

# North Dakota Automotive Technology

## *Content Standards*

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North Dakota Department of Career and Technical Education

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## INTRODUCTION TO CTE STANDARDS

### **CTE Mission**

The mission of the State Board for Career and Technical Education is to work with others to provide all North Dakota citizens with the technical skills, knowledge, and attitudes necessary for successful performance in a globally competitive workplace.

### **Program Mission and Vision Statements**

To provide a technical foundation in Automotive Technology with specific job skills for employment in the Automotive Industry and/or pursue additional technical education in a related postsecondary program.

### **Goal**

Career and Technical Education (CTE) is a series of educational programs organized to prepare students for careers in their chosen fields, to take leadership roles, and to balance their multiple roles in life. The CTE goal is to create a competitive and knowledgeable work force. CTE programs prepare students with the knowledge and skills to make informed career choices, to integrate and apply academic concepts, to prepare for successful participation in a global society, and to engage in lifelong learning.

The North Dakota standards for each CTE program define expectations for student learning. These expectations guide the development of high-quality and relevant career-focused programs that are consistent across the state.

### **Process**

Writing standards is a multi-phase process. Existing national and/or industry standards are the basis for the North Dakota program standards. In addition, standards from other states are reviewed for essential content. A team of expert secondary and postsecondary teachers, business and industry representatives, and the state program supervisor(s) draft the standards document. Once the document is finalized, the State Board of Career and Technical Education approves and adopts the standards.

The standards documents are reviewed and updated on a four-year cycle. Further information on the standards can be found at:

<http://www.nd.gov/cte/standards/>

### **Academic Integration**

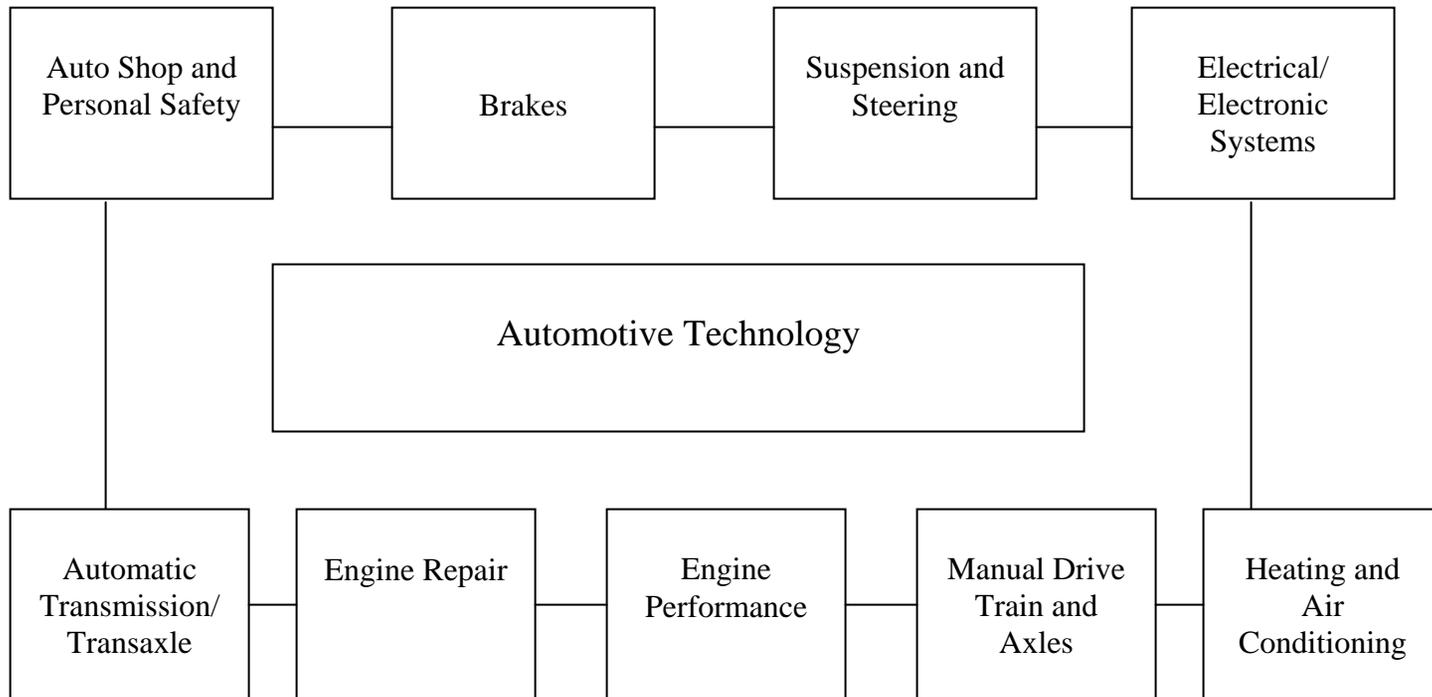
The Department of Career and Technical Education strongly believes in the importance of academic integration within each program. CTE courses are a vehicle by which students can apply academic knowledge to everyday life. Each standards document includes an academic cross-walk that identifies the standards in English/Language Arts, Mathematics, and Science that relate to CTE standards and can be taught or reinforced in the CTE program.

### **Using the Standards**

Districts will use the standards as guides for developing curriculum that reflects local needs and are also tailored to prepare young people for the opportunities that exist in North Dakota and elsewhere.

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## Automotive Technology Content Standards



## Standards and Topics at a Glance

- 1.0 Auto Shop and Personal Safety
  - 1.1 Auto Shop Safety Practices and Safety Equipment Orientation
  - 1.2 Automotive Tool Applications and Proper Usage
  - 1.3 Service Information and Retrieval Systems
  - 1.4 Customer Concerns and Proper Vehicle Service Preparation
  - 1.5 Quality Control Issues While Preparing the Vehicle for the Customer
  - 1.6 Vehicle Maintenance and Inspection Techniques
- 2.0 Suspension and Steering
  - 2.1 Steering and Suspension Systems
- 3.0 Brakes
  - 3.1 Brake Components, Inspections, and Repair
- 4.0 Electrical/Electronic Systems
  - 4.1 Electrical and Electronic Systems, Measurement and Testing
- 5.0 Engine Performance
  - 5.1 Engine Performance and Diagnostic Tasks
- 6.0 Automatic Transmission/Transaxle
  - 6.1 Automatic Transmission Maintenance Procedures
- 7.0 Engine Repair
  - 7.1 Engine Maintenance Procedures
- 8.0 Heating and Air Conditioning
  - 8.1 Air Conditioning System Components and Temperature Diagnosis
- 9.0 Manual Drive Train and Axles
  - 9.1 Manual Driveline System Maintenance

## Organization of the Standards Document

**Standard:** provides a broad overview or general description of the content.

**Topics:** describe in general terms what students should know and be able to do.

**Competencies:** more specifically define the knowledge, skills, and practices of topics and provide the basis for measuring student learning.

|   |   |  |
|---|---|--|
| <b>Standard 1: Career, Community and Family Connections</b> – Integrate multiple life roles and responsibilities in family, work, and community settings. <i>(Based on National Standard # 1)</i> |   |  |
| Topic 1: Analyze strategies to manage multiple life roles and responsibilities.   |   |  |
| <b>Introductory</b>   | <b>Core</b>   | <b>Advanced</b>  |
|   | 1.1.1 List and describe trends in the workplace and community that impact individuals and families (e.g., policies, issues, ethics, worker benefits, etc.)<br>1.1.2 Describe how individual career goals can affect the family<br>1.1.3 Set personal goals for learning and leisure.<br>1.1.4 Predict the potential impact of career path decisions on balancing work and family.   | 1.1.5 Analyze the impact of social, economic, and technological change on work and family dynamics<br>1.1.6 Develop a life plan for achieving individual, family, and career goals                     |
| Topic 2: Identify transferable and employability skills   |   |  |
| <b>Introductory</b>   | <b>Core</b>   | <b>Advanced</b>  |
| 1.2.1 Apply communication skills (e.g., reading, writing, speaking, etc.)   | 1.2.2 Explore a variety of careers with emphasis on those requiring Family and Consumer Sciences skills (e.g., Textiles and Clothing, Food Production, Hospitality and Tourism, Interior Design, Food Science, etc.)<br>1.2.3 List job seeking and job keeping skills<br>1.2.4 Demonstrate teamwork and leadership “ skills<br>1.2.5 Examine work ethics and professionalism (e.g., dress, emails at work, gossip, theft, etc.) | 1.2.6 Develop strategies to manage the impact of changing technologies in workplace settings.<br>1.2.7 Examine factors that contribute to maintaining safe and healthy work and community environments |

## Automotive Technician Competency Categories

The competencies are further categorized into three divisions: Introductory, Core, and Advanced.

Learners at this level **analyze, synthesize, judge, assess** and **evaluate** knowledge in accord with their own goals, values and beliefs, and/or real situations.

### **Advanced**

Learners at this level **experience** acquired knowledge by **applying** it to familiar situations and to themselves.

### **Core**

Learners at this level **explore** and become more **aware** of the content within the subject.

### **Introductory**

## **Keys to Employability**

The eight skills are based on materials gathered from the North Dakota Career Resource Network and the National Career Development Guidelines. These national skills standards, developed by industry groups and sponsored by the U.S. Department of Education and Labor, provide career and technical educators with the expectations of employers across the United States.

### **Basic Skills**

- Reading-locates, understands, and interprets written information in prose and in documents such as manuals, graphs, and schedules.
- Writing-communicates thoughts ideas, information, and messages in writing; creates documents such as letters, directions, manuals, reports, graphs, and flow charts.
- Arithmetic/Mathematic – Performs basic computations and approaches practical problems by choosing appropriately from a variety of mathematical techniques.
- Listening – Receives, attends to, interprets, responds to verbal messages and other cues.
- Speaking – Organizes ideas and communicates orally.

### **Personal Qualities**

- Responsibility – Exerts a high level of effort and preserves towards goal attainment.
- Self-Esteem – Believes in own self worth and maintains a positive view of self.
- Sociability – Demonstrates understanding, friendliness, adaptability, empathy and politeness in group setting.
- Self Management – Assess self accurately, sets personal goals, monitors progress, and exhibits self-control.
- Integrity/Honesty – Chooses ethical courses of action.

## **Keys to Employability (Continued)**

### **Technology**

- Selects Technology – Chooses procedures, tools or equipment including computers and related technologies.
- Applies Technology – Understands overall intent and proper procedures for setup and operation of equipment.
- Maintains and Troubleshoots Equipment – Prevents, identifies, or solves problems with equipment, including computers and other technologies.

### **Systems**

- Understands Systems - Knows how social, organizational, and technological systems work and operates effectively with them.
- Monitors and Corrects Performance - Distinguishes trends, predicts impacts on system operations, diagnoses deviations in systems' performance and corrects malfunctions.
- Improves or Designs Systems - Suggests modifications to existing systems and develops new or alternative systems to improve performance.

### **Thinking Skills**

- Creative thinking-generates new ideas.
- Decision making-specifies goals.
- Problem Solving – Recognizes problems and devises and implements plan of action.
- Seeing Things in the Mind's Eye – Organizes, processes symbols, pictures, graphs, objects and other information.
- Knowing How to Learn – Uses efficient learning techniques to acquire and apply new knowledge and skills.
- Reasoning – Discovers a rule or principle underlying the relationship between two or more objects and applies it when solving a problem.

### **Resources**

- Time – Selects goal-relevant activities, ranks them, allocates time, and prepares and follows schedules.
- Money – Uses or prepares budgets, makes forecasts, keeps records, and makes adjustments to meet objectives.
- Material and Facilities – Acquires, stores, allocates, and uses materials or space efficiently.
- Human Resources – Assesses skills and distributes work accordingly, evaluates performance and provides feedback.

### **Information**

- Acquires and Evaluates Information.
- Organizes and Maintains Information.
- Interprets and Communicates Information.
- Uses Computers to Process Information.

### **Interpersonal**

- Participates as a Member of a Team - Contributes to group effort.
- Teaches Others New Skills
- Serves Client/Customers - Works to satisfy customers' expectations.
- Exercises Leadership - Communicates ideas to justify position, persuades and convinces others, responsibly challenges existing procedures and policies.
- Negotiates - Works toward agreements involving exchange of resources; resolves divergent interests.
- Works with Diversity - Works well with men and women from diverse backgrounds.

**Standard 1: Auto Shop and Personal Safety –****Topic 1: Auto Shop Safety Practices and Safety Equipment Orientation**

| <b>Introductory</b> | <b>Core</b>   | <b>Advanced</b> |
|---------------------|---|-----------------|
|                     | <ul style="list-style-type: none"><li>1.1.1 Identify general shop safety rules and procedures.</li><li>1.1.2 Utilize safe procedures for handling of tools and equipment.</li><li>1.1.3 Identify and use proper placement of floor jacks and jack stands.</li><li>1.1.4 Identify and use proper procedures for safe lift operation.</li><li>1.1.5 Utilize proper ventilation procedures for working within the lab/shop area.</li><li>1.1.6 Identify marked safety areas.</li><li>1.1.7 Identify the location and use of fire blankets.</li><li>1.1.8 Identify the location and the types of fire extinguishers; demonstrate knowledge of the procedures for using fire extinguishers.</li><li>1.1.9 Identify the location and use of eye wash stations.</li><li>1.1.10 Identify the location of the posted evacuation routes.</li><li>1.1.11 Comply with the required use of safety glasses, gloves, shoes during lab/shop activities.</li><li>1.1.12 Identify and wear appropriate clothing for lab/shop activities.</li><li>1.1.13 Comply with appropriate hairstyles for lab/shop activities.</li><li>1.1.14 Demonstrate knowledge of safety aspects of supplemental restraint systems (SRS) and antilock brake systems (ABS).</li><li>1.1.15 Locate and demonstrate knowledge of material safety data sheets (MSDS).</li></ul> |                 |

| Topic 2: Automotive Tool Applications and Proper Usage            |   |          |
|---|---|----------|
| Introductory  | Core  | Advanced |
|   | 1.2.1 Identify tools and their usage in automotive applications.<br>1.2.2 Identify standard and metric designation.<br>1.2.3 Demonstrate safe handling and use of appropriate tools.<br>1.2.4 Demonstrate proper cleaning, storage, and maintenance of tools and equipment.   |          |
| Topic 3: Service Information Retrieval Systems                    |   |          |
| Introductory  | Core  | Advanced |
|   | 1.3.1 Identify sources of service information<br>1.3.2 Locate and use paper and electronic manuals.<br>1.3.3 Locate and use Technical Service Bulletins (TSBs).<br>1.3.4 Define the purpose and use of the VIN, engine numbers, and date code.<br>1.3.5 Locate VIN.<br>1.3.6 Apply knowledge of VIN information.  |          |
| Topic 4: Customer Concerns and Proper Vehicle Service Preparation |   |          |
| Introductory  | Core  | Advanced |
|   | 1.4.1 Identify information needed and the service requested on a repair order.<br>1.4.2 Identify purpose and demonstrate proper use of fender covers, mats.<br>1.4.3 Demonstrate use of the three C's (concern, cause, and correction).<br>1.4.4 Review vehicle service history.<br>1.4.5 Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction. |          |

| Topic 5: Quality Control Issues While Preparing the Vehicle for the Customer |  |          |
|--|--|----------|
| Introductory   | Core   | Advanced |
|  | 1.5.1 Ensure vehicle is prepared to return to customer per school/company policy (floor mats, steering wheel cover, etc.).   |          |
| Topic 6: Vehicle Maintenance and Inspection Techniques                       |  |          |
| Introductory   | Core   | Advanced |
|  | 1.6.1 Check and adjust engine oil level.<br>1.6.2 Check and adjust engine coolant level.<br>1.6.3 Check and adjust power steering fluid level.<br>1.6.4 Check and adjust brake fluid level.<br>1.6.5 Check and adjust windshield washer fluid level.<br>1.6.6 Check and replace wiper blades.<br>1.6.7 Check and adjust differential/transfer case fluid level.<br>1.6.8 Check and adjust transmission fluid level.<br>1.6.9 Inspect, replace, and adjust drive belts, tensioners, and pulleys; check pulley and belt alignment.<br>1.6.10 Inspect and replace air filter.<br>1.6.11 Determine fluid type requirements and identify fluid. |          |

| <b>Standard 2: Suspension and Steering</b> |  |                 |
|--|--|-----------------|
| Topic 1: Steering and Suspension Systems   |  |                 |
| <b>Introductory</b>                        | <b>Core</b>  | <b>Advanced</b> |
|  | <p>2.1.1 Identify and interpret suspension and steering concern; determine necessary action.</p> <p>2.1.2 Determine proper power steering fluid types; inspect fluid levels and condition.</p> <p>2.1.3 Flush, fill, and bleed power steering system.</p> <p>2.1.4 Diagnose power steering fluid leakage; determine necessary action.</p> <p>2.1.5 Lubricate suspension and steering systems.</p> <p>2.1.6 Inspect, remove, and replace shock absorbers.</p> <p>2.1.7 Remove, inspect, and install stabilizer bar bushings, brackets, and links.</p> <p>2.1.8 Remove, inspect, and install strut cartridge or assembly, strut coil spring, insulators (silencers), and upper strut bearing mount.</p> <p>2.1.9 Perform pre-alignment inspection; determine necessary action.</p> <p>2.1.10 Measure vehicle riding height; determine necessary action.</p> <p>2.1.11 Diagnose tire wear patterns; determine necessary action.</p> <p>2.1.12 Inspect tires; check and adjust air pressure.</p> <p>2.1.13 Diagnose wheel/tire vibration, shimmy, and noise; determine necessary action.</p> <p>2.1.14 Rotate tires according to manufacturer's recommendations.</p> <p>2.1.15 Balance wheel and tire assembly (static and dynamic).</p> <p>2.1.16 Dismount, inspect, and remount tire on wheel.</p> <p>2.1.17 Repair tire using internal patch.</p> |                 |

| <b>Standard 2: Suspension and Steering</b> |  |                 |
|--|--|-----------------|
| Topic 1: Steering and Suspension Systems   |  |                 |
| <b>Introductory</b>                        | <b>Core</b>                              | <b>Advanced</b> |
|  | 2.1.18 Reinstall wheel; torque lug nuts. |                 |

| <b>Standard 3: Brakes</b>  |  |                 |
|--|--|-----------------|
| Topic 1: Brake Components, Inspection, and Repair of Brake Systems |  |                 |
| <b>Introductory</b>  | <b>Core</b>  | <b>Advanced</b> |
|  | 3.1.1 Inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging or wear; tighten loose fittings and supports; determine necessary action.<br>3.1.2 Select, handle, store, and fill brake fluids to proper level.<br>3.1.3 Bleed (manual, pressure, vacuum, or surge) brake system.<br>3.1.4 Flush hydraulic system.<br>3.1.5 Remove, clean (using proper safety procedures), inspect, and measure brake drums; determine necessary action.<br>3.1.6 Refinish brake drum.<br>3.1.7 Remove, clean, and inspect brake shoes, springs, pins, clips, levers, adjusters/self-adjusters, other related brake hardware, and backing support plates; lubricate and reassemble.<br>3.1.8 Remove, inspect, and install wheel cylinders.<br>3.1.9 Pre-adjust brake shoes and parking brake before installing brake drums or drum/hub assemblies and wheel bearings. |                 |

| <b>Standard 3: Brakes</b>   |  |                 |
|---|--|-----------------|
| <b>Topic 1: Brake Components, Inspection, and Repair of Brake Systems</b> |  |                 |
| <b>Introductory</b>   | <b>Core</b>  | <b>Advanced</b> |
|   | <p>3.1.10 Install wheel, torque lug nuts, and make final checks and adjustments.</p> <p>3.1.11 Remove caliper assembly from mountings; clean and inspect for leaks and damage to caliper housing; determine necessary action.</p> <p>3.1.12 Clean and inspect caliper mounting and slides for wear and damage; determine necessary action.</p> <p>3.1.13 Remove, clean, and inspect pads and retaining hardware; determine necessary action.</p> <p>3.1.14 Reassemble, lubricate, and reinstall caliper, pads, and related hardware; seat pads, and inspect for leaks.</p> <p>3.1.15 Clean, inspect, and measure rotor with a dial indicator and a micrometer; follow manufacturer's recommendations in determining need to machine or replace.</p> <p>3.1.16 Remove and reinstall rotor.</p> <p>3.1.17 Refinish rotor on vehicle.</p> <p>3.1.18 Refinish rotor off vehicle.</p> <p>3.1.19 Install wheel, torque lug nuts, and make final checks and adjustments.</p> <p>3.1.20 Check vacuum supply (manifold or auxiliary pump) to vacuum-type power booster.</p> <p>3.1.21 Inspect the vacuum-type power booster unit for vacuum leaks; inspect the check valve for proper operation; determine necessary action.</p> <p>3.1.22 Diagnose wheel bearing noises, wheel shimmy, and vibration concerns; determine necessary action.</p> |                 |

| <b>Standard 3: Brakes</b>  |   |                 |
|--|---|-----------------|
| Topic 1: Brake Components, Inspection, and Repair of Brake Systems |   |                 |
| <b>Introductory</b>  | <b>Core</b>   | <b>Advanced</b> |
|  | 3.1.23 Check parking brake cables and components for wear, rusting, binding, and corrosion; clean, lubricate, or replace as needed.<br>3.1.24 Check parking brake operation; determine necessary action.<br>3.1.25 Check operation of parking brake operation indicator light system.<br>3.1.26 Check operation of brake stop light system; determine necessary action.<br>3.1.27 Replace wheel bearing and race.<br>3.1.28 Identify and inspect antilock brake system (ABS) components; determine necessary action.<br>3.1.29 Identify traction control/vehicle stability control system components. |                 |

| <b>Standard 4: Electrical/Electronic Systems</b>                   |   |                 |
|--|---|-----------------|
| Topic 1: Electrical and Electronic Systems Measurement and Testing |   |                 |
| <b>Introductory</b>  | <b>Core</b>   | <b>Advanced</b> |
|  | 4.1.1 Diagnose electrical/electronic integrity of series, parallel and series-parallel circuits using principles of electricity (Ohm's Law).<br>4.1.2 Use wiring diagrams during diagnosis of electrical circuit problems.<br>4.1.3 Demonstrate the proper use of a digital multimeter (DMM) during diagnosis of electrical circuit problems.<br>4.1.4 Check electrical circuits with a test light; determine necessary action. |                 |

| <b>Standard 4: Electrical/Electronic Systems</b>                          |  |                 |
|---|--|-----------------|
| <b>Topic 1: Electrical and Electronic Systems Measurement and Testing</b> |  |                 |
| <b>Introductory</b>   | <b>Core</b>  | <b>Advanced</b> |
|   | <p>4.1.5 Measure source voltage and perform voltage drop tests in electrical/electronic circuits using a voltmeter; determine necessary action.</p> <p>4.1.6 Measure current flow in electrical/electronic circuits and components using an ammeter; determine necessary action.</p> <p>4.1.7 Check continuity and measure resistance in electrical/electronic circuits and components using an ohmmeter; determine necessary action.</p> <p>4.1.8 Check electrical circuits using fused jumper wires; determine necessary action.</p> <p>4.1.9 Locate shorts, grounds, opens, and resistance problems in electrical/electronic circuits; determine necessary action.</p> <p>4.1.10 Measure and diagnose the cause(s) of excessive key-off battery drain (parasitic draw); determine necessary action.</p> <p>4.1.11 Inspect and test fusible links, circuit breakers, and fuses; determine necessary action.</p> <p>4.1.12 Inspect and test switches, connectors, relays, solid state devices, and wires of electrical/electronic circuits; perform necessary action.</p> <p>4.1.13 Repair connectors and terminal ends.</p> <p>4.1.14 Repair wiring harness (including CAN/BUS systems).</p> <p>4.1.15 Perform solder repair of electrical wiring.</p> <p>4.1.16 Perform battery state-of-charge test; determine necessary action.</p> |                 |

| <b>Standard 4: Electrical/Electronic Systems</b>                          |  |                 |
|---|--|-----------------|
| <b>Topic 1: Electrical and Electronic Systems Measurement and Testing</b> |  |                 |
| <b>Introductory</b>   | <b>Core</b>  | <b>Advanced</b> |
|   | <p>4.1.17 Perform battery capacity test (or conductance test); confirm proper battery capacity for vehicle application; determine necessary action.</p> <p>4.1.18 Maintain or restore electronic memory functions.</p> <p>4.1.19 Inspect, clean, fill, and replace battery.</p> <p>4.1.20 Perform slow/fast battery charge.</p> <p>4.1.21 Inspect and clean battery cables, connectors, clamps, and hold-downs; repair or replace as needed.</p> <p>4.1.22 Start a vehicle using jumper cables and a battery or auxiliary power supply.</p> <p>4.1.23 Perform starter current draw tests; determine necessary action.</p> <p>4.1.24 Perform starter circuit voltage drop tests; determine necessary action.</p> <p>4.1.25 Inspect and test starter relays and solenoids; determine necessary action.</p> <p>4.1.26 Differentiate between electrical and engine mechanical problems that cause a slow-crank or no-crank condition.</p> <p>4.1.27 Perform charging system output test; determine necessary action.</p> <p>4.1.28 Diagnose the cause of brighter than normal, intermittent, dim, or no light operation; determine necessary action.</p> <p>4.1.29 Inspect, replace, and aim headlights and bulbs.</p> |                 |

| <b>Standard 5: Engine Performance</b>                   |   |                 |
|---|---|-----------------|
| <b>Topic 1: Engine Performance and Diagnostic Tasks</b> |   |                 |
| <b>Introductory</b>                                     | <b>Core</b>   | <b>Advanced</b> |
|   | <p>5.1.1 Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels, and calibration decals).</p> <p>5.1.2 Perform engine absolute (vacuum/boost) manifold pressure tests; determine necessary action.</p> <p>5.1.3 Perform cylinder power balance test; determine necessary action.</p> <p>5.1.4 Perform cylinder cranking compression test; determine necessary action.</p> <p>5.1.5 Perform cylinder leakage test; determine necessary action.</p> <p>5.1.6 Verify engine operating temperature; determine necessary action.</p> <p>5.1.7 Prepare 4 or 5 gas analyzer; inspect and prepare vehicle for test, and obtain exhaust readings; determine necessary action.</p> <p>5.1.8 Perform cooling system pressure tests; check coolant condition; inspect and test radiator, pressure cap, coolant recovery tank, and hoses; perform necessary action.</p> <p>5.1.9 Retrieve and record stored OBD I diagnostic trouble codes; clear codes.</p> <p>5.1.10 Retrieve and record stored OBD II diagnostic trouble codes; clear codes when applicable.</p> <p>5.1.11 Obtain and interpret scan tool data.</p> <p>5.1.12 Replace fuel filters.</p> <p>5.1.13 Remove and replace thermostat and gasket.</p> |                 |

| <b>Standard 5: Engine Performance</b>            |   |                 |
|--|---|-----------------|
| Topic 1: Engine Performance and Diagnostic Tasks |   |                 |
| <b>Introductory</b>                              | <b>Core</b>   | <b>Advanced</b> |
|  | 5.1.14 Perform common fastener and thread repair to include, remove broken bolt, restore internal and external threads, and repair internal threads with thread insert. |                 |

| <b>Standard 6: Automatic Transmission/Transaxle</b>    |  |                 |
|--|--|-----------------|
| Topic 1: Automatic Transmission Maintenance Procedures |  |                 |
| <b>Introductory</b>                                    | <b>Core</b>  | <b>Advanced</b> |
|  | 6.1.1 Service transmission; perform visual inspection of transmission; replace fluids and filters. |                 |

| <b>Standard 7: Engine Repair</b>       |   |                 |
|--|---|-----------------|
| Topic 1: Engine Maintenance Procedures |   |                 |
| <b>Introductory</b>                    | <b>Core</b>   | <b>Advanced</b> |
|  | 7.1.1 Inspect engine assembly for fuel, oil, coolant, and other leaks; determine necessary action.<br>7.1.2 Test coolant; drain and recover coolant; flush and refill cooling system with recommended coolant; bleed air as required.<br>7.1.3 Perform oil and filter change.<br>7.1.4 Remove and replace radiator.<br>7.1.5 Inspect powertrain mounts; determine necessary action. |                 |

| <b>Standard 8: Heating and Air Conditioning</b>                              |   |                 |
|--|---|-----------------|
| <b>Topic 1: Air Conditioning System Components and Temperature Diagnosis</b> |   |                 |
| <b>Introductory</b>  | <b>Core</b>   | <b>Advanced</b> |
|  | 8.1.1 Identify and visually inspect A/C system components.<br>8.1.2 Locate refrigerant label and identify specified refrigerant type (e.g., R-12, R-134a).<br>8.1.3 Conduct preliminary performance test of A/C system (i.e., verify compressor engagement, measure outlet duct temperature, sense temperature change across A/C components); determine necessary action. |                 |

| <b>Standard 9: Manual Drive Train and Axles</b>     |  |                 |
|---|--|-----------------|
| <b>Topic 1: Manual Driveline System maintenance</b> |  |                 |
| <b>Introductory</b>                                 | <b>Core</b>  | <b>Advanced</b> |
|   | 9.1.1 Diagnose fluid loss, level, and condition concerns; determine necessary action.<br>9.1.2 Drain and fill transmission/transaxle and final drive unit.<br>9.1.3 Inspect clutch pedal linkage, cables, automatic adjuster mechanisms, brackets, bushings, pivots, and springs; determine necessary action.<br>9.1.4 Inspect hydraulic clutch slave and master cylinders, lines, and hoses; determine necessary action.<br>9.1.5 Bleed clutch hydraulic system.<br>9.1.6 Diagnose fluid leakage concerns; determine necessary action.<br>9.1.7 Inspect and replace drive axle shaft wheel studs. |                 |

| <b>Standard 9: Manual Drive Train and Axles</b>     |   |                 |
|---|---|-----------------|
| <b>Topic 1: Manual Driveline System maintenance</b> |   |                 |
| <b>Introductory</b>                                 | <b>Core</b>   | <b>Advanced</b> |
|   | 9.1.8 Inspect constant-velocity (CV) joint boots.<br>9.1.9 Remove and replace rear wheel drive drive shaft. |                 |