Arkansas CTE

Automotive Brakes: Grades 9, 10, 11, 12

Adopted 2014

Identify and demonstrate workplace safety

1.1 Students will be able to identify and demonstrate safe work practices.

1. Identify general shop safety rules and procedures. 1.1.1
2. Utilize safe procedures for handling of tools and equipment. 1.1.2
3. Identify and use proper placement of floor jacks and jack stands. 1.1.3
4. Identify and use proper procedures for safe lift operation. 1.1.4
5. Utilize proper ventilation procedures for working within the lab/shop area. 1.1.5
6. Identify marked safety areas. 1.1.6
7. Identify the location and the types of fire extinguishers and other fire safety equipment; demonstrate knowledge of the procedures for using fire extinguishers and other fire safety equipment. 1.1.7

1.2 Students will be able to practice personal safety.

1. Identify the location and use of eye wash stations. 1.2.1
2. Identify the location of the posted evacuation routes. 1.2.2
3. Comply with the required use of safety glasses, ear protection, gloves, and shoes during lab/shop activities. 1.2.3
4. Identify and wear appropriate clothing for lab/shop activities. 1.2.4
5. Secure hair and jewelry for lab/shop activities. 1.2.5
6. Demonstrate awareness of the safety aspects of supplemental restraint systems (SRS), electronic brake control systems, and hybrid vehicle high voltage circuits. 1.2.6
7. Demonstrate awareness of the safety aspects of high voltage circuits (such as high intensity discharge (HID) lamps, ignition systems, injection systems, etc.). 1.2.7
8. Locate and demonstrate knowledge of material safety data sheets (MSDS). 1.2.8

Demonstrate proper usage of tools and equipment

2.1 Student will demonstrate knowledge of shop tools and equipment.

1. Identify tools and their usage in automotive applications. 2.1.1
2. Identify standard and metric designation. 2.1.2
3. Demonstrate safe handling and use of appropriate tools. 2.1.3

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4. Demonstrate proper cleaning, storage, and maintenance of tools and equipment. 2.1.4
5. Demonstrate proper use of precision measuring tools (i.e. micrometer, dial-indicator, dial-caliper). 2.1.5

Develop employability/leadership skills

3.1 Student will demonstrate employability skills.

1. Demonstrate a good work ethic (i.e., relations with other, dependability, attitude, and personal hygiene). 3.1.1
2. Demonstrate teamwork. 3.1.2
3. Demonstrate job-seeking techniques (i.e., write a resume, search for a job, arrange references, and apply interview techniques) 3.1.3
4. Describe legal issues of sexual harassment in the workplace. 3.1.4
5. Identify employment eligibility requirements (e.g. valid driver's license, background check etc.) 3.1.5

3.2 Student will demonstrate leadership skills.

1. Perform basic parliamentary procedures in a group meeting. 3.2.1
2. Demonstrate an understanding of one's personal values, interpersonal skills, etiquette, effectiveness in oral and written communication and courtesy. Develop and maintain a code of professional ethics. 3.2.2
3. Maintain a good professional appearance. 3.2.3
4. Perform basic tasks related to securing and terminating employees. 3.2.4

Diagnose and repair hydraulic brake system

4.1 Student will demonstrate initial diagnostic procedures.

1. Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins. 4.1.1
2. Describe procedure for performing a road test to check brake system operation, including an anti-lock brake system (ABS). 4.1.2

4.2 Student will demonstrate ability to repair hydraulic brake system.

1. Measure brake pedal height, travel, and free play (as applicable); determine necessary action. 4.2.1
2. Check master cylinder for internal and external leaks and proper operation. 4.2.2
3. Inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging, wear, loose fittings and supports; determine necessary action. 4.2.3
4. Select, handle, store, and fill brake fluids to proper level. 4.2.4
5. Identify components of brake warning light system. 4.2.5
6. Bleed and/or flush brake system. 4.2.6
7. Test brake fluid for contamination. 4.2.7

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Diagnose and repair drum brake system

5.1 Student will demonstrate initial diagnostic procedures.

1. Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins. 5.1.1
2. Describe procedure for performing a road test to check brake system operation, including an anti-lock brake system (ABS). 5.1.2

5.2 Student will demonstrate applicable knowledge of drum brake system.

1. Remove, clean, inspect, and measure brake drum diameter; determine necessary action. 5.2.1
2. Refinish brake drum and measure final drum diameter; compare with specifications. 5.2.2
3. Remove, clean, and inspect brake shoes, springs, pins, clips, levers, adjusters/self-adjusters, other related brake hardware, and backing support plates; lubricate and reassemble. 5.2.3
4. Inspect wheel cylinders for leaks and proper operation; remove and replace as needed. 5.2.4
5. Pre-adjust brake shoes and parking brake; install brake drums or drum/hub assemblies and wheel bearings; make final checks and adjustments. 5.2.5
6. Install wheel and torque lug nuts. 5.2.6

Diagnose and repair disc brake system

6.1 Student will demonstrate initial diagnostic procedures.

1. Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins. 6.1.1
2. Describe procedure for performing a road test to check brake system operation, including an anti-lock brake system (ABS). 6.1.2

6.2 Student will demonstrate applicable knowledge of disc brake system.

1. Remove and clean caliper assembly; inspect for leaks and damage/wear to caliper housing; determine necessary action. 6.2.1
2. Clean and inspect caliper mounting and slides/pins for proper operation, wear, and damage; determine necessary action. 6.2.2
3. Remove, inspect, and replace pads and retaining hardware; determine necessary action. 6.2.3
4. Lubricate and reinstall caliper, pads, and related hardware; seat pads and inspect for leaks. 6.2.4
5. Clean and inspect rotor, measure rotor thickness, thickness variation, and lateral runout; determine necessary action. 6.2.5
6. Remove and reinstall rotor. 6.2.6
7. Refinish rotor on vehicle; measure final rotor thickness and compare with specifications. 6.2.7

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8. Refinish rotor off vehicle; measure final rotor thickness and compare with specifications. 6.2.8
9. Retract and re-adjust caliper piston on an integral parking brake system. 6.2.9
10. Check brake pad wear indicator; determine necessary action. 6.2.10
11. Describe importance of operating vehicle to burnish/break-in replacement brake pads according to manufacturer's recommendations. 6.2.11

Diagnose and repair power assist units

7.1 Student will demonstrate initial diagnostic procedures.

1. Check brake pedal travel with, and without, engine running to verify proper power booster operation. 7.1.1
2. Check vacuum supply (manifold or auxiliary pump) to vacuum-type power booster. 7.1.2

Diagnose and repair miscellaneous (wheel bearings, parking brakes, electrical, etc.)

8.1 Student will demonstrate initial diagnostic and repair procedures.

1. Remove, clean, inspect, repack, and install wheel bearings; replace seals; install hub and adjust bearings. 8.1.1
2. Check parking brake cables and components for wear, binding, and corrosion; clean, lubricate, adjust or replace as needed. 8.1.2
3. Check parking brake operation and parking brake indicator light system operation; determine necessary action. 8.1.3
4. Check operation of brake stop light system. 8.1.4
5. Replace wheel bearing and race. 8.1.5

Diagnose and repair electronic brakes, and traction and stability control systems

9.1 Student will demonstrate initial diagnostic and repair procedures.

1. Identify traction control/vehicle stability control system components. 9.1.1
2. Describe the operation of a regenerative braking system. 9.1.2

Diagnose and repair manual drive train and axles

10.1 Student will demonstrate initial diagnostic procedures

1. Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins. 10.1.1
2. Drain and refill manual transmission/transaxle and final drive unit. 10.1.2
3. Check fluid condition; check for leaks. 10.1.3

10.2 Student will demonstrate applicable knowledge of clutch system.

1. Check and adjust clutch master cylinder fluid level. 10.2.1
2. Check for system leaks. 10.2.2

10.3 Student will demonstrate applicable knowledge of the transmission/transaxle system.

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1. Describe the operational characteristics of an electronically-controlled manual transmission/transaxle. 10.3.1

10.4 Student will demonstrate applicable knowledge of Drive Shaft, Half Shafts, Universal and Constant-Velocity (CV) Joints.

1. Inspect, remove, and replace front wheel drive (FWD) bearings, hubs, and seals. 10.4.1
2. Inspect, service, and replace shafts. 10.4.2

10.5 Student will demonstrate applicable knowledge of Differential Case Assembly.

1. Clean and inspect differential housing; check for leaks; inspect housing vent. 10.5.1
2. Check and adjust differential housing fluid level. 10.5.2
3. Drain and refill differential housing. 10.5.3

10.6 Student will demonstrate applicable knowledge of Drive Axles.

1. Inspect and replace drive axle wheel studs. 10.6.1

10.7 Student will demonstrate applicable knowledge of Four-wheel Drive/All-wheel Drive.

1. Inspect front-wheel bearings and locking hubs. 10.7.1
2. Check for leaks at drive assembly seals; check vents; check lube level. 10.7.2

Preparing vehicle

11.1 Student will be able to prepare vehicle for service.

1. Identify information needed and the service requested on a repair order. 11.1.1
2. Identify purpose and demonstrate proper use of fender covers, mats. 11.1.2
3. Demonstrate use of the three C's (concern, cause, and correction). 11.1.3
4. Review vehicle service history. 11.1.4
5. Complete work order to include customer information, vehicle identifying information, customer concerns, related service history, cause, and correction. 11.1.5

11.2 Student will be able to prepare vehicle for customer.

1. Ensure vehicle is prepared to return to customer per school or company policy (floor mats, steering wheel cover, etc.). 11.2.1