AUTOMOTIVE TECHNOLOGIES 47.0600.20
TECHNICAL STANDARDS

An Industry Technical Standards Validation Committee developed and validated these standards on December 19, 2024. The updated standards show changes in some verbs and phrases to curb the cost/expense in completing skill set. Additionally, because these standards align with the Automotive Service Excellence (ASE) Task List, students completing the program are eligible to earn the ASE Certification. The Arizona Career and Technical Education Quality Commission, the validating authority for the Arizona Skills Standards Assessment System, reviewed these standards on May 27, 2025.

Note: Arizona's Professional Skills are taught as an integral part of the Automotive Technologies program.

The Technical Skills Assessment for Automotive Technologies is available SY2025-2026.

Note: In this document i.e. explains or clarifies the content and e.g. provides examples of the content that must be taught.

STANDARD 1 .0 PERFORM ENGINE SERVICES—GENERAL

1.1 Research vehicle service information [e.g., fluid type, internal combustion engine operation, vehicle service history, service precautions, technical service bulletins, and recalls including xEVs (electric vehicles and their extended variants) and vehicles equipped with advanced driver assistance systems (ADAS)]

1.2 Identify vehicle systems, including advanced driver assistance systems (ADAS)

1.3 Retrieve and record on-board diagnostics, Diagnostic Trouble Codes (DTCs), monitor status, and freeze frame data; clear codes and data when directed

1.4 Verify operation of the instrument panel engine warning indicators

1.5 Inspect engine assembly for fuel, oil, coolant, and other leaks

1.6 Explain the various gaskets, seals, and sealers and their removal and application procedures for engine covers

1.7 Explain procedures for verifying engine mechanical timing

1.8 Inspect engine mounts

1.9 Identify service precautions related to service of the internal combustion engine of-an xEV

1.10 Explain the components and configuration of the cylinder head and valve train

1.11 Explain the components and configurations of engine block assembly

1.12 Explain the function of lubrication and cooling system components and configurations

1.13 Perform engine oil and filter change; use proper fluid type per manufacturer specification; reset maintenance reminder as required

1.14 Perform cooling system pressure and dye tests to identify leaks; check coolant condition and level; inspect and test radiator, pressure cap, coolant reservoir/recovery tank, heater core, and galley plugs; determine necessary action

1.15 Explain causes of engine overheating

1.16 Inspect, replace, and/or adjust drive belts, tensioners, and pulleys; check pulley and belt alignment

1.17 Inspect and test coolant; drain and recover coolant; flush and refill cooling system; use proper fluid type per manufacturer specification; bleed air as required

1.18 Identify different types of water/coolant pumps (belt driven, chain driven, and electric)

1.19 Explain procedures for removing, inspecting, and replacing thermostat and gasket/seal

STANDARD 2.0 PERFORM AUTOMATIC TRANSMISSION AND TRANSAXLE SERVICES—GENERAL

2.1 Research vehicle service information [e.g., fluid type, vehicle service history, service precautions, technical service bulletins, and recalls including xEVs and/or vehicles equipped with advanced driver assistance systems (ADAS)]

2.2 Identify vehicle systems, including advanced driver assistance systems (ADAS)

2.3 Explain automatic transmission and transaxle components and configurations including torque converter automatic, dual-clutch automatic (DCT), Continuously Variable Transmission (CVT), and xEV drive

2.4 Retrieve and record on-board diagnostics, DTCs, monitor status, and freeze frame data; clear codes and data when directed

2.5 Inspect transmission fluid condition and level, and inspect for leaks in a transmission or a transaxle equipped with a dipstick

2.6 Inspect transmission fluid condition; check fluid level; inspect for leaks on transmission or transaxle not equipped with a dipstick

2.7 Explain transmission/transaxle gear reduction/multiplication operation using driving, driven, and held member (power flow) principles

2.8 Explain hydraulic principles (Pascal's Law) in a transmission/transaxle

2.9 Inspect external manual valve shift linkage, transmission range sensor/switch, and/or park/neutral position switch

2.10 Explain procedures to drain and replace fluid and filter(s) to include proper fluid type per manufacturer specification

2.11 Explain relearn procedure

2.12 Inspect, replace and/or align power train mounts

2.13 Describe the operational characteristics of a continuously variable transmission (CVT)

2.14 Describe the operational characteristics of a hybrid vehicle drive train

2.15 Describe the operational characteristics of dual-clutch transmission (DCT)

STANDARD 3.0 PERFORM MANUAL DRIVE TRAIN AND AXLE SERVICES—DRIVE SHAFT, HALF SHAFTS, UNIVERSAL JOINTS AND CONSTANT VELOCITY (CV) JOINTS (FRONT, REAR, ALL WHEEL AND 4-WHEEL DRIVE)

3.1 Research vehicle service information [e.g., fluid type, vehicle service history, service precautions, technical service bulletins, and recalls including xEVs and vehicles equipped with advanced driver assistance systems (ADAS)]

3.2 Identify vehicle systems, including advanced driver assistance systems (ADAS)

3.3 Describe manual drive train components and configuration

3.4 Retrieve and record on-board diagnostics, DTCs, monitor status, and freeze frame data; clear codes and data when directed

3.5 Check fluid condition; check for leaks

3.6 Drain and refill manual transmission/transaxle; use proper fluid type per manufacturer specification

3.7 Check and adjust clutch primary cylinder fluid level

3.8 Inspect, remove, and/or replace bearings, hubs, and seals

3.9 Inspect, service, and/or replace shafts, yokes, boots, and universal/CV joints

3.10 Inspect differential housing; check for leaks; inspect housing vent

3.11 Explain procedures to adjust differential housing fluid level; use proper fluid type per manufacturer specification

3.12 Drain and refill differential housing, using proper fluid type per manufacturer specification

3.13 Inspect drive axle wheel studs and explain replacement procedure

3.14 Identify concerns related to variations in tire circumference and/or final drive ratios

3.15 Check for leaks at drive assembly and transfer case seals; check vents; check fluid level; use proper fluid type per manufacturer specification

STANDARD 4.0 PERFORM SUSPENSION AND STEERING SYSTEM SERVICES—GENERAL

4.1 Research vehicle service information [e.g., fluid type, vehicle service history, service precautions, technical service bulletins, and recalls including xEVs and vehicles equipped with advanced driver assistance systems (ADAS)]

4.2 Identify vehicle systems, including advanced driver assistance systems (ADAS)

4.3 Describe suspension and steering system components and configurations

4.4 Retrieve and record on-board diagnostics, DTCs, monitor status, and freeze frame data; clear codes and data when directed

4.5 Disable, enable, and properly handle supplemental restraint system (SRS)/airbag system components during vehicle service following manufacturer procedures

4.6 Inspect rack and pinion steering gear inner tie rod ends (sockets) bellows boots

4.7 Inspect power steering fluid level and condition

4.8 Drain and replace power steering system fluid; use proper fluid type per manufacturer specification

4.9 Inspect for power steering fluid leakage

4.10 Remove, inspect, replace, and/or adjust power steering pump drive belt

4.11 Inspect and replace power steering hoses and fittings

4.12 Inspect pitman arm, relay (centerlink/intermediate) rod, idler arm, mountings, and steering linkage damper

4.13 Inspect tie rod ends (sockets), tie rod sleeves, and clamps (non-rack and pinion)

4.14 Describe an electric power steering system

4.15 Inspect upper and lower control arms, bushings, and shafts

4.16 Inspect and replace rebound/jounce bumpers

4.17 Inspect track bar, strut rods/radius arms, and related mounts and bushings

4.18 Inspect upper and lower ball joints (with or without wear indicators)

4.19 Inspect suspension system coil springs and spring insulators

4.20 Inspect torsion bars and mounts

4.21 Inspect and/or replace front/rear stabilizer bar (sway bar) bushings, brackets, and links

4.22 Inspect, remove and/or replace strut assembly, strut coil spring, insulators, and upper strut bearing mount

4.23 Inspect components of rear suspension systems (Coil, Leaf, and Torsion Beam)

4.24 Inspect components of electronically controlled suspension systems

4.25 Inspect, remove, and/or replace shock absorbers; inspect mounts and bushings

4.26 Inspect front and rear wheel bearings

4.27 Describe the function of electronically controlled suspension and steering systems and components (e.g., active suspension and stability control)

4.28 Determine the need to recalibrate a vehicle's advanced driver assistance system (ADAS) that may require calibration after repairs or adjustment

4.29 Perform pre-alignment inspection; place vehicle in service mode as required; measure vehicle ride height

4.30 Describe four-wheel alignment angles (camber, caster toe. setback, and thrust angle) and effects on vehicle handling/tire wear

4.31 Inspect tire condition/age; identify tire wear patterns; check for correct tire size, application (service-class, load and speed ratings), and air pressure as listed on the tire information placard/label

4.32 Rotate tires according to manufacturer’s recommendation including vehicles equipped with tire pressure monitoring systems (TPMS)

4.33 Dismount, inspect, and remount tire on wheel (with/without TPMS); balance wheel and tire assembly

4.34 Inspect tire and wheel assembly for air loss; determine necessary action

4.35 Repair tire following tire manufacturer approved procedure

4.36 Describe indirect and direct tire pressure monitoring systems (TPMS); calibrate/relearn system; verify operation of instrument panel lamps

4.37 Explain the steps required to remove and replace sensors (per OEM/sensor manufacturer) in a tire pressure monitoring system (TPMS)

4.38 Perform Road Force balance/match mounting

STANDARD 5.0 PERFORM BRAKE SYSTEM SERVICES—GENERAL

5.1 Research vehicle service information [e.g., fluid type, system design (hydraulic, electronic, etc.), vehicle service history, service precautions, technical service bulletins, and recalls including xEVs and vehicles equipped with advanced driver assistance systems (ADAS)]

5.2 Identify vehicle systems, including advanced driver assistance systems (ADAS)

5.3 Identify brake system components and configuration

5.4 Retrieve and record on-board diagnostics, DTCs, monitor status, and freeze frame data; clear codes and data when directed

5.5 Research service information for the need to place a vehicle in service mode before servicing the brake system (sounds awkward)

5.6 Research service information for the need to perform calibration/recalibration, initialization, or relearn procedures as required

5.7 Describe procedure for performing a road test to check brake system operation including an anti-lock brake system (ABS)

5.8 Install wheel and torque lug nuts/wheel fasteners

5.9 Explain hydraulic principles (Pascal’s law)

5.10 Describe proper brake pedal height, travel, and feel

5.11 Check primary cylinder for proper operation

5.12 Inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging, wear, and loose fittings/supports

5.13 Explain procedures for selecting, handling, storing, and filling brake fluids to proper level; use proper fluid type per manufacturer specification

5.14 Describe components of hydraulic brake warning light system

5.15 Explain procedures for bleeding and/or replacing fluid in the brake system

5.16 Test brake fluid for contamination

5.17 Explain the removal, cleaning, and inspecting of a brake drum including measuring the brake drum diameter

5.18 Explain the procedures for refinishing brake drums including final drum measurement and diameter; compare with specification

5.19 Explain the removal, cleaning, inspecting, and/or replacement of brake shoes, springs, pins, clips, levers, adjusters/self-adjusters, other related brake hardware, and backing support plates; lubrication and reassembling

5.20 Explain procedures for inspecting wheel cylinders for leaks and proper operation; remove and replace as needed

5.21 Explain procedures for preadjusting brake shoes and parking brake; installing brake drums or drum/hub assemblies and wheel bearings; making final checks and adjustments

5.22 Remove and clean caliper assembly; inspect for leaks and damage/wear

5.23 Inspect caliper mounting and slides/pins for proper operation, wear, and damage

5.24 Remove, inspect, and/or replace brake pads and retaining hardware

5.25 Lubricate and reinstall caliper, brake pads, and related hardware; seat brake pads against rotor and inspect for leaks

5.26 Clean and inspect rotor and mounting surface, measure rotor thickness, thickness variation, and lateral runout; determine necessary action

5.27 Remove and reinstall/replace rotor

5.28 Refinish rotor on vehicle; measure final rotor thickness and compare with specification

5.29 Explain procedures to refinish rotor off vehicle, measuring final rotor thickness and comparing with specification

5.30 Retract and re-adjust caliper piston on an integral parking brake system

5.31 Explain the procedure to burnish/break-in replacement brake pads according to manufacturer's recommendation

5.32 Check brake pedal travel with, and without, engine running to verify proper power booster operation

5.33 Describe the components of the brake power assist system (vacuum/hydraulic/electric)

5.34 Remove, clean, inspect, repack/replace, and install wheel bearings; remove and install bearing races; replace seals; install hub and adjust bearings

5.35 Check parking brake system components for wear, binding, and corrosion; clean, lubricate, adjust and/or replace as necessary

5.36 Check parking brake operation (including electric parking brakes) and parking brake indicator light system operation

5.37 Check operation of brake stop light system

5.38 Describe the electronic brake control system components and function (ABS, TCS, ESC)

5.39 Describe the operation of a regenerative braking system

5.40 Inspect wheel studs/fastener and describe procedures for replacement

STANDARD 6.0 PERFORM ELECTRICAL/ELECTRONIC SYSTEM SERVICES—GENERAL

6.1 Research vehicle service information [e.g., fluid type, vehicle service history, service precautions, technical service bulletins, and recalls including xEVs and vehicles equipped with advanced driver assistance systems (ADAS)]

6.2 Identify vehicle systems, including advanced driver assistance systems (ADAS)

6.3 Identify electrical/electronic system components and configurations

6.4 Retrieve and record on-board diagnostics, DTCs, monitor status, and freeze frame data; clear codes and data when directed

6.5 Discuss the need to perform calibration/recalibration, initialization, or relearn procedures as required

6.6 Describe electrical/electronic series, parallel, and series-parallel circuits using principles of electricity (Ohm's Law)

6.7 Demonstrate proper use of a digital multimeter (DMM) when measuring source voltage, voltage drop (including grounds), current flow, and resistance

6.8 Discuss the causes and effects from shorts, grounds, opens, and resistance problems in electrical/electronic circuits

6.9 Describe precautions related to the use of test lights

6.10 Use fused jumper wires to check operation of electrical circuits per service information

6.11 Use wiring diagrams to trace electrical/electronic circuits

6.12 Measure key-off battery drain (parasitic draw)

6.13 Inspect and test fusible links, circuit breakers, and fuses

6.14 Repair and/or replace connectors, terminal ends, and wiring of electrical/electronic systems

6.15 Perform battery state-of-charge test; determine necessary action

6.16 Confirm proper battery capacity, size, type, and application for vehicle; perform battery capacity and load test as recommended by manufacturer

6.17 Maintain or restore electronic memory functions as recommended by manufacturer

6.18 Inspect and clean battery; check battery cables, connectors, clamps, and hold-downs

6.19 Perform battery charging according to manufacturer's recommendations

6.20 Explain procedures for jump-starting a vehicle using jumper cables and a booster battery or an auxiliary power supply according to manufacturer's recommendations

6.21 Identify electrical/electronic modules, security systems, radios, and other accessories that require reinitialization or code entry after reconnecting vehicle battery

6.22 Perform starter current draw test

6.23 Perform starter circuit voltage drop tests

6.24 Inspect and test starter relays and solenoids

6.25 Describe the removal and installation of a starter in a vehicle

6.26 Inspect and test switches, connectors, and wires of starter control circuits

6.27 Explain the operation of an automatic idle-stop/start-stop system that uses a low-voltage starter to restart the engine

6.28 Perform charging system output test; determine necessary action

6.29 Explain removal/replacement procedures for generator (alternator) drive belts; check pulleys and tensioners for wear; check pulley and belt alignment

6.30 Remove, inspect, and/or reinstall generator (alternator)

6.31 Perform charging circuit voltage drop tests; determine necessary action

6.32 Inspect interior and exterior lamps and sockets including headlights and auxiliary lights (fog lights/driving lights); replace as needed

6.33 Aim headlights

6.34 Verify operation of instrument panel gauges and warning/indicator lights; reset maintenance indicators as required

6.35 Describe vehicle comfort, convenience, access, safety, and related systems operation

6.36 Describe the operation of keyless entry/remote-start systems

6.37 Describe procedures for disabling and enabling for supplemental restraint system (SRS); verify indicator lamp operation

6.38 Verify windshield wiper and washer operation; replace wiper blades

6.39 Locate procedures to safely de-energize/disable and energize/enable high-voltage systems

STANDARD 7.0 PERFORM HEATING, VENTILATION AND AIR CONDITIONING (HVAC) SYSTEM SERVICES— GENERAL

7.1 Research vehicle service information [e.g., refrigerant/oil/fluid type, vehicle service history, service precautions, technical service bulletins, and recalls including xEVs and vehicles equipped with advanced driver assistance systems (ADAS])

7.2 Identify vehicle systems, including advanced driver assistance systems (ADAS)

7.3 Describe heating, ventilation and air conditioning (HVAC) components and configuration

7.4 Retrieve and record on-board diagnostics, DTCs, monitor status, and freeze frame data; clear codes and data when directed

7.5 Explain the steps of an A/C performance test as recommended by manufacturer

7.6 Describe abnormal operating noises in the A/C system

7.7 Visually inspect A/C components for signs of leaks

7.8 Interpret heating and air conditioning concerns

7.9 Discuss the need to place a vehicle in service mode before servicing the HVAC system

7.10 Inspect and replace A/C compressor drive belts, pulleys, and tensioners; determine necessary action

7.11 Inspect A/C condenser for proper airflow

7.12 Inspect evaporator housing condensation drain; determine necessary action

7.13 Inspect engine cooling and heater systems hoses and pipes; determine necessary action

7.14 Inspect HVAC system ducts, doors, hoses, cabin filters, and outlets

7.15 Identify the source of HVAC system odors

7.16 Demonstrate the need to recover, recycle, and handle refrigerants using proper equipment and procedures

STANDARD 8.0 PERFORM ENGINE PERFORMANCE SERVICES – GENERAL

8.1 Research vehicle service information [e.g., fluid type, vehicle service history, service precautions, technical service bulletins, and recalls including xEVs and vehicles equipped with advanced driver assistance systems (ADAS)]

8.2 Identify vehicle systems, including advanced driver assistance systems (ADAS)

8.3 Retrieve and record on-board diagnostics, DTCs, monitor status, and freeze frame data; clear codes and data when directed

8.4 Explain proper engine cooling system operation

8.5 Describe camshaft timing including engines equipped with variable valve timing (VVT) systems

8.6 Explain computerized control system components and configurations

8.7 Explain ignition system components and configurations

8.8 Describe the removal and replacement of spark plugs and the inspection of secondary ignition components for wear and damage

8.9 Describe fuel, air induction, and exhaust system components and configurations

8.10 Explain fuel filter(s) replacement(s) where applicable

8.11 Inspect, service, or replace air filters, filter housings, and intake duct work

8.12 Inspect integrity of the exhaust manifold, exhaust pipes, muffler(s), catalytic converter(s), resonator(s), tail pipe(s), and heat shields; determine necessary action

8.13 Inspect condition of exhaust system hangers, brackets, clamps, and heat shields; determine necessary action

8.14 Explain procedures to check and refill diesel exhaust fluid (DEF)

8.15 Describe emission control system components and configurations

8.16 Inspect, test, and service positive crankcase ventilation (PCV) filter/breather, valve, tubes, orifices, and hoses; perform necessary action

STANDARD 9.0 PERFORM AUTOMOTIVE SHOP AND SAFETY TASKS

9.1 Exhibit general lab/shop safety rules and procedures

9.2 Utilize safe procedures for handling tools and equipment

9.3 Demonstrate proper placement of floor jacks and jack stands

9.4 Identify and use proper procedures for safe lift operation, ensuring the configuration and weight rating of the lift is appropriate for the vehicle being lifted, including xEVs

9.5 Utilize proper ventilation procedures for working within the lab/shop area

9.6 Identify marked safety areas

9.7 Identify the location and the types of fire extinguishers and other fire safety equipment

9.8 Explain the procedures for using fire extinguishers and other fire safety equipment

9.9 Identify the location and use of eye wash stations

9.10 Identify the location of the posted evacuation routes

9.11 Comply with the required use of safety glasses, ear protection, gloves, and shoes during lab/shop activities

9.12 Wear appropriate clothing for lab/shop activities

9.13 Secure hair and jewelry for lab/shop activities

9.14 Identify vehicle systems which pose a safety hazard during service [i.e., supplemental restraint systems (SRS), electronic brake control systems, stop/start systems, remote start systems, etc.]

9.15 Identify vehicle systems which pose a safety hazard during service due to high voltage (i.e., xEV drivetrains, lighting systems, ignition systems, A/C systems, injection systems, etc.)

9.16 Locate and explain the purpose of material safety data sheets (SDS)

9.17 Identify personal protective equipment (PPE) required for use in high voltage/electric vehicle circuits

9.18 Identify tools and their usage in automotive applications

9.19 Identify standard and metric designation as it applies to tools

9.20 Demonstrate safe handling and use of appropriate tools including torque wrenches

9.21 Demonstrate proper cleaning, storage, and maintenance of tools and equipment

9.22 Demonstrate proper use of precision measuring tools (i.e., micrometer, dial-indicator, dial-caliper, etc.)

9.23 Perform common fastener and thread repair, including removing broken bolts, restoring internal and external threads, and repairing internal threads with a thread insert

9.24 Identify necessary information and the service requested on a repair order

9.25 Identify purpose and demonstrate proper use of fender covers, mats, seat, and steering wheel covers

9.26 Perform a vehicle walk-around inspection; identify and document existing vehicle conditions (i.e., body-, paint- and/or windshield damage, etc.)

9.27 Perform a vehicle multi-point inspection and complete a vehicle inspection report (written and/or electronic)

9.28 Demonstrate use of the three C's (concern, cause, and correction)

9.29 Create a plan of action for each specific service or diagnostic situation, including placing vehicle in service mode as required

9.30 Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction

9.31 Ensure vehicle is prepared to return to customer per school/company policy (i.e., floor mats, steering wheel cover, etc.)

9.32 Discuss hazards related to high voltage systems/electric vehicles including electrocution, fire, explosion, arc flash, gases and fumes, hazardous chemicals, and EMF, and how to properly respond to emergency situations

9.33 Identify high voltage systems, component coloring, warning labels, lights, signage, and lock-out/tag-out procedures

9.34 Identify components and circuits containing high voltage

9.35 Discuss the steps needed to assess possible hazards prior to servicing a high voltage/electric vehicle, including awareness of automatic systems that may operate while the key switch/ignition is off

9.36 Discuss limitations on which systems, components, and circuits of a high voltage/electric vehicle a technician is capable of safely servicing based on their level of training and qualification

9.37 Identify the steps of the high voltage/electric vehicle intake process, inspection, handling, and in-process monitoring for all vehicles including damaged/compromised vehicles