Diesel Brakes-570045

This course is designed to provide students with in-depth knowledge and skills for servicing diesel brake systems. Safety and proper tool use are emphasized throughout this course. Specific topics include diagnostics and repair of air supply and service systems for air brakes and hydraulic brake system components. As part of this course, students participate in various activities that enhance knowledge and skills in servicing diesel brake systems. 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 Diesel Program.

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

Air Brakes Supply and Service Systems

6. Identify poor stopping, air leaks, premature wear, pulling, grabbing, dragging, or balance problems caused by supply and service system malfunctions; determine needed action.

7. Check air system build-up time; determine needed action.

8. Drain air reservoir/tanks; check for oil, water, and foreign material; determine needed action.

9. Inspect air compressor drive gear, belts and coupling; adjust or replace as needed.

10. Inspect air compressor inlet
    • Inspecting oil supply and coolant lines, fittings, and mounting brackets; repair or replace as needed.

11. Inspect and test air system pressure controls: governor, unloader assembly valves, filters, lines, hoses, and fittings; adjust or replace as needed.

12. Inspect air system lines, hoses, fittings, and couplings; repair or replace as needed.

13. 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.

14. Inspect and clean air drier systems, filters, valves, heaters, wiring, and connectors; repair or replace as needed.

15. Inspect and test brake application (foot/treadle) valve, fittings, and mounts; check pedal operation; replace as needed.

16. Inspect and test stop light circuit switches, wiring, and connectors; repair or replace as needed.

17. Inspect and test hand brake (trailer) control valve, lines, fittings, and mountings; repair or replace as needed.

18. Inspect and test brake relay valves; replace as needed.

19. Inspect and test quick release valves; replace as needed.

20. Inspect and test tractor protection valve; replace as needed.
21. Inspect and test emergency (spring) brake control/modulator valve(s); replace as needed.

22. Inspect and test low pressure warning devices, wiring, and connectors; repair or replace as needed.

23. Inspect and test air pressure gauges, lines, and fittings; replace as needed.

**Air Mechanical/Foundation Brakes**

24. Identify 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.

25. Inspect and test service brake chambers, diaphragm, clamp, spring, pushrod, clevis, and mounting brackets; repair or replace as needed.

26. Identify type, inspect and service slack adjusters; perform needed action.

27. Inspect camshafts, tubes, rollers, bushings, seals, spacers, retainers, brake spiders, shields, anchor pins, and springs; replace as needed.

28. Inspect, clean, and adjust air disc brake caliper assemblies; determine needed repairs.

29. Inspect and measure brake shoes or pads; perform needed action.

30. Inspect and measure brake drums or rotors; perform needed action.

**Air Parking Brakes**

31. Inspect and test parking (spring) brake chamber diaphragm and seals; replace parking (spring) brake chamber; dispose of removed chambers in accordance with local regulations.

32. Inspect and test parking (spring) brake check valves, lines, hoses, and fittings; replace as needed.

33. Inspect and test parking (spring) brake application and release valve; replace as needed.

34. Manually release (cage) and reset (uncage) parking (spring) brakes in accordance with manufacturers’ recommendations.

35. Identify and test anti compounding brake function.

**Hydraulic Brake System**

36. Identify poor stopping, premature wear, pulling, dragging, balance, or pedal feel problems caused by the hydraulic system; determine needed action.

37. Inspect and test master cylinder for internal/external leaks and damage; replace as needed.
38. Inspect hydraulic system brake lines, flexible hoses, and fittings for leaks and damage; replace as needed.

39. Inspect and test metering (hold-off), load sensing/proportioning, proportioning, and combination valves; replace as needed.

40. Inspect and test brake pressure differential valve and warning light circuit switch, bulbs/LEDs, wiring, and connectors; repair or replace as needed.

41. Inspect disc brake caliper assemblies; replace as needed.

42. Inspect/test brake fluid; bleed and/or flush system; determine proper fluid type.

**Hydraulic Mechanical/Foundation Brakes**

43. Identify poor stopping, brake noise, premature wear, pulling, grabbing, dragging, or pedal feel problems caused by mechanical components; determine needed action.

44. Inspect and measure rotors; perform needed action.

45. Inspect and measure disc brake pads; inspect mounting hardware; perform needed action.

46. Check parking brake operation; inspect parking brake application and holding devices; adjust and replace as needed.

**Hydraulic Power Assist Units**

47. Identify stopping problems caused by the brake assist (booster) system; determine needed action.

48. Inspect, test, repair, or replace hydraulic brake assist (booster), hoses, and control valves; determine proper fluid type.

49. Check emergency (back-up, reserve) brake assist system.

**Air and Hydraulic Antilock Brake Systems (ABS) and Automatic Traction Control (ATC)**

50. Observe antilock brake system (ABS) warning light operation (includes trailer and dash mounted trailer ABS warning light); determine needed action.

51. Diagnose antilock brake system (ABS) electronic control(s) and components using self-diagnosis and/or electronic service tool(s); determine needed action.

52. Identify poor stopping and wheel lock-up problems caused by failure of the antilock brake system (ABS); determine needed action.

53. Test and check operation of antilock brake system (ABS) air, hydraulic, electrical, and mechanical components; perform needed action.

54. Test antilock brake system (ABS) wheel speed sensors and circuits; adjust or replace as needed.
55. Bleed the ABS hydraulic circuits.

56. Observe automatic traction control (ATC) warning light operation; determine needed action.

57. 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.

58. Verify power line carrier (PLC) operations.

**Wheel Bearings**

59. Clean, inspect, lubricate and replace wheel bearings and races/cups; replace seals and wear rings; inspect spindle/tube; inspect and replace retaining hardware; adjust wheel bearings. Verify end play with dial indicator method.

60. Identify, inspect or replace unitized/preset hub bearing assemblies.