



*ALIGNED WITH
ASE/NATEF*

**AUTOMOTIVE
ENGINE PERFORMANCE
TECHNICIAN
SKILLS STANDARDS
OD32104**

COMPETENCY-BASED EDUCATION: OKLAHOMA'S RECIPE FOR SUCCESS

BY THE INDUSTRY FOR THE INDUSTRY

Oklahoma's *CareerTech* system of competency-based education uses industry professionals and certification standards to identify the knowledge and abilities needed to master an occupation. This industry input provides the foundation for development of instructional materials that help prepare the comprehensively trained, highly skilled employees demanded by our workplace partners.

TOOLS FOR SUCCESS

CareerTech relies on three basic instructional components to deliver competency-based instruction: skills standards, curriculum materials, and competency assessments.

Skills standards provide the foundation for competency-based instruction in Oklahoma's *CareerTech* system. The skills standards outline the knowledge, skills, and abilities needed to perform related jobs within an industry. Skills standards are aligned with national skills standards; therefore, a student trained to the skills standards possesses technical skills that make him/her employable in both state and national job markets.

Curriculum materials contain information and activities that teach students the knowledge and skills outlined in the skills standards. In addition to complementing classroom instruction, curriculum resources provide supplemental activities to enhance learning and provide hands-on training experiences.

Competency Assessments test the student over material outlined in the skills standards and taught using the curriculum materials. When used with classroom performance evaluations, written competency assessments provide a means of measuring occupational readiness.

Although each of these components satisfy a unique purpose in competency-based education, they work together to reinforce the skills and abilities students need to gain employment and succeed on the job.

MEASURING SUCCESS

Written competency assessments are used to evaluate student performance. Results reports communicate competency assessment scores to students and provide a breakdown of assessment results by duty area. The results breakdown shows how well the student has mastered skills needed to perform major job functions and identifies areas of job responsibility that may require additional instruction and/or training.

Group analysis of student results also provides feedback to instructors seeking to improve the effectiveness of career and technology training. Performance patterns in individual duties indicate opportunities to evaluate training methods and customize instruction.

TRUE TO OUR PURPOSE

"We prepare Oklahomans to succeed in the workplace, in education, and in life" defines the mission of Oklahoma *CareerTech* and its competency-based system of instruction. Skills standards, curriculum, and assessments that identify and reinforce industry expectations provide accountability for programs and assure *CareerTech*'s continued role in preparing skilled workers for a global job market

Copyright 2006
Oklahoma Department of Career and Technology Education
All rights reserved

Printed in the United States of America by the
Oklahoma Department of Career and Technology Education
Stillwater, Oklahoma

The Oklahoma Department of Career and Technology Education does not discriminate on the basis of race, creed, color, national origin, sex, age, veteran status, or qualified handicap.

TASK LIST AND ASSUMPTIONS

The following occupations and skills standards are drawn from the 2005 NATEF taskings. The format and duty titles were revised to conform to the model utilized for other skills standards within the Oklahoma Department of Career and Technology Education system. Additionally, the numbering of tasks in duties with multiple sections reflects a continuation of the numbering from previous sections in that duty. This was done to accommodate the test-bank computer software being utilized for competency tests.

The NATEF task list was reviewed and updated in February 2005. A national committee was assembled in Alpharetta, Georgia to review the standards used in the automobile certification program. The committee consisted of individuals representing the automobile manufacturers, automobile repair shop owners and technicians, automobile instructors and trainers, and automobile equipment and parts suppliers.

The committee reviewed the standards, task list, tools and equipment list, program hours, and instructor qualifications. The committee also had the most current National Institute for Automotive Service Excellence (ASE) automobile task lists for reference purposes.

All the tasks are assigned a priority number: P-1, P-2, or P-3. These priority numbers pertain to requirements for instruction on tasks as follows:

- P-1: 95% must be taught in the curriculum.
- P-2: 80% must be taught in the curriculum.
- P-3: 50% must be taught in the curriculum.

Theory instruction and hands-on performance of all the basic tasks will provide initial training for entry level employment in the automobile service field or further training in any or all of the specialty areas. Competency in these tasks will indicate to employers that the graduate is skilled in that area.

1. It is assumed that:

- * in all areas, appropriate theory, safety, and support instruction will be required in the performance of each task;
- * the instruction has included identification and use of appropriate tools and testing and measurement equipment required to accomplish certain tasks;
- * the student has received the necessary training to locate and use current reference and training materials from accepted industry publications and resources.
- * in all areas, the student has demonstrated the ability to write work orders and warranty reports, to include information regarding problem resolution and the results of the work performed for the customer and manufacturer. The writing process will incorporate the "Three C's" (concern, cause and correction) as a format to communicate this information.

2. It is assumed that:

- * all diagnostic and repair tasks described in this document are to be accomplished in accordance with manufacturers recommended procedures as published.

3. It is assumed that:

- * individual training programs being evaluated for certification should have written and detailed performance standards for each task covered and taught in the curriculum;
- * the learning progress of students will be monitored and evaluated against these performance standards;

- * a system is in place, which informs all students of their individual progress through all phases of the training program.

4. It is assumed that:

- * individual courses of study will differ across automobile technician training programs;
- * development of appropriate learning delivery systems and tests, which monitor student progress, will be the responsibility of the individual training program.

5. It is assumed that:

- * all students will receive instruction in the storage, handling, and use of Hazardous Materials as required in Hazard Communication Title 29, Code of Federal Regulation Part 1910.1200, the "Right to Know Law", and state and local requirements;
- * hazardous and toxic materials will be handled, removed and recycled or disposed of according to federal, state, and local regulations.

For every skill listed within the auto mechanics skills standards list, the following safety requirements must be strictly enforced:

Comply with personal and environmental safety practices associated with clothing; eye protection; hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of chemicals/materials in accordance with local, state, and federal safety and environmental regulations.

For further information concerning NATEF, please contact them at:
National Automotive Technicians Education Foundation
101 Blue Seal Drive, Suite 101 · Leesburg, Virginia 20175
(703) 669-6650 Fax: (703) 669-6125
www.natef.org

**AUTOMOTIVE
ENGINE PERFORMANCE TECHNICIAN
SKILLS STANDARDS
Desired Skills Level Ratings**

Duty ES: Demonstrate Employability Skills

Desired Skill Level: The level of training necessary for the student to be employable in the occupation specified:

- 4 – Skilled Can perform the task independently with no additional training
- 3 – Moderately Skilled Has performed the task independently during training program; limited additional training may be required
- 2 – Limited Skill Has practiced task during training program; additional training is required to develop the skills
- 1 – No Exposure No experience or knowledge in this area

***DSL = Desired Skill Level**

DUTY ES: Demonstrate Employability Skills

CODE	TASK	DSL
ES.01	Demonstrate personal characteristics desired by employers <ul style="list-style-type: none"> • Detail-oriented • Good communication skills • Good attendance • Neat appearance • Honest/ethical • High self-esteem • Flexible • Goal-oriented • Commitment • Cooperative • Initiative • Responsible • Positive attitude • Self management • Drug free/alcohol free 	4
ES.02	Demonstrate effective interpersonal skills	3
ES.03	Demonstrate a positive attitude	4
ES.04	Demonstrate customer service skills	3
ES.05	Demonstrate personal resource skills	3
ES.06	Utilize proper telephone techniques	2
ES.07	Use job-related terminology, symbols, and abbreviations	3

ES.08	Interpret and follow oral and written directions	4
ES.09	Recognize the importance of team work and participate as a team member	4
ES.10	Use critical thinking skills in workplace situations	4
ES.11	Demonstrate negotiation skills	3
ES.12	Demonstrate leadership skills	2
ES.13	Understand organization structure and employee roles	3
ES.14	Understand cultural diversity in the workplace	3
ES.15	Explore opportunities for advanced training	3
ES.16	Participate in computer literacy training, when applicable	3
ES.17	Perform self-evaluation to establish/modify career goals	3
ES.18	Identify employment opportunities	4
ES.19	Identify levels of training recommended for related careers	3
ES.20	Understand salary, wages, and benefits packages	3
ES.21	Complete an employment application	4
ES.22	Prepare a resume	4
ES.23	Complete an employment interview	4
ES.24	Complete a W-4 form	3
ES.25	Create an employment portfolio	3
	Safety	
ES.26	Explain the purpose for safety policies	4
ES.27	Discuss the role of OSHA and EPA <ul style="list-style-type: none"> • Locate information in MSDS 	4
ES.28	Participate in OSHA training <ul style="list-style-type: none"> • Lock Out/Tag Out • HAZCOM • MSDS • Blood Born Pathogens 	4
ES.29	Explain the proper steps in reporting an accident or emergency	4
ES.30	Explain the hazards associated with specific types of equipment and tools	4
ES.31	Perform machine operator safety checks of equipment and accessories, when necessary	4
ES.32	Practice tool safety	4
ES.33	Demonstrate and use appropriate tools for the job	4
ES.34	Describe the types of fire hazards found in the workplace	4
ES.35	Discuss electrical hazards	3
ES.36	Demonstrate safe use of personal protective equipment	4
ES.37	Demonstrate safe material handling techniques <ul style="list-style-type: none"> • Lifting • Transporting • Storing 	4
ES.38	Understand established first aid procedures	4
ES.39	Practice good housekeeping	4

ES.40	Comply with company safety policies	4
	Academic Skills	4
ES.41	Apply reading and writing skills, when necessary	4
ES.42	Apply mathematical operations involving whole numbers, fractions, decimals, percentages, mathematical word problems, , ratios, etc., when necessary <ul style="list-style-type: none"> • Addition • Subtraction • Multiplication • Division 	4
ES.43	Apply advanced mathematical operations, when necessary <ul style="list-style-type: none"> • Algebra • Geometry • Trigonometry 	3
ES.44	Apply scientific principles, when necessary <ul style="list-style-type: none"> • Physics • Chemistry 	4
ES.45	Interpret charts, tables, and graphs	3
	Quality Assurance & Problem Solving	
ES.46	Understand the principles of quality assurance	3
ES.47	Participate in the implementation of quality assurance programs <ul style="list-style-type: none"> • Material and Labor Utilization 	3
ES.48	Identify the effects of continuous quality improvement	3
ES.49	Utilize problem solving and critical thinking techniques to identify and solve problems <ul style="list-style-type: none"> • Brainstorming 	4
ES.50	Discuss data collection techniques for the quality assurance and problem solving process	3
ES.51	Identify opportunities for applying problem solving skills	3
ES.52	Identify basic elements of schematics <ul style="list-style-type: none"> • Terms • Components • Symbols 	4
ES.53	Discuss and interpret different types of schematics	4
ES.54	Interpret symbols	4
	Measurement Tools & Techniques	
ES.55	Identify types of measuring instruments	4
ES.56	Use appropriate measurement instrument for a measurement task	4
ES.57	Read measuring instruments	4
ES.58	Identify the appropriate formula and units for a measurement task	3
ES.59	Differentiate between English and Metric measurement systems, when necessary	3
ES.60	Communicate measurements using proper symbols or words	4
ES.61	Demonstrate the importance of calibration	3

**AUTOMOTIVE
ENGINE PERFORMANCE TECHNICIAN
SKILLS STANDARDS
Desired Skills**

Duty A: Perform General Engine Diagnosis

Duty B: Perform Computerized Engine Controls Diagnosis and Repair

Duty C: Perform Ignition System Diagnosis and Repair

Duty D: Perform Fuel, Air Induction, and Exhaust Systems Diagnosis and Repair

Duty E: Perform Emissions Control Systems Diagnosis and Repair

Duty F: Perform Engine Related Service

DUTY A: Perform General Engine Diagnosis

CODE	TASK	
A.01	Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction	P-1
A.02	Identify and interpret engine performance concern; determine necessary action	P-1
A.03	Research applicable vehicle and service information, such as engine management system operation, vehicle service history, service precautions, and technical service bulletins	P-1
A.04	Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels, and calibration decals)	P-1
A.05	Inspect engine assembly for fuel, oil, coolant, and other leaks; determine necessary action	P-2
A.06	Diagnose abnormal engine noise or vibration concerns; determine necessary action	P-2
A.07	Diagnose abnormal exhaust color, odor, and sound; determine necessary action	P-2
A.08	Perform engine absolute (vacuum/boost) manifold pressure tests; determine necessary action	P-1
A.09	Perform cylinder power balance test; determine necessary action	P-1
A.10	Perform cylinder cranking compression tests; determine necessary action	P-1
A.11	Perform engine running compression test; determine necessary action	P-2
A.12	Perform cylinder leakage test; determine necessary action	P-1
A.13	Diagnose engine mechanical, electrical, electronic, fuel, and ignition concerns with an oscilloscope and/or engine diagnostic equipment; determine necessary action	P-1
A.14	Prepare 4 or 5 gas analyzer; inspect and prepare vehicle for test, and obtain exhaust readings; interpret readings, and determine necessary action	P-1
A.15	Verify engine operating temperature; determine necessary action	P-1
A.16	Perform cooling system pressure tests; check coolant condition; inspect and test radiator, pressure cap, coolant recovery tank, and hoses; perform necessary action	P-1
A.17	Verify and correct camshaft timing	P-2

DUTY B: Perform Computerized Engine Controls Diagnosis and Repair

CODE	TASK	
B.01	Retrieve and record stored OBD I diagnostic trouble codes; clear codes	P-3
B.02	Retrieve and record stored OBD II diagnostic trouble codes; clear codes when applicable	P-1
B.03	Diagnose the causes of emissions or drivability concerns resulting from malfunctions in the computerized engine control system with stored diagnostic trouble codes	P-1
B.04	Diagnose emissions or drivability concerns resulting from malfunctions in the computerized engine control system with no stored diagnostic trouble codes; determine necessary action	P-1
B.05	Check for module communication (including CAN/BUS systems) errors using a scan tool	P-2
B.06	Inspect and test computerized engine control system sensors, powertrain control module (PCM), actuators, and circuits using a graphing multimeter (GMM)/digital storage oscilloscope (DSO); perform necessary action	P-1
B.07	Obtain and interpret scan tool data	P-1
B.08	Access and use service information to perform step-by-step diagnosis	P-1
B.09	Diagnose driveability and emissions problems resulting from malfunctions of interrelated systems (cruise control, security alarms, suspension controls, traction controls, A/C, automatic transmissions, non-OEM-installed accessories, or similar systems); determine necessary action	P-3
B.10	Perform active tests of actuators using scan tool; determine necessary action	P-1

DUTY C: Perform Ignition System Diagnosis and Repair

CODE	TASK	
C.01	Diagnose ignition system related problems such as no-starting, hard starting, engine misfire, poor driveability, spark knock, power loss, poor mileage, and emissions concerns on vehicles with electronic ignition (distributorless) systems; determine necessary action	P-1
C.02	Diagnose ignition system related problems such as no-starting, hard starting, engine misfire, poor driveability, spark knock, power loss, poor mileage, and emissions concerns on vehicles with distributor ignition (DI) systems; determine necessary action	P-1
C.03	Inspect and test ignition primary circuit wiring and solid-state components; perform necessary action	P-2
C.04	Inspect, test and service distributor	P-3
C.05	Inspect and test ignition system secondary circuit wiring and components; perform necessary action	P-2
C.06	Inspect and test ignition coil(s); perform necessary action	P-1
C.07	Check and adjust ignition system timing and timing advance/retard (where applicable)	P-3
C.08	Inspect and test ignition system pick-up sensor or triggering devices; perform necessary action	P-1

DUTY D: Perform Fuel, Air Induction, and Exhaust Systems Diagnosis and Repair

CODE	TASK	
D.01	Diagnose hot or cold no-starting, hard starting, poor drivability, incorrect idle speed, poor idle, flooding, hesitation, surging, engine misfire, power loss, stalling, poor mileage, dieseling, and emissions problems on vehicles with injection-type fuel systems; determine necessary action	P-1
D.02	Check fuel for contaminants and quality; determine necessary action	P-3
D.03	Inspect and test fuel pumps and pump control systems for pressure, regulation, and volume; perform necessary action	P-1
D.04	Replace fuel filters	P-1
D.05	Inspect and test cold enrichment system and components; perform necessary action	P-3
D.06	Inspect throttle body, air induction system, intake manifold and gaskets for vacuum leaks and/or unmetered air	P-2
D.07	Inspect and test fuel injectors	P-1
D.08	Check idle speed	P-2
D.09	Inspect the integrity of the exhaust manifold, exhaust pipes, muffler(s), catalytic converter(s), resonator(s), tail pipe(s), and heat shield(s); perform necessary action	P-2
D.10	Perform exhaust system back-pressure test; determine necessary action	P-1
D.11	Test the operation of turbocharger/supercharger systems; determine necessary action	P-3

DUTY E: Perform Emissions Control Systems Diagnosis and Repair

CODE	TASK	
	Positive Crankcase Ventilation	
E.01	Diagnose oil leaks, emissions, and driveability problems resulting from malfunctions in the positive crankcase ventilation (PCV) system; determine necessary action	P-2
E.02	Inspect, test and service positive crankcase ventilation (PCV) filter/breather cap, valve, tubes, orifices, and hoses; determine necessary action	P-2
	Exhaust Gas Recirculation	
E.03	Diagnose emissions and driveability problems caused by malfunctions in the exhaust gas recirculation (EGR) system; determine necessary action	P-1
E.04	Inspect, test, service and replace components of the EGR system, including EGR tubing, exhaust packages, vacuum/pressure controls, filters and hoses; perform necessary action	P-1
E.05	Inspect and test electrical/electronic sensors, controls, and wiring of exhaust gas recirculation (EGR) systems; perform necessary action	P-2
	Exhaust Gas Treatment	
E.06	Diagnose emissions and driveability problems resulting from malfunctions in the secondary air injection and catalytic converter systems; determine necessary action	P-2
E.07	Inspect and test mechanical components of secondary air injection systems; perform necessary action	P-3
E.08	Inspect and test electrical/electronically-operated components and circuits of air injection systems; perform necessary action	P-3
E.09	Inspect and test catalytic converter performance	P-1
	Evaporative Emissions Controls	

E.10	Diagnose emissions and driveability problems resulting from malfunctions in the evaporative emissions control system; determine necessary action	P-1
E.11	Inspect and test components and hoses of evaporative emissions control system; perform necessary action	P-2
E.12	Interpret evaporative emission related diagnostic trouble codes (DTCs); determine necessary action	P-1

DUTY F: Perform Engine Related Service

CODE	TASK	
F.01	Adjust valves on engines with mechanical or hydraulic lifters	P-1
F.02	Remove and replace timing belt; verify correct camshaft timing	P-1
F.03	Remove and replace thermostat and gasket	P-1
F.04	Inspect and test mechanical/electrical fans, fan clutch, fan shroud/ducting, air dams, and fan control devices; perform necessary action	P-1
F.05	Perform common fastener and thread repair to include, remove broken bolt, restore internal and external threads, and repair internal threads with thread insert	P-1
F.06	Perform oil and filter changes	P-1
F.07	Demonstrate proficiency in using oxy-acetylene torch to heat and cut metal	P-3
F.08	Identify hybrid vehicle internal combustion engine service precautions	P-3