer bars, torque arms, and related bushings, mounts, shims, and cams; determine needed corrective measures.
6. Inspect walking beams, center (cross) tube, bushings, mounts, load pads, and saddles/caps; replace as needed.
7. Inspect tandem suspension equalizer components; identify and address any issues requiring action.
8. Evaluate air suspension pressure regulators and height control valves, lines, hoses, dump valves, and fittings; adjust, repair, or replace, as necessary.
9. Examine air springs, mounting plates, suspension arms, and bushings; replace components as required.
10. Demonstrate measuring ride height and implement the required adjustments if needed.
11. Inspect and identify rough ride problems and determine the necessary corrective actions.

### Standard 24: Wheel Alignment and Wheel/Tire Inspection and Repair

Students will be able to inspect, diagnose, and adjust vehicle alignment angles and suspension components, as well as perform tire inspections and repairs, to ensure optimal vehicle performance, safety, and handling.

* Aligned Industry Recognized Credentials: ASE – Entry Level Certifications -Suspension and Steering, ASE – Entry Level Certification – Inspection, Maintenance, and Minor Repair

#### Skills:

1. Analyze the causes of vehicle wandering, pulling, shimmy, hard steering, and off-center steering wheel problems; adjust or repair as needed.
2. Evaluate camber, caster, and toe alignment angles; determine and perform necessary adjustments to ensure proper vehicle alignment.
3. Analyze rear axle alignment (thrustline/centerline) and tracking; adjust or repair as needed.
4. Identify turning/Ackerman angle (toe-out-on-turns) problems; determine the necessary corrective action.
5. Inspect front axle alignment (centerline); adjust or repair as needed.
6. Demonstrate tire inspection by analyzing tire wear patterns, checking tread depth and pressure, and inspecting the valve stem and cap; determine necessary corrective actions.
7. Diagnose wheel/tire vibration, shimmy, pounding, or hop (tramp) problems; determine necessary corrective action.
8. Remove, inspect, and install steering and drive axle wheel/tire assemblies, torque fasteners to manufacturer’s specifications.
9. Inspect tires for proper application (size, load range, position, and tread design); determine necessary corrective action.
10. Inspect wheel/rims for proper application (load range, size, and design); assess and determine any necessary replacement or adjustment.
11. Check operation of tire pressure monitoring system; determine needed action.

### Standard 25: Frame and Coupling Devices

Students will be able to inspect, service, and repair fifth wheels, sliding fifth wheel components, frame structures, and pintle hooks to ensure vehicle coupling systems' safety and integrity.

* Aligned Industry Recognized Credentials: ASE – Entry Level Certifications -Suspension and Steering, ASE – Entry Level Certification – Inspection, Maintenance, and Minor Repair

#### Skills:

1. Inspect, service, and adjust fifth wheel, pivot pins, bushings, locking mechanisms, and mounting hardware to ensure proper function and safety.
2. Inspect and service sliding fifth wheel components including tracks, stops, locking systems, air cylinders, springs, lines, hoses, and controls; perform necessary repairs.
3. Examine the frame and frame members for cracks, breaks, corrosion, distortion, elongated holes, looseness, and damage; determine and implement needed repairs.
4. Inspect, install, or repair frame hangers, brackets, and cross members in accordance with manufacturers’ recommended procedures.
5. Inspect, repair, or replace pintle hooks and draw bars to ensure they meet safety and operational standards.

### Standard 26: Engine Brakes and Drive Train Inspection, Maintenance, and Repair

Students will demonstrate inspecting, diagnosing, servicing, and repairing key components of vehicle drive train, engine brake, clutch, transmission, drive axle, and power divider systems, ensuring optimal vehicle performance and adherence to safety and maintenance standards.

* Aligned Industry Recognized Credentials: ASE – Entry Level Certification – Inspection, Maintenance, and Minor Repair

#### Skills:

1. **Research, analyze, and document vehicle service information** including fluid types, service history, service precautions, and technical service bulletins, to ensure accurate maintenance and repairs are conducted across systems.
2. **Inspect and diagnose engine compression and/or exhaust brake systems,** including housing, valves, seals, lines, fittings, control circuits, switches, and solenoids, identifying issues, performing necessary repairs, and determining corrective actions.
3. Identify and categorize drive train components, transmission types, and configurations, demonstrating an understanding of their functions and interactions within the system.
4. Inspect and adjust clutch components, including clutch brake, linkage, cables, levers, brackets, bushings, pivots, springs, and clutch safety switch, ensuring proper pedal height and travel, and determine necessary adjustments or repairs.
5. Assess clutch master cylinder fluid levels and inspect clutch system components (master cylinder, slave cylinder, lines, and hoses) for leaks or damage, determining and demonstrating needed actions.
6. Inspect transmission shifter and linkage, transmission mounts, insulators, and mounting bolts, evaluating their condition, and recommending corrective actions as needed.
7. Assess transmission for leakage, determining the source and appropriate remedial actions to ensure system integrity.
8. Replace transmission cover plates, gaskets, seals, and cap bolts, inspecting seal surfaces and vents to ensure proper function and determining corrective actions where necessary.
9. Check transmission fluid levels and condition, identifying required maintenance or replacement to optimize performance.
10. Inspect transmission breather, oil filters, coolers, and related components, diagnosing issues and implementing corrective actions to maintain transmission efficiency.
11. Inspect and test speedometer components for proper functionality, determining needed repairs or replacements.
12. Inspect and test the function of REVERSE light, neutral start, and warning device circuits, identifying and correcting any faults in the systems.
13. Inspect, service, or replace driveshaft components, including slip joints, yokes, drive flanges, support bearings, universal joints, boots, seals, and retaining/mounting hardware, ensuring proper phasing of all shafts and overall system integrity.
14. Diagnose drive axle(s) drive unit noise and overheating problems; determine needed action.
15. Check for fluid leaks and inspect the drive axle housing assembly, including cover plates, gaskets, seals, vent/breather, and magnetic plugs, identifying any maintenance needs or repairs.
16. Check drive axle fluid levels and condition, inspect drive axle filter, and determine necessary maintenance actions.
17. Remove and replace differential carrier assembly.
18. Inspect, repair, or replace 2-speed axle shift control system, speedometer adapters, motors, axle shift units, wires, air lines, and connectors.
19. Inspect power divider (inter-axle differential) assembly; determine needed action.
20. Inspect, adjust, repair, or replace air operated power divider (inter-axle differential) lockout assembly including diaphragms, seals, springs, yokes, pins, lines, hoses, fittings, and controls.
21. Inspect drive axle shafts, determining necessary repairs or replacements to ensure performance.
22. Inspect, repair, or replace drive axle lubrication system: pump, troughs, collectors, slingers, tubes, and filters.
23. Demonstrate the ability to remove and replace wheel assemblies, inspect rear wheel seals and axle flanges for leaks, and determine appropriate corrective actions.
24. Inspect and test the drive axle temperature gauge and sending unit/sensor; determine needed action.

### Standard 27: Heating, Ventilation, and Air Conditioning (HVAC)

Students will be able to diagnose, inspect, and repair heating, ventilation, and air conditioning (HVAC) systems in vehicles, including refrigeration, engine cooling, and operating systems, using appropriate tools and techniques to ensure optimal system performance and adherence to safety standards.

* Aligned Industry Recognized Credentials: ASE – Entry Level Certification – Inspection, Maintenance, and Minor Repair

#### Skills:

1. Identify and categorize HVAC components and configurations, demonstrating an understanding of their function and how they interact within the vehicle system.
2. Demonstrate use of appropriate electronic service tools to diagnose HVAC problems, check, and clear diagnostic codes, and interpret digital multimeter (DMM) readings, applying the data to determine necessary actions.
3. Inspect A/C compressor drive belts, pulleys, and tensioners, verifying proper belt alignment and diagnosing potential issues for repair.
4. Evaluate A/C system operation by checking system pressures, visually inspecting components for leaks, and assessing the A/C monitoring system to determine needed maintenance.
5. Inspect A/C condenser for airflow restrictions, diagnosing issues and determining appropriate corrective actions.
6. Inspect engine cooling system and heater system hoses and pipes, diagnosing issues and determining necessary repairs or replacements.
7. Inspect HVAC system components, including heater ducts, doors, hoses, cabin filters, and outlets, identifying problems and determining corrective actions.
8. Identify the source of A/C system odors, diagnosing the cause and determining appropriate solutions.
9. Verify blower motor operation, confirming proper air distribution and temperature control, and diagnosing issues to determine required actions for repair or adjustment.

### Standard 28: Cab, Instruments and Controls, Safety Equipment, and Hardware

Students will demonstrate the ability to diagnose, inspect, and service vehicle electronic systems, instruments, controls, safety equipment, and hardware components, using appropriate diagnostic tools and procedures to ensure optimal vehicle performance, safety, and adherence to maintenance standards.

* Aligned Industry Recognized Credentials: ASE – Entry Level Certification – Inspection, Maintenance, and Minor Repair

#### Skills:

1. Utilize appropriate electronic service tools and procedures to diagnose vehicle system problems, check, record, and clear diagnostic codes, reset maintenance monitors, and interpret digital multimeter (DMM) readings to ensure accurate diagnosis and repair.
2. Check and record trip and operational data, applying the information to determine necessary maintenance or corrective actions.
3. Inspect and evaluate the mechanical key condition and ignition switch operation, and check the functionality of indicator lights, warning lights, alarms, and instruments, ensuring accurate oil pressure and system voltage readings.
4. Test the operation of electronic power take-off (PTO) and engine idle speed controls, identifying issues and determining needed actions for repair or adjustment.
5. Assess the functionality of all vehicle accessories, ensuring optimal performance and identifying any needed repairs or replacements.
6. Understand the operation of auxiliary power units (APU) or electric power units (EPU), demonstrating their application within vehicle systems.
7. Test the operation of horns (electric and air), warning devices (reverse, air pressure, etc.), and inspect the condition of spare fuses, safety triangles, fire extinguisher, and required decals to ensure compliance with safety regulations.
8. Inspect the condition of seat belts, sleeper restraints, wiper blades, and arms, identifying necessary repairs or replacements to maintain safety standards.
9. Test the operation of wipers and washers, inspect windshield glass for cracks or discoloration, and verify the condition and operation of sun visors, seats, door glass, and window mechanisms.
10. Inspect door and cab locks, steps, grab handles, mirrors, mountings, brackets, and glass, identifying any necessary repairs or adjustments for proper function.
11. Record all physical damage to the vehicle's cab and related components, noting areas requiring attention or repair.
12. Inspect and lubricate all grease fittings including door and hood hinges, latches, strikers, lock cylinders, safety latches, linkages, and cables for smooth operation.
13. Inspect cab mountings, hinges, latches, linkages, and ride height, determining needed repairs to maintain vehicle structural integrity.
14. Inspect quarter fenders, mud flaps, and brackets, identifying areas for maintenance or replacement to ensure proper safety and function.**Top of Form**

## Employability Standards

### Standard 29: Employability Skills

Students will demonstrate professional communication, critical thinking, problem-solving, professionalism, teamwork, and collaboration within the context of the Diesel Technology field.

#### Skills:

1. Demonstrate effective communication and interpersonal skills to provide exceptional customer service across various platforms, including face-to-face interactions, telephone conversations, written, and electronic correspondence.
2. Analyze complex problems and develop effective solutions, applying critical thinking and problem-solving techniques relevant to the Diesel Technology field.
3. Exhibit active listening skills by giving full attention to others, understanding their points of view, and asking appropriate questions to meet job expectations and improve production methods.
4. Collaborate effectively in teams to achieve common goals, demonstrating coordination and cooperation with other professionals in the Diesel Technology field.
5. Apply effective time management techniques, including task prioritization, deadline management, and efficient workload handling.
6. Demonstrate ethical behavior and adhere to industry standards, ensuring safety, compliance, and integrity in all professional activities.

## Entrepreneurship Standards

### Standard 30: Entrepreneurship

Students will be able to describe opportunities for entrepreneurship and be able to evaluate the value proposition of business ownership in the Diesel Technology field.

#### Skills:

1. Evaluate the licensing, regulatory, and tax implications of self-employment and business ownership in the Diesel Technology field compared to W-2 employment.
2. Understand current job trends, skill requirements, and potential areas of growth within the modern Diesel Technology field, market demands, and evolving industry standards.
3. Assess the impact of technological advancements on business opportunities and strategies in Diesel Technology, including the integration of new tools, software, and diagnostic equipment, and how these innovations can drive business growth and efficiency.

## Digital Literacy Standards

### Standard 31: Digital Literacy

Students will demonstrate digital literacy skills for the Diesel Technology field, including the use of diagnostic software, data management, technical documentation, and digital communication, to effectively perform modern diesel maintenance and repair tasks.

#### Skills:

1. Demonstrate communicating and collaborating digitally with team members, customers, and suppliers using email, messaging apps, and video conferencing tools.
2. Utilize diagnostic software and tools effectively for troubleshooting and repairing diesel engines, including reading and interpreting error codes and performance data.
3. Manage and record diagnostic and service data electronically, including using databases and software for tracking maintenance schedules and parts inventory.
4. Access and interpret digital technical documentation, such as service manuals and schematics, and use online resources for up-to-date information.