Diesel Preventative Maintenance and Inspection-570049

This course is designed to provide students with in-depth knowledge and skills for entry level maintenance and inspection tasks. Safety and proper tool use are emphasized throughout this course. As part of this course, students participate in servicing activities associated with preventative and maintenance tasks. The tasks included in the Preventive Maintenance and Inspection area are entry-level technician inspection tasks designed to introduce the student to correct procedures and practices of vehicle inspection in a teaching/learning environment. They are not intended to satisfy the Annual Federal Vehicle Inspection requirement as prescribed in the Federal Motor Carrier Safety Regulations, Part 396, Appendix G to Subchapter B, Minimum Periodic Inspection Standards. This course must follow the guidelines and standards set forth by Automotive Service Excellence (ASE) and National Automotive Technicians Education Foundation (NATEF) minimum standards. Workplace Employability Skills Task lists should be incorporated into the diesel Program.

This course is designed to be used as a foundation course for diesel programs or as a diesel service exploration course for automotive programs.

Career and technical student organizations are integral, co-curricular components of each career and technical education course. These organizations serve as a means to enhance classroom instruction while helping students develop leadership abilities, expand workplace-readiness skills, and broaden opportunities for personal and professional growth.

Safety

Students will:

1. Identify and practice general shop safety rules and procedures.
   - Utilizing safe procedures for handling of tools and equipment.
   - Identifying and using proper placement of floor jacks and jack stands.
   - Identifying and using proper procedures for safe lift operation.
   - Utilizing proper ventilation procedures for working within the lab/shop area.
   - Identifying marked safety areas.
   - Identifying the location and the types of fire extinguishers and other fire safety equipment.
   - Demonstrating knowledge of the procedures for using fire extinguishers and other fire safety equipment.
   - Identifying the location and use of eye wash stations.
   - Identifying the location of the posted evacuation routes.
   - Complying with the required use of safety glasses, ear protection, gloves, and shoes during lab/shop activities.
   - Identifying and wearing appropriate clothing for lab/shop activities.
   - Securing hair and removing jewelry for lab/shop activities.
Demonstrating awareness of the safety aspects of supplemental restraint systems (SRS), electronic brake control systems, and hybrid vehicle high voltage circuits.

Demonstrating awareness of the safety aspects of high voltage circuits (such as high intensity discharge (HID) lamps, ignition systems, injection systems, etc.).

Locating and demonstrating knowledge of material safety data sheets (MSDS).

**Tools and Equipment**

2. Identify tools and their usage in automotive applications.
   - Identifying standard and metric designation.
   - Demonstrating safe handling and use of appropriate tools.
   - Demonstrating proper cleaning, storage, and maintenance of tools and equipment.
   - Demonstrating proper use of precision measuring tools
     Examples: micrometer, dial-indicator, dial-caliper

**Diesel Engine**

3. Check engine starting/operation (including unusual noises, vibrations, exhaust smoke, etc.); record idle and governed rpm.

4. Inspect vibration damper.

5. Inspect belts, tensioners, and pulleys; check and adjust belt tension; check belt alignment.

6. Check engine oil level and condition; check dipstick seal.

7. Inspect engine mounts for looseness and deterioration.

8. Check engine for oil, coolant, air, fuel, and exhaust leaks (Engine Off and Running).

9. Check engine compartment wiring harnesses, connectors, and seals for damage and proper routing.

**Diesel Fuel Systems**

10. Check fuel tanks, mountings, lines, caps, and vents.

11. Drain water from fuel system.

12. Service water separator/fuel heater; replace fuel filter(s); prime and bleed fuel system.

**Air Induction and Exhaust System**

13. Check exhaust system mountings for looseness and damage.

14. Check engine exhaust system for leaks, proper routing, and damaged or missing components to include exhaust gas recirculation (EGR) system and after treatment devices, if equipped.
15. Check air induction system: piping, charge air cooler, hoses, clamps, and mountings; check for air restrictions and leaks.

16. Inspect turbocharger for leaks; check mountings and connections.

17. Check operation of engine compression/exhaust brake.

18. Service or replace air filter as needed; check and reset air filter restriction indicator.

19. Inspect and service crankcase ventilation system.

20. Inspect diesel exhaust fluid (DEF) system, to include tanks, lines, gauge pump, and filter.

21. Inspect selective catalyst reduction (SCR) system; including diesel exhaust fluid (DEF) for proper levels, leaks, mounting and connections.

**Cooling System**

22. Check operation of fan clutch.

23. Inspect radiator (including air flow restriction, leaks, and damage) and mountings.

24. Inspect fan assembly and shroud.

25. Pressure test cooling system and radiator cap.

26. Inspect coolant hoses and clamps.

27. Inspect coolant recovery system.

28. Check coolant for contamination, additive package concentration, aeration, and protection level (freeze point).

29. Service coolant filter.

30. Inspect water pump.

**Lubrication System**

31. Change engine oil and filters; visually check oil for coolant or fuel contamination; inspect and clean magnetic drain plugs.

32. Take an engine oil sample for analysis.

**Cab Instruments and Controls**

33. Inspect key condition and operation of ignition switch.
34. Check warning indicators.

35. Check instruments; record oil pressure and system voltage.

36. Check operation of electronic power take off (PTO) and engine idle speed controls (if applicable).

37. Check HVAC controls.

38. Check operation of all accessories.

39. Using electronic service tool(s) or on-board diagnostic system; retrieve engine monitoring information; check and record diagnostic codes and trip/operational data (including engine, transmission, ABS, and other systems).

**Cab and Hood Safety Equipment**

40. Check operation of electric/air horns and reverse warning devices.

41. Check condition of spare fuses, safety triangles, fire extinguisher, and all required decals.

42. Inspect seat belts and sleeper restraints.

43. Inspect wiper blades and arms.

**Cab and Hood Hardware**

44. Check operation of wiper and washer.

45. Inspect windshield glass for cracks or discoloration; check sun visor.

46. Check seat condition, operation, and mounting.

47. Check door glass and window operation.

48. Inspect steps and grab handles.

49. Inspect mirrors, mountings, brackets, and glass.

50. Record all observed physical damage.

51. Lubricate all cab and hood grease fittings.

52. Inspect and lubricate door and hood hinges, latches, strikers, lock cylinders, safety latches, linkages, and cables.

53. Inspect cab mountings, hinges, latches, linkages and ride height; service as needed.

**HVAC**

54. Inspect A/C condenser and lines for condition and visible leaks; check mountings.
55. Inspect A/C compressor and lines for condition and visible leaks; check mountings.

56. Check A/C system condition and operation; check A/C monitoring system, if applicable.

57. Check HVAC air inlet filters and ducts; service as needed.

**Battery and Starting Systems**
58. Inspect battery box(es), cover(s), and mountings.

59. Inspect battery hold-downs, connections, cables, and cable routing; service as needed.

60. Check/record battery state-of-charge (open circuit voltage) and condition.

61. Perform battery test (load and/or capacitance).

62. Inspect starter, mounting, and connections.

63. Engage starter; check for unusual noises, starter drag, and starting difficulty.

**Charging System**
64. Inspect alternator, mountings, cable, wiring, and wiring routing; determine needed action.

65. Perform alternator output tests.

**Lighting System**
66. Check operation of interior lights; determine needed action.

67. Check all exterior lights, lenses, reflectors, and conspicuity tape; check headlight alignment; determine needed action.

68. Inspect and test tractor-to-trailer multi-wire connector(s), cable(s), and holder(s); determine needed action.

**Air Brakes**
69. Check operation of parking brake.

70. Record air governor cut-in and cut-out setting (psi).

71. Check operation of air reservoir/tank drain valves.

72. Check air system for leaks (brakes released).

73. Check air system for leaks (brakes applied).

74. Test one-way and double-check valves.

75. Check low air pressure warning devices.
76. Check emergency (spring) brake control/modulator valve, if applicable.
77. Check tractor protection valve.
78. Test air pressure build-up time.
79. Inspect coupling air lines, holders, and gladhands.
80. Check brake chambers and air lines for secure mounting and damage.
81. Check operation of air drier.
82. Inspect and record brake shoe/pad condition, thickness, and contamination.
83. Inspect and record condition of brake drums/rotors.
84. Check antilock brake system wiring, connectors, seals, and harnesses for damage and proper routing.
85. Check operation and adjustment of brake automatic slack adjusters (ASA); check and record push rod stroke.
86. Lubricate all brake component grease fittings.
87. Check condition and operation of hand brake (trailer) control valve, if applicable.
88. Perform antilock brake system (ABS) operational system self-test.
89. Drain air tanks and check for contamination.
90. Check condition of pressure relief (safety) valves.

**Hydraulic Brakes**
91. Check master cylinder fluid level and condition.
92. Inspect brake lines, fittings, flexible hoses, and valves for leaks and damage.
93. Check parking brake operation; inspect parking brake application and holding devices; adjust as needed.
94. Check operation of hydraulic system: pedal travel, pedal effort, pedal feel.
95. Inspect calipers for leakage, binding and damage.
96. Inspect brake assist system (booster), hoses and control valves; check reservoir fluid level and condition.
97. Inspect and record brake lining/pad condition, thickness, and contamination.
98. Inspect and record condition of brake rotors.

99. Check antilock brake system wiring, connectors, seals, and harnesses for damage and proper routing.

**Diesel Drivetrain**
100. Check operation of clutch, clutch brake, and gearshift.

101. Check clutch linkage/cable for looseness or binding, if applicable.

102. Check hydraulic clutch slave and master cylinders, lines, fittings, and hoses, if applicable.

103. Check clutch adjustment; adjust as needed.

104. Check transmission case, seals, filter, hoses, lines and cooler for cracks and leaks.

105. Inspect transmission breather.

106. Inspect transmission mounts.

107. Check transmission oil level, type, and condition.

108. Inspect U-joints, yokes, driveshafts, boots/seals, center bearings, and mounting hardware for looseness, damage, and proper phasing.

109. Inspect axle housing(s) for cracks and leaks.

110. Inspect axle breather(s).

111. Lubricate all drive train grease fittings.

112. Check drive axle(s) oil level, type, and condition.

113. Change drive axle(s) oil and filter/screen, if applicable; check and clean magnetic plugs.

114. Check transmission wiring, connectors, seals, and harnesses for damage and proper routing.

115. Change transmission oil and filter, if applicable; check and clean magnetic plugs.

116. Check interaxle differential lock operation.

117. Check transmission range shift operation.

**Suspension and Steering Systems**
118. Check steering wheel operation for free play and binding.

119. Check power steering pump, mounting, and hoses for leaks, condition, and routing; check fluid level.
120. Change power steering fluid and filter.

121. Inspect steering gear for leaks and secure mounting.

122. Inspect steering shaft U-joints, pinch bolts, splines, pitman arm-to-steering sector shaft, tie rod ends, and linkages.

123. Check kingpins for wear.

124. Check wheel bearings for looseness and noise.

125. Check oil level and condition in all non-drive hubs; check for leaks.

126. Inspect springs, pins, hangers, shackles, spring U-bolts, and insulators.

127. Inspect shock absorbers for leaks and secure mounting.

128. Inspect air suspension springs, mounts, hoses, valves, linkage, and fittings for leaks and damage.

129. Check and record suspension ride height.

130. Lubricate all suspension and steering grease fittings.

131. Check axle locating components (radius, torque, and/or track rods).

**Tires and Wheels**

132. Inspect tires for wear patterns and proper mounting.

133. Inspect tires for cuts, cracks, bulges, and sidewall damage.

134. Inspect valve caps and stems; determine needed action.

135. Measure and record tread depth; probe for imbedded debris.

136. Check and record air pressure; adjust air pressure in accordance with manufacturers’ specifications.

137. Check wheel mounting hardware condition; determine needed action.

138. Inspect wheels for cracks, damage and proper hand hold alignment.

139. Check tire matching (diameter and tread) on single and dual tire applications.

**Frame and Fifth Wheel**

140. Inspect fifth wheel mounting, bolts, air lines, and locks.

141. Test operation of fifth wheel locking device; adjust if necessary.
142. Check quarter fenders, mud flaps, and brackets.

143. Check pintle hook assembly and mounting, if applicable.

144. Lubricate all fifth wheel grease fittings and plate, if applicable.

145. Inspect frame and frame members for cracks and damage.