

DUTY AREAS AND TASKS	NOCTI	NATIONAL SKILL STANDARD-NATEF
I. DIESEL ENGINES		
A. GENERAL ENGINE DIAGNOSIS		
1. Inspect fuel, oil, and coolant levels, condition, and consumption; determine needed action	EDFA2	
2. Diagnose causes of engine fuel, oil, coolant, air, and other leaks; determine needed action	EDFA2	
3. Interpret engine noises; determine needed action	EDFA4	
4. Observe engine exhaust smoke color and quantity; determine needed action	EDFA2	
5. Perform air intake system restriction and leakage tests; determine needed action	EDFA2	
6. Perform intake manifold pressure (boost) test; determine needed action	EDFA3	
7. Perform exhaust back pressure test; determine needed action	EDFA2	
8. Perform crankcase pressure test; determine needed action	EDFA2	
9. Diagnose no cranking, cranks but fails to start, hard starting, and starts but does not continue to run problems; determine needed action	EDFA1	
10. Diagnose surging, rough operation, misfiring, low power, slow deceleration, slow acceleration, and shutdown problems; determine needed action	EDFA1	
11. Diagnose engine vibration problems; determine needed action	EDFA2	
12. Check, record, and clear electronic diagnostic (fault) codes; monitor electronic data; determine needed action	EDFA1	
13. Perform cylinder compression test; determine needed action	EDFA1	
B. CYLINDER HEAD AND VALVE TRAIN DIAGNOSIS AND REPAIR		
1. Remove, clean, inspect for visible damage, and replace cylinder head(s) assembly	CH1	
2. Clean and inspect threaded holes, studs, and bolts for serviceability; determine needed action	CH3	
3. Inspect cylinder head for cracks/damage; check mating surfaces for warpage; check condition of passages; inspect core/expansion and gallery plugs; determine needed action	CH3	
4. Disassemble head and inspect valves, guides, seats, springs, retainers, rotators, locks, and seals; determine needed action	CH2	
5. Measure valve head height relative to deck and valve face-to-seat contact; determine needed action	CH1	

DUTY AREAS AND TASKS	NOCTI	NATIONAL SKILL STANDARD-NATEF
6. Inspect injector sleeves and seals; measure injector tip or nozzle protrusion; perform needed action	CH2	
7. Inspect and adjust valve bridges (crossheads) and guides; perform needed action	CH3	
8. Reassemble cylinder head	CH4	
9. Inspect, measure, and replace/reinstall overhead camshaft; measure/adjust end play and backlash	CH4	
10. Inspect pushrods, rocker arms, rocker arm shafts, electronic wiring harness, and brackets for wear, bending, cracks, looseness, and blocked oil passages; perform needed action	CH3	
11. Inspect cam followers; perform needed action	CH3	
12. Adjust valve clearance	CH3	
C. ENGINE BLOCK DIAGNOSIS AND REPAIR		
1. Remove, inspect, service, and install pans, covers, vents, gaskets, seals, and wear rings	EC7	
2. Disassemble, clean, and inspect engine block for cracks/damage; measure mating surfaces for warpage; check condition of passages, core/expansion and gallery plugs; inspect threaded holes, studs, dowel pins, and bolts for serviceability; determine needed action	EC7	
3. Inspect cylinder sleeve counterbore and lower bore; check bore distortion; determine needed action	EC7	
4. Clean, inspect, and measure cylinder walls or liners for wear and damage; determine needed action	EC7	
5. Replace/reinstall cylinder liners and seals; check and adjust liner height (protrusion)	PT3	
6. Inspect in-block camshaft bearings for wear and damage; determine needed action	EC7	
7. Inspect, measure, and replace/reinstall in-block camshaft; measure/adjust end play	BA2	
8. Clean and inspect crankshaft for surface cracks and journal damage; check condition of oil passage plugs; measure journal diameter; determine needed action	BA2	
9. Inspect main bearings for wear patterns and damage; replace as needed; check bearing clearances; check and adjust crankshaft end play	BA2	
10. Inspect, install, and time gear train; measure gear backlash; determine needed action	DFS3	
11. Inspect connecting rod and bearings for wear patterns; measure pistons, pins, retainers, and bushings; perform needed action	EC7	

DUTY AREAS AND TASKS	NOCTI	NATIONAL SKILL STANDARD
12. Determine piston-to-cylinder wall clearance; check ring-to-groove clearance and end gap; install rings on pistons	EC7	
13. Assemble pistons and connecting rods; install in block; install rod bearings and check clearances	BA1	
14. Check condition of piston cooling jets (nozzles); determine needed action	EC6	
15. Inspect and measure crankshaft vibration damper; determine needed action	EDFA4	
16. Install and align flywheel housing; inspect flywheel housing(s) to transmission housing/engine mating surface(s) and measure flywheel housing face and bore runout; determine needed action	PM6	
17. Inspect flywheel/flexplate (including ring gear) and mounting surfaces for cracks and wear; measure runout; determine needed action	PM6	
D. LUBRICATION SYSTEMS DIAGNOSIS AND REPAIR		
1. Test engine oil pressure and check operation of pressure sensor, gauge, and/or sending unit; determine needed action	EDFA4	
2. Check engine oil level, condition, and consumption; determine needed action	EDFA2	
3. Inspect and measure oil pump, drives, inlet pipes, and pick-up screens; determine needed action	PM2	
4. Inspect oil pressure regulator valve(s), by-pass and pressure relief valve(s), oil thermostat, and filters; determine needed action	PM2	
5. Inspect, clean, and test oil cooler and components; determine needed action	PM2	
6. Inspect turbocharger lubrication system; determine needed action	PM5	
7. Determine proper lubricant and perform oil and filter change	DETT2	
E. COOLING SYSTEM DIAGNOSIS AND REPAIR		
1. Check engine coolant type, level, condition, and consumption; determine needed action	PM1	
2. Test coolant temperature and check operation of temperature sensor, gauge, and/or sending unit; determine needed action	PM1	
3. Inspect and reinstall/replace pulleys, tensioners and driver belts; adjust drive belts and check alignment	PM1PM6	
4. Inspect thermostat(s), by-passes, housing(s), and seals; replace as needed	PM1	

DUTY AREAS AND TASKS	NOCTI	NATIONAL SKILL STANDARD
5. Test coolant for freeze protection and additive package concentration; adjust as needed	PM1	
6. Recover, flush, and refill with recommended coolant/additive package; bleed cooling system	PM1	
7. Inspect coolant conditioner/filter assembly for leaks; inspect valves, lines, and fittings; replace as needed	PM1	
8. Inspect water pump and hoses; replace as needed	PM1	
9. Inspect, clean, and pressure test radiator, pressure cap, tank(s) and recovery systems; determine needed action	PM1	
10. Inspect thermostatic cooling fan systems (hydraulic, pneumatic, and electronic) and fan shroud; replace as needed	PM1	
F. AIR INDUCTION AND EXHAUST SYSTEMS DIAGNOSIS AND REPAIR		
1. Inspect turbocharger(s), wastegate, and piping systems; determine needed action	SIES2	
2. Check air induction system: piping, hoses, clamps, and mounting; check for air restrictions and leaks; service or replace air filter as needed	SIES1	
3. Remove and reinstall turbocharger/wastegate assembly	SIES2	
4. Inspect intake manifold, gaskets, and connections; replace as needed	SIES3	
5. Inspect, clean, and test charge air cooler assemblies; replace as needed	SIES1	
6. Inspect exhaust manifold, piping, mufflers, exhaust after-treatment device(s), and mounting hardware; repair or replace as needed	SIES3	
7. Inspect and test preheater/inlet air heater, or glow plug system and controls; perform needed action	SIES3	
8. Inspect and test exhaust gas recirculation (EGR) system; determine needed action	SIES3	
G. FUEL SYSTEM DIAGNOSIS AND REPAIR		
1. Fuel Supply System Diagnosis and Repair		
a. Check fuel level, quality, and consumption; determine needed action	DFS1	
b. Inspect fuel tanks, vents, caps, mounts, valves, screens, crossover system, supply and return lines and fittings; determine needed action	DFS3	

DUTY AREAS AND TASKS	NOCTI	NATIONAL SKILL STANDARD
c. Inspect, clean, and test fuel transfer (lift) pump, pump drives, screens, fuel/water separators/indicators, filters, heaters, coolers, ECM cooling plates, and mounting hardware; determine needed action	DFS1	
d. Inspect and test low pressure regulator systems (check valves, pressure regulator valves, and restrictive fittings); determine needed action	DFS1	
e. Check fuel system for air; determine needed action; prime and bleed fuel system; check primer pump	DFS1	
2. Mechanical Fuel Injection Diagnosis and Repair	DFS4	
a. Perform on-engine inspections, tests, and adjustments; check and adjust timing or replace and time a distributor (rotary) type injection pump; determine needed action	DFS4	
b. Perform on-engine inspections, tests, and adjustments; check and adjust timing or replace and time an in-line type injection pump; determine needed action	DFS4	
c. Inspect and adjust throttle control linkage; determine needed action	DFS1	
d. Inspect air/fuel ratio control systems; determine needed action	DFS1	
e. Inspect, test, and adjust engine fuel shut-down devices and controls; determine needed action	DFS1	
f. Inspect high pressure injection lines, hold downs, fittings and seals; replace as needed	DFS1	
3. Electronic Fuel Management System Diagnosis and Repair	DFS1	
a. Inspect and test power and ground circuits and connections; measure and interpret voltage, voltage drop, amperage, and resistance readings using a digital multimeter (DMM); determine needed action	DFS1	
b. Interface with vehicle's on-board computer; perform diagnostic procedures using recommended electronic diagnostic equipment and tools (to include PC based software and/or data scan tools); determine needed action	DFS2	
c. Locate and use relevant service information (to include diagnostic procedures, flow charts, and wiring diagrams)	DFS1	
d. Inspect and replace electrical connector terminals, seals, and locks	DFS1	

DUTY AREAS AND TASKS	NOCTI	NATIONAL SKILL STANDARD
e. Inspect and test switches, sensors, controls, actuator components, and circuits; adjust or replace as needed	EC4	
f. Using recommended electronic diagnostic tools (to include PC based software and/or data scan tools), access and change customer parameters	EC3	
g. Inspect, test, and adjust electronic unit injectors (EUI); determine needed action	EC3	
h. Remove and install electronic unit injectors (EUI) and related components; recalibrate ECM (if applicable)	EEES3	
i. Perform cylinder contribution test utilizing recommended electronic diagnostic tool	EEES3	
j. Perform engine timing sensor calibration (if applicable)	EEES3	
k. Perform on-engine inspections and tests on hydraulic electronic unit injectors and system electronic controls; determine needed action	EEES3	
l. Perform on-engine inspections and tests on hydraulic electronic unit injector high pressure oil supply and control systems; determine needed action	DFS2	
m. Perform on-engine inspections and tests on distributor-type injection pump electronic controls; determine needed action	DFS1	
n. Perform on-engine inspections and tests on in-line type injection pump electronic controls; determine needed action	DFS1	
o. Perform on-engine inspections and tests on common rail type injection systems; determine needed action	DFS1	
H. ENGINE BRAKES		
1. Inspect and adjust engine compressions/exhaust brakes; determine needed action	EC6	
2. Inspect, test, and adjust engine compression/exhaust brake control circuits, switches, and solenoids; repair or replace as needed	PM6	
3. Inspect engine compression/exhaust brake housing, valves, seals, screens, lines, and fittings; repair or replace as needed	PM5	
II. DRIVE TRAIN		
A. CLUTCH DIAGNOSIS AND REPAIR		

DUTY AREAS AND TASKS	NOCTI	NATIONAL SKILL STANDARD
1. Diagnose clutch noise, binding, slippage, pulsation, vibration, grabbing, dragging, and chatter problems; determine needed action	EC6	
2. Inspect and adjust clutch linkage, cables, levers, brackets, bushings, pivots, springs, and clutch safety switch (includes push and pull-type assemblies); check pedal height and travel; perform needed action	EC6	
3. Inspect, adjust, repair, or replace hydraulic clutch slave and master cylinders, lines, and hoses; bleed system	EC6	
4. Inspect, adjust, lubricate, or replace release (throw-out) bearing, sleeve, bushings, springs, housing, levers, release fork, fork pads, rollers, shafts, and seals	EC6	
5. Inspect, adjust, and replace single-disc clutch pressure plate and clutch disc	EC6	
6. Inspect, adjust, and replace two-plate clutch pressure plate, clutch discs, intermediate plate, and drive pins/lugs	EC6	
7. Inspect and/or replace clutch brake assembly; inspect input shaft and bearing retainer; perform needed action	EC6	
8. Inspect, adjust, and replace self-adjusting/continuous-adjusting clutch mechanisms	EC6	
9. Inspect and replace pilot bearing	EC6	
10. Inspect flywheel mounting area on crankshaft, rear main oil seal, and measure crankshaft end play; determine needed action	EC6	
11. Inspect flywheel, starter ring gear and measure flywheel face and pilot bore runout; determine needed action	EC6	
12. Inspect flywheel housing(s) to transmission housing/engine mating surface(s) and measure flywheel housing face and bore runout; determine needed action	EC6	
B. TRANSMISSION DIAGNOSIS AND REPAIR		
1. Diagnose transmission noise, shifting, lockup, jumping-out-of-gear, overheating, and vibration problems; determine needed action	N/A	
2. Diagnose transmission component failure cause, both before and during disassembly procedures; determine needed action	N/A	

DUTY AREAS AND TASKS	NOCTI	NATIONAL SKILL STANDARD
3. Inspect, adjust, service, repair, or replace transmission remote shift linkages, brackets, bushings, pivots, and levers	N/A	
4. Inspect, test, repair, or replace air shift controls, lines, hoses, valves, regulators, filters, and cylinder assemblies	N/A	
5. Inspect and replace transmission mounts, insulators, and mounting bolts; determine needed action 6. Inspect for leakage and replace transmission cover plates, gaskets, seals, and cap bolts; inspect seal surfaces and vents; repair as needed	N/A	
7. Check transmission fluid level and condition; determine needed service; add proper type of lubricant	N/A	
8. Inspect, adjust, and replace transmission shift lever, cover, rails, forks, levers, bushings, sleeves, detents, interlocks, springs, and lock bolts/safety wires	N/A	
9. Remove and reinstall transmission	N/A	
10. Inspect input shaft, gear, spacers, bearings, retainers, and slingers; replace as needed	N/A	
11. Inspect and adjust main shaft, gears, sliding clutches, washers, spacers, bushings, bearings, auxiliary drive assemblies, retainers, and keys; replace as needed	N/A	
12. Inspect countershafts, gears, bearings, retainers, and keys; adjust bearing preload and time multiple countershaft gears; replace as needed	N/A	
13. Inspect output shaft, gears, washers, spacers, bearings, retainers, and keys; replace as needed	N/A	
14. Inspect reverse idler shafts, gears, bushings, bearings, thrust washers, and retainers; check reverse idler gear end play (where applicable); replace as needed	N/A	
15. Inspect synchronizer hub, sleeve, keys (inserts), springs, blocking rings, synchronizer plates, blocker pins, and sliding clutches; replace as needed	N/A	
16. Inspect transmission cases including surfaces, bores, bushings, pins, studs, and magnets; replace as needed	N/A	
17. Inspect transmission lubrication system pumps, troughs, collectors, and slingers; service or replace as needed	N/A	
18. Inspect transmission oil filters and coolers; replace as needed	N/A	

DUTY AREAS AND TASKS	NOCTI	NATIONAL SKILL STANDARD
19. Inspect mechanical and electronic speedometer components; determine needed action	N/A	
20. Inspect and adjust power take-off (P.T.O.) assemblies, controls, and shafts; perform needed action	N/A	
21. Inspect and test function of backup light, neutral start, and warning device circuits; repair as needed	N/A	
22. Inspect and test transmission temperature gauge and sending unit/sensor; determine needed action	N/A	
23. Inspect, test operation, adjust, repair, or replace automated mechanical transmission and manual electronic shift controls, shift, range and splitter solenoids, shift motors, indicators, speed and range sensors, electronic/transmission control units (ECU/TCU), neutral/in gear and reverse switches, and wiring harnesses	N/A	
24. Inspect, test operation, repair, or replace automated mechanical transmission electronic shift selectors, air and electrical switches, displays and indicators, wiring harnesses, and air lines	N/A	
25. Use appropriate diagnostic tools and procedures to diagnose automated mechanical transmission problems; check and record diagnostic codes, clear codes, and interpret digital multimeter (DMM) readings; determine needed repairs	N/A	
26. Inspect, test operation, adjust, repair, or replace automatic transmission electronic and manual shift controls, shift solenoids, shift motors, indicators, speed and range sensors, electronic/transmission control units (ECU/TCU), neutral/in gear and reverse switches, and wiring harnesses	N/A	
27. Inspect, test operation, repair, or replace automatic transmission electronic shift selectors, switches, displays and indicators, wiring harnesses	N/A	
28. Use appropriate diagnostic tools and procedures to diagnose automatic transmission problems; check and record diagnostic codes, clear codes, and interpret digital multimeter (DMM) readings; determine needed repairs	N/A	
C. DRIVESHAFT AND UNIVERSAL JOINT DIAGNOSIS AND REPAIR		
1. Diagnose driveshaft and universal joint noise and vibration problems; determine needed action	N/A	
2. Inspect, service, or replace driveshaft, slip joints, yokes, drive flanges, and universal joints; check phasing of all yokes	N/A	
3. Inspect driveshaft center support bearings and mounts; determine needed action	N/A	

DUTY AREAS AND TASKS	NOCTI	NATIONAL SKILL STANDARD
4. Measure and adjust drive line angles	N/A	
D. DRIVE AXLE DIAGNOSIS AND REPAIR	N/A	
1. Diagnose drive axle(s) drive unit noise and overheating problems; determine needed action	N/A	
2. Check and repair fluid leaks; inspect and replace drive axle housing cover plates, gaskets, sealants, vents, magnetic plugs, and seals	N/A	
3. Check drive axle fluid level and condition; determine needed service; add proper type lubricant	N/A	
4. Remove and replace differential carrier assembly	N/A	
5. Inspect and replace differential case assembly including spider gears, cross shaft, side gears, thrust washers, case halves, and bearings	N/A	
6. Inspect and replace components of locking differential case assembly	N/A	
7. Inspect differential carrier case and caps, side bearing bores, and pilot (spigot, pocket) bearing bore; determine needed action	N/A	
8. Measure ring gear runout; determine needed action	N/A	
9. Inspect and replace ring and drive pinion gears, spacers, sleeves, bearing cages, and bearings	N/A	
10. Measure and adjust drive pinion bearing preload	N/A	
11. Measure and adjust drive pinion depth	N/A	
12. Measure and adjust side bearing preload and ring gear backlash	N/A	
13. Check and interpret ring gear and pinion tooth contact pattern; determine needed action	N/A	
14. Inspect, adjust, or replace ring gear thrust block/bolt	N/A	
15. Inspect, adjust, repair, or replace planetary gear-type 2-speed axle assembly including: case, idler pinion, pins, thrust washers, sliding clutch gear, shift fork, pivot, seals, cover, and springs	N/A	
16. Inspect, repair, or replace 2-speed axle shift control system, speedometer adapters, motors, axle shift units, wires, air lines, and connectors	N/A	
17. Inspect power divider (inter-axle differential) assembly; determine needed action	N/A	
18. Inspect, adjust, repair, or replace air operated power divider (inter-axle differential) lockout assembly including diaphragms, seals, springs, yokes, pins, lines, hoses, fittings, and controls	N/A	

DUTY AREAS AND TASKS	NOCTI	NATIONAL SKILL STANDARD
19. Inspect, repair, or replace drive axle lubrication system: pump, troughs, collectors, slingers, tubes, and filters	N/A	
20. Inspect and replace drive axle shafts	N/A	
21. Remove and replace wheel assembly; check rear wheel seal and axle flange gasket for leaks; perform needed action	N/A	
22. Diagnose drive axle for wheel bearing noise and damage; perform needed action	N/A	
23. Inspect and test drive axle temperature gauge and sending unit/sensor; determine needed action	N/A	
24. Clean, inspect, lubricate and replace wheel bearings; replace seals and wear rings; adjust drive axle wheel bearings	N/A	
III. BRAKES		
A. AIR BRAKES DIAGNOSIS AND REPAIR		
1. Air Supply and Service Systems	N/A	
a. Diagnose poor stopping, air leaks, premature wear, pulling, grabbing or dragging problems caused by supply and service system malfunctions; determine needed action	N/A	
b. Check air system build-up time; determine needed action	N/A	
c. Drain air reservoir tanks; check for oil, water, and foreign material; determine needed action	N/A	
d. Inspect, adjust, and align compressor drive belts, pulleys, and tensioners; replace as needed	N/A	
e. Inspect compressor drive gear and coupling; replace as needed	N/A	
f. Inspect air compressor, air cleaner/supply; inspect oil supply and coolant lines, fittings, and mounting brackets; repair or replace as needed	N/A	
g. Inspect and test system pressure controls; governor, unloader assembly valves, intake screens, filters, lines, hoses, and fittings; replace as needed	N/A	
h. Inspect air system lines, hoses, fittings, and couplings; repair or replace as needed	N/A	
i. Inspect and test air tank relief (safety) valves, one-way (single) check valves; two-way (double) check-valves, manual and automatic drain valves; replace as needed	N/A	

DUTY AREAS AND TASKS	NOCTI	NATIONAL SKILL STANDARD
j. Inspect and clean air drier systems, filters, valves, heaters, wiring, and connectors; repair or replace as needed	N/A	
k. Inspect and test brake application (foot) valve, fittings, and mounts; adjust or replace as needed	N/A	
l. Inspect and test stop light circuit switches, wiring, and connectors; repair or replace as needed	N/A	
m. Inspect and test hand brake (trailer) control valve, lines, fittings, and mountings; repair or replace as needed	N/A	
n. Inspect and test brake relay valve; replace as needed	N/A	
o. Inspect and test quick release valves; replace as needed	N/A	
p. Inspect and test front and rear axle limiting (proportioning) valves; replace as needed	N/A	
q. Inspect and test tractor protection valve; replace as needed	N/A	
r. Inspect and test emergency (spring) brake control/modulator valve(s); replace as needed	N/A	
s. Inspect and test low pressure warning devices, wiring, and connectors; replace as needed	N/A	
t. Inspect and test air pressure gauges, lines, and fittings; replace as needed	N/A	
2. Mechanical/Foundation	N/A	
a. Diagnose poor stopping, brake noise, premature wear, pulling, grabbing, or dragging problems caused by the foundation brake, slack adjuster, and brake chamber problems; determine needed action	N/A	
b. Inspect and test service brake chambers, diaphragm, clamp, spring, pushrod, clevis, and mounting brackets; repair or replace as needed	N/A	
c. Inspect and service manual and automatic slack adjusters; perform needed action	N/A	
d. Inspect camshafts, rollers, bushings, seals, spacers, retainers, brake spiders, shields, anchor pins, and springs; replace as needed	N/A	
e. Inspect, clean, and adjust air disc brake caliper assemblies; determine needed repairs	N/A	
f. Inspect and measure brake shoes, linings, or pads; perform needed action	N/A	
g. Inspect and measure brake drums and rotors; perform needed action	N/A	

DUTY AREAS AND TASKS	NOCTI	NATIONAL SKILL STANDARD
3. Parking Brakes		
a. Inspect and test parking (spring) brake chamber diaphragm and seals; replace parking (spring) brake chamber; dispose of removed chambers in accordance with local regulations	N/A	
b. Inspect and test parking (spring) brake check valves, lines, hoses, and fittings; replace as needed	N/A	
c. Inspect and test parking (spring) brake application and release valve; replace as needed	N/A	
d. Manually release (cage) and reset (uncage) parking (spring) brakes in accordance with manufacturers' recommendations	N/A	
B. HYDRAULIC BRAKES DIAGNOSIS AND REPAIR		
1. Hydraulic System	N/A	
a. Diagnose poor stopping, premature wear, pulling, dragging or pedal feel problems caused by the hydraulic system; determine needed action	N/A	
b. Check brake pedal pushrod length; adjust as needed	N/A	
c. Inspect and test master cylinder for internal/external leaks and damage; replace as needed	N/A	
d. Inspect for leaks and damage, brake lines, flexible hoses, and fittings; replace as needed	N/A	
e. Inspect and test metering (hold-off), load sensing/proportioning, proportioning, and combination valves; replace as needed	N/A	
f. Inspect and test brake pressure differential valve and warning light circuit switch, bulbs, wiring, and connectors; repair or replace as needed	N/A	
g. Inspect and clean wheel cylinders; replace as needed	N/A	
h. Inspect and clean disc brake caliper assemblies; replace as needed	N/A	
i. Inspect/test brake fluid; bleed and/or flush system; determine proper fluid type	N/A	
j. Test and adjust brake stop light switch, bulbs, wiring, and connectors; repair or replace as needed	N/A	
k. Test and adjust brake stop light switch, bulbs, wiring, and connectors; repair or replace as needed	N/A	
2. Mechanical/Foundation	N/A	

DUTY AREAS AND TASKS	NOCTI	NATIONAL SKILL STANDARD
a. Diagnose poor stopping, brake noise, premature wear, pulling, grabbing, dragging, or pedal feel problems; determine needed action	N/A	
b. Inspect and measure brake drums and rotors; perform needed action	N/A	
c. Inspect and measure drum brake shoes and linings; inspect mounting hardware, adjuster mechanisms, and backing plates; perform needed action	N/A	
d. Inspect and measure disc brake pads/ linings; inspect mounting hardware; perform needed action	N/A	
e. Check parking brake operation; inspect parking brake application and holding devices; adjust and replace as needed	N/A	
3. Power Assist Units	N/A	
a. Diagnose stopping problems caused by the brake assist (booster) system; determine needed action	N/A	
b. Inspect, test, repair, or replace power brake assist (booster), hoses, and control valves; determine proper fluid type	N/A	
c. Check emergency (back-up, reserve) brake assist system	N/A	
4. Air and Hydraulic Antilock Brake Systems (ABS) and Automatic Traction Control (ATC)	N/A	
a. Observe antilock brake system (ABS) warning light operation (includes dash mounted trailer ABS warning light); determine needed action	N/A	
b. Diagnose antilock brake system (ABS) electronic control(s) and components using self-diagnosis and/or specified test equipment (scan tool, PC computer); determine needed action	N/A	
c. Diagnose poor stopping and wheel lock-up caused by failure of the antilock brake system (ABS); determine needed action	N/A	
d. Inspect, test, and replace antilock brake system (ABS) air, hydraulic, electrical, and mechanical components; perform needed action	N/A	

DUTY AREAS AND TASKS	NOCTI	NATIONAL SKILL STANDARD
e. Diagnose, service and adjust antilock brake system (ABS) wheel speed sensors and circuits following manufacturers' recommended procedures (including voltage output, resistance, shorts to voltage/ground, and frequency data)	N/A	
f. Bleed the ABS hydraulic circuits following manufacturers' procedures	N/A	
g. Observe automatic traction control (ATC) warning light operation; determine needed action	N/A	
h. Diagnose automatic traction control (ATC) electronic control(s) and components using self-diagnosis and/or specified test equipment (scan tool, PC computer); determine needed action	N/A	
IV. SUSPENSION AND STEERING		
A. Steering Systems Diagnosis and Repair		
1. Steering Column	N/A	
a. Diagnose fixed and driver adjustable steering column and shaft noise, looseness, and binding problems; determine needed action	N/A	
b. Inspect steering shaft U-joint(s), slip joints, bearings, bushings, and seals; phase shaft U-joints; determine needed action	N/A	
c. Check and adjust cab mounting and ride height	N/A	
d. Center the steering wheel as needed	N/A	
e. Disable and enable supplemental restraint system (SRS) in accordance with manufacturers' procedures	N/A	
2. Steering Units	N/A	
a. Diagnose power steering system noise, steering binding, darting/oversteer, reduced wheel cut, steering wheel kick, pulling, non-recovery, turning effort, looseness, hard steering, overheating, fluid leakage, and fluid aeration problems; determine needed action	N/A	
b. Determine recommended type of power steering fluid; check level and condition; determine needed action	N/A	
c. Flush and refill power steering system; purge air from system	N/A	

DUTY AREAS AND TASKS	NOCTI	NATIONAL SKILL STANDARD
d. Perform power steering system pressure, temperature, and flow tests; determine needed action	N/A	
e. Inspect, service or replace power steering reservoir including filter, seals, and gaskets	N/A	
f. Inspect and reinstall/replace pulleys, tensioners, and drive belts; adjust drive belts and check alignment	N/A	
g. Inspect, replace as required, power steering pump drive gear and coupling	N/A	
h. Inspect, adjust, or replace power steering pump, mountings, and brackets	N/A	
i. Inspect and replace power steering system cooler, lines, hoses, clamps/mountings, hose routings, and fittings	N/A	
j. Inspect, adjust, or replace linkage-assist type power steering cylinder or gear (dual system)	N/A	
k. Inspect, adjust, repair, or replace integral type power steering gear and mountings	N/A	
l. Adjust manual and automatic steering gear poppet/relief valves	N/A	
3. Steering Linkage	N/A	
a. Inspect and align pitman arm; replace as needed	N/A	
b. Inspect drag link (relay rod) and tie rod ends; adjust or replace as needed	N/A	
c. Inspect steering arm and levers, and linkage pivot joints; replace as needed	N/A	
d. Inspect clamps and retainers on cross tube/relay rod/centerlink/tie rod; position or replace as needed	N/A	
e. Check and adjust wheel stops	N/A	
f. Lubricate steering linkage joints as needed	N/A	
B. SUSPENSION SYSTEMS DIAGNOSIS AND REPAIR		
1. Inspect front axles, U-bolts, and nuts; determine needed action	N/A	
2. Inspect and service king pin, steering knuckle bushings, locks, bearings, seals, and covers; determine needed action	N/A	
3. Inspect shock absorbers, bushings, brackets, and mounts; replace as needed	N/A	
4. Inspect leaf springs, center bolts, clips, eye bolts and bushings, shackles, slippers, insulators, brackets, and mounts; determine needed action	N/A	

DUTY AREAS AND TASKS	NOCTI	NATIONAL SKILL STANDARD
5. Inspect torque arms, bushings, and mounts; determine needed action	N/A	
6. Inspect axle aligning devices such as radius rods, track bars, stabilizer bars, and related bushings, mounts, shims, and cams; determine needed action	N/A	
7. Inspect walking beams, center (cross) tubs, bushings, mounts, load pads, and saddles/caps; replace as needed	N/A	
8. Inspect and test air suspension pressure regulator and height control valves, lines, hoses, dump valves, and fittings; adjust, repair or replace as needed	N/A	
9. Inspect and test air springs, mounting plates, springs, suspension arms, and bushings; replace as needed	N/A	
10. Measure vehicle ride height; determine needed action	N/A	
11. Diagnose rough ride problems; determine needed action	N/A	
C. WHEEL ALIGNMENT DIAGNOSIS, ADJUSTMENT, AND REPAIR		
1. Diagnose vehicle wandering, pulling, shimmy, hard steering, and off-center steering wheel problem(s); adjust and repair as necessary	N/A	
2. Check camber; determine needed action	N/A	
3. Check caster; adjust as needed	N/A	
4. Check toe; adjust as needed	N/A	
5. Check rear axle(s) alignment (thrustline/centerline and tracking; adjust or repair as needed	N/A	
6. Diagnose turning/Ackerman angle (toe-out-on-turns) problems; determine needed action	N/A	
7. Check front axle alignment (centerline); adjust or repair as needed	N/A	
D. WHEELS AND TIRES DIAGNOSIS AND REPAIR		
1. Diagnose unusual tire wear patterns, check tread depth, mismatched tread design; determine needed action	N/A	
2. Diagnose wheel/tire vibration, shimmy, pounding, hop (tramp) problems; determine needed action	N/A	
E. FRAME SERVICE AND REPAIR		

DUTY AREAS AND TASKS	NOCTI	NATIONAL SKILL STANDARD
1. Inspect and adjust fifth wheel, pivot pins, bushings, locking jaw mechanisms, and mounting bolts; determine needed action	N/A	
2. Inspect sliding fifth wheel, tracks, stops, locking systems, air cylinders, springs, lines, hoses, and controls	N/A	
3. Inspect frame and frame members for cracks, breaks, corrosion, distortion, elongated holes, looseness, and damage; determine needed repairs	N/A	
4. Inspect, install, or repair frame hangers, brackets, and cross members in accordance with manufacturers' recommended procedures	N/A	
5. Inspect, repair, or replace pintle hooks and draw bars	N/A	
V. ELECTRICAL/ELECTRONIC SYSTEMS		
A. GENERAL ELECTRICAL SYSTEMS DIAGNOSIS		
1. Read, interpret, and diagnose electrical/electronic circuits using wiring diagrams	EEES3	
2. Check continuity in electrical/electronic circuits using appropriate test equipment	EDFA1	
3. Check applied voltages, circuit voltages, and voltage drops in electrical/electronic circuits using a digital multimeter (DMM)	EDFA1,3	
4. Check current flow in electrical/electronic circuits and components using a digital multimeter (DMM) or clamp-on ammeter	EDFA1	
5. Check resistance in electrical/electronic circuits and components using a digital multimeter (DMM)	EDFA1	
6. Find shorts, grounds, and opens in electrical/electronic circuits	EDFA1	
7. Diagnose parasitic (key-off) battery drain problems	EDFA1	
8. Inspect and test fusible links, circuit breakers, relays, solenoids, and fuses; replace as needed	EDFA1	
9. Inspect and test spike suppression diodes/resistors; replace as needed	EDFA3	
10. Check frequency and pulse width in electrical/electronic circuits using appropriate test equipment	EDFA1	
B. BATTERY DIAGNOSIS AND REPAIR		
1. Perform battery load test; determine needed action	N/A	

DUTY AREAS AND TASKS	NOCTI	NATIONAL SKILL STANDARD
2. Determine battery state of charge using an open circuit voltage test	N/A	
3. Inspect, clean, and service battery; replace as needed	N/A	
4. Inspect and clean battery boxes, mounts, and hold downs; repair or replace as needed	N/A	
5. Charge battery using slow or fast charge method as appropriate	N/A	
6. Inspect, test, and clean battery cables and connectors; repair or replace as needed	N/A	
7. Jump start a vehicle using jumper cables and a booster battery or auxiliary power supply using proper safety procedures	N/A	
8. Perform battery capacitance test; determine needed action	N/A	
C. STARTING SYSTEM DIAGNOSIS AND REPAIR		
1. Perform starter cranking voltage and voltage drop tests; determine needed action	EEES4	
2. Inspect and test components (key switch, push button and/or magnetic switch) and wires in the starter control circuit; replace as needed	EEES4	
3. Inspect and test, starter relays and solenoids/switches; replace as needed	EEES4	
4. Remove and replace starter; inspect flywheel ring gear or flex plate	EEES4	
D. CHARGING SYSTEM DIAGNOSIS AND REPAIR		
1. Diagnose instrument panel mounted volt meters and/or indicator lamps that show a no charge, low charge, or overcharge condition; determine needed action	EEES4	
2. Diagnose the cause of a no charge, low charge, or overcharge condition; determine needed action	EEES4	
3. Inspect and replace alternator drive belts, pulleys, fans, tensioners, and mounting brackets; adjust drive belts and check alignment	EEES4	
4. Perform charging system voltage and amperage output tests; determine needed action	EEES4	
5. Perform charging system voltage drop tests; determine needed action	EEES4	
6. Remove and replace alternator	EEES4	
7. Inspect, repair, or replace connectors and wires in the charging circuit	EEES4	
8. Diagnose AC voltage leakage (failed rectifier) at alternator output; determine needed action	EEES4	
E. LIGHTING SYSTEMS DIAGNOSIS AND REPAIR		
1. Headlights, Daytime Running Lights, Parking, Clearance, Tail, Cab, and Instrument Panel Lights	N/A	

DUTY AREAS AND TASKS	NOCTI	NATIONAL SKILL STANDARD
a. Diagnose the cause of brighter than normal, intermittent, dim, or no headlight and daytime running light (DRL) operation		
b. Test, aim, and replace headlights	N/A	
c. Test headlight and dimmer circuit switches, relays, wires, terminals, connectors, sockets and control components; repair or replace as needed	N/A	
d. Inspect and test switches, bulbs/LEDs, sockets, connectors, terminals, relays and wires of parking, clearance, and taillight circuits; repair or replace as needed	N/A	
e. Inspect and test instrument panel light circuit switches, relays, bulbs, sockets, connectors, terminals, wires, and printed circuits/control modules; repair or replace as needed	N/A	
f. Inspect and test interior cab light circuit switches, bulbs, sockets, connectors, terminals, and wires; repair or replace as needed	N/A	
g. Inspect and test tractor-to-trailer multi-wire connector(s); repair or replace as needed	N/A	
2. Stoplights, Turn Signals, Hazard Lights, and Back-Up Lights	N/A	
a. Inspect, test, and adjust stoplight circuit switches, bulbs/LEDs, sockets, connectors, terminals, and wires; repair or replace as needed	N/A	
b. Inspect and test turn signal and hazard circuit flasher(s), switches, relays, bulbs/LEDs, sockets, connectors, terminals, and wires; repair or replace as needed	N/A	
c. Inspect, test, and adjust backup lights and warning device circuit switches, bulbs/LEDs, sockets, horns, buzzers, connectors, terminals, and wires; repair or replace as needed	N/A	
F. GAUGES AND WARNING DEVICES DIAGNOSIS AND REPAIR		
1. Interface with vehicle's on-board computer; perform diagnostic procedure using recommended electronic diagnostic equipment and tools (including PC based software and/or data scan tools); determine needed action	N/A	
2. Diagnose the cause of intermittent, high, low, or no gauge readings; determine needed action	N/A	
3. Diagnose the cause of data bus-driven gauge malfunctions; determine needed action	N/A	
4. Inspect and test gauge circuit sending units, gauges, connectors, terminals, and wires; repair or replace as needed	N/A	

DUTY AREAS AND TASKS	NOCTI	NATIONAL SKILL STANDARD
5. Inspect and test warning devices (lights and audible) circuit sending units, bulbs/LEDs, sockets, connectors, wires, and printed circuits/control modules; repair or replace as needed	N/A	
6. Inspect, test, replace, and calibrate (if applicable) electronic speedometer, odometer, and tachometer systems	N/A	
G. RELATED ELECTRICAL SYSTEMS		
1. Diagnose the cause of constant, intermittent, or no horn operation; determine needed action	N/A	
2. Inspect and test horn circuit relays, horns, switches, connectors, and wires; repair or replace as needed	N/A	
3. Diagnose the cause of constant, intermittent, or no wiper operation; diagnose the cause of wiper speed control and/or park problems; determine needed action	N/A	
4. Inspect and test wiper motor, resistors, park switch, relays, switches, connectors, and wires; repair or replace as needed	N/A	
5. Inspect wiper motor transmission linkage, arms, and blades; adjust or replace as needed	N/A	
6. Inspect and test windshield washer motor or pump/relay assembly, switches, connectors, terminals, and wires; repair or replace as needed	N/A	
7. Inspect and test sideview mirror motors, heater circuit grids, relays, switches, connectors, terminals, and wires; repair or replace as needed	N/A	
8. Inspect and test heater and A/C electrical components including: A/C clutches, motors, resistors, relays, switches, connectors, terminals, and wires; repair or replace as needed	N/A	
9. Inspect and test auxiliary power outlet, integral fuse, connectors, terminals, and wires; repair or replace as needed	N/A	
10. Diagnose the cause of slow, intermittent, or no power side window operation; determine needed action	N/A	
11. Inspect and test motors, switches, relays, connectors, terminals, and wires of power side window circuits; repair or replace as needed	N/A	
12. Inspect block heaters; determine needed repairs	N/A	
13. Inspect and test cruise control electrical components; repair or replace as needed	N/A	

DUTY AREAS AND TASKS	NOCTI	NATIONAL SKILL STANDARD
14. Inspect and test engine cooling fan electrical control components; repair or replace as needed	N/A	
15. Diagnose the cause of data buss communication problems; determine needed action	N/A	
VI. HEATING, VENTILATION & AIR CONDITIONING		
A. HVAC SYSTEMS DIAGNOSIS, SERVICE, AND REPAIR		
1. Verify the need for service or repair of HVAC systems based on unusual operating noises; determine needed action	N/A	
2. Verify the need for service or repair of HVAC systems based on unusual visual, smell, and touch conditions; determine needed action	N/A	
3. Identify system type and components (cycling clutch orifice tube - CCOT, expansion valve) and conduct performance test(s) on HVAC systems; determine needed action	N/A	
B. A/C SYSTEM AND COMPONENT DIAGNOSIS, SERVICE, AND REPAIR		
1. A/C System - General	N/A	
a. Diagnose the cause of temperature control problems in the A/C system; determine needed action	N/A	
b. Identify refrigerant type and check for contamination; determine needed action	N/A	
c. Diagnose A/C system problems indicated by pressure gauge and temperature readings; determine needed action	N/A	
d. Diagnose A/C system problems indicated by visual, audible, smell, and touch procedures; determine needed action	N/A	
e. Perform A/C system leak test; determine needed action	N/A	
f. Evacuate A/C system using appropriate equipment	N/A	
g. Internally clean contaminated A/C system components and hoses	N/A	
h. Charge A/C system with refrigerant	N/A	
i. Identify lubricant type needed for system application	N/A	
2. Compressor and Clutch	N/A	
a. Diagnose A/C system problems that cause protection devices (pressure, thermal, and electronic) to interrupt system operation; determine needed action	N/A	

DUTY AREAS AND TASKS	NOCTI	NATIONAL SKILL STANDARD
b. Inspect, test, and replace A/C system pressure, thermal, and electronic protection devices	N/A	
c. Inspect and replace A/C compressor drive belts, pulleys, and tensioners; adjust belt tension and check alignment	N/A	
d. Inspect, test, service and replace A/C compressor clutch components or assembly	N/A	
e. Inspect and correct A/C compressor lubricant level (if applicable)	N/A	
f. Inspect, test, and replace A/C compressor	N/A	
g. Inspect, repair, or replace A/C compressor mountings and hardware	N/A	
3. Evaporator, Condenser, and Related Components	N/A	
a. Correct system lubricant level when replacing the evaporator, condenser, receiver/drier or accumulator/drier, and hoses	N/A	
b. Inspect A/C system hoses, lines, filters, fittings, and seals; determine needed action	N/A	
c. Inspect A/C condenser for proper air flow	N/A	
d. Inspect and test A/C system condenser and mountings; determine needed action	N/A	
e. Inspect and replace receiver/drier or accumulator/drier	N/A	
f. Inspect and test cab/sleeper refrigerant solenoid, expansion valve(s); check placement of thermal bulb (capillary tube) determine needed action	N/A	
g. Inspect and replace orifice tube	N/A	
h. Inspect and test cab/sleeper evaporator core; determine needed action	N/A	
i. Inspect, clean, and repair evaporator housing and water drain; inspect and service/replace evaporator air filter	N/A	
j. Identify and inspect A/C system service ports (gauge connections); determine needed action	N/A	
k. Diagnose system failures resulting in refrigerant loss from the A/C system high pressure relief device; determine needed action	N/A	
C. HEATING AND ENGINE COOLING SYSTEMS DIAGNOSIS, SERVICE, AND REPAIR		
1. Diagnose the cause of outlet air temperature control problems in the HVAC system; determine needed action	PT5	

DUTY AREAS AND TASKS	NOCTI	NATIONAL SKILL STANDARD
2. Diagnose window fogging problems; determine needed action	PT5	
3. Perform engine cooling system tests for leaks, protection level, contamination, coolant level, coolant type, temperature, and conditioner concentration; determine needed action	PT5	
4. Inspect engine cooling and heating system hoses, lines, and clamps; determine needed action	PT5	
5. Inspect and test radiator, pressure cap, and coolant recovery system (surge tank); determine needed action	PT5	
6. Inspect water pump for leaks and bearing play; determine needed action	PT5	
7. Inspect and test thermostats, by-passes, housings, and seals; determine needed repairs	PT5	
8. Recover, flush, and refill with recommended coolant/additive package; bleed cooling system	PT5	
9. Inspect thermostatic cooling fan system (hydraulic, pneumatic, and electronic) and fan shroud; replace as needed	PT5	
10. Inspect and test heating system coolant control valve(s) and manual shutoff valves; determine needed action	PT5	
11. Inspect and flush heater core; determine needed action	PT5	
D. OPERATING SYSTEMS AND RELATED CONTROLS DIAGNOSIS AND REPAIR		
1. Electrical		
a. Diagnose the cause of failures in HVAC electrical control systems; determine needed action	N/A	
b. Inspect and test A/C heater, blower motors, resistors, switches, relays, modules, wiring, and protection devices; determine needed action	N/A	
c. Inspect and test A/C compressor clutch relays, modules, wiring, sensors, switches, diodes, and protection devices; determine needed action	N/A	
d. Inspect and test A/C-related electronic engine control systems; determine needed action	N/A	
e. Inspect and test engine cooling/condenser fan motors, relays, modules, switches, sensors, wiring, and protection devices; determine needed action	N/A	
f. Inspect and test electric actuator motors, relays/modules, switches, sensors, wiring, and protection devices; determine needed action	N/A	
g. Inspect and test HVAC system electrical control panel assemblies; determine needed action	N/A	

DUTY AREAS AND TASKS	NOCTI	NATIONAL SKILL STANDARD
2. Air/Vacuum/Mechanical	N/A	
a. Diagnose the cause of failures in HVAC air, vacuum, and mechanical switches and controls; determine needed action	N/A	
b. Inspect and test HVAC system air/vacuum/mechanical control panel assemblies; determine needed action	N/A	
c. Inspect, test, and adjust HVAC system air/vacuum/mechanical control cables and linkages; determine needed action	N/A	
d. Inspect and test HVAC system vacuum actuators (diaphragms/motors) and hoses; determine needed action	N/A	
e. Inspect and test HVAC system vacuum reservoir(s) check valve(s), and restrictors; determine needed action	N/A	
f. Inspect, test, and adjust HVAC system ducts, doors, and outlets; determine needed action	N/A	
E. REFRIGERANT RECOVERY, RECYCLING, AND HANDLING		
1. Maintain and verify correct operation of certified equipment	N/A	
2. Identify (by label application or use of a refrigerant identifier) and recover A/C system refrigerant	N/A	
3. Recycle refrigerant	N/A	
4. Handle, label, and store refrigerant	N/A	
5. Test recycled refrigerant for non-condensable gases	N/A	
VII. PREVENTIVE MAINTENANCE INSPECTION		
A. ENGINE SYSTEM		
1. Engine	EEES1	
a. Check engine starting/operation (including unusual noises, vibrations, exhaust smoke, etc); record idle and governed rpm	EEES1	
b. Inspect vibration damper	EEES1	
c. Inspect belts, tensioners, and pulleys; check and adjust belt tension; check belt alignment	EEES1	
d. Check engine oil level; check engine for oil, coolant, and fuel leaks (Engine Off)	EEES1	

DUTY AREAS AND TASKS	NOCTI	NATIONAL SKILL STANDARD
e. Inspect engine mounts for looseness and deterioration	PM6	
f. Check engine for oil, coolant, air, fuel, and exhaust leaks (Engine Running)	PM1	
g. Check electrical wiring, routing, and hold-down clamps, including Engine Control Module/Powertrain Control Module (ECM/PCM)	PM4	
2. Fuel System	N/A	
a. Check fuel tanks, mountings, lines, caps and vents	N/A	
b. Inspect throttle linkages and return springs	N/A	
c. Drain water from fuel system	N/A	
d. Inspect water separator/fuel heater; replace fuel filter(s); prime and bleed fuel system	PM3	
3. Air Induction and Exhaust System	PM5	
a. Check exhaust system mountings for looseness and damage	PM5	
b. Check engine exhaust system for leaks, proper routing, and damaged or missing components to include exhaust gas recirculation (EGR) system if equipped	PM5	
c. Check air induction system; piping, charge air cooler, hoses, clamps, and mountings; check for air restrictions and leaks	PM5	
d. Inspect turbocharger for leaks; check mountings and connections	PM5	
e. Check operation of engine compression/exhaust brake	PM5	
f. Service or replace air filter as needed; check and reset air filter restriction indicator	PM5	
4. Cooling System	PT5	
a. Check operation of fan clutch	PT5	
b. Inspect radiator (including air flow restriction, leaks, and damage) and mountings	PT5	
c. Inspect fan assembly and shroud	PT5	
d. Pressure test cooling system and radiator cap	PT5	
e. Inspect coolant hoses and clamps	PT5	
f. Inspect coolant recovery system	PT5	
g. Check coolant for contamination, supplemental coolant additives (SCA) concentration, and protection level (freeze point)	PT5	

DUTY AREAS AND TASKS	NOCTI	NATIONAL SKILL STANDARD
h. Service coolant filter/conditioner	PT5	
i. Inspect water pump for leaks and bearing play	PT5	
5. Lubrication System	PM2	
a. Change engine oil and filters; visually check oil for coolant or fuel contamination; inspect and clean magnetic drain plugs	PM2	
b. Take an engine oil sample	PM2	
B. CAB AND HOOD		
1. Instruments and Controls	N/A	
a. Inspect key condition and operation of ignition switch	N/A	
b. Check warning indicators	N/A	
c. Check instruments; record oil pressure and system voltage	N/A	
d. Check mechanical, electronic, and emergency shut down operation	N/A	
e. Check mechanical and electronic engine speed controls	N/A	
f. Check heater, ventilation, and air conditioning (HVAC) controls	N/A	
g. Check operation of all accessories	N/A	
h. Using diagnostic tool or on-board diagnostic system; extract engine monitoring information	N/A	
2. Safety Equipment	N/A	
a. Check operation of electric/air horns and back-up warning devices	N/A	
b. Check condition and documentation of safety flares, spare fuses, triangles, fire extinguisher, and all required decals	SGSP1	
c. Inspect seat belts and sleeper restraints	N/A	
d. Inspect wiper blades and arms	N/A	
3. Hardware	N/A	
a. Check wiper and washer operation	N/A	
b. Inspect windshield glass for cracks or discoloration; check sun visor	N/A	
c. Check seat condition, operation, and mounting	N/A	
d. Check door glass and window operation	N/A	

DUTY AREAS AND TASKS	NOCTI	NATIONAL SKILL STANDARD
e. Inspect steps and grab handles	N/A	
f. Inspect mirrors, mountings, brackets, and glass	N/A	
g. Record all observed physical damage	N/A	
h. Lubricate all cab and hood grease fittings	N/A	
i. Inspect and lubricate door and hood hinges, latches, strikers, lock cylinders, safety latches, linkages, and cables	N/A	
j. Inspect cab mountings, hinges, latches, linkages and ride height; service as needed	N/A	
k. Inspect tilt cab hydraulic pump, lines, and cylinders for leakage; inspect safety devices; service as needed	N/A	
4. Heating, Ventilation, & Air Conditioning (HVAC)	N/A	
a. Inspect A/C condenser and lines for condition and visible leaks; check mountings	N/A	
b. Inspect A/C compressor and lines for condition and visible leaks; check mountings	N/A	
c. Check A/C system condition and operation; check A/C monitoring system, if applicable	N/A	
d. Check HVAC air inlet filters and ducts; service as needed	N/A	
VIII. HYDRAULICS		
A. GENERAL SYSTEM OPERATION		
1. Identify system type (closed and open); perform system tests and diagnosis	N/A	
2. Read and interpret system diagrams and schematics	N/A	
3. Perform system temperature, pressure, flow, and cycle time tests; determine needed action	N/A	
4. Verify placement of equipment/component safety labels and placards; determine needed action	N/A	
B. PUMPS		
1. Verify proper fluid type	N/A	
2. Diagnose causes of pump failure, unusual pump noises, temperatures, flow, and leakage problems; determine needed action	N/A	
3. Determine pump type, rotation, and drive system, determine needed action	N/A	
4. Remove and install pump; prime and/or bleed system	N/A	
5. Inspect pump inlet for restrictions and leaks; repair as needed	N/A	

DUTY AREAS AND TASKS	NOCTI	NATIONAL SKILL STANDARD
6. Diagnose root cause of pump failure; determine needed action	N/A	
7. Inspect pump outlet for restrictions and leaks, repair as needed	N/A	
C. FILTRATION/RESERVOIRS (TANKS)		
1. Identify type of filtration system; verify filter application and flow direction	N/A	
2. Service filters and breathers in accordance with manufacturers' recommended procedures	N/A	
3. Diagnose cause(s) of system contamination; determine needed action	N/A	
4. Take a hydraulic oil sample	N/A	
5. Check reservoir fluid level, condition, and consumption; determine needed action	N/A	
6. Inspect and repair or replace reservoir, sight glass, vents, caps, mounts, valves, screens, supply and return lines	N/A	
D. HOSES, FITTINGS, AND CONNECTIONS		
1. Diagnose causes of component leakage, damage, and restriction; determine needed action	N/A	
2. Inspect hoses and connections (length, size, routing, bend radii, and protection); repair or replace as needed	N/A	
3. Assemble, hoses, tubes, connectors, and fittings in accordance with manufacturers' specifications; use proper procedures to avoid contamination	N/A	
4. Inspect and replace fitting seals and sealants	N/A	
E. CONTROL VALVES		
1. Pressure test system safety relief valve; determine needed action	N/A	
2. Perform control valve operating pressure and flow tests; determine needed action	N/A	
3. Inspect, test, and adjust valve controls (electrical/electronic, mechanical and pneumatic)	N/A	
4. Diagnose control valve leakage (internal/external); determine needed action	N/A	
5. Inspect pilot control valve linkages, cables, and PTO controls; adjust, repair, or replace as needed	N/A	
F. ACTUATORS		
1. Identify actuator type (single/double acting, multi-stage/telescopic, and motors); determine needed action	N/A	
2. Diagnose the cause of seal failure; determine needed repairs	N/A	

DUTY AREAS AND TASKS	NOCTI	NATIONAL SKILL STANDARD
3. Diagnose the cause of incorrect actuator movement and leakage (internal and external); determine needed repairs	N/A	
4. Inspect actuator mounting, frame components, and hardware for looseness, cracks, and damage; repair or replace as needed	N/A	
5. Remove, repair, and/or replace actuators in accordance with manufacturers' recommended procedures	N/A	
6. Inspect actuators for dents, cracks, damage, and leakage; repair or replace as needed	N/A	
7. Purge and/or bleed system in accordance with manufacturers' recommended procedures	N/A	