



MEDIUM/HEAVY VEHICLE AND TRUCK TECHNOLOGY 47.0613.00 TECHNICAL STANDARDS

(formerly Diesel Engine and Repair)

A Technical Standards Validation Committee met on December 19, 2025, and updated the program standards according to the recently updated Automotive Service Excellence (ASE) Task and Standards 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, endorsed these standards on July 12, 2026.

Note: Arizona's Professional Skills are taught as an integral of Medium/Heavy Vehicle and Truck Technology.

The Technical Skills Assessment for Medium/Heavy Vehicle and Truck Technology is available SY2028-2029.

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 AUTOMOTIVE SHOP AND SAFETY TASKS

- 1.1 Identify general shop safety rules and procedures
- 1.2 Utilize safe procedures for handling tools and equipment
- 1.3 Identify and use proper placement of floor jacks and jack stands
- 1.4 Identify and use proper procedures for safe lift operation
- 1.5 Utilize proper ventilation procedures for working within the lab/shop area
- 1.6 Identify marked safety areas
- 1.7 Identify location and types of fire extinguishers and other fire safety equipment
- 1.8 Identify procedures for using fire extinguishers and other fire safety equipment
- 1.9 Identify the location and use of eye wash stations
- 1.10 Identify the location of the posted evacuation routes
- 1.11 Comply with the required use of safety glasses, ear protection, gloves, and shoes during lab/shop activities
- 1.12 Identify and wear appropriate clothing for lab/shop activities
- 1.13 Secure hair and jewelry for lab/shop activities
- 1.14 Explain the safety aspects of vehicle systems that can operate automatically when the vehicle is off [e.g., supplemental restraint systems (SRS), electronic brake control systems, and electrified vehicle systems]
- 1.15 Explain the safety aspects of high voltage circuits [i.e., high intensity discharge (HID) lamps, ignition systems, injection systems, electrified vehicle powertrain, etc.]
- 1.16 Locate and demonstrate knowledge of safety data sheets (SDS)
- 1.17 Identify tools and their usage in medium/heavy truck applications
- 1.18 Identify standard and metric designation
- 1.19 Demonstrate safe handling and use of appropriate tools
- 1.20 Demonstrate proper cleaning, storage, and maintenance of tools and equipment
- 1.21 Demonstrate proper use of precision measuring tools (i.e., micrometer, dial-indicator, dial-caliper, torque wrench, etc.)
- 1.22 Identify necessary information and the service requested on a repair order
- 1.23 Identify and report damaged tools that need repair or replacement

STANDARD 2.0 PERFORM PRE-TRIP INSPECTION

- 2.1 Research vehicle service information, including fluid type, vehicle service history, service precautions, and technical service bulletins
- 2.2 Inspect level and condition of fuel, oil, diesel exhaust fluid (DEF), and coolant
- 2.3 Inspect engine assembly for fuel, oil, coolant, air, and other leaks

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- 2.4 Check engine operation (starting and running), including noise, vibration, smoke, etc.
- 2.5 Use appropriate electronic service tool(s) to check and record diagnostic codes; check and record trip/operational data; reset maintenance monitor if applicable
- 2.6 Identify system components, configurations, and types [e.g., cylinder head(s), valve train, engine block, engine lubrication, engine cooling, air induction, exhaust, fuel, and engine braking]
- 2.7 Inspect external electronic wiring harness and brackets for wear, bending, cracks, and proper securement

STANDARD 3.0 PERFORM LUBRICATION SYSTEM PERFORMANCE MAINTENANCE (PM)

- 3.1 Test engine oil pressure and check the operation of pressure sensor, gauge, and/or sending unit; test engine oil temperature and check operation of temperature sensor
- 3.2 Check engine oil level, condition, and consumption and take engine oil sample
- 3.3 Determine proper lubricant and perform oil and filter service

STANDARD 4.0 PERFORM COOLING SYSTEM PERFORMANCE MAINTENANCE (PM)

- 4.1 Check engine coolant type, level, condition, and test coolant for freeze protection and additive package concentration
- 4.2 Verify coolant temperature and check operation of temperature and level sensors, gauge, and/or sending unit
- 4.3 Inspect and reinstall/replace pulleys, tensioners and drive belts and adjust drive belts and check alignment
- 4.4 Recover coolant, flush, and refill with recommended coolant/additive package and bleed cooling system
- 4.5 Inspect coolant conditioner/filter assembly for leaks; inspect valves, lines, and fittings; replace as needed
- 4.6 Inspect water pumps, hoses, and clamps
- 4.7 Inspect and pressure test cooling systems; pressure test cap, tanks, and recovery systems; and radiator and mountings
- 4.8 Inspect thermostatic cooling fan system (e.g., hydraulic, pneumatic, and electronic) and fan shroud
- 4.9 Identify engine block heater(s)

STANDARD 5.0 PERFORM AIR INDUCTION AND EXHAUST SYSTEM PERFORMANCE MAINTENANCE (PM)

- 5.1 Inspect turbochargers, wastegates, and piping systems
- 5.2 Check air induction system including cooler assembly, piping, hoses, clamps, and mountings and replace air filter as needed; reset restriction indicator if applicable
- 5.3 Inspect manifold intake, gaskets, and connections
- 5.4 Inspect engine exhaust system, exhaust gas recirculation (EGR) system, and exhaust aftertreatment system for leaks, mounting, proper routing, and damaged or missing components
- 5.5 Explain the exhaust gas recirculation (EGR) system operation including EGR valve, cooler, piping, electronic sensors, controls, and wiring
- 5.6 Explain the exhaust aftertreatment system components and controls including diesel oxidation catalyst (DOC), selective catalytic reduction (SCR), diesel exhaust fluid (DEF), diesel particulate filter (DPF), and sensors and regeneration system operation
- 5.7 Inspect engine compression and/or exhaust brake operation

STANDARD 6.0 PERFORM FUEL SYSTEM PERFORMANCE MAINTENANCE (PM)

- 6.1 Check fuel level and condition
- 6.2 Inspect fuel tanks, vents, caps, mounts, valves, screens, crossover system, hoses, lines, and fittings
- 6.3 Inspect low pressure fuel system components (e.g., fuel pump, pump drives, screens, fuel/water separators/indicators, hoses, lines, filters, heaters, coolers, ECM cooling plates, check valves, pressure regulator valves, restrictive fittings, and mounting hardware)
- 6.4 Replace fuel filter and prime and bleed fuel system
- 6.5 Inspect high pressure fuel system components (e.g., fuel pump, pump drives, hoses, injection lines, filters, hold-downs, fittings, seals, and mounting hardware)

STANDARD 7.0 PERFORM DRIVE TRAIN PERFORMANCE MAINTENANCE (PM)

- 7.1 Research vehicle service information, including fluid type, vehicle service history, service precautions/service mode, and technical service bulletins
- 7.2 Identify drive train components, transmission type, and configuration
- 7.3 Use appropriate electronic service tools and procedures to check and record diagnostic codes
- 7.4 Inspect and adjust clutch, clutch brake, linkage, cables, levers, brackets, bushings, pivots, springs, and clutch safety switch, including push-type and pull-type and check pedal height and travel

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- 7.5 Inspect clutch primary (master) cylinder fluid level and condition and check clutch primary (master) cylinder, secondary (slave) cylinder, lines, and hoses for leaks and damage
- 7.6 Inspect transmission shifter and linkage and inspect transmission mounts, insulators, and mounting bolts
- 7.7 Inspect transmission for leakage
- 7.8 Check transmission cover plates, gaskets, seals, and cap bolts and inspect seal surfaces and vents
- 7.9 Check transmission fluid level and condition
- 7.10 Inspect transmission oil filters, coolers, and related components
- 7.11 Inspect speedometer components
- 7.12 Inspect and test function of reverse light
- 7.13 Inspect and service, if applicable, driveshafts, slip joints, yokes, drive flanges, support bearings, universal joints, boots, seals, and retaining/mounting hardware and check phasing of all shafts
- 7.14 Check for fluid leaks and inspect drive axle housing assembly, cover plates, gaskets, seals, vent/breather, and magnetic plugs
- 7.15 Check drive axle fluid level and condition and check drive axle filter
- 7.16 Inspect air-operated power divider (interaxle differential) assembly
- 7.17 Inspect drive axle shafts
- 7.18 Remove and replace wheel assembly and check rear wheel seal and axle flange for leaks
- 7.19 Inspect for drive axle wheel bearing noise, check for wheel bearing damage, and replace wheel seal

STANDARD 8.0 PERFORM AIR BRAKE SYSTEM PERFORMANCE MAINTENANCE (PM)

- 8.1 Research vehicle service information, including fluid type, vehicle service history, service precautions, and technical service bulletins
- 8.2 Identify brake system components and configurations (including air and hydraulic systems, parking brake, power assist, and vehicle dynamic brake systems)
- 8.3 Identify brake performance problems caused by the mechanical/foundation brake system (air and hydraulic)
- 8.4 Use appropriate electronic service tools and procedures, and check and record diagnostic codes
- 8.5 Inspect air supply system components such as compressor, governor, air drier, tanks, and lines and inspect service system components such as lines, fittings, mountings, and valves (hand brake/trailer control, brake relay, quick release, tractor protection, emergency/spring brake control/modulator, and pressure relief/safety)
- 8.6 Verify proper gauge operation and readings, verify low pressure warning alarm operation, perform air supply system tests such as pressure build-up, governor settings, and leakage, and drain air tanks and check for contamination
- 8.7 Inspect service brake chambers, diaphragms, clamps, springs, pushrods, clevises, and mounting brackets and determine needed action
- 8.8 Identify slack adjuster/brake adjuster type, check free stroke and applied stroke, inspect and lubricate slack adjusters/brake adjusters, and determine needed action
- 8.9 Inspect and lubricate camshafts (S-cams), tubes, rollers, bushings, seals, spacers, retainers, brake spiders, shields, anchor pins, and springs and determine needed action
- 8.10 Inspect rotor and mounting surface; measure rotor thickness, thickness variation, and lateral runout; and determine needed action
- 8.11 Inspect, clean, and adjust air disc brake caliper assemblies; inspect and measure disc brake pads; inspect mounting hardware; and determine needed action
- 8.12 Remove brake drum; clean and inspect brake drum and mounting surface; measure brake drum diameter; measure brake lining thickness; inspect brake lining condition; and determine needed action
- 8.13 Inspect and check parking (spring) brake chamber for leaks and determine needed action
- 8.14 Inspect and test parking (spring) brake check valves, lines, hoses, and fittings and determine needed action
- 8.15 Inspect and test parking (spring) brake application and release valve and determine needed action
- 8.16 Manually release (cage) and reset (uncage) parking (spring) brakes

STANDARD 9.0 PERFORM HYDRAULIC BRAKE SYSTEM PERFORMANCE MAINTENANCE (PM)

- 9.1 Check primary (master) cylinder fluid level and condition determine proper fluid type for application
- 9.2 Inspect hydraulic brake system components for leaks and damage
- 9.3 Check hydraulic brake system operation including pedal travel, pedal effort, and pedal feel
- 9.4 Inspect rotor and mounting surface; measure rotor thickness, thickness variation, and lateral runout; and determine needed action

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- 9.5 Inspect and clean disc brake caliper assemblies; inspect and measure disc brake pads; inspect mounting hardware and slides; and determine needed action
- 9.6 Remove brake drum; clean and inspect brake drum and mounting surface; measure brake drum diameter; measure brake lining thickness; inspect brake lining condition; inspect wheel cylinders; and determine needed action
- 9.7 Check parking brake operation; inspect parking brake application and holding devices
- 9.8 Check brake assist/booster system (vacuum or hydraulic) hoses, pump, switches, and control valves and check fluid level and condition (if applicable)
- 9.9 Check operation of emergency (backup/reserve) brake assist system
- 9.10 Observe antilock brake system (ABS) warning light operation including trailer and dash mounted trailer ABS warning light
- 9.11 Observe automatic traction control (ATC) and electronic stability control (ESC) warning light operation

STANDARD 10.0 PERFORM SUSPENSION AND STEERING SYSTEMS PERFORMANCE MAINTENANCE (PM)

- 10.1 Research vehicle service information, including fluid type, vehicle service history, service precautions, technical service bulletins, and special service message(s)
- 10.2 Disable and enable supplemental restraint system (SRS) and verify indicator lamp operation
- 10.3 Identify suspension and steering system components and configurations
- 10.4 Use appropriate electronic service tool(s) and procedures to diagnose problems, check and record diagnostic codes, and interpret digital multimeter (DMM) readings
- 10.5 Check the steering wheel for free play, binding, and proper centering; inspect and service steering shaft U-joint(s), slip joint(s), bearings, bushings, and seals; and phase steering shaft
- 10.6 Check operation of tilt and telescoping steering column
- 10.7 Check cab mounts, suspension, and ride height
- 10.8 Check power steering pump and gear operation, mountings, lines, and hoses; check fluid level and condition; service filter; and inspect system for leaks
- 10.9 Flush and refill power steering system and purge air from system
- 10.10 Inspect and lubricate tie rod ends, ball joints, kingpins, pitman arms, idler arms, and other steering linkage components
- 10.11 Inspect shock absorbers, bushings, brackets, and mounts and determine needed action
- 10.12 Inspect leaf springs, center bolts, clips, pins, bushings, shackles, U-bolts, insulators, brackets, and mounts and determine needed action
- 10.13 Inspect axle and axle aligning devices such as radius rods, track bars, stabilizer bars, and torque arms and inspect related bushings, mounts, and shims
- 10.14 Inspect tandem suspension equalizer components
- 10.15 Inspect air springs, mounting plates, springs, suspension arms, and bushings
- 10.16 Inspect and test air suspension pressure regulator and height control valves, lines, hoses, dump valves, and fittings
- 10.17 Measure and record ride height

STANDARD 11.0 PERFORM TIRE AND WHEEL PERFORMANCE MAINTENANCE (PM)

- 11.1 Explain alignment angles and their influence on tire wear and vehicle tracking
- 11.2 Inspect tire condition; identify tire wear patterns; measure tread depth; verify tire matching (diameter and tread); inspect valve stem and cap; set tire pressure; and verify tire pressure monitoring system (TPMS) operation (if applicable)
- 11.3 Explain causes for wheel/tire vibration, shimmy, pounding, and hop (tramp) problems
- 11.4 Check wheel mounting hardware; check wheel condition and runout; remove and install wheel/tire assemblies (steering and drive axle); and torque fasteners to manufacturer's specification using torque wrench
- 11.5 Explain Department of Transportation (DOT) tire identification numbers/markings for new and retread/recap tires, inspect tire and wheel for proper application (size, load range, position, and tread design), and determine needed action

STANDARD 12.0 PERFORM FRAME AND FIFTH WHEEL PERFORMANCE MAINTENANCE (PM)

- 12.1 Inspect, service, and/or adjust fifth wheel, pivot pins, bushings, locking mechanisms, mounting hardware, air lines, and fittings
- 12.2 Inspect frame and frame members for cracks, breaks, corrosion, distortion, elongated holes, looseness, and damage
- 12.3 Inspect frame hangers, brackets, and cross members
- 12.4 Check pintle hook and mounting (if applicable)

STANDARD 13.0 PERFORM GENERAL ELECTRICAL/ELECTRONIC SYSTEM DIAGNOSIS AND REPAIR

- 13.1 Research vehicle service information, including service history, service precautions, and technical service bulletins

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- 13.2 Demonstrate knowledge of electrical/electronic series, parallel, and series-parallel circuits using principles of electricity (e.g., Ohm's Law)
- 13.3 Demonstrate operation and proper use of digital multimeters and other test equipment when measuring source voltage, voltage drop (including grounds), current flow, continuity, and resistance
- 13.4 Demonstrate the causes and effects of shorts, grounds, opens, and resistance problems in electrical/electronic circuits
- 13.5 Use wiring diagrams to trace electrical/electronic circuits
- 13.6 Measure parasitic (key-off) battery drain
- 13.7 Demonstrate the function, operation, and testing of fusible links, circuit breakers, relays, solenoids, actuators, diodes, and fuses
- 13.8 Inspect, repair (including solder repair, mechanical crimp repair, and sealed heat shrink), and/or replace connectors, seals, terminal ends, and wiring and verify proper routing and securement
- 13.9 Use appropriate electronic service tool(s) and procedures to diagnose problems; check and record diagnostic codes; and interpret digital multimeter (DMM) readings
- 13.10 Check for malfunctions caused by faults in the data bus communications network
- 13.11 Identify electrical/electronic system components and configuration
- 13.12 Check gauge and warning indicator operation
- 13.13 Explain sensor/sending units, gauges, switches, relays, bulbs/LEDs, wires, terminals, connectors, sockets, printed circuits, and control components/modules of the instrument cluster, driver information system, and warning systems
- 13.14 Check operation of horn(s), wiper/washer, and occupant restraint systems

STANDARD 14.0 PERFORM BATTERY DIAGNOSIS AND REPAIR (LOW VOLTAGE)

- 14.1 Identify battery type and system configuration
- 14.2 Confirm proper battery capacity for application; perform battery state-of-charge test; perform battery capacity test and determine needed action
- 14.3 Inspect and clean battery, battery cables, connectors, battery boxes, mounts, and hold-downs and determine needed action
- 14.4 Charge battery using appropriate method for battery type
- 14.5 Jump-start vehicle using a booster battery and jumper cables or using an appropriate auxiliary power supply
- 14.6 Identify low voltage disconnect (LVD) systems

STANDARD 15.0 PERFORM STARTING SYSTEM DIAGNOSIS AND REPAIR

- 15.1 Explain starter system operation
- 15.2 Perform starter circuit cranking voltage and voltage drop tests
- 15.3 Inspect starter control circuit switches, relays, connectors, terminals, wires, and harnesses (including over-crank protection)

STANDARD 16.0 PERFORM CHARGING SYSTEM DIAGNOSIS AND REPAIR

- 16.1 Explain the operation of the alternator
- 16.2 Check instrument panel mounted gauges and/or indicator lamps
- 16.3 Inspect alternator drive belt condition; check pulleys and tensioners for wear; check fans and mounting brackets; and verify proper belt alignment
- 16.4 Inspect cables, wires, and connectors in the charging circuit, including remote sense circuit
- 16.5 Perform charging system voltage and amperage output tests; perform AC ripple test

STANDARD 17.0 PERFORM LIGHTING SYSTEM DIAGNOSIS AND REPAIR

- 17.1 Inspect for brighter-than-normal, intermittent, dim, or no-light operation and determine needed action
- 17.2 Test, replace, and aim headlights
- 17.3 Inspect cables, wires, and connectors in the lighting systems
- 17.4 Inspect tractor-to-trailer multi-wire connectors, cables, and holders

STANDARD 18.0 PERFORM ELECTRIFIED VEHICLE HIGH VOLTAGE SAFETY

- 18.1 Explain hazards related to high voltage system/electric vehicles, including electrocution, fire, explosion, arc flash, gases and fumes, hazardous chemicals, and EMF, and how to properly respond to emergency situations
- 18.2 Explain high voltage system and component coloring, warning labels, lights, signage, and lockout/tagout (LOTO) procedures
- 18.3 Identify which components and circuits contain high voltage

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- 18.4 Explain 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
- 18.5 Identify systems, components, and circuits of a high voltage/electric vehicle a technician can safely service based on their training and the vehicle manufacturers service guidelines and warranty